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# Arizona State University

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## 1996-98 Graduate Catalog

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POSTMASTER: ASU BULLETIN • (USPS 031-000) • Volume CXI • Number 5 • May 1996.

Published seven times a year in February, April, May, July, and November and semimonthly in March by Arizona State University, Tempe, Arizona 85287.

Second-Class Postage Paid at Tempe, Arizona.

POSTMASTER: Send change of address to

ASU BULLETIN  
MAIL SERVICES  
ARIZONA STATE UNIVERSITY  
PO Box 870710  
TEMPE, ARIZONA 85287-0710

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TEMPE AZ 85287-4805

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The front cover shows a montage of images from student life at Arizona State University. Clockwise from top: new student orientation (photo by R.C. Sorgatz); ASU basketball (photo by Jim Richardson); student commencement (photo by Jim Richardson); and students on a campus mall (photo by Stan Cusumano).

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Photo Selection / Sophia W. Tsong, Steve W. Gobbell

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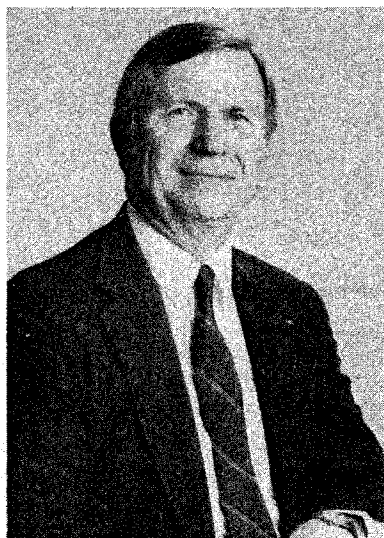
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Dianne R. Bartsch, *State Press*—page 222;  
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Conley Photography—pages 84, 91, 189;  
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236, 245, 248;  
Courtesy of News Bureau—page 277;  
Jim Richardson, News Bureau—page 212;  
Darryl Webb—page 113

### Maps

Geoffrey Boyarsky—page 352;  
Albert L. Camasto—pages 362-363, 364;  
Karl Kauffman—page 361





Dear ASU Students and Prospective Students:

It is my pleasure to welcome you to Arizona State University, a Research I university in one of the nation's fastest-growing metropolitan areas.

We are committed to excellence in research, teaching, and professional and community service, which are all essential components of a great university. I am proud to report that, this past decade, ASU has emerged as a major national research university. This accomplishment is reflected by the talented and diverse students and faculty we have been able to attract, our ability to deliver quality education, our achievements in research and creative activities, and our richness in cultural diversity.

Supported by a faculty characterized by its creative and scholarly distinction and innovation and by our outstanding resources and environment, we offer 48 doctoral programs and 94 master's degree programs to educate leaders and professionals for the 21st century.

Our degree programs prepare you for lifelong learning, help you to develop new knowledge, and provide you with the necessary skills and know-how for professional practice. In addition to meeting your educational needs and goals, we are actively engaged in training you to face the challenges of today's and tomorrow's highly competitive job market.

We will continue to strive for excellence and to encourage creative individuals to be curious and to think critically and boldly. I am proud to invite you to be a part of the vigorous academic community at ASU.

Sincerely,

A handwritten signature in black ink, appearing to read "Lattie F. Coor". The signature is written in a cursive, flowing style.

Lattie F. Coor  
President

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# Who to Contact at ASU Main

*Arizona is on mountain standard time all year and never observes daylight saving time.*

## Area Code (602)

ASU switchboard .....	965-9011
Admissions, Graduate College .....	965-6113
Advising Office, Graduate College .....	965-3521
Bookstore .....	965-7928
Computer Accounts .....	965-1211
Modern dial-in access .....	965-7001
Computing Commons .....	965-5968
Disabled Student Resources .....	965-1234
Employment	
Off-Campus .....	965-6318
On-Campus .....	965-5186
Fee Payment .....	965-4347
Format Evaluation .....	965-3521
Gammage Box Office .....	965-3434
Graduate College .....	965-3521
Dr. Bianca L. Bernstein, Dean .....	965-7279
Dr. Deborah N. Losse, Associate Dean .....	965-5999
Associate Dean .....	965-5906
Ms. Sandra L. Luehrsen, Assistant Dean .....	965-5873
Graduate Student Association .....	965-1263
Graduation Office .....	965-6980
Health Services .....	965-3346
Housing Office .....	965-3515
Intramural Sports information .....	965-8900
Intercollegiate Athletics (ticket information) .....	965-2381
Library (information) .....	965-6164
Parking and Transit Services .....	965-6406
Public Events .....	965-5062
Registration information .....	965-3124
InTouch .....	350-1500
Scholarships .....	965-4845
Student Financial Assistance .....	965-3355
Student I.D. ....	965-3124
Summer Sessions .....	965-6611
Testing Services, University .....	965-7146
Transcripts .....	965-7853

An ASU Main academic directory is available on page 366 of this catalog. An ASU West directory is available on page 353.

# ASU Main Academic Administration

Lattie F. Coor, *President*  
Milton D. Glick, *Senior Vice President and Provost*  
Robert Barnhill, *Vice President for Research and Strategic Initiatives*  
Brent W. Brown, *Vice President for Institutional Advancement*  
Christine K. Wilkinson, *Vice President for Student Affairs*  
Charles R. Bantz, *Vice Provost*  
Kathleen Church, *Vice Provost*  
Walter Harris Jr., *Vice Provost*  
William E. Lewis, *Vice Provost for Information Technology*  
Louis Olivas, *Assistant Vice President for Academic Affairs*  
Ben R. Forsyth, *Senior Executive Assistant to the President*  
Lawrence D. Mankin, *Special Assistant to the President for Administration*

## Graduate College

Bianca L. Bernstein, *Dean*  
Deborah N. Losse, *Associate Dean*  
\_\_\_\_\_, *Associate Dean*  
Sandra L. Luehrsen, *Assistant Dean*

## Colleges, Schools, and Libraries

John Meunier, *Dean, College of Architecture and Environmental Design*  
Larry E. Penley, *Dean, College of Business*  
Leonard A. Valverde, *Dean, College of Education*  
Peter Crouch, *Dean, College of Engineering and Applied Sciences*  
Bette F. DeGraw, *Dean, College of Extended Education*  
J. Robert Wills, *Dean, College of Fine Arts*  
Bianca L. Bernstein, *Dean, Graduate College*  
Richard J. Morgan, *Dean, College of Law*  
Gary S. Krahenbuhl, *Dean, College of Liberal Arts and Sciences*  
Barbara A. Durand, *Dean, College of Nursing*  
Anne L. Schneider, *Dean, College of Public Programs*  
Emilia E. Martinez-Brawley, *Dean, School of Social Work*  
Ted Humphrey, *Dean, University Honors College*  
Sherrie Schmidt, *Dean, University Libraries*

## Graduate Council

Nicholas O. Alozie, *Public Affairs*  
Ronald Barr, *Office of Research and Strategic Initiatives*  
Roger Bedard, *Theatre*  
Neil Berman, *Chemical, Bio and Materials Engineering*  
O M Brack, *English*  
Charles Braithwaite, *Communication, ASU West*  
Beverly Brandt, *Design*  
Ronald Carlson, *English*  
Jeffrey Coles, *Finance*  
Dale Furnish, *Law*  
Jerry Harris, *Psychology in Education*  
Ann MacEachron, *Social Work*  
Ali Malekzadeh, *ASU West*  
Patricia Moore, *Nursing*  
Diane Phillips, *Nursing (Student Member)*  
Peter Reingen, *Marketing*  
Barry Ritchie, *Physics and Astronomy*  
Elaine Surbeck, *Curriculum and Instruction*  
Jonathan Upchurch, *Civil Engineering*

See page 360 for ASU West administrators and page 345 for ASU East administrators and additional information on ASU Main.

## Graduate Degrees and Majors Offered at ASU Main

Baccalaureate degrees and majors offered at ASU Main and ASU West are shown in the *General Catalog*.  
Graduate degrees and majors at ASU West are shown on page 10.

<b>Master of Accountancy</b>	Learning and Instructional Technology <sup>1</sup>	Special Education <sup>1</sup>
<b>Master of Architecture</b>	Mathematics	Gifted
<b>Master of Arts</b>	Music	Mildly handicapped
Anthropology	Ethnomusicology	Multiculturally exceptional
Archaeology	Music history and literature	Severely/multiply handicapped
Bioarchaeology	Music theory	<b>Master of Environmental Planning</b>
Linguistics	Philosophy	Environmental Planning
Medical anthropology	Political Science	Urban planning
Museum studies	American politics	<b>Master of Fine Arts</b>
Physical anthropology	Comparative politics	Art
Social-cultural anthropology	International relations	Ceramics
Art	Political theory	Drawing
Art education	Religious Studies	Fibers
Art history	School Library Science <sup>1, 2</sup>	Intermedia
Communication	Social and Philosophical Foundations of	Metals
Curriculum and Instruction <sup>1</sup>	Education	Painting
Bilingual education	Sociology	Photographic studies
Communication arts	Spanish	Photography
Early childhood education	Comparative literature	Printmaking
Elementary education	Language and culture	Sculpture
English as a second language	Linguistics	Wood
Indian education	Literature	Creative Writing
Mathematics education	Special Education <sup>1</sup>	Dance
Multicultural education	Theatre	Theatre
Reading education	<b>Master of Business Administration</b>	Acting
Science education	<b>Master of Computer Science<sup>1</sup></b>	Scenography
Secondary education	<b>Master of Counseling</b>	Theatre for youth
Social studies education	<b>Master of Education</b>	<b>Master of Health Services</b>
Educational Administration	Counselor Education	<b>Administration</b>
and Supervision <sup>1</sup>	Counseling and student personnel	<b>Master of Laws<sup>2</sup></b>
Educational Psychology <sup>1</sup>	Curriculum and Instruction <sup>1</sup>	<b>Master of Mass Communication</b>
English	Bilingual education	<b>Master of Music</b>
Comparative literature	Communication arts	Composition
English linguistics	Early childhood education	Music Education
Literature and language	Elementary education	Choral music
Rhetoric and composition	English as a second language	General music
French	Indian education	Instrumental music
Comparative literature	Mathematics education	Performance
Language and culture	Multicultural education	Music theatre musical direction
Literature	Reading education	Music theatre performance
Geography	Science education	Performance pedagogy
German	Secondary education	Piano accompanying
Comparative literature	Social studies education	Solo performance (instrumental,
Language and culture	Educational Administration and	keyboard, voice)
Literature	Supervision <sup>1</sup>	<b>Master of Natural Science</b>
History	Educational Media and Computers	Natural Science
Asian history	Business education <sup>3</sup>	Botany
British history	Educational Psychology <sup>1</sup>	Chemistry
European history	Higher and Adult Education	Geology
Latin American history	Adult education <sup>2</sup>	Mathematics
Public history	Higher education	Microbiology
U.S. history	Learning and Instructional Technology <sup>1</sup>	Physics
U.S. Western history	School Library Science <sup>1, 2</sup>	Zoology
Humanities		

<sup>1</sup> Major offered toward more than one degree at the same level.

<sup>2</sup> Applications for this program are not being accepted at this time.

<sup>3</sup> This is a formalized concentration; other areas of study are available.

<sup>4</sup> Courses for this program are offered at ASU East.

<sup>5</sup> Students apply to this degree program through the College of Law, not the Graduate College.

## Graduate Degrees and Majors Offered at ASU Main (continued)

<b>Master of Public Administration</b>	Family Resources and Human Development	Structures
Public Administration	Family studies	Transportation
Public information management	General family resources and human development	Water resources/hydraulics
Public management	Geology	Electrical Engineering <sup>1</sup>
Public policy analysis and evaluation	Industrial Engineering <sup>1</sup>	Engineering Science <sup>1</sup>
Urban management and planning	Computer-aided processes	Industrial Engineering <sup>1</sup>
<b>Master of Science</b>	Computer-integrated manufacturing	Computer-aided processes
Aerospace Engineering <sup>1</sup>	Human factors	Computer-integrated manufacturing
Agribusiness <sup>4</sup>	Information systems	Human factors
Agribusiness management and marketing	Operations research	Information systems
Food quality assurance	Organization control	Operations research
Bioengineering	Quality control/reliability	Organization control
Biological Sciences	Justice Studies	Quality control/reliability
Botany	Mechanical Engineering <sup>1</sup>	Mechanical Engineering <sup>1</sup>
Ecology <sup>3</sup>	Microbiology	<b>Master of Social Work</b>
Photosynthesis <sup>3</sup>	Molecular and Cellular Biology	<b>Master of Taxation</b>
Building Design	Nursing	<b>Master of Teaching English as a Second Language</b>
Computer-aided design	Adult health nursing	<b>Master of Technology<sup>4</sup></b>
Energy performance and climate responsive architecture	Community health nursing	Technology
Facilities development and management	Community mental health/psychiatric nursing	Aeronautical engineering technology
Chemical Engineering <sup>1</sup>	Nursing administration	Aeronautical management technology
Biomedical and clinical engineering	Parent-child nursing	Electronics engineering technology
Chemical process engineering	Physics	Graphic communications technology
Chemical reactor engineering	Recreation	Industrial management and supervision
Energy and materials conversion	Outdoor recreation	Manufacturing engineering technology
Environmental control	Recreation administration	Mechanical engineering technology
Solid state processing	Social/psychological aspects of leisure	Welding engineering technology
Transport phenomena	Tourism and commercial recreation	<b>Doctor of Education</b>
Chemistry	Statistics	Counselor Education <sup>2</sup>
Analytical chemistry	Zoology	Curriculum and Instruction <sup>1</sup>
Biochemistry	Ecology <sup>3</sup>	Bilingual education
Geochemistry	<b>Master of Science in Design</b>	Communication arts
Inorganic chemistry	Industrial Design	Curriculum studies
Organic chemistry	Design methodology, theory, and criticism	Early childhood education
Physical chemistry	Facilities planning and management	Elementary education
Solid state chemistry	Human factors in design	English as a second language
Civil Engineering <sup>1</sup>	Interior Design	Indian education
Environmental/sanitary	Design methodology, theory, and criticism	Mathematics education
Geotechnical/soil mechanics	Facilities planning and management	Multicultural education
Structures	Human factors in design	Reading education
Transportation	<b>Master of Science in Engineering</b>	Science education
Water resources/hydraulics	Aerospace Engineering <sup>1</sup>	Secondary education
Communication Disorders	Chemical Engineering <sup>1</sup>	Social studies education
Computer Science <sup>1</sup>	Biomedical and clinical engineering	Educational Administration and Supervision
Construction	Chemical process engineering	Higher and Adult Education
Construction science	Chemical reactor engineering	Adult education <sup>2</sup>
Facilities	Energy and materials conversion	Higher education
Management	Environmental control	Learning and Instructional Technology <sup>2</sup>
Decision and Information Systems	Solid state processing	<b>Doctor of Musical Arts</b>
Economics	Transport phenomena	Music
Electrical Engineering <sup>1</sup>	Civil Engineering <sup>1</sup>	Choral music
Engineering Science <sup>1</sup>	Environmental/sanitary	General music
Environmental Resources	Geotechnical/soil mechanics	
Exercise Science/Physical Education		

<sup>1</sup> Major offered toward more than one degree at the same level.

<sup>2</sup> Applications for this program are not being accepted at this time.

<sup>3</sup> This is a formalized concentration; other areas of study are available.

<sup>4</sup> Courses for this program are offered at ASU East.

<sup>5</sup> Students apply to this degree program through the College of Law, not the Graduate College.

## Graduate Degrees and Majors Offered at ASU Main (continued)

Instrumental music	Computer Science	Operations research
Music composition	Counseling Psychology	Organization control
Solo performance	Curriculum and Instruction	Quality control/reliability
<b>Doctor of Philosophy</b>	Curriculum studies	Justice Studies
Aerospace Engineering	Early childhood education	Criminal and juvenile justice
Anthropology	Educational media and computers	Dispute resolution
Archaeology	Elementary education	Law, justice, and minority populations
Physical anthropology	English education	Law, policy, and evaluation
Social-cultural anthropology	Exercise and wellness education	Woman, law, and justice
Bioengineering	Music education	Learning and Instructional Technology <sup>1</sup>
Botany	Physical education	Instructional technology
Ecology	Reading education	Learning
Photosynthesis	Science education	Mathematics
Business Administration	Special education	Mechanical Engineering
Accountancy	Economics	Microbiology
Decision and information systems	Educational Leadership and	Molecular and Cellular Biology
Finance	Policy Studies	Physics
Health services research <sup>2</sup>	Educational Psychology	Political Science
Management	Lifespan developmental psychology	American politics
Marketing	Measurement, statistics, and	Comparative politics
Purchasing and logistics management	methodological studies	International relations
Chemical Engineering	School psychology	Political theory
Biomedical and clinical engineering	Electrical Engineering	Psychology
Chemical process engineering	Engineering Science	Behavioral neuroscience
Chemical reactor engineering	English	Clinical psychology
Energy and materials conversion	Environmental Design and Planning	Cognitive/behavioral systems
Environmental control	Design	Developmental psychology
Solid state processing	History, theory, and criticism	Environmental psychology
Transport phenomena	Planning	Social psychology
Chemistry	Exercise Science	Science and Engineering of Materials
Analytical chemistry	Biomechanics	Social Work
Biochemistry	Motor behavior/sport psychology	Sociology
Geochemistry	Physiology of exercise	Spanish
Inorganic chemistry	Family Science	Speech and Hearing Science
Organic chemistry	Marriage and family therapy <sup>3</sup>	Developmental neurolinguistic
Physical chemistry	Geography	disorders
Solid state chemistry	Geology	Neuroauditory processes
Civil Engineering	History	Neuroergonomic communication
Environmental/sanitary	Asian history	disorders
Geotechnical/soil mechanics	British history	Theatre
Structures	European history	Theatre for youth
Transportation	Latin American history	Zoology
Water resources/hydraulics	U.S. history	Ecology <sup>3</sup>
Communication	Industrial Engineering	<b>Doctor of Public Administration</b>
Communicative development	Computer-aided processes	<b>Juris Doctor<sup>5</sup></b>
Intercultural communication	Computer-integrated manufacturing	
Organizational communication	Human factors	
	Information systems	

## Graduate Degrees and Majors Offered at ASU West

### Master of Business Administration

### Master of Education

- Educational Administration and Supervision
- Elementary Education
- Secondary Education

<sup>1</sup> Major offered toward more than one degree at the same level.

<sup>2</sup> Applications for this program are not being accepted at this time.

<sup>3</sup> This is a formalized concentration; other areas of study are available.

<sup>4</sup> Courses for this program are offered at ASU East.

<sup>5</sup> Students apply to this degree program through the College of Law, not the Graduate College.



Concurrent and Dual Degrees Offered at ASU Main

Concurrent or Dual Degrees	Administered by	Pages
Juris Doctor/Master of Science in Economics*	College of Law/Department of Economics	89
Juris Doctor/Master of Health Services Administration	College of Law/School of Health Administration and Policy	65, 89, 103, 206
Juris Doctor/Doctor of Philosophy in Justice Studies	College of Law/Committee on Law and Social Sciences	103, 221
Master of Business Administration/Juris Doctor	College of Business/College of Law	89, 103
Master of Business Administration/Master of Architecture	College of Business/School of Architecture	86, 89
Master of Business Administration/Master of Health Services Administration	College of Business	65, 89
Master of Business Administration/Master of International Management	College of Business/American Graduate School of International Management (Thunderbird)	89
Master of Business Administration/Master of International Management	College of Business/Groupe Ecole Supérieure de Commerce Toulouse, France	89
Master of Science in Agribusiness/Master of International Management	School of Agribusiness and Resource Management/American Graduate School of International Management (Thunderbird)	119
Master of Science in Engineering (Industrial Engineering)/Master of International Management of Technology	Department of Industrial and Management Engineering/American Graduate School of International Management (Thunderbird)	215
Master of Science in Justice Studies/Master of Arts in Anthropology	School of Justice Studies/Department of Anthropology	112, 121, 218
Master of Science in Nursing/Master of Health Services Administration	College of Nursing/School of Health Administration and Policy	65, 89, 109, 206, 241-242, 243

\* Applications for this program are not being accepted at this time.

Certificate Programs Offered at ASU Main and West

Certificate Program	Administered by	Pages
Certificate in Accountancy	ASU West	349
Certificate in Financial Management and Control	College of Business	59
Certificate in Gerontology	Adult Development and Aging Program	115, 206
Certificate in Hazardous Materials and Waste Management	School of Technology	See pages 437-438, <i>General Catalog.</i>
Certificate in Investment Valuation and Management	College of Business	58-59
Certificate in Medieval Studies	Arizona Center for Medieval and Renaissance Studies	237
Certificate in Museum Studies	Department of Anthropology	121
Certificate in Renaissance Studies	Arizona Center for Medieval and Renaissance Studies	237
Certificate in Scholarly Publishing	Department of History	260
Certificate in Translation	Department of Languages and Literatures	See page 154, <i>General Catalog.</i>
Certificate in Treasury Management	College of Business	59

**July 1996**

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

**August 1996**

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

**September 1996**

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

**October 1996**

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

**November 1996**

S	M	T	W	T	F	S
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3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

**December 1996**

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

# Graduate College Calendar

**1996**

Check the fall 1996 *Schedule of Classes* for details and to confirm these dates.

Wed., May 1–  
Fri., Aug. 30

Wed., Aug. 7

Sat., Aug. 17,  
9:00 a.m.–2:00 p.m.

Mon., Aug. 19,  
8:00 a.m.–5:00 p.m.

Mon.–Sat.,  
Aug. 19–23

Tues., Aug. 20,  
7:15–9:15 p.m.;  
Wed., Aug. 21,  
10:00 a.m.–noon

Thurs., Aug. 22

Thurs., Aug. 22,  
8:15 a.m.–5:15 p.m.

Fri., Aug. 23  
9:00–11:00 a.m.

Mon., Aug. 26

Fri., Aug. 30,  
7:15–9:00 p.m.  
Sat., Aug. 31,  
9:30–11:30 a.m.

Mon., Sept. 2

Wed., Sept. 18,  
3:30–5:30 p.m.

Fri., Sept. 20

Fri., Oct. 18

Fri., Nov. 1

Mon., Nov. 11

Wed., Nov. 2

Thurs.–Fri.,  
Nov. 28–29

Thurs., Dec. 5

Wed., Dec. 11

Thurs., Dec. 12

**Fall Semester**

Registration

Final fee payment deadline for fall 1996 (For students who register after Aug. 7, fees are due daily.)

ASU West new MBA student orientation  
(workshop at Fletcher Library)

New Teaching Assistant Orientation

International Student Orientation and activities

Welcoming orientation for all new graduate students  
Memorial Union, Arizona Room

New Faculty and Academic Professional Orientation  
and Reception

Workshops for new graduate students  
BAC 116

New Graduate Student Tours—Hayden and Noble  
Libraries

Instruction begins

New Graduate Student Workshops—Hayden Library

Classes are excused for Labor Day

ASU West New Graduate Student Workshops—  
Fletcher Library

Unrestricted withdrawal deadline

December graduation filing deadline (must be met to  
have name appear in commencement program)

Mid-semester scholarship reports due in Office of  
Registrar

Restricted course withdrawal deadline

Classes are excused for Veterans Day

Last day to submit materials for thesis and dissertation  
format review and oral defense

Classes are excused for Thanksgiving recess

Restricted complete withdrawal deadline

Instruction ends

Reading day

**January 1997**

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

**February 1997**

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	

**March 1997**

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

**April 1997**

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

**May 1997**

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

**June 1997**

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Fri.-Sat.,  
Dec. 13-14;  
Mon.-Thurs.,  
Dec. 16-19

Fri., Dec. 13

Tues., Dec. 17

Fri., Dec. 20

Sat., Dec. 21

**1997**

Check the spring 1997 *Schedule of Classes* for details and to confirm these dates.

Wed., Nov. 27, 1996-

Fri., Jan. 24, 1997

Tues., Dec. 17, 1996

Mon.-Sat.,

Jan. 13-18

Mon., Jan. 13

Mon., Jan. 20

Tues., Jan. 21

Fri., Feb. 14

Sun.-Sun.,

Mar. 16-23

Fri., Apr. 4

Fri., Apr. 4

Fri., Apr. 25

Thurs., May 1

Wed., May 7

Thurs., May 8

Fri., May 9

Fri.-Sat., May 9-10;

Mon.-Thurs.,

May 12-15

Tues., May 13

Fri., May 16

Final examinations

Last day to hold oral examination in defense of a thesis or dissertation

Last day to obtain signature of the Graduate College dean for thesis and dissertation approval

Last day to submit to ASU Bookstore binding for thesis and dissertation

Commencement

Midyear recess begins

**Spring Semester**

Registration

Final fee payment deadline for spring 1997 (For students who register after Dec. 17, fees are due daily.)

International Student Orientation and activities

New Graduate Student Orientation begins

New Teaching Assistant Orientation

Classes are excused for Martin Luther King Jr. Day

Instruction begins

Unrestricted withdrawal deadline

Classes are excused for spring recess

May graduation filing deadline (must be met to have name appear in commencement program)

Mid-semester scholarship reports due in Office of Registrar

Restricted course withdrawal deadline

Last day to submit materials for thesis and dissertation format review and oral defense

Restricted complete withdrawal deadline

Instruction ends

Reading day

Last day to hold oral examination in defense of a thesis or dissertation

Final examinations

Last day to obtain signature of the Graduate College dean for thesis and dissertation approval

Last day to submit to ASU Bookstore binding for thesis and dissertation

Commencement

**July 1997**

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

**August 1997**

S	M	T	W	T	F	S
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

**September 1997**

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

**October 1997**

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

**November 1997**

S	M	T	W	T	F	S
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

**December 1997**

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

**1997**

Check the 1997 *Summer Sessions Bulletin* for details and to confirm these dates.

Mon., June 2

Instruction begins for first five-week session and eight-week session

Mon., June 9

Instruction begins for first supplemental session

Thurs., July 3

First five-week session ends

Mon., July 7

Instruction begins for second five-week session

Fri., July 4

Classes are excused for Independence Day

Fri., July 11

First supplemental session ends

August graduation filing deadline (must be met to have name appear in commencement program)

Mon., July 14

Instruction begins for second supplemental session

Fri., July 18

Last day to submit materials for thesis and dissertation format review and oral defense

Fri., July 25

Eight-week session ends

Fri., Aug. 1

Last day to hold oral examination in defense of a thesis or dissertation

Tues., Aug. 5

Last day to obtain signature of the Graduate College dean for thesis and dissertation approval

Last day to submit to ASU Bookstore binding for thesis and dissertation

Fri., Aug. 8

Second five-week session ends

Commencement

Fri., Aug. 15

Second supplemental session ends

**1997****Fall Semester**

Check the fall 1997 *Schedule of Classes* for details and to confirm these dates.

Wed., Apr. 30-

Registration

Fri., Aug. 29

Final fee payment deadline for fall 1997 (For students who register after Aug. 6, fees are due daily.)

Wed., Aug. 6

International Student Orientation and activities

Mon.-Sat.,  
Aug. 18-23

New Teaching Assistant Orientation

Mon., Aug. 18,  
8:00 a.m.-5:00 p.m.

Tues., Aug. 19  
8:00-noon

Welcoming orientation for all new graduate students

Tues., Aug. 19,  
7:15-9:15 p.m.;

Wed., Aug. 20  
10:00 a.m.-noon

New Faculty and Academic Professional Orientation and Reception

Thurs., Aug. 21

Workshops for new graduate students

Thurs., Aug. 21,  
8:15 a.m.-5:15 p.m.

Fri., Aug. 22

New Graduate Student Tours—Hayden and Noble Libraries

Mon., Aug. 25

Instruction begins

Mon., Sept. 1

Classes are excused for Labor Day

Fri., Sept. 19

Unrestricted withdrawal deadline

**January 1998**

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	1
18	19	20	21	22	23	24
25	26	27	28	29	30	31

**February 1998**

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

**March 1998**

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

**April 1998**

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

**May 1998**

S	M	T	W	T	F	S
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3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

**June 1998**

S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Fri., Oct. 17

December graduation filing deadline (must be met to have name appear in commencement program)

Mid-semester scholarship reports due in Office of Registrar

Fri., Oct. 31

Restricted course withdrawal deadline

Fri., Nov. 11

Classes are excused for Veterans Day

Wed., Nov. 26

Last day to submit materials for thesis and dissertation format review and oral defense

Thurs.-Fri.,  
Nov. 27-28

Classes are excused for Thanksgiving recess

Thurs., Dec. 4

Restricted complete withdrawal deadline

Wed., Dec. 10

Instruction ends

Thurs., Dec. 11

Reading day

Fri.-Sat.,  
Dec. 12-13;  
Mon.-Thurs.,  
Dec. 15-18

Final examinations

Fri., Dec. 12

Last day to hold oral examination in defense of a thesis or dissertation

Tues., Dec. 16

Last day to obtain signature of the Graduate College dean for thesis and dissertation approval

Fri., Dec. 19

Last day to submit to ASU Bookstore binding for thesis and dissertation

Sat., Dec. 20

Commencement

Midyear recess begins

**1998**

**Spring Semester**

Check the spring 1998 *Schedule of Classes* for details and to confirm these dates.

Wed., Nov. 26, 1997-

Registration

Fri., Jan. 23, 1998

Wed., Dec. 17, 1997

Final fee payment deadline for spring 1998 (For students who register after Dec. 16, fees are due daily.)

Mon.-Sat.,  
Jan. 12-17

International Student Orientation and activities

Mon., Jan. 12

New Graduate Student Orientation begins

Mon., Jan. 19

Classes are excused for Martin Luther King Jr. Day

Tues., Jan. 20

Instruction begins

Fri., Feb. 13

Unrestricted withdrawal deadline

Sun.-Sun.,  
Mar. 15-22

Classes are excused for spring recess

Fri., Apr. 3

May graduation filing deadline (must be met to have name appear in commencement program)

Fri., Apr. 3

Mid-semester scholarship reports due in Office of Registrar

Fri., Apr. 24

Restricted course withdrawal deadline

Last day to submit materials for thesis and dissertation format review and oral defense

Thurs., Apr. 30

Restricted complete withdrawal deadline

Wed., May 6

Instruction ends

Thurs., May 7

Reading day

**July 1998**

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

**August 1998**

S	M	T	W	T	F	S
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2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

**September 1998**

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

**October 1998**

S	M	T	W	T	F	S
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4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

**November 1998**

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

**December 1998**

S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

Fri.-Sat., May 8-9;  
Mon.-Thurs.,  
May 11-14

Fri., May 8

Tues., May 12

Fri., May 15

**1998**

Check the 1998 *Summer Sessions Bulletin* for details and to confirm these dates.

Mon., June 1

Mon., June 8

Thurs., July 2

Fri., July 3

Mon., July 6

Fri., July 10

Mon., July 13

Fri., July 17

Fri., July 24

Fri., July 31

Tues., Aug. 4

Fri., Aug. 7

Fri., Aug. 14

Time and place for 1995-96 workshops and orientations to be announced.

Final examinations

Last day to hold oral examination in defense of a thesis or dissertation

Last day to obtain signature of the Graduate College dean for thesis and dissertation approval

Last day to submit to ASU Bookstore binding for thesis and dissertation

Commencement

**Summer Sessions**

Instruction begins for first five-week session and eight-week session

Instruction begins for first supplemental session

August graduation filing deadline (must be met to have name appear in commencement program)

First five-week session ends

Classes are excused for Independence Day

Instruction begins for second five-week session

First supplemental session ends

Instruction begins for second supplemental session

Last day to submit materials for thesis and dissertation format review and oral defense

Eight-week session ends

Last day to hold oral examination in defense of a thesis or dissertation

Last day to obtain signature of the Graduate College dean for thesis and dissertation approval

Last day to submit to ASU Bookstore binding for thesis and dissertation

Second five-week session ends

Commencement

Second supplemental session ends

**Offices of the Graduate College**

See page 84 for information on the offices of the Graduate College.

# Accreditation and Affiliation

Arizona State University is accredited by the North Central Association of Colleges and Secondary Schools. Programs in the various colleges, schools, divisions, and departments are accredited by, affiliated with, or members of national bodies as described in the "Academic Accreditation," "Academic Affiliation," and "Academic Membership" tables. Some programs in the College of Education are approved

by the State Board of Education (Arizona) and the National Association of School Psychologists.

**ASU West.** ASU West is separately accredited by the North Central Association of Colleges and Schools. Professional programs in the various academic areas are accredited by national bodies as described in the "Academic Accreditation at ASU West" table, page 20.

## Academic Accreditation

College or School	Unit or Program	Accredited by
College of Architecture and Environmental Design	B.S.D., Interior Design	Foundation for Interior Design Education Research
	M.Arch.	National Architectural Accrediting Board
	M.E.P.	Planning Accreditation Board
College of Business	all programs	American Assembly of Collegiate Schools of Business
	School of Accountancy	American Assembly of Collegiate Schools of Business
	School of Health Administration and Policy	Accrediting Commission on Education for Health Services Administration
College of Education	M.C., Counseling	Council for Accreditation of Counseling and Related Educational Programs
	Ph.D., Counseling Psychology;	American Psychological Association
	Ph.D., Educational Psychology with a concentration in school psychology	
College of Engineering and Applied Sciences	B.S., Aeronautical Engineering Technology; B.S., Electronics Engineering Technology;	Technology Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.
	B.S., Manufacturing Engineering Technology	
	B.S.E., Aerospace Engineering;	Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.
	B.S.E., Bioengineering;	
	B.S.E., Chemical Engineering;	
	B.S.E., Civil Engineering;	
	B.S.E., Computer Systems Engineering; B.S.E., Electrical Engineering; B.S.E., Industrial Engineering; B.S.E., Mechanical Engineering; B.S.E., Engineering Special Studies	
	B.S., Computer Science	Computer Science Accreditation Commission of the Computing Sciences Accreditation Board
College of Fine Arts	B.S., Construction	American Council for Construction Education
	Department of Dance	National Association of Schools of Dance
	Department of Theatre	National Association of Schools of Theatre
	School of Music	National Association of Schools of Music
College of Law	J.D.	American Bar Association
College of Liberal Arts and Sciences	B.A., B.S., Family Resources and Human Development with a concentration in human nutrition-dietetics;	American Dietetic Association
	M.S., Family Resources and Human Development with a concentration in general family resources and human development (human nutrition and foods area)	

College or School	Unit or Program	Accredited by
	B.S., Clinical Laboratory Sciences	National Accrediting Agency for Clinical Laboratory Sciences
	M.S., Communication Disorders	American Speech-Language-Hearing Association
	Ph.D., Psychology with a concentration in clinical psychology	American Psychological Association
College of Nursing	Continuing and Extended Education Program	American Nurses' Credentialing Center's Commission on Accreditation
	B.S.N., M.S., Nursing	Arizona State Board of Nursing National League for Nursing
College of Public Programs	Department of Recreation Management and Tourism	Council on Accreditation of the National Recreation and Park Association
	School of Public Affairs	National Association of Schools of Public Affairs and Administration
	Walter Cronkite School of Journalism and Telecommunication	Accrediting Council on Education in Journalism and Mass Communications
School of Social Work	B.S.W., M.S.W.	Council on Social Work Education

#### Academic Affiliation

College or School	Unit or Program	Affiliated with
College of Architecture and Environmental Design	School of Architecture	American Institute of Architects, Central Arizona and Rio Salado Chapters Architectural Research Centers Consortium Association for Computer-Aided Design in Architecture
	School of Design	Association of Collegiate Schools of Architecture American Society of Interior Designers Human Factors and Ergonomics Society Industrial Designers Society of America Interior Design Educators Council International Interior Design Association
	School of Planning and Landscape Architecture	American Planning Association American Society of Landscape Architects Association of Collegiate Schools of Planning Council of Educators in Landscape Architecture Society for Range Management Soil and Water Conservation Society Wildlife Society
College of Education		American Association of Colleges for Teacher Education The Holmes Group University Council for Educational Administration
College of Public Programs	Department of Recreation Management and Tourism	American Humanics, Inc.
	School of Justice Studies	Onati International Institute for the Sociology of Law



## Academic Membership

College	Unit or Program	Membership with
College of Education		American Association of Colleges for Teacher Education The Holmes Group
College of Law		Association of American Law Schools
College of Liberal Arts and Sciences	Department of Anthropology	American Anthropological Association Council for Museum Anthropology
	Department of Botany	American Association of Plant Physiologists Botanical Society of America Mycological Society of America Phycological Society of America
	Department of Chemistry and Biochemistry	American Association for Advancement of Science American Chemical Society American Society for Advancement of Science
	Department of Exercise Science and Physical Education	American Alliance for Health, Physical Education, Recreation and Dance American College of Sports Medicine American Physical Society Arizona Society of Medical Technology Committee on Allied Health Education National Association for Physical Education in Higher Education North American Society for Sports History North American Society for Sports Psychology and Physical Activity
	Department of Family Resources and Human Development	American Dietetic Association
	Department of Geography	Association of American Geographers
	Department of Geology	American Association of Petroleum Geologists American Geophysical Union American Institute of Professional Geologists Geological Society of America Mineralogical Society of America Society of Economic Paleontologists and Mineralogists
	Department of History	American Association for State and Local History American Association of Museums American Historical Association Institute of Historical Research
	Department of Languages and Literatures	American Council on Teaching Foreign Language International Studies Association Modern Language Association
	Department of Mathematics	American Mathematical Society Mathematical Association of America Rocky Mountain Mathematics Consortium Society for Industrial and Applied Mathematics
	Department of Microbiology	American Society of Microbiology
	Department of Military Science M.S., Ph.D., Molecular and Cellular Biology	Association of U.S. Army American Society of Medical Technology
	Department of Philosophy	American Philosophical Association
	Department of Physics and Astronomy	Acoustical Society of America American Association of Physicists in Medicine American Association of Physics Teachers American Astronomical Society American Crystallographic Association American Physical Society American Vacuum Society

College	Unit or Program	Membership with
		International Astronomical Union Materials Research Society Optical Society of America
	Department of Political Science	American Political Science Association Inter-University Consortium for Political and Social Research
	Department of Psychology	American Society of Clinical Psychologists
	Department of Sociology	American Sociological Association
	Department of Women's Studies	Association for Women in Science National Women's Studies Association
	Department of Zoology	American Institute of Biological Sciences American Society of Naturalists American Society of Zoologists Animal Behaviorists' Society
College of Nursing		Sigma Psi American Academy of Colleges of Nursing Council of Member Agencies for the Baccalaureate and Higher Degree Programs of the National League for Nursing
College of Public Programs	Department of Communication	Western Institute of Nursing Speech Communication Association Western States Communication Association
	Department of Recreation Management and Tourism	Arizona American Indian Tourism Association Arizona Heritage Alliance Arizona Park and Recreation Association Arizona State Therapeutic Association National Park and Recreation Association Travel Tourism Research Association
	School of Justice Studies	Arizona Justice Educators Association of Criminal Justice Doctoral Programs
	School of Public Affairs	National Academic Advising National Association of Schools of Public Affairs and Administration
	Walter Cronkite School of Journalism and Telecommunication	Association of Schools of Journalism and Mass Communication Broadcast Education Association National Collegiate Honors Council
University Honors College		

#### Academic Accreditation at ASU West

College or School	Unit or Program	Accredited by
College of Human Services	Department of Recreation and Tourism Management	National Recreation and Park Association/American Association for Leisure and Recreation
School of Management	Department of Social Work all programs	Council on Social Work Education American Assembly of Collegiate Schools of Business



It is my pleasure to extend a warm welcome to new and continuing graduate students at Arizona State University. Designated by the Carnegie Foundation as a Research I institution, we lead the nation in many professional and scholarly areas. Our distinguished faculty, our excellent resources and environment, and our superb metropolitan location have positioned us to provide state-of-the-art graduate education for our community of outstanding students. Our programs are designed to help you be competitive in the job market as well as to enhance your development as professionals.

We offer 48 doctoral and 94 master's degree programs, supported by 1,500 faculty members whose teaching and research are well-known nationally and internationally. Our faculty's spirit of sharing knowledge leads to positive mentoring relationships that are characteristic of the ASU academic community. Our graduate programs reflect our strong commitment to the highest standards of academic inquiry, generating and sharing knowledge, and serving our community.

We are proud of our commitment to graduate education: to prepare you to become scholars, researchers, and thinkers in a new century in which technology will continue to transform the way we advance the boundaries of knowledge. Our partnership with you provides a nurturing environment to enhance your personal and professional growth. If we can be of service to you, please do not hesitate to call on us.

I wish you the very best in the pursuit of your goals at Arizona State University.

Cordially,

A handwritten signature in cursive script that reads "Bianca L. Bernstein". The signature is written in dark ink and is positioned above the printed name.

Bianca L. Bernstein  
Dean, Graduate College

# General Information

## OBJECTIVES

Arizona State University provides an opportunity for students from all racial, cultural, and economic backgrounds to pursue a full range of high-quality academic programs. The university actively seeks to have reflected within its student body and among its employees the rich diversity of cultures found within the state, the nation, and the world.

Active research programs contribute to and expand knowledge, thereby serving the instructional needs of students, contributing to the professional advancement of the faculty, and enhancing economic, social, cultural, and technological progress.

The university's teaching, research, and service programs seek to instill in students sensitivity to other races and cultures and a spirit of critical inquiry and challenge them to seek answers to fundamental questions of human concern. The university's support programs contribute to the academic success and personal development of all students.

The university seeks to expand cultural horizons, enhance respect for human diversity, improve moral and ethical standards, and educate for responsible citizenship while preparing its graduates to accept and perform capably in rewarding careers in our pluralistic society.

## MISSION

Arizona State University has emerged as a leading national and international research and teaching institution with a primary focus on Maricopa County, Arizona's dominant population center. This rapidly growing, multicampus public research university offers programs from the baccalaureate through the doctorate for approximately 43,000 full-time and part-time students through ASU Main in Tempe; ASU West in northwest Phoenix; a major educational center in downtown Phoenix; ASU East, located at the Williams Campus (formerly Williams Air Force Base) in southwest Mesa; and other instructional, research, and public service sites throughout Maricopa County. ASU is a modern university that applies the strongest features of the traditional major research university to the rapidly evolving needs of Maricopa County and the state. ASU is governed by the Arizona Board of Regents.

As a leading public university, Arizona State University's goal is to become a world-class university in a multicampus setting, one of the very best public universities in the nation. The university's mission is to provide outstanding programs in instruction, research, and creative activity, to promote and support economic development, and to provide service appropriate for the nation, the state of Arizona, and the state's major metropolitan area. To fulfill its mission, ASU places special emphasis on the core disciplines and offers a full-range of degree programs—baccalaureate through doctorate. To become competitive with the very best public universities, the institution recognizes that it must offer quality programs at all degree levels in a broad range of fundamental fields of inquiry. ASU will continue to dedicate itself to superior instruction, to excellent student performance, to original research, creative endeavor, and scholarly achievement, and to outstanding public service and economic development activities. As a result of this dedication, ASU was awarded the prestigious Research I university status in 1994, recognizing ASU as a premier research institution.

## ORGANIZATION

Arizona State University is part of a university system governed by the Arizona Board of Regents, a body corporate and politic with perpetual succession under the constitution and laws of Arizona. The board consists of eight citizens appointed by the governor of the state for terms of eight years, and one student regent serving for one year with the elected governor and state superintendent of public instruction as members *ex officio*.

The regents select and appoint the president of the university, who is the liaison between the Arizona Board of Regents and the institution. The president is aided in the administrative work of the institution by the senior vice president and provost, other provosts, vice presidents, deans, directors, department chairs, faculty, and other officers. Refer to "ASU Main Academic Administration," page 7, and "Administrative and Academic Personnel," pages 340-345.

The academic units develop and implement the teaching, research, and service programs of the university,

aided by the university libraries, museums, and other services.

The faculty and students of the university play an important role in educational policy, with an Academic Senate, joint university committees and boards, and the Associated Students serving the needs of a large institution.

### **EQUAL OPPORTUNITY AND AFFIRMATIVE ACTION**

It is the policy of ASU to provide equal opportunity through affirmative action in employment and educational programs and activities. Discrimination is prohibited on the basis of race, color, religion, national origin, citizenship, sex, sexual orientation, age, disability, special disabled veteran or Vietnam era veteran status. Equal employment opportunity includes but is not limited to recruitment, hiring, promotion, termination, compensation, benefits, transfers, university-sponsored training, education, tuition assistance, and social and recreational programs.

ASU is committed to taking affirmative action in increasing opportunities at all levels of employment and to increasing participation in programs and activities by all faculty, staff, and students. Affirmative action is directed toward minority persons, women, special disabled veterans, Vietnam era veterans, and persons with disabilities.

### **University Policy Prohibiting Discriminatory Harassment**

**Harassment Prohibited.** Subject to the limiting provisions of "Freedom of Speech and Academic Freedom" specified below, it is a violation of university policy for any university employee or student to subject any person to harassment on university property or at a university-sponsored activity.

**Harassment Defined.** Actions constitute harassment if (1) they substantially interfere with another's educational or employment opportunities, peaceful enjoyment of residence, physical security, and (2) they are taken with a general intent to engage in the actions and with the knowledge that the actions are likely to substantially interfere with a protected interest identified above. Such intent and knowledge may be inferred from all the circumstances.

**Freedom of Speech and Academic Freedom.** Neither this nor any other university policy is violated by actions

that amount to expression protected by the state or federal constitutions or by related principles of academic freedom. This limitation is further described in the ASU First Amendment Guidelines, the current version of which supplements this policy and is available in the Office of the General Counsel.

**Relationship to the Work of the Campus Environment Team.** If harassment is discriminatory, it falls within the education, monitoring, reporting, and referral functions of the Campus Environment Team. Harassment is discriminatory if taken with the purpose or effect of differentiating on the basis of another person's race, sex, color, national origin, religion, age, sexual orientation, disability, or Vietnam era veteran status.

### **HISTORY OF ARIZONA STATE UNIVERSITY**

On February 26, 1885, House Bill 164, "An Act to Establish a Normal School in the Territory of Arizona," was introduced in the 13th Legislative Assembly of Arizona Territory by John Samuel Armstrong. The bill, strongly supported by Charles Trumbull Hayden of Tempe, passed the House on March 6 and the Council on March 11 and was signed by Governor F.A. Tritle on March 12, 1885, thereby founding the institution known today as Arizona State University. Under the supervision of Principal Hiram Bradford Farmer, instruction was instituted on February 8, 1886, when 33 students met in a single room on land donated by George and Martha Wilson of Tempe.

The institution began with the broad obligation to provide "instruction of persons...in the art of teaching and in all the various branches that pertain to good common school education; also, to give instruction in the mechanical arts and in husbandry and agricultural chemistry, the fundamental law of the United States, and in what regards the rights and duties of citizens."

With the growth of the state, especially the surrounding Phoenix metropolitan area, the school has carried forward this charter, accompanied by successive changes in scope, name, and governance.

**The Early Years.** For the first 14 years, the school was governed by six principals. At the turn of the century and with another new name, Normal

School of Arizona, President Arthur John Matthews brought a 30-year tenure of progress to the school.

He assisted in changing the school to an all-college student status; the normal school had enlisted high school students who had no other secondary educational facilities in Arizona. He embarked on a building schedule that included the state's first dormitories. Of the 18 buildings constructed while Matthews was president, six are still in use. His legacy of an "evergreen campus," with the import of many shrubs and trees and the planting of Palm Walk, continues to this day: the main campus is a nationally recognized arborum.

Matthews also saw to it that the Arizona Normal School was accredited outside the state. His service on national education organization boards was conducive to this recognition. The school remained a teacher's college in fact and theory during Matthews' tenure, although the struggle to attain status as a university was ongoing.

An extraordinary event occurred March 20, 1911, when former President Theodore Roosevelt visited the Tempe school and spoke from the steps of Old Main. He had dedicated the Roosevelt Dam the day before and was impressed with Arizona. He noted that construction of the dam would benefit central Arizona's growth and that of the Normal School. It would be another year before the territory became a state.

During the Great Depression, Ralph W. Swetman was hired as president to "sweep clean," firing those faculty who did not have master's or doctoral degrees in order to follow North Central Association of Colleges and Secondary Schools guidelines.

**The Gammage Years.** In 1933, Grady Gammage, then president of Arizona State Teachers College at Flagstaff, became president of Arizona State Teachers College at Tempe, a tenure that would last for nearly 28 years.

On March 8, 1945, the three state institutions of higher learning came under the authority of one Arizona Board of Regents, which oversees ASU today.

The phenomenal growth of the college began after the end of World War II. Dr. Gammage had foreseen that the G.I. Bill of Rights would flood campuses everywhere with returning veterans. Many of the veterans who had received military training in Arizona had

fallen in love with the state and vowed to return after the war. The numbers within one year were staggering: in the fall semester of 1945, 553 students were enrolled; over the weekend semester break in January 1946, enrollment increased 110% to 1,163 students. Successive semesters saw continuing increased enrollment.

Like his predecessor, Dr. Gammage oversaw the construction of a number of buildings. His greatest dream, that of a great auditorium, came five years after his death. He laid the groundwork for it with Frank Lloyd Wright, who designed what is now the university's hallmark building, Grady Gammage Memorial Auditorium, built in 1964.

**Years of Growth and Stature.** During the 1960s, with the presidency of Dr. G. Homer Durham, Arizona State University began its academic rise with the establishment of several new colleges (the College of Fine Arts, the College of Law, the College of Nursing, and the School of Social Work) and the reorganization of what became the College of Liberal Arts and Sciences and the College of Engineering and Applied Sciences. Perhaps most important, the university gained the authority to award the Doctor of Philosophy and other doctoral degrees.

The next three presidents—Harry K. Newburn, 1969–71, John W. Schwada, 1971–81, and J. Russell Nelson, 1981–89—and Interim President Richard Peck, 1989, led the university to increased academic stature, expansion of the campuses, and rising enrollment. With approximately 43,000 students, ASU is the fifth largest university in the nation.

On January 1, 1990, Dr. Lattie F. Coor, a native Arizonan, became 15th in the institution's succession of principals and presidents. He has highlighted undergraduate education, research, cultural diversity, and economic development as the "four pillars" of the university's agenda and has taken steps in these areas by further defining the role of ASU West and by initiating the establishment of the College of Extended Education, approved by the Arizona Board of Regents July 20, 1990.

**Research I Status.** ASU was named a Research I university by the Carnegie Foundation for the Advancement of Teaching in early 1994. Nationally, 88 universities have been granted this sta-

tus, indicating successful garnering of support for research projects and educating future scientists.

### Athletics

The original nickname for the Normal School of Arizona athletic teams was the Owls. Athletics other than Sunday hikes and lawn tennis were not part of the early curriculum.

During President Matthews' tenure, some team competition began. The Tempe Bulldogs saw some interesting and rough competition with the University of Arizona Wildcats.

In the 1940s, the college's teams became the Sun Devils. In 1979, the university joined the Pacific-10 Conference. In 1987, ASU became the first Arizona football team to play in the Rose Bowl, defeating the University of Michigan Wolverines 22–15.

### Graduate College

Graduate education at ASU began with the creation of the Graduate Division in 1937 and the establishment of the first master's program the same year. For the first 20 years, graduate education focused exclusively on professional programs in education. During the 1950s as the campus grew and broadened its mission, a number of new degree programs appeared, significantly enhancing the role of graduate studies on the campus. By the early 1960s, graduate programs were established in many disciplines: humanities, social science, and science fields were well represented, as were professional programs in business, engineering, fine arts, and public administration. With this expansion of the mission of the campus came new facilities and the development of a wider range of research interests and activities.

Major changes in the nature and role of graduate education came in the early 1960s when the first Ph.D. programs were established in chemistry, education, engineering, English, physics, and psychology. The research focus of campus programs grew at a rapid pace. Master's programs matured as doctoral programs were added. From the late 1960s to the present, campus facilities for instruction, research, and advanced study significantly expanded to support university programs with the construction of new laboratories, classroom structures, and two large libraries—including a new main library and a separate science and engineering library.

## UNIVERSITY CAMPUSES AND SITES

Arizona State University is one university with two campuses that are separately accredited by the North Central Association, a regional accrediting body, and by the professional accrediting agencies. Courses for two ASU Main programs, the Master of Science in Agribusiness and the Master of Technology, are offered at ASU East.

Applications can be submitted for admission as a nondegree student or degree-seeking student at either office. Application for admission to a specific academic program must be reviewed by the desired campus and program.

### For ASU Main

GRADUATE COLLEGE  
ARIZONA STATE UNIVERSITY  
PO Box 871003  
TEMPE AZ 85287-1003

### For ASU West

GRADUATE STUDIES  
ASU WEST  
PO Box 37100  
PHOENIX AZ 85069-7100

For more information, call the Graduate College Admissions office at ASU Main (602/965-6113) or at ASU West (602/543-4567).

Degree-seeking students who wish to apply for graduate programs at both campuses (e.g., to maximize the probability of acceptance to a graduate program) must submit separate applications to the respective programs, but only a single set of transcripts and test scores is required. Academic units may require additional materials, such as letters of reference, portfolios, and written work.

Students admitted to graduate degree programs have been required to designate upon application both the program and the campus from which they will receive their degree. A student will submit a program of study to the specific campus from which the student will receive a degree. Nondegree students are not required to designate formal campus affiliation.

Students who wish to transfer from a graduate program on one ASU campus to a graduate program on another ASU campus must apply through the normal application procedures of the receiving campus.

Graduate students may register for courses on either campus; however,

registration qualifications and restrictions for any specific course are determined by the respective campus faculties, are described in the ASU catalogs, and may be campus specific. Any academic unit on either campus has the authority to place restrictions on its courses.

Graduate degree-seeking students must fulfill the following requirements.

**Master's nondegree hours.** With the approval of the student's supervisory committee, the head of the academic unit, and the dean of the Graduate College, a maximum of nine semester hours of ASU nondegree graduate course work completed before admission to a graduate program may be included in the program of study. Nine hours may be used if completed at the "home" campus. Hours completed at another institution or campus before admission to a degree program are considered nondegree hours and are limited by the transfer policy stated below.

**Master's transfer hours.** The number of hours transferred from other institutions or campuses may not exceed 20 percent of the total minimum semester hours required for a master's degree unless stated otherwise by a specific degree program. Transfer credit taken before admission to a master's degree program at ASU is nondegree credit. Nondegree credit taken at the "home" campus combined with nondegree credit taken at another institution or campus may not exceed nine hours on the master's program of study.

**Doctoral programs.** Students in a Ph.D., D.M.A., or D.P.A. program must take the last 54 semester hours in the program of study, including dissertation credit, at ASU Main. Students in the Ed.D. program must take the last 60 semester hours in the program of study, including dissertation credit, at ASU Main. The final 54 hours of a Ph.D., D.M.A., or D.P.A. program or the final 60 hours of an Ed.D. program must be taken after admission to the doctoral program.

Faculty members at one campus may serve on graduate committees at the other campus if recommended to serve by the head of the academic unit and approved by the dean of the Graduate College.

Beginning fall 1992, two additions were made to ASU transcripts: (1) a campus indicator, "M" for "Main" and

"W" for "West," appears before each course on all transcripts, and (2) three GPAs are noted, for courses taken at ASU Main, for courses taken at ASU West, and for all courses. At graduation, the following are added to the transcript: the degree, the major, the date the degree was conferred, and the statement "awarded at the Main campus" or "awarded at the West campus."

The diploma is an Arizona State University diploma with the statement "awarded at the Main campus" or "awarded at the West campus" included in the text. Some of the signatures on the diploma are campus specific.

**ASU Main.** ASU Main is located near the heart of metropolitan Phoenix in the city of Tempe (population 156,844). Nearby are the municipalities that make up the fast-growing Valley of the Sun: Chandler, Gilbert, Glendale, Mesa, Scottsdale, and other communities.

ASU Main comprises more than 700 acres and offers outstanding physical facilities to support the university's educational programs. Buildings are modern, air-conditioned, and attractively designed.

Broad pedestrian malls laid out in an easy-to-follow grid plan, bicycle lanes connecting all parts of the university, and spacious lawns and subtropical landscaping characterize a campus serving the physical, aesthetic, and educational needs of students, faculty, and staff.

**ASU West.** ASU West is a campus of Arizona State University that offers only upper-division and graduate courses. It is located in northwest Phoenix to serve the higher educational needs of residents of western Maricopa County. As a comprehensive campus, the institution is developing a broad spectrum of professional and academic programs that share a liberal arts foundation and an interdisciplinary emphasis.

The campus is located between 43rd and 51st Avenues on West Thunderbird Road in Phoenix. Immediately west of the campus is the city of Glendale. The core campus was completed in March 1991 and includes the Fletcher Library, the Sands Classroom Building, the Classroom Laboratory/Computer Building, the Faculty and Administration Building, Kiva Lecture Hall, and the University Center Building.

For more information, see pages 346-353 of this catalog. For complete information and course listings, see the *ASU West 1996-97 Catalog*.

**ASU East.** ASU East is located at the former Williams Air Force Base at 6001 S. Power Road in east Mesa. ASU East opened for classes in fall 1994 with a selected set of class offerings. For more information, see pages 420-441 of the *General Catalog* or call 602/965-3278.

**ASU Downtown Center.** Located in downtown Phoenix at the Mercado, 502 E. Monroe, the ASU Downtown Center offers credit and noncredit courses of interest to employees in private businesses and government agencies and to individuals seeking personal growth and enrichment. Noncredit microcomputing training classes, offered by the Personal Computer Training Program, are held at the center and are taught during daytime and evening hours. In addition, noncredit and certificate programs are offered to working professionals by the Professional Programs and Institutes unit of the College of Extended Education. The center also provides students with mainframe access through its computer lab and library services. The Joint Urban Design Studio, administered by the College of Architecture and Environmental Design, is also housed in the ASU Downtown Center. For more information, see page 401 of the *General Catalog* or call 602/965-3046.

**ASU East Valley Center.** The university's newest center is in southeast Mesa at the former Williams Air Force Base. The East Valley Center extends the university's programs and resources into the eastern part of Maricopa County. For more information, see page 401 of the *General Catalog* or call 602/965-9781.

**ASU Extended Campus.** The ASU Extended Campus is a network of centers, sites, schedules, and technologies designed to increase accessibility of university resources to the public. It enriches the capability of ASU Main, West, and East to serve the community. For more information, see pages 399-403 of the *General Catalog* or call 602/965-9696.

**ASU Research Park.** The mission of the Research Park is to attract to Arizona new corporate and regional headquarters and research and development firms that broaden the base for potential research among ASU departments, interact with graduate students, consult with university faculty, co-sponsor seminars on research topics, and provide employment opportunities for graduates of ASU.

Long-term excess revenues from ground leases within this 324-acre park flow back to the ASU Foundation to be used for scholarships. The Research Park has several major tenants—Fiberite, VLSI, Walgreens Health Care Plus, Motorola University, the planned Motorola Flat Panel Display Division Facility, and the National Association of Purchasing Management—a 50,000-square-foot multitenant building developed by Transamerica Corporation, and the Lakeside Technology Center, a 44,000-square-foot multitenant building developed by Price-Elliott Research Park, Inc. The Research Park is part of the ASU effort to become a major research university by attracting high-quality private and public research firms and institutes.

**ASU Sun Cities Center.** The ASU Sun Cities Center educational facility is located in Sun City, Arizona, the nation's largest retirement community. The Lifelong Learning Program offers predominantly noncredit courses and includes a curriculum tailored specifically to the interests of the retirement community. Each year more than 150 courses from approximately 30 disciplines are taught. Weekly lectures also are available throughout the year in a variety of subjects. For more information, see pages 401–402 of the *General Catalog* or call 602/965-5600.

**Camp Tontozona.** Located in the famed Mogollon Rim country near Kohl's Ranch, northeast of Payson, this continuing education facility of the university serves the needs of academic departments conducting teaching and research in mountain terrain. The camp is also available to faculty, staff, graduate students, and alumni for family use.

## UNIVERSITY LIBRARIES AND COLLECTIONS

The collections of the university's libraries comprise more than 3 million volumes, approximately 6.3 million microform units, and more than 35,000

periodical and serial subscriptions. Computer access to commercially and locally produced databases and the ability to borrow research materials from other libraries enhance local resources. ASU is a member of the Association of Research Libraries and the Center for Research Libraries.

**Charles Trumbull Hayden Library.** The Charles Trumbull Hayden Library houses the largest multidisciplinary collection. In addition to the open stack areas, separate collections and service areas include Current Periodicals and Microforms; Government Documents; Interlibrary Loan and Document Delivery Services; Labriola National American Indian Data Center; Library Instruction, Systems, and Technology (L.I.S.T.); Reference; Reserve; Special Collections; and Archives and Manuscripts, which includes the Arizona Collection, the Chicano Research Collection, and the Visual Literacy Collection.

Specialized collections include comprehensive holdings of the Pre-Raphaelite period, a 14th-century manuscript on algebra, the child drama collection, the Thomas Mosher collection, the William S. Burroughs collection, and the papers of several major Arizona political figures.

**Architecture and Environmental Design Library.** The Architecture and Environmental Design Library, located in the College of Architecture and Environmental Design/North building, contains books and periodicals pertinent to areas of study within the college. See page 87 for more information.

**Arizona Historical Foundation Library.** Under a cooperative agreement with ASU, the Arizona Historical Foundation houses a library of several thousand volumes, manuscript collections, maps, and photographs, and a large collection of audio/visual materials. Housed in the Charles Trumbull Hayden Library, the collection's focus is on the history of Arizona and the Southwest.

**Fletcher Library.** Located at the ASU West campus, Fletcher Library utilizes a range of electronic systems, from compact discs to telecommunications networks, to provide access to resources and delivery of materials. Its holdings include over 250,000 volumes, 3,400 serial subscriptions, and one million microfilms selected to complement ASU West course offerings.

**Law Library.** The John J. Ross-William C. Blakley Law Library is located on McAllister Avenue. See page 103 for more information.

**Music Library.** A large collection of music scores, recordings, books, music reference materials, and listening facilities for individuals and groups are located on the third floor of the Music Building.

**Daniel E. Noble Science and Engineering Library.** The Daniel E. Noble Science and Engineering Library houses books, journals, and microforms in the sciences and engineering, the Map Collection, and the U.S. Patent and Trademark Depository.

**University Archives.** The University Archives collection (1885–present) of university theses and dissertations, administrative records of the university, historical photographs and personal papers of faculty, staff, and alumni as well as student, faculty, and official university publications are available for use at the Luhrs Reading Room in Hayden Library. The historic University Archives building on Tyler Mall is the home of the 1907 Gallery, which hosts exhibits of historical photographs from the collections of the Department of Archives and Manuscripts.

## PERFORMING AND FINE ARTS FACILITIES

**Computing Commons Gallery.** One of the unique features of the Computing Commons building is an art gallery, located off the main lobby in the northwest corner of the building. The gallery has design features that are unique for showcasing technology-based artwork and displays. The Computing Commons gallery can support display of national online computer art networks (e.g., via Internet) and holographic displays, as well as more traditional two-dimensional graphic presentations. This is an exciting decade for the arts as new technology-based tools and techniques open new avenues for creativity, as demonstrated by the exhibits in the Computing Commons Gallery.

**Dance Studio Theatre.** Located in the Physical Education Building East, the Dance Studio Theatre is a 6,000-square-foot dance studio that also serves as a proscenium-style performance space. The 215-seat theatre is devoted to informal and formal show-



cases of student and faculty choreographic work.

**Drama City.** Representing a synthesis of the creative energies of the Institute for Studies in the Arts and the Department of Theatre, Drama City is an 1,800-square-foot black-box theatre that serves as a laboratory for the development and presentation of experimental and innovative theatrical and interdisciplinary works.

**Gallery of Design.** Housed in the College of Architecture and Environmental Design, the Gallery of Design features traveling exhibitions on design and urban issues.

**Paul V. Galvin Playhouse.** Built to stage the largest productions of the ASU Theatre, the Paul V. Galvin Playhouse is a 496-seat proscenium-stage theatre set at the east end of the Nelson Fine Arts Center. The Department of Theatre's annual season of 12 to 15 plays also includes productions in the Lyceum and Prism theatres and the Fine Arts Center Studios.

**Grady Gammage Memorial Auditorium.** A versatile center for the performing arts designed by Frank Lloyd Wright and named for the late President Grady Gammage, Grady Gammage Memorial Auditorium seats 3,000 and has won wide acclaim for its design and acoustics. In addition to the great hall and related facilities—including the Aeolian-Skinner organ contributed by Hugh W. and Barbara V. Long—the building contains classrooms and workshops for the College of Fine Arts.

**Katzin Concert Hall.** Located in the new music building expansion, the Katzin Concert Hall seats 350 people. Primarily used for solo and chamber music recitals, the hall houses a nine-foot Hamburg concert Steinway piano. The acoustics are enhanced by the maple-paneled stage and the multifaceted walls and ceiling.

**Louise Lincoln Kerr Cultural Center.** Located in Scottsdale, the Louise Lincoln Kerr Cultural Center offers cultural events, especially in the performing arts, to the community.

**Lyceum Theatre.** A small but technically sophisticated 164-seat proscenium-theatre, the Lyceum Theatre is a theatre laboratory devoted to the work of student playwrights, directors, and actors.

**Music Theatre.** As part of the music complex, the Music Theatre, modeled after the Wagnerian Theatre in Bayreuth, Germany, rises five stories and seats an audience of 500. This theatre is the home of many opera and musical productions.

**J. Russell and Bonita Nelson Fine Arts Center.** Designed by Albuquerque architect Antoine Predock, the J. Russell and Bonita Nelson Fine Arts Center is a spectacular, 119,000-square-foot village-like aggregate of buildings that includes five galleries of the ASU Art Museum, the Paul V. Galvin Playhouse, the University Dance Laboratory, seven specialized theatre and dance studios, a video studio, and a variety of scenic outdoor features, including courtyards, fountains, pools, and a 50-by-100-foot projection wall designed for outdoor video.

**Northlight Gallery.** The Northlight Gallery is dedicated to museum-quality exhibitions of historical and contemporary photography. Located in Matthews Hall, it is open during the academic year.

**Organ Hall.** Also located in the new music building expansion, the Organ Hall houses the Fritts Organ. This tracker-action pipe organ is designed to capture the qualities of baroque European organs. The hall is designed to complement the organ with a barrel-vaulted ceiling and wooden benches to seat 175 persons.

**Prism Theatre.** The Prism Theatre is an alternative black box space devoted to multiethnic, new, or experimental works.

**Recital Hall.** Located on the fifth floor of the music building, the Recital Hall is an intimate 125-seat facility that opens onto a rooftop courtyard.

**Sundome Center for the Performing Arts.** As America's largest single-level theatre, the Sundome Center for the Performing Arts in Sun City West has 7,169 seats. The theatre is equipped with sophisticated and state-of-the-art lighting systems, and a single-span roof affords each seat a clear view. As one of Arizona's premier entertainment venues, the Sundome provides a varied array of top entertainment from Las Vegas concerts to classical ballets to celebrity lectures.

**Television Station KAET.** KAET, Channel 8, Phoenix, is licensed and owned by the Arizona Board of Regents and operated by Arizona State University. Studios of the award-winning station are located in the Stauffer Communication Arts Building. The station is affiliated with the Public Broadcasting Service (PBS) and broadcasts 24 hours daily. Program information is available from the KAET program manager (602/965-3506).

**University Art Museum.** The University Art Museum collections are housed in a large complex of galleries and art study rooms in two locations: the Nelson Fine Arts Center and the second floor of the Matthews Center. The Oliver B. James Collection of American Art ranges from the early 18th century to the contemporary and includes major works by Stuart, Ryder, Homer, and the Ash Can School painters. Master works by great printmakers such as Durer, Rembrandt, Whistler, and Hogarth are often featured in special exhibitions selected from the university's extensive print collection.

The gallery devoted to Latin American art features folk art as well as paintings by celebrated 20th-century artists Rivera, Siquerios, and Tamayo. The museum also displays many fine examples of 19th- and 20th-century crafts, paintings, and sculpture.

The contemporary art holdings include works by Vernon Fisher, Leon Golub, Sue Coe, Luis Jimenez, and Robert Colescott. Exhibitions curated by the museum emphasize contemporary art and new media, crafts, and Mexican art.

**University Dance Laboratory.** A flexible performance space within the Nelson Fine Arts Center, the University Dance Laboratory is designed specifically for experimental dance productions. Along with the Dance Studio Theatre in the Physical Education Building East, the University Dance Laboratory is used by the Department of Dance for its season performances.

**Harry Wood Gallery.** Housed in the Art Building (ART 120), the Harry Wood Gallery provides temporary exhibitions of the visual arts during the academic year.

## COMPUTING FACILITIES AND SERVICES

Computers are a fundamental tool for research, instruction, and learning in every college and department at ASU. A variety of computing equipment and services are available for use by students, faculty, and staff.

Programming, statistical, graphics, and other applications are provided on microcomputers and mainframe computing systems. These services, including university-wide electronic mail and the library's online catalog, can be accessed through a communications network from many sites and offices on campus, as well as from off-campus offices and homes via a phone connection. Communication with other research facilities is possible through the Internet.

A wide range of information on campus activities and related topics is available online. On the World Wide Web (WWW), the ASU home page can be accessed at <http://www.asu.edu>. This WWW site features a complete source of ASU information with text, photos, audio, and video. Via the Internet, students, faculty, and staff of ASU also have access to the thousands of information systems around the world. The ASU Server contains such information as a phone and electronic mail directory, the *Schedule of Classes*, the athletic calendar of events, weather forecasts from around the United States, and information from various colleges, departments, and organizations.

Educational services to assist faculty, students, and staff include online documentation, online consulting facilities, online tutorials, videotaped and written materials, and noncredit seminars.

The following service centers are provided for the academic community.

**Computing Commons.** The Computing Commons was opened in 1993 to provide the university with an ideal setting to learn and experience the vast new frontier of high-performance computing. The purpose of the Computing Commons is to draw together students, faculty, and staff from all disciplines and create an environment designed to foster maximum interaction. The building and its facilities are drawing national recognition and acclaim as a model facility for the support of instruction and research in a technology-based environment. The commons

houses a 200-workstation student computing site open 24 hours a day, nine electronic classrooms, a Visualization Center, COMPASS, a computer store, and a technology-based art gallery.

**Assistance Center.** The Computing Assistance Center (COMPASS) has a library of reference manuals, computing periodicals, and other information concerning computing systems and software. Self-paced training is available for a variety of subjects on Windows, DOS, Macintosh, and mainframe computers. COMPASS also distributes communication, virus protection, and other site-licensed software.

**Student Consulting.** This service is available to ASU students using the academic computing systems either on campus or through dial in. Student Consulting focuses on the needs of undergraduate and graduate students in classes.

**Instructional Services.** The Consortium for Instructional Innovation (CII) assists faculty with computing support for instructional and learning technologies, including graphics, videos, and courseware development. See page 34 for more information.

**Research Computing Support.** Assistance is available to researchers, including help with scientific programming and use of statistical software, and support for interactive visualization and "hard copy" presentation of data and analysis results.

A variety of computation facilities are provided to support the ASU community. Everything from workstations to mainframes are available as is access to the national NSF Centers.

**Visualization Center.** The Visualization Center provides support services and resources for faculty, staff, and graduate students in visualizing the results of computational science and by acting as a test bed of software, hardware, and communications for interactive viewing of scientific data.

**Computer Accounts.** Computer accounts are needed to access many of the computing systems and can be obtained from the Computer Accounts Office.

## ALUMNI ASSOCIATION

Founded in 1894, the Alumni Association involves graduates and former students throughout Arizona and around

the world. It communicates with all alumni and provides services to dues-paying members. The Alumni Center, located at 601 E. Apache Blvd., maintains more than 160,000 files of graduates. The Alumni Association strives to promote effective interest in and loyalty to ASU on the part of alumni and the general public.

## RESEARCH CENTERS, INSTITUTES, AND LABORATORIES

These units serve the university's mission in research. They are overseen by seven of the colleges and the vice president for Research and Strategic Initiatives.

### College of Architecture and Environmental Design

**Herberger Center for Design Excellence.** The Herberger Center for Design Excellence serves the Phoenix area through research, publications, and symposia regarding urban design, design, and environmental planning issues. For more information, call 602/965-6693.

### College of Business

**Arizona Real Estate Center.** The Arizona Real Estate Center serves a multi-function research and educational role to foster better understanding of the real estate sector of the Arizona economy. Housing, commercial real estate, and construction activity data for Arizona and Maricopa County are collected by the center and are utilized for a variety of ongoing projects, including the calculation of affordability indexes and the computation of housing appreciation figures for the metropolitan Phoenix area. The center's annual outlook series provides a public forum for prominent members of the real estate industry to present their perceptions of market conditions.

For more information, contact the director, Arizona Real Estate Center, BA 319, 602/965-5440.

**Center for Advanced Purchasing Studies (CAPS).** This center, established in November 1986, is a national affiliation agreement between the ASU College of Business and the National Association of Purchasing Management (NAPM). It is the first and only program of its kind in the nation and is located in the Arizona State University

Research Park, about eight miles south of the main ASU campus. CAPS conducts in-depth research into the problems facing the purchasing profession today and, through its studies, seeks to improve purchasing effectiveness and efficiency, and the overall state of purchasing readiness.

For more information, call 602/752-2277, or contact

DIRECTOR, CENTER FOR ADVANCED  
PURCHASING STUDIES  
ASU RESEARCH PARK  
2055 E. CENTENNIAL CIRCLE  
PO Box 22160  
TEMPE AZ 85285-2160

**Center for Business Research.** The Center for Business Research has been a consistent source of information on the Arizona and metropolitan Phoenix economies since 1951. Both the business community and the public have had access to the economic indicators produced by the ongoing projects of the center, including quarterly net migration estimates for Arizona and Maricopa County, and the metropolitan Phoenix Consumer Price Index. The center has conducted projects for local government agencies and businesses, such as the economic impact of aviation in Arizona, a study of seasonal migration to Arizona, and an analysis of the state's hospital industry. A monthly publication of the center, *AZB/Arizona Business*, plays a major role in disseminating to the public the economic information compiled by the research centers of the College of Business. The staff within the center is available to respond to inquiries and to provide available data.

For more information, contact the director, Center for Business Research, BA 319, 602/965-3961.

**Center for Financial System Research.** This center serves the national financial, policy-making, and academic communities through research, publications, conferences, and educational programs. The focus of such activities is on the changing nature of the domestic and international financial system with such specific areas as the interaction between financial markets, deposit insurance reform, the deregulation of financial institutions, the financing of mergers and acquisitions, and the effect of government policy on financial markets receiving recent attention.

For more information, contact the director, Center for Financial System Research, BAC 319, 602/965-5229.

**Economic Outlook Center.** The Economic Outlook Center, established in 1985, specializes in economic forecasts of Arizona and the Western states. The center publishes the *Arizona Blue Chip Economic Forecast* (monthly), *Metro Phoenix Blue Chip Economic Forecast* (quarterly), and *Western Blue Chip Economic Forecast* (10 issues per year). The center also publishes *Blue Chip Job Growth Update* (monthly), an update of current job growth in the United States.

For more information, contact the director, Economic Outlook Center, BAC 319, 602/965-5543.

**First Interstate Center for Services Marketing.** The First Interstate Center for Services Marketing (FICSM) is North America's leading university-based hub for the study of services marketing and management. It was established to fill organizations' emerging need for marketing theory and research that is related to the unique challenges service organizations face. Such information is essential in today's environment of deregulation and intense competition.

The center conducts research on such topics as service quality; the dynamics of service delivery; professional services such as health care, banking, and insurance; and service personnel. A leader in the business and academic communities, FICSM's work advances scholarly understanding and provides firms with applicable principles, concepts, and tools.

The center offers specialized education and training. Its annual Services Marketing Institute is the premier education program for executives in service industries and in companies devoted to providing quality service. The annual "Activating Your Firm's Service Culture" Symposium addresses the issues firms face as they move to instill a more service-oriented culture.

The center's charter member list is a who's who of service companies, including AT&T, The Dial Corporation, Marriott Corporation, IBM, Xerox Corporation, First Interstate Bank, and Baxter Healthcare Corporation.

For more information, contact the director, First Interstate Center for Services Marketing, BAC 451, 602/965-6201.

## College of Education

**Center for Bilingual/Bicultural Education.** Bilingual education is an internationally significant field that crosses many disciplines. In 1980, the College of Education formally instituted a Center for Bilingual/Bicultural Education with a multidisciplinary perspective addressing local, national, and international concerns. The center initiates and coordinates research ventures in bilingual/bicultural education and is responsible for assembling faculty and staff expertise and outside resources to accomplish research goals.

The center also supports instructional activity in bilingual curricula and related program efforts within the college. Because of the cross-disciplinary nature of bilingual education programs, a college-wide effort is necessary to develop, evaluate, and strengthen such programs.

The center is committed to

1. enhancement of broadly based faculty participation in research;
2. acquisition of external research and training resources;
3. enhancement of communication networks with other local, state, national, and international institutions and agencies that can increase the center's ability to achieve its objectives; and
4. development of a scholarly dissemination strategy incorporating colloquia, conferences, and publications.

For more information, contact the director, Center for Bilingual/Bicultural Education, ED 414, 602/965-7134.

**Center for Indian Education.** The Center for Indian Education is an interdisciplinary research and service center administered through the College of Education. It promotes studies in American Indian policy and administration that contribute to scholarship and effective practices in education, professional training, and tribal capacity building. It is structured to foster relations between the university and sovereign tribes, and to provide training and technical assistance for community programs. The center publishes the *Journal of American Indian Education* and sponsors workshops and colloquia that bring together scholars and tribal community leaders.

The center provides leadership through a group of American Indian faculty and is organized on the basis of scholarly expertise of the faculty. In addition to College of Education faculty, responsibilities are shared by faculty from the School of Social Work, the School of Justice Studies, the College of Liberal Arts and Sciences, and the College of Law. Areas currently studied include administrative leadership, policy analysis, bilingual education, health and welfare policy, justice studies, and program development in professional studies.

For more information, contact the director, Center for Indian Education, ED 415, 602/965-6292.

### **College of Engineering and Applied Sciences**

**Aerospace Research Center.** This center was established in the College of Engineering and Applied Sciences (CEAS) in July 1990. The center's purpose is to promote interdisciplinary programs in aerospace-related fields, to establish working relations with local industry, and to enrich the graduate and undergraduate programs in technical areas of importance to the aerospace industry in the state and nation. The center's technical scope is broad, including but not limited to propulsion, automation, aerodynamics, structures, materials, aeroelasticity, performance, flight mechanics, guidance, robotics, safety, avionics, control, telecommunications, and planetary science. Research projects are supported by a wide variety of laboratory facilities and extensive computational equipment. Projects are funded both by government agencies as well as by several industrial sponsors.

The Aerospace Research Center is headed by a director, reporting to the dean of the college. The research is conducted by faculty, research associates, and graduate students from several departments within CEAS and the College of Liberal Arts and Sciences. With this cross-departmental breadth, the center provides an infrastructure supporting multidisciplinary research activities, while at the same time providing an aerospace-research focal point in the university. It is also a convenient contact point for external organizations with aerospace interests, and facilitates the transfer of aerospace research results to these organizations.

For more information, contact the ARC director, 602/965-2553.

**Center for Advanced Transportation Systems Research.** This center was established in 1983 in the College of Engineering and Applied Sciences (CEAS). The center's purpose is to advance interdisciplinary research in transportation related fields, to maintain working relations with government transportation agencies, and to support the undergraduate and graduate programs providing professional and academic education in transportation. The center's technical scope currently includes traffic engineering; pavement materials testing and management; human factors in vehicle operation; geographic information systems in transportation; urban travel behavior; travel demand management; freeway management systems; location and network optimization; infrastructure design, construction, and operation; and technology transfer services to local governments in Arizona and the Southwest. The center supports a transportation computer laboratory and materials testing laboratory for faculty and graduate student research.

For more information, contact the director, Center for Advanced Transportation Systems Research, ENGR 405, 602/965-2001.

**Center for Agribusiness Policy Studies.** The Center for Agribusiness Policy Studies, located at ASU East, carries out research and development relating to agribusiness, rural development, multiple use of scarce resources, and public policy. The center addresses regional, national, and international development in the context of global and competitive markets for agricultural products and inputs. Of particular interest is the development of private sector strategies and public policy alternatives that go beyond traditional government subsidy programs to find innovative, market-oriented ways to enhance competitiveness in international markets, increase rural incomes, and create new jobs. A related center concern is the development of "win-win" strategies for environmental management and the multiple use of scarce natural resources by competing interest groups. The goal of such policy development is to resolve or manage conflict regionally, nationally, or globally and to promote long-term, sustainable agriculture in terms of regional economic growth.

Of particular interest to the center are innovative rural credit programs for developing nations, strategic marketing to identify profitable "niche" markets and further processing to create jobs and add value to agricultural products.

For more information, contact the director, Center for Agribusiness Policy Studies, ASU East, 602/965-3585.

### **Center for Energy Systems Research.**

This center coordinates energy-related research within the College of Engineering and Applied Sciences. Because energy impacts almost all areas of technology, as well as the socioeconomic system, energy research involves investigators from diverse disciplines and backgrounds. Significant state, regional, and national energy research is conducted by the 29 faculty members of various disciplines who are associated with the center. Their research is facilitated by 16 laboratories and other major facilities. Research areas include combustion; thermal radiation and thermal insulation; heat and mass transfer; solar thermal and photovoltaic systems; biomass and fuels conversion; thermionics; power electronics; power systems analysis; dielectrics; laser and radiation measurement. New research emphasis areas in "advanced gas turbine systems" and "transport phenomena in manufacturing of energy systems" are being established. The center has also recently added two unique solar test facilities: a photovoltaic qualification module test laboratory which tests PV modules to all standards of IEEE, ASTM, IEC, and UL; and a solar thermal research and test laboratory, which tests solar water heating systems to SRCC standards. The center's faculty affiliates are from various academic departments. They supervise student energy research projects as part of work contributing to degree programs offered by their departments.

For more information, contact the director, Center for Energy Systems Research, ENGR 509, 602/965-2896; fax 602/965-0745; e-mail [tong@asu.edu](mailto:tong@asu.edu).

**Center for Research in Engineering and Applied Sciences.** The Center for Research in the College of Engineering and Applied Sciences was established to provide opportunities for faculty and graduate student cooperation to define and develop solutions to current and anticipated problems. The center provides research support services for all

research in the college as well as interfacing with the research offices of the university and other colleges. Basic policy is to support and enhance the educational program through involvement of students and faculty in realistic applications of research in the applied sciences and engineering. Government and industry sponsorships are sought, with emphasis on Arizona problems, industries, and institutions. Specialized and interdisciplinary efforts are currently developed in such areas as acoustics, agribusiness, air pollution, alternative energy, applied mechanics, artificial intelligence, automated manufacturing, bioengineering, biomass to energy conversion, communications, computational microelectronics, computer-aided design and manufacturing (CAD/CAM), computer-integrated manufacturing (CIM), computer science, data and information systems, electrical characterization, environmental resources and control, expert systems, fluid mechanics, fuels, heat transfer, image processing, lasers, materials, mass transfer, metallurgy, nuclear radiation, photovoltaics, plasma, plastics, power systems, analyses, range management, robotics, semiconductor materials and fabrication, semiconductor processing, signal processing, soil mechanics, solar thermal energy, solid state electronics and systems design and analysis, surface analysis, systems design and analysis, telecommunications, thermodynamics, transportation systems, turbines, very-large-scale integrated circuits, waste management, and water resources.

For more information, contact the director, Center for Research in Engineering and Applied Sciences, EC G127, 602/965-1725.

**Center for Solid State Electronics Research.** CSSER focuses on research in the areas of semiconductors crystal growth, both by bulk and epitaxial techniques, device characterization and modeling, defect behavior in semiconductors material characterization, processing, fine line lithography, surface analysis, and transport. Major programs address semiconductor device modeling, transport theory, optoelectronics, ferroelectrics, semiconductor processing, microwave devices, and ultra-submicron devices. New programs address synthetic neural systems and their impact on VLSI design. Research in the specially designed facilities in-

cludes various aspects of submicron dimension devices.

For more information, contact the director, Center for Solid State Electronics Research, ENGR 115, 602/965-3708.

**Computer Integrated Manufacturing Systems Research Center.** This multidisciplinary engineering research center focuses its attention on the design and manufacture of discrete parts. Computer Integrated Manufacturing (CIM) provides the research foundation for such areas as information integration, including computer aided design and heterogeneous database; controls integration, including local area networks and vision; material flow integration, including robotics; and overall systems and man-machine interaction. Laboratories for each discipline have been established.

For more information, contact the director, CIM Systems Research Center, ENGR 552, 602/965-3709.

**Telecommunications Research Center.** Telecommunications play a vital role in home, commercial, entertainment, educational, scientific, and military systems. The Telecommunications Research Center focuses its interests and activities in research and educational programs. The approach is to conduct basic and applied research, develop technologies, and provide education programs in all major areas of telecommunications, from signal generation to reception. The targeted areas of excellence are antennas, propagation, and scattering; microwave circuits, devices, and measurements; optical communications; signal processing; broadband switching; and communication systems. Ultra-modern laboratories and computational facilities are associated with the center.

For more information, contact the director, Telecommunications Research Center, GWC 411, 602/965-5311.

### College of Fine Arts

**Institute for Studies in the Arts.** As the research center for the College of Fine Arts, the Institute for Studies in the Arts (ISA) serves as a laboratory for the research and development of new art forms, new ideas and concepts, and innovative technologies for artistic expression; a network for communication among creative scholars both within and outside the arts; and a re-

source base for the documentation, evaluation, and dissemination of research in the arts. ISA addresses the needs of a variety of populations through technical and monetary support and sponsorship of research projects, performances, exhibitions, and symposia.

ISA facilities include an experimental performance studio at Drama City and a state-of-the-art video production and post-production laboratory in Matthews Center. ISA maintains a database of interdisciplinary scholarship in the arts and actively seeks to communicate with researchers from diverse backgrounds in the ASU community and worldwide.

ISA is open to a wide range of research proposals from both faculty and graduate students, provided such proposals address the ISA mission of experimentation and innovation in the arts.

For information, contact the director, Institute for Studies in the Arts, MCENT 252, 602/965-9438.

### College of Law

**Center for the Study of Law, Science and Technology.** Located in the College of Law, the center conducts research, edits the *Jurimetrics Journal of Law, Science and Technology* in cooperation with the American Bar Association Section on Science and Technology, and sponsors seminars, workshops, and conferences. Through these activities, the center seeks to contribute to the formulation and improvement of law and public policy affecting science and technology and to the wise application of science and technology in the legal system. Current areas of research include communications and telecommunications law, computer-related law, forensic science and statistics, legal issues and biotechnology, law and medicine, and law and social science.

For more information, contact the director, Center for the Study of Law, Science and Technology, LAW 102, 602/965-2124.

### College of Liberal Arts and Sciences

**Arizona Center for Medieval and Renaissance Studies (ACMRS).** The Arizona Center is a research unit serving affiliate scholars from ASU, Northern Arizona University, and the University of Arizona. It represents a variety

of disciplines including history, literature, philosophy, religion, language, music, art, and science. ACMRS enriches academic offerings in medieval and Renaissance studies by sponsoring one or two visiting professors each year. Graduate research assistantships are also available through the center.

Significant opportunities for the study of the Middle Ages and the Renaissance exist at ASU. Hayden Library has an extensive microfilm collection and many rare books in medieval and Renaissance studies. ACMRS also sponsors a lecture series each semester covering a variety of topics.

Recently instituted programs include an annual conference, a public symposium, a summer study abroad program at Cambridge University (United Kingdom), and student exchange programs with the University of Copenhagen and the University of Kalmar (Sweden).

Since 1995, ACMRS supports and operates the editing of *Medievalia et Humanistica: Studies in Medieval and Renaissance Culture*, an annual journal whose editorial board includes members from universities including Harvard, Yale, Princeton, Stanford, Oxford, Cambridge, and Tours. In collaboration with the University of Massachusetts at Dartmouth and the Medieval and Renaissance Committee of the University of Michigan, ACMRS sponsors and co-edits the interdisciplinary journal, *Mediterranean Studies*, an annual publishing articles on all aspects of the Mediterranean region. ACMRS will begin an essay collection series titled "Arizona Studies in the Middle Ages and Renaissance" with Brepols Publishers (Belgium).

For more information, contact the director, Arizona Center for Medieval and Renaissance Studies, SS 224, 602/965-5900.

**Cancer Research Institute.** Significant advances in the treatment of human cancer and other serious medical problems depend upon scientists well trained in organic chemistry, biochemistry, and biology. The Cancer Research Institute provides graduate students with the specialized training necessary for research in the discovery and development of effective anticancer drugs. Among various activities, laboratory personnel are pursuing a unique program concerned with isolation, structural identification, and synthesis

of naturally occurring anticancer agents from marine animals, plants, and marine microorganisms.

For more information, contact the director, Cancer Research Institute, PS C357, 602/965-3351.

**Center for Asian Studies.** Through its East Asian and Southeast Asian studies programs, the center serves as research coordinator for Asian studies' faculty and graduate students in a variety of disciplines. The center sponsors colloquia and research conferences. It also publishes two scholarly *Monograph Series* and a newsletter on Southeast Asian studies, *Suvannabhumi*, which have an international readership. Graduate students may apply for research assistantships in the center and its program.

The center administers student exchange programs with a number of universities in Asia. The center also sponsors a graduate student colloquium and film series on Asian topics. A reading room is located in the center office suite offering a variety of Asian and English language publications and newspapers from and about Asia.

For more information, contact the director, Center for Asian Studies, WHALL 109, 602/965-7184.

**Center for Latin American Studies.** Arizona maintains an ever-growing interest in Latin America that draws upon an extensive experience of historical and geographical ties. The Center for Latin American Studies is the focal point for these interests at ASU.

Through its program, the center serves the university community and maintains strong ties with various Latin American organizations in the state and the nation. Principal activities are coordinating Latin American studies at the undergraduate and graduate levels; sponsoring student exchange programs, events featuring Latin American arts and culture, numerous seminars, and research conferences; publishing a wide range of professional materials; and undertaking and facilitating research about the region.

The center administers student exchange programs with the Catholic University of Bolivia and three Mexican universities—the Autonomous University of Guadalajara, the Autonomous University of Nuevo Leon, and the University of Sonora. Each spring several

ASU students are selected to attend courses at the Latin American universities while Bolivian and Mexican students attend ASU.

Each year the center publishes several scholarly books as well as shorter monographs in its Special Studies Series.

The center is a member of the American Modern Language Association, the Consortium of U.S. Research Programs for Mexico, the Consortium for Latin American Studies Association, Pacific Coast Council on Latin American Studies, Rocky Mountain Council for Latin American Studies, Consortium of Latin American Studies Programs, and Conference on Latin American History.

The center directly encourages research, not only through its publications program and research conferences, but also through close coordination with the Latin American collection of Hayden Library and networking with Latin American universities.

For more information, contact the director, Center for Latin American Studies, SS 213, 602/965-5127.

**Center for Meteorite Studies.** One of the nation's largest collections of extraterrestrial materials is available for research in the Center for Meteorite Studies. Teaching and research on meteorites, meteorite craters, and related areas of space and planetary science are accomplished through the regular academic units in cooperation with the center.

For more information, contact the director, Center for Meteorite Studies, PS C151, 602/965-6511.

**Center for Solid State Science.** The Center for Solid State Science is a research unit within the College of Liberal Arts and Sciences.

The membership comprises faculty and academic professional researchers and research support personnel, many of whom also hold appointments in academic units. The Center for Solid State Science is the ASU focal point for interdisciplinary research on the properties and structures of condensed phases of matter. Current research topics include, among others, electronic materials, ceramics, composites, rare earth oxides, intercalation compounds, and ionic conductors.

Members of the center operate modern and sophisticated research facilities, organize regular research colloquia and

symposia, and often collaborate with external researchers on projects of mutual interest. The most rapidly expanding topical research area in the center is the science and engineering of materials, with emphasis on the structure and reactivity of interfaces and surfaces, synthesis and processing of new materials, high resolution microstructural and chemical analysis, and research computing, consultation, and analysis with high speed computer graphics for physical modeling and visualization.

The Goldwater Materials Science Laboratories of the center include

1. the Materials Preparation Facility (MPF), which provides a wide range of synthesis and processing capabilities for preparation of specimen materials. MPF also provides thermal analysis for study of solid state reactions and Auger and X-ray photoelectron spectroscopy for analysis of surface compositions and electronic structure of surfaces;
2. the Materials Science Electron Microscopy Laboratory (MSEML), which provides state-of-the-art electron microscopes for analysis of microstructures, including imaging and diffraction, and high spatial resolution chemical analysis using energy dispersive X-ray and electron energy loss microscopy;
3. the Ion Beam Analysis of Materials (IBeAM) Facility, which provides compositional and structural determination of the surface and near-surface regions (0–2mm) of solids by ion beam analysis where elemental composition and depth distribution information are needed. Channeling experiments are used to determine crystal perfection and site occupancy;
4. the Facility for High Resolution Electron Microscopy (HREM) operates several ultra high resolution and ultra high vacuum electron microscopes and supports microscopy methods and instrumentation development including holography, position- and time-resolved nanospectroscopy and energy-filtered imaging and diffraction. The center provides high resolution capability for a large external group from other universities and industry; and

5. the Secondary Ion Mass Spectrometry (SIMS) laboratory, which provides depth profile and point composition analysis with very high chemical sensitivity, on the order of one part per billion, including isotopic analysis for many materials. SIMS is also used as a chemical microscope, to image elemental distributions on specimen surfaces.

The Goldwater Materials Science Laboratories of the Center for Solid State Science are the primary teaching and research resources used by students in the Science and Engineering of Materials interdisciplinary Ph.D. program and the undergraduate option for Materials Synthesis and Processing. They are used for the same purposes by students from affiliated departments.

Special laboratories for other relevant research are available in affiliate departments. These include nuclear and electron resonance spectroscopy laboratories, X-ray diffraction and fluorescence laboratories, mechanical properties measurements capability over a wide range of temperatures, optical (laser) spectroscopy laboratories, and scanning tunneling and atomic force microscope laboratories.

For more information, contact the director, Center for Solid State Science, PS B234, 602/965-4544.

**Center for the Study of Early Events in Photosynthesis.** This center, located in the College of Liberal Arts and Sciences, was established at ASU in 1988 as part of the USDA/DOE/NSF Plant Science Centers Program. The center serves as an infrastructure supporting ASU scientists who study photosynthesis using a variety of methods and approaches, ranging from molecular biology and biochemistry to organic chemistry, ultrafast laser spectroscopy, X-ray crystallography, and theoretical chemistry. It is designed to enhance undergraduate, graduate, and postdoctoral education through multidisciplinary cooperative research projects.

The ultimate objective of the research is the elucidation of the basic principles governing the biochemical and biophysical processes of photosynthetic energy storage. This goal is being realized via investigation of the early events of photosynthesis, including: light absorption and excitation transfer in photosynthetic antennas; the mechanism of primary photochemistry

in plant and bacterial systems; secondary electron transfer processes; structure and assembly of photosynthetic antennas, reaction centers, and electron transfer proteins; pigment-protein interactions; artificial and biomimetic photosynthetic solar energy conversion systems; and mechanisms of biological electron transfer reactions.

The center is equipped with state-of-the-art instrumentation which allows students to do frontier research in a broad range of disciplines. Equipment includes a variety of pulsed lasers for measurements with time resolution ranging from sub-picoseconds to seconds; a 500 MHz NMR instrument; an EPR spectrometer; a protein X-ray facility; spectrophotometers; fluorometers; a protein sequencer; and an amino acid analyzer.

The center sponsors a weekly Photosynthesis Seminar Series and brings in visiting scientists from around the world to carry out collaborative research. Undergraduate, graduate and postdoctoral training programs in the Department of Chemistry and Biochemistry and the Department of Botany are central components of the activities of the center.

For more information, contact the director, Center for the Study of Early Events in Photosynthesis, PS D207, 602/965-1963.

**Exercise and Sport Research Institute.** The Exercise and Sport Research Institute (ESRI) is an interdisciplinary research unit located in the Department of Exercise Science and Physical Education and serves, in part, as a research facility for the interdisciplinary doctoral program in exercise science.

The major research areas can be described as follows. *Biomechanics* applies the laws of physics to the study of human movement. It examines internal and external forces applied to the human body and the effects these forces have on the body. *Exercise physiology* studies the acute responses of the body to exercise and its chronic adaptations to training. It also studies the interrelationships among physical activity, performance, and health. *Exercise biochemistry* focuses on the study of subcellular systems involved in the provision and regulation of energy transfer during exercise. *Exercise endocrinology* studies interrelationships of exercise and training with stress, hormones,



neurotransmitters, and the immune system. *Motor behavior and sport psychology* study human behavior in fundamental motor activity and sport. *Motor behavior* includes the subdomains of *motor learning, control, and development*. Motor learning focuses on skill acquisition, motor control studies how movement is regulated and controlled via the nervous system in normal and pathological populations, and motor development studies how growth and maturation affect performance and learning across the lifespan. Within the context of sport and exercise, *sport psychology* examines the influence of psychological variables on performance or health and the influence of participation on psychological phenomena.

The ESRI is affiliated with a number of medical institutions in the Phoenix area.

Faculty and graduate students at the ESRI are investigating a wide range of topics concerning human physical activity, including different ages, levels of health, levels of ability and fitness, and environments; and levels and types of training, body composition, nutrition, and physical and emotional stresses. Where applicable, these aspects are studied using an interdisciplinary approach.

For more information, contact the director, Exercise and Sport Research Institute, PEBE 159, 602/965-7473.

**Hispanic Research Center.** The Hispanic Research Center (HRC) at ASU is an interdisciplinary research unit within the College of Liberal Arts and Sciences. As a university-wide center, the main purpose of the HRC is to conduct basic and applied research on a broad range of topics related to Hispanic populations, to disseminate research findings to the academic community and the public, and to provide public service in areas of importance to Hispanics.

Research foci include Hispanic entrepreneurship, science and technology, the Hispanic polity, and the arts. Researchers and advanced graduate students throughout the university are encouraged to develop specific lines of inquiry under these four general areas. Ongoing activities of the HRC include the *Bilingual Review Press*, Hispanic Data Archives, the Electronic Publications Program, the Hispanic Research

and Arts Network, and the Electronic Bulletin Board. In addition, the HRC supports the Community Documentation Program, which sponsors action research in community settings in collaboration with community-based organizations.

For more information, contact the director, Hispanic Research Center, CFS 104, 602/965-3990.

### College of Public Programs

#### Morrison Institute for Public Policy.

Established in 1981 by the Morrison family of Gilbert, Arizona, the Institute conducts research on public policy matters, informs policy makers and the public about issues of importance, and advises leaders on choices and actions. Morrison Institute offers a variety of services to public and private sector clients and pursues its own research agenda. Services include policy research and analysis, program evaluation, strategic planning, public policy forums, and support of citizen participation in public affairs. The institute's interests, research, and publications span such areas as education, urban growth, the environment, human services, workforce development, economic development, and arts and culture.

For more information, call 602/965-4525 or write

MORRISON INSTITUTE FOR PUBLIC  
POLICY  
ARIZONA STATE UNIVERSITY  
PO BOX 874405  
TEMPE, AZ 85287-4405

#### Vice President for Research and Strategic Initiatives

#### Center for Environmental Studies.

Established in 1974, the center encourages and coordinates interdisciplinary environment-related activities in the natural and social sciences within the university.

Research programs within the center emphasize riparian and aquatic studies; wildlife biology; ecosystem and human impact studies; environmental regulation and policy issues; covering environmental risk assessment; hazardous materials; waste management; and studies relating to environmental problems on the U.S.-Mexico border. The center also organizes a variety of training programs for practitioners on current federal environmental regulations.

The center encourages communication among academic, government, and private sectors through research, workshops, seminars, and working papers. It manages the Sierra Ancha Research Station for the university. The station is located at an elevation of 5,000 feet in the desert-pine forest transition. It offers research potential in biology, geology, anthropology, resource management, and nuclear engineering. Research space and living accommodations are also available for academic and research organizations.

For more information, contact the director, Center for Environmental Studies, Tempe Center (University and Mill), 602/965-2975.

### CONSORTIUM FOR INSTRUCTIONAL INNOVATION

The Consortium for Instructional Innovation (CII) is a multidisciplinary unit committed to developing and supporting new pedagogical and technological approaches to teaching. CII uses a vast system of university resources to provide members of the university teaching community the opportunity to combine their talents and expertise with the latest technologies in producing beneficial new teaching methods.

CII combines existing teaching methods with technological options such as the use of computers, videotape, computer animation, and laser disks to create the best possible instructional methods.

CII offers assistance and financial aid to members of the teaching community who seek to develop projects in improving the quality of education at ASU. In evaluating proposals for curricular innovation, CII considers the applicability of projects to other areas and settings, the impact of projects on both students and faculty, and the commitment from the college or department in support of proposed programs.

In addition to developing teaching methods, CII periodically sponsors workshops and serves as a clearing house for information and referrals.

The units that make up CII are Computer and Network Consulting Services, University Libraries, University Media Systems, the University Program for Faculty Development, and the Writing across the Curriculum program.



# Fees, Deposits, and Other Charges

The Arizona Board of Regents reserves the right to change fees and charges without notice. The current semester *Schedule of Classes* generally reflects the up-to-date fee amounts.

The following fees apply to both credit and noncredit (audit) registrations and are subject to change.

## DEFINITIONS

*Resident tuition* refers to the charge assessed to all students who register for classes at ASU. *Nonresident tuition* refers to additional charges assessed to nonresidents, as established in Arizona Board of Regents' Policy 4-102.

## ACADEMIC YEAR TUITION

The resident and nonresident tuition for fall and spring semesters is shown in the "1995-96 Resident and Nonresident Tuition" table below. The amounts listed are per academic semester. For more information on classification for fee status, see "Residency Classification Procedures and Policies," on pages 38-39.

All graduate students pay a resident tuition, the amount of which depends on the number of semester hours for which the student is enrolled. Nonresidents of Arizona pay nonresident tuition in addition to a resident tuition. For assessing tuition, the number of semester hours includes both credit and noncredit (audit) course work. *Note:* The rate for one hour is charged if the student is registered for only a zero-hour class.

**College of Law Fees.** Rates for full-time law students admitted in fall 1993 or later are \$1,000.00 more per semester than the standard resident or nonresident rates. Students admitted to the College of Law before the fall 1993 semester pay the standard tuition. See the current semester *Schedule of Classes* for fee amounts.

**Summer Sessions Fees.** The 1996 registration fee per semester hour is \$99.00 except for law students. The registration fee per semester hour for law students is \$203.00. For more information, see page 51 and the *Summer Sessions Bulletin*.

## OTHER FEES, DEPOSITS, AND CHARGES

**Special Class Fees and Deposits.** Certain university classes require payment of fees or deposits for materials, breakage, and rentals. These fees and deposits are listed in the *Schedule of Classes* for each semester. See the "Special Class Fees and Deposits" table on pages 39 and 368-369.

**Student Recreation Complex Fee.** All students (except university employees) who take at least one class at ASU Main must pay a mandatory Student Recreation Complex fee. Full-time (seven or more hours) students are charged \$25.00 per semester. Part-time

1995-96 Resident and Nonresident Tuition<sup>1</sup>

Semester Hours	Resident Tuition <sup>2</sup>	Nonresident Students	
		Nonresident Tuition	Total Tuition <sup>2</sup>
1	\$ 99	\$ 231	\$ 330
2	198	462	660
3	297	693	990
4	396	924	1,320
5	495	1,155	1,650
6	594	1,368	1,980
7	942	1,386	2,310
8	942	1,698	2,640
9	942	2,028	2,970
10	942	2,358	3,300
11	942	2,688	3,630
12 or more	942	3,014	3,956

<sup>1</sup> Tuition is subject to change for 1996-97 and 1997-98.

<sup>2</sup> In addition to tuition, students are charged other fees (e.g., the Student Recreation Complex fee and financial aid trust fee). Students admitted to the College of Law are charged the appropriate resident or nonresident amount plus an additional fee. In 1995-96 the additional fee was \$1,000.

students pay \$12.00 per semester, and summer students pay a per semester hour fee. See the current semester *Schedule of Classes* for more information.

**Financial Aid Trust Fee.** All students must pay a financial aid trust fee. Full-time (seven or more hours) students are charged no more than one percent of the current tuition. The fee for students enrolled six or fewer hours is half that charged full-time students. The total summer sessions fee does not exceed the amount for a full-time student. Fees collected from students are matched by the State of Arizona and used to create a Financial Aid Trust Fund, from which student grants are awarded under the usual financial aid eligibility criteria.

#### Late Registration

Fee is assessed on registrations beginning with the first day of each session ..... \$10.00

#### Admission Application

Nonrefundable fee for degree applications is ..... \$35.00  
Nonrefundable fee for nondegree or readmission applications is ..... \$10.00

#### Transcripts

Official transcripts for currently enrolled students ..... \$1.00 each  
Official transcripts for nonenrolled students ..... \$5.00/first copy

Additional copies ordered at the same time are \$1.00 each. Requests for official transcripts should be made at least two weeks in advance of the time desired.

**Graduation Application or Reapplication.** If the graduation charge is not paid on or before the date specified, a late fee of \$5.00 is added to the usual \$15.00 charge.

#### Private Music Instruction

One-half hour of instruction weekly ..... \$40.00  
One hour of instruction weekly ..... \$60.00  
More than one hour of instruction weekly—music majors only ..... \$60.00

#### Musical Instrument Rental Charge

Charge for use of university-owned musical instruments ..... \$25.00  
Consult the School of Music for specific information.

#### Binding and Microfilm Fees

Binding Fee for Thesis or Dissertation ..... \$17.00 per copy

This fee is subject to change. Additional charges may be required depending on the size and nature of the document.

Dissertation Microfilming Fee ..... \$50.00

This fee is subject to change.

#### ID Card

Replacement fee ..... \$5.00

**Parking Decals.** A parking decal must be purchased, in person or by using the Park Smart Touch-Tone telephone system 602/921-PARK (7275), for motor vehicles parked on campus except in areas where metered parking or visitor lots are available. Photo identification is required. Annual decals range from \$45.00 to \$105.00 for controlled access parking. For more decal sales information, call 602/965-6124.

Each vehicle registered at ASU Parking and Transit Services must comply with Arizona emission standards (ARS § 15-1627G) during the entire registration period. The fee for this emission inspection is \$10.00 to \$20.00 per vehicle.

Everyone is encouraged to support travel reduction measures by using mass transit, the university shuttle bus, carpooling, bicycling, or walking whenever possible. See "Transportation" below for more information.

**Parking Violations.** Due to high demand, parking regulations are strictly enforced. Fines range from \$10.00 to \$50.00. Appeals to parking citations may be filed within 14 calendar days to Parking and Transit Services and, after payment, may be further appealed to the Parking Citation Appeals Board. Unpaid parking citations are delinquent financial obligations subject to provisions of the "Delinquent Financial Obligations" section, page 38. Any person owing three or more unpaid parking citations or \$100.00 in unpaid parking citations is subject to impoundment. A \$50.00 minimum fee is assessed if impoundment is required. If the vehicle is towed, an additional charge is applied. For more information, call 602/965-4527.

**Returned Checks.** Checks returned by a bank are assessed a \$10.00 service charge with repayment needed within five business days of notification. A second \$10.00 service charge is made if the returned check is not repaid within this five-day period. Repayment of a returned check must typically be in cash.

The university may have arrangements with its bank to redeposit automatically for a second time checks for which there are insufficient funds. No service charge is assessed by ASU until a check is returned to ASU; however, the payer may be assessed a service charge by the payer's financial institution.

Students paying registration fees and tuition with a check that is subsequently not honored by a financial institution are subject to involuntary withdrawal from the university if repayment is not made. All students involuntarily withdrawn are charged tuition and/or registration fees according to the standard refund schedule as of the involuntary withdrawal date, as determined by the university.

**On-Campus Housing.** The cost of on-campus housing varies. In 1995-96 the most typical cost is \$2,580.00 per academic year. Meal plans are purchased separately. For more information, see "Student Development and Residential Life," pages 31-32 of the *General Catalog* or call 602/965-3515.

#### TRANSPORTATION

To reduce air pollution and traffic congestion, students are encouraged to travel to and from campus by means other than automobile. Nearby on-campus automobile parking space is limited and tightly controlled.

Alternative transportation modes are used by many thousands of ASU students. ASU is served by a Phoenix-area regional bus service; monthly and reduced-fare semester passes are available on campus. In addition, an inexpensive express shuttle runs between ASU Main in Tempe and ASU West in northwest Phoenix, and a Free Local Area Shuttle (FLASH) is available around the periphery of ASU Main.

Bicycle ridership at ASU is estimated to be more than 12,000 students daily. Ample racks in many locations enable the parking and securing of bicycles. Bicycle use is restricted only in those areas of campus where pedestrian traffic is sufficiently heavy to make such use a hazard. The Bike Co-op Repair Service provides assistance with bicycle maintenance.

Also, careful class scheduling, when possible, can reduce a student's transportation needs. For more information, call 602/965-1072.

**PAYMENT METHODS AND DEADLINES**

**InTouch.** The InTouch system, at 602/350-1500, allows students to register for classes, to drop/add, and to make fee payment from any Touch-Tone phone. Fees can be paid from any Touch-Tone phone with available financial aid, debit cards, VISA, and MasterCard. Refer to the *Schedule of Classes* for available dates and times and more information about the InTouch system.

**Debit/Credit Cards.** ASU accepts debit cards, VISA, and MasterCard. Debit/credit card payments through InTouch are processed online with the bank. See the *Schedule of Classes* for information about using debit/credit cards by mail or campus payment boxes.

**Check.** Checks payable for the exact amount of charges and without a restrictive endorsement are generally acceptable, except for students on check use suspension due to a previously returned check.

**Financial Aid.** Students receiving financial aid may use their expected aid to pay university charges, including tuition and fees. Students who wish to do so must follow specified procedures. See the current semester *Schedule of Classes* for more information.

**Veterans Deferred Payment.** The Veterans Readjustment Assistance Act allows veterans to apply for deferred payment of registration fees. A Certificate of Eligibility must be presented. Contact the Veterans Services Section for information on meeting the necessary requirements. The university may deny this privilege to students with previous delinquent obligations.

**Payment Deadlines.** Fees must be paid by the deadline dates and times indicated or the registration is voided. A fee payment deadline is printed on all Schedule/Billing Statements and in the *Schedule of Classes*.

**REFUNDS**

**Academic Year Resident and Non-resident Tuition.** Students withdrawing from school or individual classes receive a refund as follows:

Withdrawal Date	Refund
Before first day of the semester	100% less \$10.00
One through 7 calendar days	80%
8 through 14 calendar days	60%
15 through 21 calendar days	40%
22 through 28 calendar days	20%
After the 28th calendar day	No refund

The university provides a prorated refund for first-time students receiving financial aid; therefore, the refund schedule is the minimum amount refundable to these students.

Withdrawal occurs on the calendar day that withdrawal is requested, either in person at a registrar site or by phone using InTouch, the ASU Touch-Tone telephone system for registration and fee payment. Students withdrawing for medical or other extenuating circumstances may contact the Comptroller's Office Student Fee Payment Section, SSV B235, for refunds that may be available under these circumstances.

**Summer Sessions Fees.** Students withdrawing from any summer session or individual classes receive a refund as follows:

Withdrawal Date	Refund
Before first day of session	100%*
First and second days of session	80%*
Third day of session	60%*
Fourth day of session	40%*
Fifth day of session	20%*
After fifth day of session	No refund

\* A \$10.00 processing fee is subtracted per session.

Refunds are based on the session days and not the class meeting dates for any particular class.

**Special Class Fees.** Refunds, if any, are determined by the department offering the course. Refund determination is based on withdrawal date, type of activity, and costs already assessed by the department.

**Private Music Instruction.** If a student must drop a music course because of illness or other emergency beyond the student's control, not more than

half of the instruction charge may be refunded, as determined by the School of Music.

**Late Registration.** This fee is not refundable.

**Student Recreation Complex Fee.** This fee is refundable only upon complete withdrawal in percentage increments per the refund schedule.

**Financial Aid Trust Fee.** This fee is not refundable.

**Official Transcripts.** Overpayments by mail of \$5.00 or less are only refunded by specific request.

**Graduation Fee.** Overpayments by mail of \$5.00 or less are refunded only by specific request.

**Residence Halls.** Refunds to students departing from residence halls before the end of the academic year are computed on the following basis:

*Charges and Deposits.* Housing payments and deposits are refunded as prescribed by the Residential Life License Agreement that students sign when they apply for residence hall accommodations. Students should refer to this document for specific information on refunds.

**Other University Charges.** Other university charges are normally not refundable, except for individual circumstances.

**Payment of Refunds.** Refunds require student identification and are made for the net of amounts due the university. When the last day of a refund period falls on a weekend or holiday, a withdrawal form must be submitted to one of the registrar sites during operating hours on the workday preceding the weekend or holiday. Refunds are normally paid by check and are mailed to the student's local address.

**Parking Decals.** Prorated refunds are available through the last business day in April.

**Forfeiture of Refunds.** Refunds are subject to forfeiture unless obtained within 90 days of the last class day of the semester for which the fees were originally paid.

## DELINQUENT FINANCIAL OBLIGATIONS

Arizona Board of Regents' Policy 4-103B, which applies to ASU, states the following:

1. Each university shall establish procedures to collect outstanding obligations owed by students and former students.
2. Each university shall maintain a system to record all delinquent financial obligations owed to that university by students and former students.
3. Students with delinquent obligations shall not be allowed to register for classes, purchase parking decals, receive cash refunds, or obtain transcripts, diplomas, or certificates of degree. The university may allow students to register for classes, obtain transcripts, diplomas or certificate of degree if the delinquent obligation is \$25.00 or less.
4. Unpaid obligations shall remain a matter of record until students and former students satisfy their financial obligations or until satisfactory arrangements for repayment are made with the university.
5. The university may write off delinquent financial obligations of students according to accepted accounting principles and after appropriate collection efforts. No such write-off shall operate to relieve the student of liability for the obligation nor shall such write-off entitle the student to release of any transcript, diploma or certificate of degree or to register for further university classes until such obligation is actually paid.
6. Each university shall include this policy in its bulletin or catalog.

A late charge of \$10.00 is made for any balances due the university not paid within 30 days of the initial due date, with a second \$10.00 late charge being made if these amounts are not paid within 30 days of the first late charge. Procedures to be followed for disputed charges are available from the Accounts Receivable Section of the Business Services Office, located in ADM 109.

## RESIDENCY CLASSIFICATION PROCEDURES AND POLICIES

The Arizona Board of Regents is required by law to establish uniform guidelines and criteria for classifying students' residency to determine those students who must pay nonresident tuition. The following is a summary of the general guidelines used to determine residency for tuition purposes. All of the evidence is weighed under the presumption that a nonresident student's presence in Arizona is primarily for the purpose of education and not to establish domicile and that decisions of an individual about the intent to establish domicile are generally made after the completion of an education and not before.

To obtain resident status for tuition purposes, independent students must establish their residence in Arizona at least one year immediately before the last day of regular registration for the semester in which they propose to attend ASU. Arizona residence is generally established when individuals are physically present in the state with the intention of making Arizona their permanent home.

Mere physical presence in Arizona for one year does not automatically establish residency for tuition purposes. Adult students and emancipated minors must combine physical presence in Arizona for one year with objective evidence of their intent to make Arizona their permanent home. If these steps are delayed, the one-year period is extended until both presence and intent have been demonstrated for one full year. In addition to physical presence and intent, the student must demonstrate financial independence for the two tax years immediately preceding the request for resident classification. The student must demonstrate objective evidence of self-support and that he or she was not claimed as an income tax deduction by his or her parents or any other individual for two years. An adult student is defined as being at least 18 years of age at the beginning of the domicile year. For a complete definition of an emancipated minor, refer to the Arizona Board of Regents' residency classification policies, available in the Residency Classification Section, SSV B115.

No person is considered to have gained or lost resident status merely by

attending an out-of-state educational institution.

**Aliens.** Students who are aliens are subject to the same requirements for in-state residency as are U.S. citizens. In establishing domicile, aliens must not hold a visa that prohibits establishing domicile in Arizona.

**Refugees.** Refugees may qualify as in-state students by virtue of having been granted refugee status in accordance with all applicable laws of the United States and having met all other requirements for residence in Arizona.

### Exceptions to the General Residency Rule

Students may be eligible for resident status for tuition purposes if they can meet one of the following criteria on or before the last day of regular registration.

**Legal Dependents.** If a student and his or her parents are domiciled in Arizona and have not met the one-year residency requirement but the parents are entitled to claim the student as a dependent for federal and state tax purposes, the student may be eligible for resident status for tuition purposes.

**Transferred Employees.** If students are domiciled in Arizona and have not met the one-year residency requirement but are employees or spouses of employees who have been transferred to Arizona by their employers for employment purposes, the students may be eligible for resident status for tuition purposes.

**Members of the Military.** If students are not domiciled in Arizona but are members of the U.S. Armed Forces stationed in Arizona or are the spouses or dependent children of a member (as defined in A.R.S. § 43-1001), the students may be eligible for resident status for tuition purposes. If military service is concluded while they are enrolled, students do not lose resident status while they are continuously enrolled in a degree program. If individuals are domiciled in Arizona immediately before becoming members of the U.S. Armed Forces, they do not lose resident status because of their absence while on active duty with the military as long as they maintain Arizona affiliations and state tax filing status consistent with a claim to Arizona residence during their absence.

**Native Americans.** Students who are members of a Native American tribe whose reservation lies both in Arizona and an adjacent state and who are residents of that reservation may be eligible for resident status for tuition purposes.

**Procedures for Establishing Residency Status**

All students are responsible for obtaining residency classification for tuition purposes before registering and paying their fees. This procedure requires students to complete and file a domicile affidavit form. This form is required of all new and returning students as part of the admission or readmission process. Students classified as nonresidents who believe they may qualify for resident status must file a petition with the Residency Classification Section. This petition must be filed by the last day of regular registration. A student seeking resident status must also file supporting documentation necessary to provide a basis for resident classification (source[s] of support, driver's license, voter's registration, vehicle registration, etc.). Students whose residency petitions are in process at the fee payment deadline are responsible for paying nonresident tuition and fees. However, an appropriate refund is issued if residency is later granted for that semester.

*Any student found to have made a false or misleading statement concerning residency or tuition status is subject to dismissal from the university.*

Failure to file a timely written petition for reclassification of residency

status for tuition purposes constitutes a waiver of the student's right to apply for the given semester. Petition deadlines are published each semester in the *Schedule of Classes*.

Residency classification is an extremely complex issue. The information presented here is a summary and does not address each individual's situation; therefore, students are encouraged to make a personal visit to the Residency Classification Section to discuss their individual circumstances as soon as possible. Guidelines for determination of residency for tuition purposes are subject to review and change without notice. For more information, call the Residency Classification Section at 602/965-7712.

**Graduate Assistantships, Scholarships, and Loans**

**Application Procedure.** Since it is necessary for all applicants to be admitted to degree programs before awards are made, students should apply for admission through the Graduate Admissions Office at the same time they apply for financial assistance.

**Graduate Assistantships and Associateships.** Appointments as graduate assistants and associates are available in most academic units offering graduate work to students admitted with regular status. Students who have completed a master's degree or the equivalent may be considered for graduate associateships when available.

All graduate assistants and associates must enroll for a minimum of six semester hours during each semester of their appointment. The six hours cannot include audit enrollment. A half-time (50%) graduate assistant or associate working 20 clock hours per week may not register for more than 12 hours of course work each semester; a third-time (33%) assistant or associate for more than 13 hours; and a quarter-time (25%) assistant or associate for more than 15 hours.

During the summer sessions, graduate assistants employed 25% time may enroll for a maximum of six semester hours during a five-week session or nine hours during the eight-week session; those employed 50% time may enroll for a maximum of five hours during a five-week session or seven hours during the eight-week session; and those employed 100% time may enroll for a maximum of three hours during a five-week session or four hours during the eight-week session.

Out-of-state tuition is waived (but not the registration fee) for all graduate assistants and associates working 25% or more time if their first working day occurs before the end of the first five days of instruction during the semester in question.

A number of academic units administer assistantships under research programs sponsored and supported by government, industry, and foundations. Inquiries concerning requirements and deadlines as well as applications should be sent to the head of the appropriate academic unit.

**Special Class Fees and Deposits**

Refunds of special class fees and deposits are processed automatically if the related course is dropped during the first week of class. After the first week, refunds, if any, are determined by the department offering the course. Refund determination is based on withdrawal date, type of activity, and costs already incurred by the department. For more information, see "Fees, Deposits, and Other Charges," pages 35-38, and "Refunds," page 37.

**Special Fees**

ART 401	Non-Silver Photography .....	\$30.00	ART 427	Advanced Watercolor .....	40.00
ART 402	Senior Projects .....	25.00	ART 431	Special Problems in Sculpture .....	20.00
ART 404	Portraiture Photography .....	25.00	ART 437	Dimensional Animation .....	20.00
ART 405	Advanced Color Photography .....	35.00	ART 452	Advanced Lithography .....	40.00
ART 407	View Camera .....	35.00	ART 454	Advanced Screenprinting .....	30.00
ART 414	Advanced Life Drawing (ASU Main only) .....	25.00	ART 455	Advanced Photo Processes and Printmaking .....	25.00
ART 414	Advanced Life Drawing (ASU West only) .....	20.00	ART 460	Ceramic Clay .....	25.00
ART 415	Art Anatomy .....	20.00	ART 463	Ceramic Glaze .....	25.00
ART 425	Advanced Figure Painting (ASU Main only) .....	25.00	ART 466	Special Problems in Ceramics .....	25.00
ART 425	Advanced Figure Painting (ASU West only) .....	20.00	ART 472	Advanced Jewelry .....	15.00

See "Special Class Fees and Deposits," continued on pages 368-369.

**Assistantships, Associateships, and Commercial Services.** All graduate students who are hired for class/course support or who hold assistantships or associateships for a specific course—including teaching assistants, research assistants, and graduate assistants—may not take or provide notes for that course to commercial notetaking services or students. An exception may be made by the course instructor(s) on a case-by-case basis as an authorized support service for a disabled student. This policy covers all commercial activities (e.g., notetaking and paid review sessions) that might be associated with a course for which the assistant/associate has assigned responsibilities.

### DEFINITIONS

*Registration fee* refers to the fee charged to all students who register for classes at ASU. *Tuition* refers to additional charges assessed to nonresidents, as established in Arizona Board of Regents' Policy 4-102.

### SCHOLARSHIPS

**Regents Graduate Academic Scholarships.** Regents Graduate Academic Scholarships are available on a competitive basis to graduate students with outstanding academic records. This scholarship covers the *registration fee only* (not *nonresident tuition*) and is granted for the academic year or one semester only (not including summer sessions). Applicants must be regularly admitted to a graduate degree program; continuing students must also be in good standing (3.00 postbaccalaureate GPA at ASU). A graduate student may be nominated for this scholarship by the head of the student's academic unit. Application forms and further information may be obtained from each academic unit. Forms are also available from the Graduate College. Applications should be completed and returned to the academic unit. The Graduate College does not accept direct applications. Applicants must meet deadlines established by the academic units and the Graduate College.

**Regents Graduate Tuition Scholarships.** Regents Graduate Tuition Scholarships are available on a competitive basis to nonresident graduate students with outstanding academic

records. This scholarship covers *non-resident tuition only* (not the *registration fee*) and is granted for the academic year or one semester only (not including summer sessions). Applicants must be regularly admitted to a graduate degree program; continuing students must also be in good standing (3.00 postbaccalaureate GPA at ASU). Application forms and further information may be obtained from each academic unit. Forms are also available from the Graduate College. Applications should be completed and returned to the academic unit. The Graduate College does not accept direct applications. Applicants must meet deadlines established by their academic unit and the Graduate College.

**Sponsored Scholarships.** The scholarships listed below are offered through the Graduate College.

**Herman E. DeMund Memorial Scholarship.** This is an annual award of at least \$2,000.00 for a deserving graduate student at ASU. Students who are regularly admitted to a graduate degree program are eligible to be nominated for this award. Nominations are made by the heads of the individual academic units to the Graduate College and the recipient is chosen from these nominees. The selection for this award is made on the basis of scholastic ability. The deadline for the submission of nominations is announced by the Graduate College.

**Phelps Dodge Scholarships.** Two graduate scholarships of \$5,000.00 are awarded to regularly admitted graduate students who are residents of Arizona and graduates of ASU. Awards for any academic year are limited to (1) a student chosen from the engineering student body for advanced study in mining, geology, metallurgy, or other fields allied with or pertaining to the mineral industry, or, if no suitable candidate is available for postgraduate study in these fields, then for advanced study in any engineering field, and (2) a student chosen from the student body for advanced study in any field that the student may select and for which he or she may be qualified. Nominations are made by the head of the individual academic unit to the Graduate College and the recipients are chosen from those

nominees. The selection for these awards is made on the basis of academic achievement. The deadline for the submission of nominations is announced by the Graduate College.

**James J. Sweitzer Memorial Scholarship.** This annual award provides a \$1,500.00 stipend to a graduate student in Agribusiness. Regularly admitted in-state or out-of-state graduate students planning a career in agribusiness are eligible to apply as first- or second-year students. The minimum GPA requirement is 3.25 on a 4.00 scale. The selection committee considers financial needs but gives preference to high scholarship and potential in the field. Detailed information and application forms are available at the Graduate College.

**Travel and Research Grants.** The Graduate Student Research Office (GSRO) funds small grants to support graduate student research. These grants usually are made to defray expenses incurred by students completing their theses or dissertations. The Graduate College funds travel grants for doctoral students who wish to present their research results at regional and national conferences. Meeting scholars in their fields and participating with faculty in professional organizations presents opportunities for students to get involved in activities that will become central to their professional lives.

**Other Forms of Scholarship Support.** Students are encouraged to contact the academic unit in which they intend to study and the Scholarship Office in the Student Services Building to determine if other sources of support are available.

The Graduate College publishes *Grad News*, a newsletter listing current grant and scholarship information. Reference books on national and regional scholarships for which students may be eligible are on reserve at Hayden Library. Announcements are available for review in Center Lobby, Wilson Hall.

**Loans.** Loans are available to students enrolled in graduate programs to meet reasonable educational expenses. Inquiries should be sent to the Director of the Student Financial Assistance Office, Student Services Building, 602/965-3355.

# Classification of Courses

See pages 382–383 for the  
“Course Prefix Index.”

## COURSE INFORMATION

Information about all lower- and upper-division courses offered at ASU Main and about all ASU graduate courses appears in the *General Catalog*, published biennially every other spring. Classes scheduled for the current or upcoming fall or spring semester are listed in the *Schedule of Classes*, published before the beginning of registration. Classes scheduled for the summer sessions are listed in the *Summer Sessions Bulletin*, published every spring. Information about courses that apply toward graduate programs also appears in the *Graduate Catalog*, published biennially. Information about lower- and upper-division courses offered at ASU West appears in the *ASU West Catalog*, published annually.

## COURSE NUMBERING SYSTEM

### 100–299 (Lower-Division) Courses.

Lower-division courses are designed primarily for freshmen and sophomores. Certain classes are closed to freshmen who lack the designated prerequisites or whose majors are outside the unit offering the course. This information is available in the *General Catalog*, in the *Schedule of Classes*, or from the student’s academic advisor.

### 300–499 (Upper-Division) Courses.

Upper-division courses are designed primarily for juniors, seniors, and other advanced students. Prerequisites and other restrictions should be noted before registration. Courses at the 400 level apply to graduate degree requirements for individual programs of graduate study when approved by the Graduate College. See “Reserving of Course Credit by Undergraduates” on page 49.

### 500–799 (Graduate-Level) Courses.

Graduate-level courses are designed for graduate students. However, an upper-division undergraduate student may enroll in these courses with the approval of the student’s advisor, the course instructor, the department chair, and the dean of the college in which the course is offered. If the course does not meet an undergraduate graduation requirement, it may be eligible for use in a future graduate program on the same basis as work taken by a nondegree graduate student. See “Reserving of Course Credit by Undergraduates” on page 49.

**Continuing Registration.** Courses numbered 595, 695, and 795, Continuing Registration, carry one semester hour of credit; however, the student receives neither credit nor grade for the course.

**Omnibus Courses.** The omnibus numbers are used for courses offered on a one-time or tutorial basis or for courses in which the content is new or periodically changes. Academic units use their own prefixes before omnibus course numbers. The general nature of the work required for a particular omnibus course is consistent from unit to unit, but subject matter varies. Omnibus courses are often offered for a variable number of semester hours. See the appropriate academic unit in the *General Catalog* or major in the *Graduate Catalog* for the omnibus course listing under a subject area.

## OMNIBUS GRADUATE COURSE DESCRIPTIONS

- 500, 600, 700 Research Methods.** (1–12)  
Course on research methods in a specific discipline.
- 580, 680, 780 Practicum.** (1–12)  
Structured practical experience in a professional program, supervised by a practitioner and/or faculty member with whom the student works closely.
- 583, 683, 783 Field Work.** (1–12)  
Structured, supervised field experience in a field science or other discipline requiring experience in field techniques.
- 584, 684, 784 Internship.** (1–12)  
Structured practical experience following a contract or plan, supervised by faculty and practitioners.
- 590, 690, 790 Reading and Conference.** (1–12)  
Independent study in which a student meets regularly with a faculty member to discuss assignments. Course may include such assignments as intensive reading in a specialized area, writing synthesis of literature on a specified topic, writing literature review of a topic.
- 591, 691, 791 Seminar.** (1–12)  
A small class emphasizing discussion, presentations by students, and written research papers.
- 592, 692 Research.** (1–12)  
Independent study in which a student, under supervision of a faculty member, conducts research that is expected to lead to a specific project such as a thesis or dissertation, report, or publication. Assignments might include data collection, experimental work, data analysis, or preparation of a manuscript.
- 593, 693, 793 Applied Project.** (1–12)  
Preparation of a supervised applied project that is a graduation requirement in some professional majors.
- 594 Conference and Workshop.** (1–12)  
Topical instruction, usually in compressed format, leading to academic credit. Often offered off campus to groups of professionals.



**595, 695, 795 Continuing Registration.** (1) Used in situations where registration is necessary but where credit is not needed. Replaces arbitrary enrollment in reading and conference, research, thesis, dissertation, etc. Used by students when taking comprehensive examinations, defending thesis or dissertation, or fulfilling the continuous enrollment requirement in doctoral programs. Credit is not awarded, and no grade is assigned.

**598 Special Topics.** (1-4) Topical courses not offered in regular course rotation—e.g., new courses not in the catalog, courses by visiting faculty, courses on timely topics, highly specialized courses responding to unique student demand.

**599 Thesis.** (1-12) Supervised research focused on preparation of thesis, including literature review, research, data collection and analysis, and writing.

**792 Research.** (1-15) Independent study in which a student, under supervision of a faculty member, conducts research that is expected to lead to a specific project such as a dissertation, report, or publication. Assignments might include data collection, experimental work, data analysis, or preparation of a manuscript.

**799 Dissertation.** (1-15) Supervised research focused on preparation of dissertation, including literature review, research, data collection and analysis, and writing.

The preceding courses are described in announcements of the Graduate College and are also available in the respective departments. Under special circumstances, arrangements may be made at the dean's request, through the

approval of the senior vice president and provost, to increase the standard semester hours of credit.

**LAW 597, 697, and 797.** The numbers 597, 697, and 797 have been reserved for the Visiting Student Program in the College of Law.

**Prerequisites and Corequisites.** Some requirements, known as prerequisites, must be met *before* registering for a course. Other requirements, called corequisites, must be met *while* taking a course. A student registering for a course should be able to show that prerequisites have been met and that corequisites will be met as stated in the catalog or *Schedule of Classes* or must otherwise satisfy the instructor that equivalent preparation has been completed.

**International Program Courses.** Courses with the prefix IPO numbered 495 and 595 are reserved for International Programs study abroad and exchange programs. For most programs, participating students register for 18 semester hours. Following completion of an international program, undergraduate students receive credit for the study completed, with a minimum of 12 semester hours and a maximum of 18 semester hours, graduates with a mini-

imum of six semester hours and a maximum of 12 semester hours.

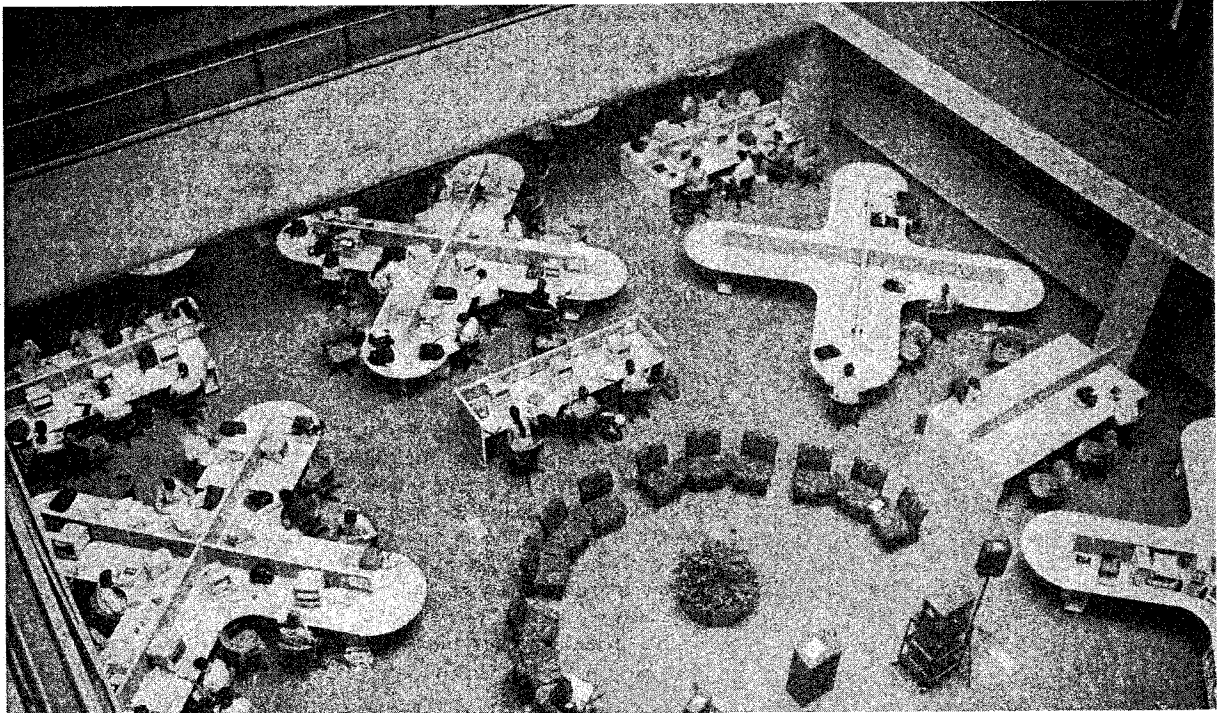
IPO courses numbered 494 and 598 may be taken for one semester hour. Students register for these courses under the title "Study Abroad." At the conclusion of the program and the transfer of overseas courses to the students' ASU records, a grade of "Y" is entered for the course.

For some special international programs, students register and receive credit for fewer semester hours.

#### Key to Course Listing Codes

Code	Definition
M	ASU Main campus code*
W	ASU West campus code*
GLG	Example of a departmental prefix designation
410	Example of a course number
(3)	Example of course semester hours
F	Course offered fall only
S	Course offered spring only
SS	Course offered summer session only
F, S	Course offered both semesters
A	Course offered once a year
F '96	Course offered every other year on semester indicated
N	Course not regularly offered

\* Campus codes are not used in the catalogs but appear in the *Schedules of Classes*.





# Graduate Studies at ASU Main

## GRADUATE DEGREES AND MAJORS

The Graduate College at ASU provides students with opportunities to study beyond the bachelor's degree. The college enrolls students in programs leading to both professional and research-oriented advanced degrees. The Master of Arts, Master of Science, and Doctor of Philosophy degrees are awarded to students completing programs that culminate in research. The Doctor of Philosophy degree is the highest university award, conferred on candidates who have proven their ability as scholars and original researchers.

Professional graduate programs emphasize training that leads to professional practice. In these degree programs, students develop a mastery of a comprehensive body of knowledge and the ability to organize and carry out significant investigations in their professional field. Professional degrees usually are named Master of (Professional Field) and Doctor of (Professional Field), although some Master of Arts and Master of Science degree programs have professional tracks. The professional doctoral degree is the highest university award to candidates completing academic preparation for professional practice. The following professional degrees are offered through the Graduate College:

- Master of Accountancy
- Master of Architecture
- Master of Business Administration
- Master of Computer Science
- Master of Counseling
- Master of Education
- Master of Environmental Planning
- Master of Fine Arts
- Master of Health Services Administration
- Master of Laws
- Master of Mass Communication
- Master of Music
- Master of Natural Science
- Master of Public Administration
- Master of Science in Design
- Master of Science in Engineering
- Master of Social Work
- Master of Taxation
- Master of Teaching English as a Second Language
- Master of Technology
- Doctor of Education
- Doctor of Musical Arts
- Doctor of Public Administration

Faculty members offering a specific graduate degree program may be members of a single academic unit (such as a department, school, or college), or they may form an interdisciplinary committee consisting of faculty from various academic units. The Graduate College awards degrees upon the recommendation of the faculty offering the graduate degree programs.

## Interdisciplinary Study

Although most graduate programs are administered by academic units, a diverse group of interdisciplinary programs falls directly under the supervision of the Graduate College. Many majors are in fields that are still emerging as recognized academic disciplines and, therefore, do not customarily form the academic basis for departments. Other fields of study are inherently interdisciplinary and do not fit well with conventional disciplines around which departments are formed. Curricula must reflect intrinsically broad disciplinary affinities, and faculty must be drawn from more than one department.

The Graduate College oversees eight interdisciplinary programs and has joint responsibility with the College of Education for another; several others are planned. Existing interdisciplinary programs are as follows:

- Adult Development and Aging Program (Certificate in Gerontology)
- Creative Writing (M.F.A.)
- Curriculum and Instruction (Ph.D.) (jointly administered with the College of Education)
- Exercise Science (Ph.D.)
- Justice Studies (Ph.D.)
- Public Administration (D.P.A.)
- Science and Engineering of Materials (Ph.D.)
- Speech and Hearing Science (Ph.D.)
- Statistics (M.S.)

Other interdisciplinary programs include Communication (Ph.D.) (administered by the College of Public Programs), Humanities (M.A.) (administered by the College of Liberal Arts and Sciences), and Molecular and Cellular Biology (Ph.D.) (administered by the College of Liberal Arts and Sciences).

Each of these programs uses resources and faculty from several disciplines. The programs promote cooperative research and instruction among faculty who share common interests but are housed in different academic units.

They allow students to pursue degrees that are intellectually coherent but that bring together diverse strengths of the university.

### Certificate Programs

A number of certificate programs are offered by various academic units or programs on campus:

**Adult Development and Aging Program**  
Gerontology

**Arizona Center for Medieval and Renaissance Studies**  
Medieval Studies  
Renaissance Studies

**Department of Anthropology**  
Museum Studies

**ASU West**  
Accountancy

**College of Business**  
Financial Management and Control  
Investment Valuation and Management  
Treasury Management

**Department of History**  
Scholarly Publishing

**Department of Languages and Literatures**  
Translation

**School of Technology**  
Hazardous Materials and Waste Management

### ADMISSION TO THE GRADUATE COLLEGE

#### Eligibility

Anyone who holds a bachelor's (or equivalent) or graduate degree from a college or university of recognized standing is eligible to apply for admission to the Graduate College. Remedies for undergraduate deficiencies may be assigned if the undergraduate degree is based on credits not accepted by ASU, such as life experience or non-credit workshops and seminars.

#### Graduate College Requirements

Generally, an applicant must have a GPA of 3.00 (scale is 4.00 = A), or the equivalent, in the last two years of work leading to the bachelor's degree. A student who enters a graduate degree program is expected to have undergraduate educational experiences, in-

cluding general education studies, that are similar to those required for the baccalaureate degree at ASU.

#### Requirements of the Academic Unit

Academic units, departments or colleges, may have admission requirements in addition to those of the Graduate College. Many graduate programs require scores from a national admissions test such as the Graduate Record Examination (GRE), Graduate Management Admission Test (GMAT), or the Miller Analogies Test (MAT). Some programs require a portfolio, letters of recommendation, or a statement of goals. Applicants should contact the academic unit regarding specific requirements.

#### Submission of an Application

U.S. citizens and permanent residents should submit the following *in one envelope* (clearly labeled "application") to

*For ASU Main*  
GRADUATE COLLEGE  
ARIZONA STATE UNIVERSITY  
PO Box 871003  
TEMPE AZ 85287-1003

*For ASU West*  
GRADUATE STUDIES  
ASU WEST  
PO Box 37100  
PHOENIX AZ 85069-7100

1. application;
2. application fee;
3. two transcripts from every college and university in which the applicant was previously enrolled;
4. appropriate test score reports (e.g., GRE, GMAT); and
5. a domicile affidavit if the applicant is a resident of Arizona.

If all materials are not available, what is available ought to be submitted with the application and fee. The rest of the materials should be submitted as soon as possible. If an academic unit has a specific deadline, the applicant must submit all required application materials to the Admissions Office *in advance of the deadline* to allow processing.

To facilitate the application process, ASU accepts personal photocopies of transcripts and test scores. Before registering for classes, every student must submit *official* transcripts.

The Graduate College accepts as *official* all transcripts submitted in sealed

envelopes, stamped and verified by the issuing institution or transcripts sent directly from another college or university. The applicant must ask Educational Testing Service to send the test results directly to the Graduate Admissions Office. The process of providing all necessary official records may take two months or longer.

Portfolios, letters of recommendation, and statements of goals should be sent directly to the academic unit.

International applicants should submit the following *in one envelope* (clearly labeled "application") to

*For ASU Main*  
GRADUATE COLLEGE  
ARIZONA STATE UNIVERSITY  
PO Box 871003  
TEMPE AZ 85287-1003

*For ASU West*  
GRADUATE STUDIES  
ASU WEST  
PO Box 37100  
PHOENIX AZ 85069-7100

1. application;
2. application fee;
3. two copies of all college and university academic records;
4. translation of all college and university academic records;
5. TOEFL score;
6. appropriate test score report (e.g., GRE, GMAT); and
7. Financial Guarantee form. (This item may be submitted at a later time.)

#### Application Fee

Each application for entry to ASU graduate programs must be accompanied by a nonrefundable application fee. The fee is \$35.00 to apply for admission to a degree program and \$10.00 to apply for nondegree studies. A student who pays the \$35.00 application fee may apply within one year to more than one degree program. A student who applies simultaneously to a degree and nondegree program must pay \$35.00.

Students currently enrolled in any ASU graduate degree program need not pay a fee to change from one program to another or to apply to a program for a higher degree than the one in which they are currently enrolled (e.g., to continue from a master's to a doctoral program). Former or present ASU nondegree students applying to a degree program must pay the \$35.00 application

fee. ASU nondegree or degree students who have not been enrolled at ASU for one or more semesters must apply to re-enter the university in their previous degree or nondegree status. Re-entry applications must be accompanied by a nonrefundable \$10.00 application fee. The re-entry fee is waived for Ph.D. students who have been granted a leave of absence and for students who were enrolled in the Graduate College within the last two semesters and session (fall, spring, or summer) before the one for which they seek re-entry.

Applicants not accepted into the degree program to which they apply, can, within one year of the time the application fee was paid, apply to another degree program or apply to be a nondegree student without paying an additional application fee.

ASU faculty, staff, or dependents who are eligible for reduced tuition rates are granted waivers of the application fee.

### International Applicants

Applicants who will attend the university while holding F-1 or J-1 visas must meet the regulations of the Immigration and Naturalization Services in addition to the requirements of the Graduate College and the academic units to which they apply.

International applicants must meet the requirements of the Graduate College as well as those of the degree programs to which they apply. Applicants from outside the United States are also required to submit additional materials and should follow the procedures described in the Graduate College brochure *Admission Information for New International Students*. International applicants should read this brochure carefully to become familiar with all the requirements they must meet and should consult it often for the instructions they must follow in submitting materials. The *Graduate Catalog* provides essential information about ASU and its graduate programs, but applicants can also consult ASU's listings in *Peterson's Graduate Education Directory* and in the *Directory of Graduate Programs* (published by the Educational Testing Service).

Among the additional materials required of international students are scores from English language examinations. All applicants whose native language is not English must submit a score from the Test of English as a For-

eign Language (TOEFL). All international applicants who do not speak English as a primary language and who wish to apply for teaching assistantships must pass an examination that certifies their skill in speaking English—either the Test of Spoken English (TSE), which may be taken in the student's home country, or the SPEAK test, which is administered at ASU. Some degree programs also require TSE or SPEAK scores of all applicants whose native language is not English. For specific information about TSE requirements, contact directly the head of the academic unit.

As required by the U.S. Immigration and Naturalization Service, international applicants must also verify that they have the financial resources to cover their expenses during graduate study at ASU. The Graduate Admissions Office provides the Financial Guarantee form to international applicants, who then must see that the form with a verification from a bank or sponsoring organization is completed and returned to Graduate Admissions. The I-20 or the IAP66 (documents needed to obtain a student visa) are issued only after the completed, properly verified Financial Guarantee form has arrived. International students may enroll at ASU only if they have been admitted to a degree program and therefore may not pursue nondegree studies. They must meet all appropriate immigration standards and requirements.

Applications are processed when they are received. However, international applicants should submit all materials in December or January in order to begin study the following fall semester and in August or September in order to begin study the following spring semester. An application fee of \$35.00 (in U.S. funds) must accompany the formal application, which otherwise is not evaluated. (See pages 44-45, "Application Fee," in this catalog regarding multiple applications and other matters relating to the application fee.)

All F-1 or J-1 visa students must have insurance coverage against illness and accident before being permitted to register. Insurance must be maintained throughout the student's enrollment in the university and may be obtained at the time of registration.

Upon arrival on campus, students must report to the advisor in the International Student Office.

### Application Deadlines

The Graduate College does not have deadlines. Applications are processed as they are received. However, many academic units have specific and early deadlines; many units review applications once a year, usually in January or February for fall admission. Applicants are urged to contact the academic units regarding deadlines. If an academic unit has a specific deadline, the applicant must submit all required application materials to the Admissions Office *in advance of the deadline* to allow processing.

### Application Procedures

When the Graduate Admissions Office has a complete file (the application, Domicile Affidavit, application fee, transcripts, and the TOEFL, if required) for an applicant, one copy is forwarded to the academic unit. A second copy is kept in the Graduate College. Academic units review the file and the supporting materials (such as applicable test scores, portfolios, and letters of recommendation) and, following admission policies established by the Graduate College and the faculty of the academic unit, make a recommendation (regular admission, regular admission with deficiencies, provisional admission, or denial) to the Graduate College. All recommendations are reviewed and approved by admissions officers in the Graduate College. If there are questions about the likelihood of a student succeeding in the designated program, the Graduate College admissions officers communicate with the academic unit, perhaps agreeing on a provisional admission or arranging for the student in question to have a special faculty advisor or an advanced graduate student assigned as a mentor. Other times they may suggest that the student take some preliminary courses as a nondegree student. International students, however, may enroll at ASU only if they have been admitted to a degree program and therefore may not pursue nondegree studies. They must meet all appropriate immigration standards and requirements.

Academic units, which must indicate their willingness to admit applicants, frequently set higher standards than those established by the Graduate College. Many qualified applicants are denied because only a limited number of students are admitted each year.

### Notice of Admission Decisions

Only the dean of the Graduate College can make formal offers of admission. The Graduate College notifies all applicants in writing of the admission decision.

All documents received by the university in connection with an application for admission become the property of ASU. If the applicant does not enroll in the university within one year, the admission documents may be destroyed.

The date (month/day/year) on the Graduate College dean's letter of admission is the actual date of admission. If the student is enrolled in courses on the admission date, those courses—if applicable—may be considered part of a program of study. Courses taken the semester before this date are nondegree hours.

### Admission Classifications

**Regular Admission.** Applicants who fulfill all requirements for admission and are acceptable to both the academic unit and the Graduate College are granted regular admission.

**Regular Admission with Deficiencies.** A student whose grades and test scores are at an acceptable level but who does not have the undergraduate background expected by the academic unit and the university may be required to complete courses to remedy deficiencies. The letter of admission specifies the deficiencies that must be completed before the student is awarded a graduate degree. Deficiency courses may not be applied toward the minimum hours required for the degree program.

**Provisional Admission.** A student who does not meet minimum academic standards but has counterbalancing evidence to suggest the potential for success may be admitted on a provisional basis. Provisional admission provides an academic unit with more evidence on which to base its decision. Normally the academic unit reviews the student's status following completion of 12 semester hours of approved graduate study. At that time, the academic unit recommends to the Graduate College a change in status to either regular admission or withdrawal from the program. When students have completed their provisional requirements, they should check with their advisors to make sure that the change of status has

been recommended. A provisional student may also be assigned deficiencies.

**Nondegree Admission.** A student not interested in earning a degree or not yet ready to apply to a particular degree program may enroll as a nondegree student. The application process is streamlined, does not require submission of transcripts or test scores, and can be completed during a single visit to the Graduate Admissions Office. This process may also be completed by mail. A maximum of nine hours taken at ASU while in this category may be applied toward a master's degree if appropriate for the student's program of study.

The six-year maximum time limit applies to nondegree semester hours appearing on a master's program of study. In addition, because of limited class size and resources, certain academic units may limit the enrollment of nondegree students.

### Recognition of a Degree

Recognition of a degree is acknowledgment that the program leading to the degree is equivalent to a program offered by ASU or is an acceptable program for the proposed graduate major at ASU. A student who enters a graduate degree program at ASU is expected to have undergraduate educational experiences, including general education studies, that are appropriate for the program.

### Definition of a Unit of Credit

The Arizona Board of Regents has defined (May 26, 1979) a unit of credit for the institutions under its jurisdiction. A minimum of 45 hours of work by each student is required for each unit of credit. An hour of work is the equivalent of 50 minutes of class time (often called a "contact hour") or 60 minutes of independent study work. For lecture-discussion courses, this requirement equates to at least 15 contact hours and a minimum of 30 hours of work outside of the classroom for each unit of credit. Even though the values of 15 and 30 may vary for different modes of instruction, the minimum total of 45 hours of work for each unit of credit is a constant. Since the unit of credit as defined by the Arizona Board of Regents is the cornerstone of academic degree programs at ASU, degrees granted by other institutions that are recognized by ASU should be based on a similar unit of credit.

## GRADUATE COLLEGE PROCEDURES

### Change in Graduate Degree Program

A change from one graduate degree program to another requires a new application to the Graduate College. The usual admission procedures are followed. For details on matters relating to the application fee, see pages 44-45 of this catalog.

### Re-entry to the Graduate College

Any former graduate student who has not been in attendance at the university for one or more semesters must submit an application for re-entry to the Graduate College. The application should be submitted at least one month before the beginning of the semester in which the student plans to re-enter. For details on re-entry and other matters relating to the application fee, see pages 44-45 of this catalog.

### Withdrawal Policy

A graduate student who does not enroll for three calendar years is considered withdrawn and must reapply for admission to a degree program.

### Determination of Catalog Requirements

The *Graduate Catalog* is published biennially. Requirements for an academic unit or college, campus, or the university as a whole, may change and are often upgraded.

*In determining graduation requirements, a student may use only one catalog.*

A student graduates under the curriculum, course requirements, and regulations for graduation in effect at the time of admission to a graduate degree program at ASU. A student may also choose to graduate under any subsequent catalog issued.

Some changes in policies and procedures affect all students regardless of the catalog used by the student. These policies and procedures may appear in the catalog or in other university publications.

### Registration

Graduate students, like all university students, register during the intervals indicated in the *Schedule of Classes* issued by the Office of the Registrar. Details regarding registration and course drop-add procedures are also provided in the *Schedule of Classes*.

Day and evening graduate classes, offered on or off campus, during the two regular semesters and the summer sessions, are considered part of the regular program.

InTouch, the ASU Touch-Tone telephone system for registration and fee payment, and the online registration system, accessed at any registrar site, including one at ASU West, ease the enrollment process.

**Audit Enrollment**

Graduate students may register as auditors in one or more courses with the approval of the supervisory committee chair and the consent of the instructor involved. The student must be registered properly and pay the fees for the course. An audited course is counted in the student's maximum course load. It does not count for students who must take a minimum number of credits, e.g., teaching assistants or students receiving financial assistance. The mark of "X" is recorded for completion of an audited course, unless the instructor determines that the student's participation or attendance has been inadequate, in which case a "W" may be recorded.

**Course Withdrawal**

During the first four weeks of a semester, a student may withdraw with a mark of "W." From the fifth week to the end of the tenth week of a semester, a student may withdraw with a mark of "W" only from courses in which the instructor certifies the student is passing at the time of withdrawal.

Failure to withdraw officially from a course results in a grade of "E," which is used in the computation of the GPA.

The *Schedule of Classes* lists the procedures for withdrawal.

An instructor may withdraw a student from a class with a mark of "W" or a grade of "E" for disruptive classroom behavior. A student may appeal an instructor-initiated withdrawal to the standards committee of the college in which the course is offered. The decision of the committee is final.

**Course Load**

The course load is determined by the supervisory committee but is not to exceed 15 semester hours of credit during each of the two semesters, six semester hours during each five-week summer session, or nine semester hours of credit during an eight-week summer session. An audited course is counted in the student's maximum load.

All graduate assistants and associates must enroll for a minimum of six semester hours during each semester (fall and spring) of their appointment. The six hours cannot include audit enrollment. Enrollment in continuing registration (595, 695, or 795) does not fulfill the six-hour requirement. A half-time (50%) graduate assistant or associate working 20 clock hours per week may not register for more than 12 hours of course work each semester; a third-time (33%) assistant or associate for more than 13 hours; and a quarter-time (25%) assistant or associate for more than 15 hours.

All graduate students doing research, working on theses or dissertations, taking comprehensive or final examinations, or using university facilities or faculty time, must be registered for a minimum of one hour of credit, not au-

dit, that appears on the program of study or is an appropriate graduate-level course, such as 595, 695, or 795 Continuing Registration.

Doctoral students fulfilling residence requirements for the Doctor of Philosophy and Doctor of Musical Arts degrees must be enrolled full time (nine semester hours minimum or six semester hours for graduate assistants) during the specified period. See specific degree requirements in this catalog for fulfilling residence requirements for other doctoral degree programs.

**Summer Course Loads.** Maximum load for each five-week session is six semester hours and nine semester hours for an eight-week session. The student registering in a five-week session and an eight-week session simultaneously may not exceed the following combinations of semester hours:

Session			
Five-Week	Eight-Week	Second Five-Week	Total Semester Hours
0	9	3	12
1	8	3	12
2	7	3	12
3	6	3	12
4	4	4	12
5	2	5	12
6	0	6	12

**Enrollment Verification Guidelines.** The registrar is responsible for verifying enrollment according to the general guidelines in the "Enrollment Verification Guidelines" table.

**Enrollment Verification Guidelines**

	Full-Time	Half-Time	Less Than Half-Time
<b>Regular Semester</b>			
Graduate	9 or more hours	5-8 hours	4 or fewer hours
Graduate Assistant*	6 or more hours		
<b>Five-Week Summer Session</b>			
Graduate	3 or more hours	2 hours	1 hour
Graduate Assistant*	2 or more hours	1 hour	
<b>Eight-Week Summer Session</b>			
Graduate	5 or more hours	3-4 hours	2 or fewer hours

\* For enrollment verification purposes, graduate assistant is a generic term that includes graduate assistant, teaching assistant, research assistant, graduate associate, teaching associate, and research associate.

## GRADUATE COLLEGE DEGREE REQUIREMENTS

### Graduate Advising

Advising is much more than technical support; it is an integral part of graduate education. Students' programs of study are generally tailored to meet individual needs, and students should seek advice from faculty or advisors as they plan their course work, examinations, and other degree requirements.

### Graduate College Advising Office.

The Graduate College provides advising service to prospective and enrolled students. Information is provided concerning Graduate College admissions, nondegree status, programs of study, and policies and procedures. Academic and professional advisement is available to nondegree students. Advisors assist nondegree or prospective students in contacting appropriate faculty and advisors. Students may call for an appointment (602/965-3521) or stop by Wilson Hall.

### Grading

The "Grades" table defines grades and gives their values.

A grade of "P" (pass) in a 400-level course may not appear on a program of study. Grades on transfer work or ASU law credit are not included in computing GPAs.

Grades of "D" and "E" cannot be used to meet the requirements for a graduate degree, although they are used to compute the GPAs. A student receiving a grade of "D" or "E" must repeat the course in a regularly scheduled (not an independent study) class if it is to be included in the program of study. However, both the "D" or "E" and the new grade are used to compute the GPAs.

Graduate course work (500, 600, and 700-level courses) reported as an "I" (incomplete) must be completed within one calendar year. At the time the "I" grade is given, the student must complete a "Request for Grade of Incomplete" form. The form first serves as a record of the "I" grade and the work required to complete it. When the student has completed the work, the form then serves as a change-of-grade authorization.

If the work specified on the form is not completed within one calendar year, the "I" grade (500, 600, and 700-level courses) becomes part of the

student's permanent transcript. The student is not allowed to complete the course work as specified on the "Incomplete" form. The student may, however, repeat the course after the "I" has become permanent, by reregistering, paying fees, and fulfilling all course requirements. The grade for the repeated course appears on the transcript but does not replace the permanent "I."

**Repeating ASU Courses.** Graduate students (degree or nondegree) may retake any courses at any level at ASU, but all grades remain on the student transcript as well as in GPA calculations.

### University Policy for Student Appeal Procedures on Grades

#### Informal

The steps outlined below, beginning with step A, must be followed by any student seeking to appeal a grade. Student grade appeals must be processed in the regular semester immediately following the issuance of the grade in dispute (by commencement for fall or spring), regardless of whether the student is enrolled at the university. It is university policy that students filing grievances and those who are witnesses will be protected from retaliation. Students who believe they are victims of retaliation should immediately contact the dean of the college in which the course is offered.

- A. The aggrieved student must first undergo the informal procedure of conferring with the instructor, stating the evidence (if any) and reasons for questioning that the grade

received was not given in good faith. The instructor is obliged to review the matter, explain the grading procedure utilized, and show how the grade in question was determined. If the instructor is a graduate assistant and this interview does not resolve the difficulty, the student may then go to the faculty member in charge of the course (regular faculty member or director of the course sequence) with the problem.

- B. If the grading dispute is not resolved in step A, the student may appeal to the department chair or other appropriate chair of the area within the department (if any). The department chair may confer with the instructor to handle the problem. Step B applies only in departmentalized colleges.
- C. If these discussions are not adequate to settle the matter to the complainant's satisfaction, the student may then confer with the dean of the college concerned (or the dean-designate), who will review the case. If unresolved, the dean or designate may refer the case to the college academic grievance hearing committee to review the case formally. In most instances, however, the grievance procedure will not go beyond this level.

#### Formal

The following procedure takes place after steps A, B, and C (or A and C) have been completed.

- D. Each college has on file in the office of the dean (and in each department of the college) the proce-

Grades			
Grade	Definition	Value	Notes
A	Excellent	4.00	
B	Good	3.00	
C	Passing	2.00	
D	No graduate credit	1.00	
E	Failure	0.00	
W	Withdrawal		This grade is given whenever a student officially withdraws from a class.
I	Incomplete		
X	Audit		
Y	Satisfactory		
Z	Course in progress		This grade is usually given pending completion of courses.

dures and composition of the undergraduate or graduate academic grievance hearing committee for student grievances. Each college committee shall operate under grievance procedures as stated which satisfy due process requirements. The committee shall always meet with the student and the instructor in an attempt to resolve the differences. At the conclusion of the hearing, the committee shall send its recommendations to the dean.

- E. Final action in each case will be taken by the dean after full consideration of the committee's recommendation. Grade changes, if any are recommended, may be made by the dean. The dean shall inform the student, instructor, department chair (if any), the registrar, and the grievance committee of any action taken.

#### Scholarship

To be eligible for a degree in the Graduate College, a student must achieve two GPAs of "B" (3.00) or better. The first GPA is based on all courses numbered 500 or higher that appear on the transcript. (Courses noted as deficiencies in the original letter of admission are not included.) The second GPA is based on all courses that appear on the program of study.

The designation of honors (*summa cum laude*, *magna cum laude*, and *cum laude*) is reserved for undergraduates. The Graduate College does not use these academic distinctions.

Academic excellence is expected of students doing graduate work. Upon recommendation from the head of the academic unit, the dean of the Graduate College can withdraw a student who is not progressing satisfactorily.

A graduate student who does not enroll for three calendar years is considered withdrawn and must reapply for admission to a degree program.

Graduate students (degree or nondegree) may retake any courses at any level at ASU, but all grades remain on the student transcript as well as in GPA calculations.

#### Graduate Credit Courses

Courses at the 500, 600, and 700 levels are graduate credit courses. Courses at the 400 level apply to graduate degree requirements when appearing on an approved program of study. However, 400-level courses are not graduate

courses by definition and cannot be certified as such for purposes of employment or transferring to other institutions.

**Reserving of Course Credit by Undergraduates.** Seniors at ASU within 12 semester hours of graduation may enroll in a 400-level or graduate course and reserve the credit for possible use in a future graduate program. The course cannot be used to meet a baccalaureate graduation requirement. Before registration in the class, the student must submit a Graduate College Petition form requesting credit reservation; the form must be signed by the student's advisor, the head of the academic unit offering the class, and the dean of the Graduate College.

Permission to reserve a course does not guarantee admission to a graduate degree program or that the course may be used toward graduate degree requirements. A maximum of nine hours of credit may be reserved, and only courses with an "A" or "B" grade are applicable. Reserved credit earned before admission to a graduate degree program is classified as nondegree credit. The maximum course load for a student enrolled in a reserved course is 15 semester hours during a regular semester and six hours during a summer session.

**Transfer Credit.** Transfer of credit is the acceptance of credit from another institution for inclusion in a program of study leading to a degree awarded by ASU. The number of hours transferred from other institutions may not exceed 20% of the total minimum semester hours required for a master's degree unless stated otherwise for a specific degree program.

Transfer credit taken before admission to a graduate degree program at ASU is nondegree credit. Nondegree credit taken at ASU combined with nondegree credit taken at another institution may not exceed nine hours on the master's program of study. The date (month/day/year) on the Graduate College dean's letter of admission is the actual date of admission. If the student is enrolled in courses on the admission date, those courses—if applicable—may be considered part of a program of study. Courses taken the semester before this date are nondegree hours. The nine-hour limit does not apply to doctoral programs.

Transfer credits must be acceptable toward graduate degrees at the institution where the courses were completed. Certain types of graduate credits cannot be transferred to ASU, including the following:

1. credits awarded by postsecondary institutions in the United States that lack candidate status or accreditation by a regional accrediting association;
2. credits awarded by postsecondary institutions for life experience;
3. credits awarded by postsecondary institutions for courses taken at noncollegiate institutions (e.g., government agencies, corporations, and industrial firms);
4. credits awarded by postsecondary institutions for noncredit courses, workshops, and seminars offered by other postsecondary institutions as part of continuing education programs; and
5. credits given for extension courses.

Acceptable academic credits earned at other institutions that are based on a different unit of credit than the ones prescribed by the Arizona Board of Regents are subject to conversion before being transferred to ASU.

Only resident graduate courses with an "A" or "B" grade may be transferred. A course with the grade of pass, credit, or satisfactory may not be transferred.

Official transcripts of any transfer credit to be used on a program of study must be sent directly to the Graduate Admissions Office from the office of the registrar at the institution where the credit was earned.

#### Correspondence and Extension

**Courses.** Correspondence and extension courses cannot be used to meet the requirements for a graduate degree.

#### Graduate Supervisory Committees

When the program of study is filed, upon the recommendation of the head of the academic unit, the dean of the Graduate College appoints a graduate student's supervisory committee, consisting of a chair and other resident faculty members. The number of members serving on this committee depends on the degree program.

Academic professionals (e.g., research scientists, research engineers), non-tenure track faculty (e.g., adjunct



professors, research professors), and individuals granted affiliated faculty status through established university procedures may serve as co-chairs, members, or extra members of thesis and dissertation committees upon approval by the Graduate College. Individuals who are recommended by an academic unit as eligible to serve as a co-chair must meet the criteria established by the academic unit and be approved by the Graduate College.

Upon the recommendation of the committee chair and head of the academic unit, ASU West tenured (or tenure-track) faculty may serve as committee members for master's and doctoral committees at ASU Main. ASU West tenured (or tenure-track) faculty may serve as co-chairs for theses and dissertations at ASU Main upon the recommendation of the head of the academic unit and approval of the dean of the Graduate College. Co-chairs must meet the academic unit's criteria for chairing theses and dissertations.

Qualified individuals outside the university, upon the recommendation of the head of the academic unit and approval of the Graduate College, may serve as members of thesis and dissertation committees; however, such individuals may not serve as chairs or co-chairs (unless they have affiliated faculty status). With the approval of the academic unit and the dean of the Graduate College, former ASU faculty with students completing their degrees may continue to serve as co-chairs. At least 50 percent of the committee must be made up of faculty from ASU Main.

#### **Foreign Language Requirements**

A graduate degree program may require proficiency in a foreign language. If a foreign language is required, students must demonstrate at least a reading knowledge in the area of study required by the supervisory committee and consistent with the requirements for the graduate degree program. Normally, the language is selected from French, German, Russian, or Spanish, although other languages may be recommended when there is adequate justification.

Students who are required to demonstrate proficiency in a foreign language must pass a foreign language examination specific to their particular graduate programs. The examinations are administered three times each year by the

Department of Languages and Literatures, which certifies language competency. Students planning to take the examination must register in the Graduate College at least one month in advance of the examination date. The chair of the student's supervisory committee is responsible for providing the Department of Languages and Literatures with materials from which the examination is then prepared. The chair should submit or recommend relevant books or journals of approximately 200 pages in length in the desired foreign language.

A student may petition the Graduate College for a re-examination but must pass the examination in no more than three attempts.

#### **Theses and Dissertations**

The master's thesis or equivalent is an introduction to research writing. All doctoral degree candidates must submit a dissertation, with the exception of the Doctor of Musical Arts degree in Music (concentrations in choral music and solo performance), which requires three recitals and a research paper. The Doctor of Philosophy dissertation should be a valuable educational experience that demonstrates the candidate's mastery of research methods, theory, and tools of the discipline. It should demonstrate the candidate's ability to address a major intellectual problem and to propose meaningful questions and hypotheses. The dissertation should be a contribution to knowledge that is worthy of publication by an established press as a book or monograph or as one or more articles in a reputable journal.

For format, the Graduate College must review the final copy of the master's thesis, doctoral dissertation, and other final documents that are required to be placed in the library. Copies of the *Format Manual* are available in the Graduate College. The student is required to submit a complete copy of the thesis or dissertation for format review at least 10 working days (two weeks if there are no holidays during the time period) before the oral defense. Doctoral students must submit a completed Survey of Earned Doctorates Awarded in the United States, conducted by the National Research Council.

Graduate students and their supervisory committee chairs jointly select a style guide or journal format representative of the field of study. The Graduate College allows certain flexibility in

the format of the manuscript, but Graduate College and library guidelines must be followed.

The student must submit two final copies of a thesis or dissertation to the ASU Bookstore for binding. The student is responsible for the binding fees. Bound copies are placed in the Hayden Library and Archives. Doctoral students must submit one copy of the title page, approval page, and abstract (which must not exceed 350 words); the original signature of the doctoral student must appear on the University Microfilms International (UMI) Dissertation Agreement Form. The student is responsible for the UMI microfilming fee, which covers the expense of having the document sent to UMI, where it is microfilmed and catalogued. Information on the dissertation will appear in *Dissertation Abstracts International*.

#### **Application for Graduation**

Students should apply for graduation no later than the date specified in the *Graduate Catalog* calendar. All fees are payable at that time. Students applying for graduation after the deadline listed in the *Graduate Catalog* calendar are required to pay a late fee. At the end of the semester in which they apply for graduation, students are officially notified of any requirements for their degree that they have not yet completed.

Students are requested to complete a questionnaire which serves as a graduate student exit survey.

Students who do not complete all degree requirements by their anticipated graduation date are required to pay a refile fee.

#### **Withdrawal from the University**

Students who find it necessary to withdraw from the university should obtain and complete an official withdrawal form from any registrar site. Until officially withdrawn, the student is registered in all courses and, at the end of the semester, receives grades appropriate for the performance in each course. A student who officially withdraws from the university during the first four weeks of a semester receives the mark of "W" in all courses registered. A student who officially withdraws from the university later than the fourth week receives a mark of "W" or "E," depending upon the quality of work at the time of official withdrawal. No student is permitted to withdraw



during or after the last two weeks of the semester (the last week of classes and final examination week).

A graduate student who does not enroll for three calendar years is considered withdrawn and must reapply for admission to a degree program.

**Unrestricted Withdrawal.** During the first four weeks of a semester or the first six days of a summer session, a student may withdraw from any course with a mark of "W." See the *Schedule of Classes* or the *Summer Sessions Bulletin* for the dates of the unrestricted withdrawal period.

**Restricted Withdrawal.** From the fifth week to the end of the 10th week of a semester and from the seventh day to the end of the third week of a summer session, students may withdraw with a mark of "W" from courses only in which the instructor certifies that they are passing at the time of the withdrawal. See the *Schedule of Classes* or the *Summer Sessions Bulletin* for dates of the restricted withdrawal period.

**Medical Withdrawal.** Normally, a medical withdrawal request is made in cases where serious illness or injury prevents a student from continuing courses and incompletes or when other arrangements with the instructor are not possible. Consideration is usually given for complete withdrawal. An application for less than a complete withdrawal must be well documented to justify the selective nature of the medical withdrawal request. This policy applies both to cases involving physical health problems and those involving mental or emotional difficulties.

To receive permission for a medical withdrawal from courses, a student must present a Request for Documented Medical Withdrawal form and proper documentation (usually a letter from a physician) of the medical condition to the medical-withdrawal designee of the college of the student's major. For complete procedural information, contact the appropriate medical withdrawal designee.

### Summer Sessions

Work taken during the summer sessions carries the same scholastic recognition as that taken during the regular semester. A complete schedule of offerings is available in the summer bulletins, which may be obtained from the Office of Summer Sessions.

### Dates and Deadlines

The Graduate College calendar found in the current *Graduate Catalog* lists deadlines for the submission of theses and dissertations to the Graduate College, the last day to apply for graduation, the last day to hold an oral defense of a thesis or dissertation, and the last day to submit theses and dissertations to the ASU Bookstore for binding.

### Student Responsibility

It is the responsibility of the graduate student to know and observe all procedures and requirements of the Graduate College as defined in the *Graduate Catalog*, the *Schedule of Classes*, and the *Format Manual*. Each student should also be informed about the requirements concerning the student's degree program and any special requirements within the academic unit.

The highest standards of academic integrity are expected of all students. The failure of any student to meet these standards may result in suspension or expulsion from the university and/or other sanctions as specified in the academic integrity policies of the individual colleges. Violations of academic integrity include, but are not limited to, cheating, fabrication, tampering, plagiarism, or facilitating such activities. The university and college academic integrity policies are available in the Office of the Senior Vice President and Provost and the offices of the deans of the individual colleges.

### Traveling Scholar Program

The Traveling Scholar Program is a cooperative program among the state universities designed to enable students to take advantage of programs or special resources that are not available at their own institutions. Any graduate student with a GPA of at least 3.0 enrolled *full time* at ASU, Northern Arizona University, or University of Arizona may be designated a Traveling Scholar by prior mutual agreement of the appropriate academic authorities at both the sponsoring and hosting institutions. Contact the Records Information Section for more information and the application form.

### Misconduct in Scholarly Research and Creative Activities

Students are expected to maintain the highest standards of integrity and truthfulness in scholarly research and creative activities. Misconduct in schol-

arly research and creative activities includes, but is not limited to, fabrication, falsification or misrepresentation of data, and plagiarism. Misconduct by any student may result in suspension or expulsion from the university and other sanctions as specified by the individual colleges. Policies on misconduct are available in the Office of the Senior Vice President and Provost.

## STUDENT RECORDS

### Family Educational Rights and Privacy Act of 1974

This act, known as the Buckley Amendment, sets forth the requirements governing the protection of the privacy of the educational records of students who are or have been in attendance at ASU.

### Definitions

**Eligible Student.** For the purpose of this act, an *eligible student* is defined as any individual formally admitted to and enrolled at ASU or the parents of a *dependent* eligible student. Dependency is defined by Section 152 of the Internal Revenue Code of 1954.

**Record.** Any information or data recorded in any medium, including, but not limited to, handwriting, print, tapes, film, microfilm, microfiche, and electronic means.

### Types of Information

**Educational Record.** The educational record refers to those records that are directly related to a student and are maintained by an educational institution. Two types of educational records are subject to the provisions of this act, (1) *directory information* and (2) *personally identifiable information*. The term does not include those records specifically excluded by Section 99.3 of the Privacy Act.

**Directory Information.** *Directory information* includes the following student information: name, local and permanent address, local telephone number, date and place of birth, citizenship, residency status, academic level, major field of study, college of enrollment, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance, degrees and awards received, and the most recent previous educational agency or institution attended by the student.

**Personally Identifiable Information.**

*Personally identifiable information* includes the name of a student, the student's parent or other family member(s), a personal identifier such as the student's Social Security number, a list of personal characteristics, or other information that would make the student's identity easily traceable and any information, including directory information, that the student has indicated not to be released.

**Access to Records**

Eligible students, or parents of a dependent eligible student, may inspect and review their educational records. Some form of photo identification must be displayed before access to educational records is allowed.

*Directory information* may be released to anyone without consent of the student, unless the student indicates otherwise. Students may request that this information not be released by completing a form in the Office of the Registrar. Request to withhold this information will exclude the student from being listed in the annual *Directory*.

All other educational records that contain *personally identifiable information* may not be released without the written consent of the student. Parents of a dependent student may challenge denial of such access by producing the most current copy of Internal Revenue Form 1040. If that form lists the student in question as a dependent, the parents will be required to sign an affidavit that affirms that the student is their dependent. The affidavit will be retained by the Office of the Registrar. Upon receipt of the affidavit, the university will make student records available to parents for the rest of that calendar year as specified under the Privacy Act.

Students may grant access to parents or agencies by completing a form in the Office of the Registrar.

**Location of Policy and Records**

The Custodian of Educational Records at ASU is the Office of the Registrar. Copies of this policy are available in the following offices: the Reserve Section of Hayden Library and the Noble Science and Engineering Library, the Office of the Registrar, the Offices of Undergraduate and Graduate Admissions, and the Student Life Office. The Office of the Registrar also

maintains a directory that lists all education records maintained on students by ASU.

**ACADEMIC INTEGRITY**

The highest standards of academic integrity are expected of all students. The failure of any student to meet these standards may result in suspension or expulsion from the university and/or other sanctions as specified in the academic integrity policies of the individual colleges.

Violations of academic integrity include, but are not limited to, cheating, fabrication, tampering, plagiarism, or facilitating such activities.

The university and college academic integrity policies are available in the Office of the Provost and the dean's offices of the individual colleges.

**POLICIES AND PROCEDURES OF THE GRADUATE COUNCIL APPEALS BOARD**

The Graduate Council Appeals Board (GCAB) acts as the appeals body for graduate students seeking redress on academic decisions regarding their graduate program. Before filing an appeal, the graduate student should discuss the situation with the associate dean of the Graduate College to explore resolution of the matter at the unit or college level.

**Graduate Council Appeals Board**

(GCAB). The purpose of the GCAB is to review written appeals of graduate students. (On occasion a faculty member may be appealing the decision about a graduate student made by a program, an academic unit, the Graduate College, or another college.) Such appeals concern

1. retention in graduate programs;
2. other academic issues (except grade appeals, which are handled in academic colleges); and
3. procedural matters in graduate student programs (e.g., programs of study, thesis/dissertation exams).

The GCAB consists of three or more members of the Graduate Council appointed by the dean of the Graduate College at the beginning of each academic year. In specific cases the GCAB may ask for additional members from the faculty or one or more graduate students to be appointed by the dean of the Graduate College. The GCAB is

chaired by one of the members as designated by the dean or associate dean. The GCAB is assisted by the assistant dean who oversees the hearing but does not serve as a member of the GCAB. Membership is on an annual basis, but members of the Graduate Council may serve for a maximum of three consecutive years. To the extent possible, GCAB membership does not change during a student appeal. A member continues to serve on the GCAB into the next academic year if an appeal is continued during that time.

**GCAB Meetings.** The GCAB meets when notified by the assistant dean that an appeal is pending. The GCAB requires two-thirds of the committee present for a quorum. A GCAB member must disqualify herself or himself if a case involves a student in her or his academic unit or the member has some direct tie to the student who is appealing. The dean of the Graduate College replaces the individual with a current or past Graduate Council member. A recording secretary is selected before each appeal. This person keeps notes of the hearing. Secretarial support for typing notes is provided by the assistant dean. A tape is made of the hearing.

**Jurisdiction of the GCAB.** The GCAB has the authority to receive written appeals from graduate students on the review of any action or decision by any university faculty member, staff member, or administrator. However, any appeal must first be reviewed at the level of the academic unit from which the graduate student is making an appeal.

The GCAB has the right to decide not to hear an appeal. In this case, the decision of the academic unit is final. The GCAB may hear appeals on program dismissal, other academic issues, or procedural issues. In addition, the GCAB hears any appeal referred to it by the dean of the Graduate College.

The GCAB does not review

1. appeals of course grades, including omnibus courses such as independent research, thesis, or dissertation, which are handled through the academic colleges;
2. appeals concerning academic dishonesty, which are handled by the academic unit with appeals to the University Hearing Board;
3. appeals concerning scientific misconduct, which are handled by the academic unit with appeals to the

Council of Research and Creative Activity through the Office of the Vice President for Research and Strategic Initiatives;

4. appeals for which the graduate student has not fully used all other appeal and review processes (e.g., the academic unit);
5. appeals filed more than 30 calendar days after receiving notification of the action taken at an appeal by the academic unit (or, if appropriate, another university committee);
6. allegations of discrimination; and
7. other appeals or grievances under the jurisdiction of other university boards and committees.

Appeals are not heard during the summer. The calendar stops on the last day of exams for the spring semester and begins on the first day of classes for the fall semester.

**Mediation.** Mediation between the graduate student and any university official is always a preferred option to a hearing. If mediation appears beneficial when the initial appeal is filed with the GCAB, the GCAB may recommend that mediation occur and select a mediator. If mediation is successful and both parties agree to the decision, a written record of the outcome is filed by the mediator with the GCAB, all parties involved, and the dean of the Graduate College. If mediation is not successful, the graduate student has 30 days from the end of the mediation process to request in writing a formal appeal hearing.

**Authority.** The GCAB may affirm or reverse the original decision being appealed and make such recommendations for further actions as seem appropriate. In the course of any hearing, the GCAB is authorized to request additional evidence or testimony by any student, faculty or staff member, administrator, other university employee, or other individual as a witness. The GCAB has final authority in procedural matters. The decision of the GCAB is final. The chair of the GCAB notifies all parties of the decision.

**Filing an Appeal.** Before an appeal comes to the GCAB, the normal channels for resolving disputes must have been consulted. The appellant should consult with the major professor to resolve the issue at that level. If the issue

cannot be resolved with the major professor, the appellant should seek out the department chair or designated individual for resolution. In some cases, if the major professor and department chair have not been able to resolve the issue or the outcome still needs to be pursued, it may be appropriate to pursue the issue with the academic college dean. If the issue has not been resolved at one of these levels, an appeal to the GCAB may be pursued.

Before initiating an appeal, the graduate student should speak to the associate dean to see if the issue can be resolved informally. Should negotiation, through the associate dean of the Graduate College, not succeed, the graduate student may submit a written appeal.

All appeals must be submitted in writing to the associate or assistant dean of the Graduate College. Witnesses and any other pertinent evidence must be listed in the appeal. The written appeal must specify the grounds for the appeal as listed in the document "Guidelines for Appeals," available in the Graduate College. Only documents that follow the guidelines are considered, although university regulations pertinent to the case may be used as supporting grounds. It is incumbent upon the student to demonstrate to the GCAB that grounds for the appeal exist. The written appeal may not exceed 10 pages.

The associate or assistant dean notifies the appellee and request, in writing, information from the appellee related to the case. The initial written response by the appellee is submitted within 15 days of receiving notice of the appeal.

## Master's Degrees

Faculty at ASU offer programs leading to the Master of Arts (M.A.) degree, the Master of Science (M.S.) degree, and various professional master's degrees. The M.A. and M.S. programs serve primarily as an introduction to research; the professional master's programs are intended primarily as a preparation for a career in professional practice. The student should consult the academic unit, as well as the sections on page 54 on "Comprehensive Examinations" and "Thesis or Equivalent Requirements," for information on the special requirements for these degrees.

**Admission to All Master's Degree Programs.** Students wishing to enroll in a master's program at ASU are admitted according to the procedure described on pages 44-46. Since graduate work presupposes adequate preparation in a selected field at the undergraduate level, deficiencies are specified at the time of admission by the academic unit involved.

**Credit Requirements.** A minimum of 30 semester hours of graduate work approved by a student's supervisory committee and the Graduate College is required. More than 30 semester hours are required in certain programs.

**Supervisory Committee.** The supervisory committee is responsible for the guidance and direction of the student's graduate program. The committee is composed of a minimum of three members, including a chair, for students writing a thesis or equivalent.

**Program of Study.** After regular status has been granted, it is in the student's best interest to have an official program of study filed with the Graduate College at the earliest possible date. When the program of study is filed, a supervisory committee is appointed by the dean of the Graduate College upon the recommendation of the head of the academic unit (verified by the signature on the program of study). Changes in the planned program may be made by the student's supervisory committee, with the approval of the head of the academic unit and the dean of the Graduate College. Forms for the submission of the program of study are available in the Graduate College and in the Graduation section of the Office of the Registrar, Student Services Building. A student is not eligible to apply for the comprehensive or final examination until a program of study has been approved and any foreign language requirement completed.

**Credit Completed before Admission.** With the approval of the student's supervisory committee, the head of the academic unit, and the dean of the Graduate College, a maximum of nine semester hours of ASU graduate course work completed before admission to a graduate degree program may be included in the program of study for a master's degree. The date (month/day/year) on the Graduate College dean's letter of admission is the actual date of

admission. If the student is enrolled in courses on the admission date, those courses—if applicable—may be considered part of a program of study. Courses taken the semester before this date are nondegree hours. Individual academic units may have a policy of accepting fewer than nine semester hours attained before admission. For details, refer to the specific degree program.

Graduate credit earned at another institution before admission to a graduate degree program at ASU is nondegree credit. Nondegree credit earned at ASU combined with nondegree credit earned at another institution may not exceed nine semester hours in the program of study. For example, if six semester hours earned before admission to ASU are transferred from another institution, only three nondegree semester hours may be from ASU for a master's degree program. (See "Transfer Credit," page 49.)

The six-year maximum time limit applies to nondegree/transferred semester hours appearing on a program of study. (See "Maximum Time Limit," page 55.) Certain degree programs may have different maximum time limits. The student should refer to the specific degree program.

**College of Law Credit.** The Graduate College accepts a numerical grade of 70 or above for courses taken in the College of Law at ASU as part of an approved program of study for a master's degree program. These grades are not used in the two GPAs calculated for graduation: the courses on the program of study and all courses numbered 500 and above.

A maximum of six semester hours taken in the College of Law may be included in a 30-hour program of study for a master's degree. For a 36- to 45-hour program, the number of hours is limited to a maximum of nine semester hours of course work in the College of Law.

**Foreign Language Requirements.** A graduate degree program may have a foreign language requirement. This requirement must be fulfilled before the student is eligible to apply for the final written comprehensive examination or the defense of the thesis or equivalent. For certification of proficiency, see "Foreign Language Requirements," page 50.

**Comprehensive Examinations.** A comprehensive examination, written, oral, or both, administered by the academic unit, is required in all professional master's programs that do not have a thesis or equivalent requirement. A comprehensive examination is optional in other programs. Students are not eligible to apply for the comprehensive or for the oral defense of the thesis or equivalent until they have been regularly admitted, have filed an approved program of study, removed any deficiencies, and fulfilled any foreign language requirements. Students are required to register for at least one hour of credit that appears on the program of study or one hour of appropriate graduate-level credit (such as 595, 695, and 795 Continuing Registration) during the semester or summer session in which they take their comprehensive examinations. Failure in the comprehensive examination is considered final unless the supervisory committee and the head of the academic unit recommend, and the dean of the Graduate College approves, a re-examination. Only one re-examination is permitted. A re-examination may be administered no sooner than three months and no later than one year from the date of the original examination.

**Thesis or Equivalent Requirements.** To satisfy the research requirement for most M.A. or M.S. degrees, a student is expected to present a thesis or equivalent, which is defended in an oral examination. Some professional master's programs may also require a thesis, research project, performance, or exhibition. The requirement varies with each major. Each student writing a thesis or equivalent must register for a minimum of six semester hours of thesis or for a combination of research and thesis totaling six hours, which are directed toward a common research problem.

Credit taken to fulfill the thesis or equivalent enrollment requirement must appear on the program of study.

A student writing a thesis must include on the program of study six hours of 592 Research and 599 Thesis, at least three of which must be 599 Thesis. Although additional 592 Research hours may be included on a program of study, a maximum of six hours of 599 Thesis may be used.

A thesis or equivalent should be of high quality, giving evidence that the program provided an introduction to re-

search. Format evaluation of the thesis or equivalent, described on page 50, must be obtained before its submission to the Graduate College for the oral defense. The final approved copy is bound and placed in the Hayden Library. Copies of the *Format Manual* are available in the Graduate College.

The final copy of the thesis or equivalent must be reviewed by the student's supervisory committee and submitted to the Graduate College for format evaluation at least ten working days before the defense date. The final oral examination in defense of the thesis or equivalent must be conducted at least one week before the degree conferral date. The examination is conducted by the supervisory committee. Applications for the examination are available at the Graduate College.

Each student must be enrolled for at least one hour of credit that appears on the program of study or one hour of appropriate graduate-level credit (such as 595, 695, or 795 Continuing Registration) during the semester or summer session in which the student defends the thesis or equivalent.

**Open Thesis Defenses.** Master's thesis defenses are open to all members of the university community. The oral defense engages the supervisory committee and the candidate in a critical, analytical discussion of the research and findings of the study as well as a review of the relation of the thesis to the major field. The presentation of a thesis defense in an open forum fosters a broader awareness of the state of graduate research at the university, promotes a wider scholarly dialogue among disciplines, and recognizes publicly the scholarly contributions of thesis candidates. Announcements are posted in prominent places in the student's department. Members of the university community are invited to thesis defenses through announcements published in ASU Insight, the university's weekly news bulletin. The supervisory committee may conduct the final part of its questioning in closed session. Committee deliberations and final vote are conducted in closed session.

**Graduation.** The student is eligible for graduation when all course work is successfully completed, the Graduate College scholarship requirements have been met, any required comprehensive examinations have been passed, and the

thesis or equivalent, if applicable, has been approved by the supervisory committee and accepted by the head of the academic unit and the dean of the Graduate College. See "Application for Graduation," page 50.

**Maximum Time Limit.** Unless stated otherwise for a specific degree program, all work offered toward a master's degree must be completed within six consecutive years. The six years begin with the first course included on a student's approved program of study. For example, if the first course listed was taken fall semester, 1995, the student must complete all requirements by August 2001. The six-year maximum time limit applies to nondegree transferred semester hours appearing on a program of study. (See "Credit Completed before Admission," pages 53-54.)

**Withdrawal Policy.** A master's degree student who does not enroll for three calendar years is considered withdrawn and must reapply for admission to a degree program.

**Programs Leading to Two Master's Degrees.** A student may pursue concurrent master's degrees or a second master's degree provided that a maximum of one-sixth of the minimum total semester hours required for the completion of both degrees is common to the two programs of study. The total number of hours common to both degree programs may vary from this maximum value only when the Graduate Council has formally approved coordinated degree programs.

In all cases these guidelines must be followed:

1. course work common to both programs must constitute a well-planned and meaningful part of each of the programs;
2. the course work common to both programs may not include 599 Thesis or 592 Research credits leading to the thesis or equivalent in either degree;
3. graduate credit transferred from another institution may be applied toward only one degree program; and
4. when the two degree programs are pursued at the same time, they must have the approval of the heads of both academic units involved.

## Professional Master's Degrees

### MASTER OF ACCOUNTANCY

The Master of Accountancy degree provides specialized preparation for careers in professional accounting in accounting information systems/management (i.e., computer systems design and security, EDP audit and management consulting). Students applying to this program must submit scores on the Graduate Management Admission Test. International applicants whose native language is not English must submit scores from the TOEFL exam and the TSE or SPEAK exam.

**Prerequisites.** Students whose transcripts do not include certain undergraduate courses or their equivalents must complete these courses. Students are not required to hold an undergraduate degree in Accountancy. Contact the School of Accountancy for a current list of the program prerequisites.

**Program of Study.** The program of study consists of a minimum of 30 semester hours, as follows:

ACC 515	Professional Practice Seminar .....	3
At least four of the following courses .....		12
ACC 533	EDP Auditing (3)	
ACC 541	Managerial Accounting Controls (3)	
ACC 557	Microcomputers in Accounting Information Systems (3)	
ACC 567	Financial Models in Accounting Systems (3)	
ACC 587	Computerized Accounting Systems (3)	
ACC 591	Seminar: Management Turnaround Consulting (3)	
ACC 591	Seminar: Internet Information Access (3)	

Additional courses in accounting, computer information systems, computer science, industrial engineering, or other acceptable areas to complete the degree program are selected in consultation with the student's supervisory committee. The program of study must include a minimum of 15 semester hours of credit in graduate-level accounting courses, a minimum of nine hours of non-accountancy course work, and a minimum of 24 semester hours of resident credit in courses open exclusively to graduate students. A maximum of six semester hours may be taken outside the College of Business.

**Course Load.** Students are limited to 13 hours per semester.

**Foreign Language Requirements.** None.

**Thesis Requirements.** A thesis is optional.

**Final Examinations.** A final comprehensive, written examination is required of all candidates. In addition, an oral examination in defense of the thesis is required of candidates who elect to write a thesis.

### MASTER OF ARCHITECTURE

The Master of Architecture is the accredited professional degree program at ASU. There are two typical programs of study available: (1) a two-year program for applicants who have completed the four-year Bachelor of Science in Design (with a major in Architectural Studies) at ASU or an equivalent degree from another school that offers an accredited professional degree in architecture, and (2) a three-plus-year program for applicants with an undergraduate degree in a discipline or field other than architecture. Both programs promote broad areas of knowledge, professional skill, and a social awareness that the architect must command if architecture is to enhance contemporary life and remain an enduring and valid expression of society.

The program represents an attempt to develop the knowledge and skills necessary for graduates to achieve future leadership roles in the professional practice of architecture and related environmental design fields.

It is the intention of the faculty that the programs also

1. ensure a basic level of educational experience sufficient to enter the practice of architecture after successfully completing state licensing requirements and examination;
2. encourage the student to develop proficiencies in specific areas compatible with individual interests and university instructional capabilities;
3. provide a breadth of understanding that will encourage and motivate the student to continue learning throughout a professional career; and

4. develop opportunities that combine instruction and research directed toward adding value to the built environment.

Elective foci currently offered in the program include energy-conscious design, computer applications, urban design, architectural history and theory, and architectural administration and management.

In the first year of the two-year program, graduate design studio projects focus on advanced comprehensive problems that require integration of the full range of knowledge and skills from students' undergraduate education. In the second year, students select design studios and undertake final design projects that complement their areas of interest. Courses in technology, history and theory, and architectural management are structured alongside the studio sequence.

The three-plus-year program begins with an intensive 10-week summer session introducing architecture and design fundamentals and continues with a preparatory year of architectural history, technology, and design. The final two years are similar to the two-year program described above. Students with no work experience in architecture must also complete a summer internship between the first and second years.

**Application Requirements.** An applicant to the M.Arch. program must hold a baccalaureate or graduate degree from a college or university recognized by ASU and must meet the minimum GPA requirements as established by the Graduate College.

In addition, all applicants are required to submit for review a design portfolio, GRE scores (except for international students), a statement of intent, and letters of reference. Applicants are accepted on a space-available basis only. Students may be admitted to the two-year program *with deficiencies* if their previous course work is not equivalent to the ASU undergraduate requirements and standards.

Students intending to apply for admission to the professional program in architecture at the *graduate level* should write the graduate program coordinator well in advance of the application deadline.

International applicants whose native language is not English must submit a TOEFL score of 550 or above. International students should write the Graduate Admissions Office at least one year before the date they plan to begin study.

**Application Procedures.** Applicants must submit separate application materials to the Graduate College and the School of Architecture.

**School of Architecture.** In addition to the Graduate College admission requirements, applicants must file all of the following admission materials with

GRADUATE SECRETARY, MASTER OF  
ARCHITECTURE PROGRAM  
SCHOOL OF ARCHITECTURE  
ARIZONA STATE UNIVERSITY  
PO Box 871605  
TEMPE AZ 85287-1605

Applicants are encouraged to contact the graduate secretary to be sure that all materials have been received (602/965-2507).

1. *Statement of Intent.* A personal narrative (maximum 600 words or two pages typed) indicating the applicant's interest, previous academic and practical background, and personal and professional educational objectives must be submitted. Students wishing to be considered for a teaching or research assistantship should include an additional one-page statement outlining subject areas in which they feel competent or special skills and qualifications. This statement may be placed at the front of the portfolio.
2. *Letters of Recommendation.* A minimum of three letters of recommendation in support of the applicant must be mailed directly to the Graduate Admissions Committee, School of Architecture. The references should be from professionals or educators familiar with the applicant's experience and capability for graduate work.
3. *Portfolio.* A portfolio of work is required of all applicants. It is extremely important to the judgment of an applicant's qualification for admission and in determining advanced standing. Accordingly, applicants should take appropriate care in its preparation. The portfolio

must be in a nonzippered presentation binder with acetate sleeves and, for convenience and economy, must be no larger than 9" x 12" (image size). The admissions committee is interested in the quality of the work submitted; applicants are therefore advised not to lavish energy and expense on special or unusual packaging. Loose sheets, original drawings, and 35 mm slides should not be submitted. The portfolio should include at least five projects with a range of complexity and concise explanatory statements for each project. Included should be the dates of execution and a brief analysis of the results.

When the work is not completely original, the sources must be given. When the work is of a team nature, the applicant's role and contribution to the project should be clearly indicated. Additional examples of self-directed skills and creative endeavors may also be included. Applicants who have professional experience and wish to submit examples of work done professionally may do so. Of greatest interest are projects in which the applicant has played a *principal* role in design. The applicant's contributions to professional projects must be clearly described.

The portfolio is returned after final admission procedures *provided* the applicant encloses a self-addressed return mailer with sufficient prepaid postage or appears in person to claim the materials within one year of submission. Unclaimed portfolios are retained for only one year. The School of Architecture assumes no liability for lost or damaged materials.

Because of space limitations, not all qualified applicants can be accommodated and the admission process is necessarily selective.

Students should indicate for which program of study they are applying. Those with a four-year degree equivalent to the Bachelor of Science in Design (with a major in Architectural Studies) should apply for the two-year program. Those with an undergraduate degree not in architecture should apply for the three-plus-year program. Students who are uncertain about which



program suits them should write to the graduate program coordinator for determination of appropriate application.

Students with a previous professional degree in architecture (five or six years) who wish to pursue advanced study in climate responsive architecture, building energy performance, computer-aided design, energy simulation and analysis, and facilities development and management should apply to the Master of Science program. See pages 136-137.

**Application Deadline.** Priority consideration is given to completed applications received on or before January 15. All fellowship and scholarship appointments for entering students are normally made from applicants in this group. Applications for admission received after January 15 can be considered only for remaining vacancies and "alternate" placement. Students are not admitted to the two-year Master of Architecture program at any time other than the beginning of the fall semester. Students are not admitted to the three-plus-year Master of Architecture program at any time other than the beginning of the first summer session.

**Personal Interview.** A personal interview is not required. However, a candidate wishing to visit the school is welcome and should make arrangements by contacting the Graduate Programs Coordinator in the School of Architecture.

**Requirements for the Two-Year Program.** The two-year graduate program requires a minimum of 56 semester hours of approved courses and electives and a comprehensive examination. For most students, this program involves an average of 14 semester hours per semester. An internship may be offered as an elective to be taken in the summer before the final year of study. The internship is an honors program individually arranged and approved by the Master of Architecture Committee. Students electing to take a summer internship normally take 12-13 hours per semester during the second year.

Students who can adequately demonstrate competence through experience or previous academic course work for any of the specific requirements outlined below are encouraged to petition the graduate advisor for a course substitution.

**Typical Program of Study**

**First Year**

<b>Fall</b>	
ADE 521	Advanced Architectural Studio I ..... 5
ATE 553	Building Systems III ..... 3
ATE 563	Building Structures III ..... 3
	Professional elective* ..... 3
Total	..... 14

**Spring**

AAD 551	Architectural Management I ..... 3
ADE 522	Advanced Architectural Studio II ..... 5
APH 681	Architectural Theory ..... 3
	Professional elective* ..... 3
Total	..... 14

**Second Year**

<b>Fall</b>	
AAD 552	Architectural Management II ..... 3
ADE 621	Advanced Architectural Studio III ..... 5
ANP 681	Project Development ..... 3
	Professional elective* ..... 3
Total	..... 14

**Spring**

AAD 681	Professional Seminar: Capstone ..... 3
ADE 622	Advanced Architectural Studio IV ..... 5
	Approved elective ..... 3
	Professional elective* ..... 3
Total	..... 14
Master of Architecture total ..... 56	

**Requirements for the Three-Plus-Year Program.** The three-plus-year graduate program requires a minimum of 101 semester hours of approved courses and electives and a comprehensive examination. For most students, this program involves 12 semester hours in the first summer and 14-15 semester hours in each of the subsequent six semesters. A summer internship is also required after the first full year of study unless the student has work experience in an architectural office. A second internship may be offered as an elective to be taken in the summer before the final year of study. The second internship is an honors program individually arranged and approved by the Master of Architecture Committee.

\* Professional electives are individually approved by the graduate advisor based on the selected elective focus, other approved interests, and previous academic and professional experience.

Those electing to take a summer internship normally take 12-13 hours per semester during the final year.

Students who can adequately demonstrate competence through experience or previous academic course work for any of the specific requirements outlined below are encouraged to petition the graduate advisor for a course substitution.

**Typical Program of Study**

**First Year**

**Summer**

ADE 510	Foundation Architectural Studio ..... 6
APH 200	Introduction to Architecture ..... 3
APH 509	Foundation Seminar ..... 3
Total	..... 12

**Fall**

ADE 511	Core Architectural Studio I ... 6
APH 313	History of Western Architecture I ..... 3
ATE 353	Architectural Construction .... 3
ATE 451	Building Systems I ..... 3
Total	..... 15

**Spring**

ADE 512	Core Architectural Studio II .. 6
APH 314	History of Western Architecture II ..... 3
ATE 361	Building Structures I ..... 3
ATE 452	Building Systems II ..... 3
Total	..... 15

**Summer**

ARP 584	Clinical Internship ..... 3
Total	..... 3

**Second Year**

**Fall**

ADE 521	Advanced Architectural Studio I ..... 5
ATE 462	Building Structures II ..... 3
ATE 553	Building Systems III ..... 3
	History elective ..... 3
Total	..... 14

**Spring**

AAD 551	Architectural Management I ..... 3
ADE 522	Advanced Architectural Studio II ..... 5
APH 681	Architectural Theory ..... 3
	Professional elective* ..... 3
Total	..... 14

## Third Year

<b>Fall</b>	
AAD 552	Architectural Management II ..... 3
ADE 621	Advanced Architectural Studio III ..... 5
ANP 681	Project Development ..... 3
ATE 563	Building Structures III ..... 3
Total	..... 14
<b>Spring</b>	
AAD 681	Professional Seminar: Capstone ..... 3
ADE 622	Advanced Architectural Studio IV ..... 5
Professional elective*	..... 3
Professional elective*	..... 3
Total	..... 14
Total hours in program	..... 101

\* Professional electives are individually approved by the graduate advisor based on the selected elective focus, other approved interests, and previous academic and professional experience.

**Comprehensive Examinations.** The faculty require that all students pass an oral comprehensive examination based, in part, on a defense of their final design project in ADE 622. Each student is required to undertake an independent design project in ADE 622, based on an approved proposal completed the previous semester in ANP 681. Examiners typically include members of the Architecture faculty and may include distinguished practitioners not on the faculty.

**M.Arch./M.B.A. Concurrent Degree Program.** A Master of Architecture/Master of Business Administration concurrent degree program is offered through cooperative arrangement between the faculty of the College of Business and the College of Architecture and Environmental Design. Students may obtain both degrees in approximately three years of study by concurrently meeting the requirements for each degree program. Separate applications are required by the respective units.

This program requires a minimum of 88 semester hours. Once admitted, in consultation with their respective advisors, students develop programs of study that meet degree requirements of both programs and their particular interests. Students interested in this offering should request further information from the School of Architecture graduate advisor.

## MASTER OF BUSINESS ADMINISTRATION

The central theme of the program is to build and strengthen capabilities in knowledge and analysis of the functional areas of business, basic skills, and managerial abilities. Knowledge involves textbook and case materials. Basic skills include computing, writing and critical thinking, presentation and speaking, team and group work, interpersonal relations, and time management. There is a strong team emphasis throughout the ASU curriculum.

The M.B.A. program is supported by each of the eight academic units within the College of Business. For faculty, research activity, and courses, refer to pages 138-142.

**Admission.** See the general requirements for admission to the Graduate College on pages 44-46. All students applying to graduate business administration programs (except those applying to the Master of Science degree in Economics) are required to take the Graduate Management Admission Test (GMAT). The Test of English as a Foreign Language (TOEFL) is required of all international applicants whose native language is not English or who are not graduates of an institution located in the United States. These applicants are also required to submit scores from the Test of Spoken English (TSE). For more information on testing, call 609/771-7330 or write

EDUCATIONAL TESTING SERVICE  
PO Box CN 6103  
PRINCETON NJ 08541-6103

Students applying to the full-time M.B.A. program are required to have at least two years of full-time work experience and to submit a statement of personal objectives for the degree program addressing commitment, goals, qualifications, and reasons for interest in the program. Applicants are to provide letters of recommendation commenting on the student's motivation, commitment, achievements, work experience, and opportunity for success in the program. In addition to the above data, students are to communicate their interest for either the full-time or evening program.

**Registration.** Registration in courses numbered 502 and above is limited to students who have been admitted to a graduate degree program, have the ap-

proval of the M.B.A. program office, and have the prerequisites of calculus and computer literacy.

**The Full-Time M.B.A. Program.** Before beginning the M.B.A. program, students must have demonstrated computer proficiency in the use of a spreadsheet package and word processing package and must demonstrate strong quantitative ability. Completion of advanced courses in mathematics (e.g., calculus) or statistics or an above average performance on the quantitative section of the GMAT is also required. The program consists of a minimum of 48 hours and is to be completed in two years. Students are admitted to the fall semester only and, generally, enter and graduate as a class.

The first-year courses are designed to provide a foundation in business knowledge and skills and must be taken in the prescribed sequence.

Second-year courses build upon the business core acquired in the first year and focus on the further development of an area of study. Students select an elective track during the second year, allowing them to specialize in one of the functional areas in business. Full-time students must file an approved program of study that includes those courses required to complete a second-year track.

**Foreign Language Requirements.** None.

**Thesis Requirements.** None.

**Comprehensive Examinations.** All students must successfully complete the comprehensive requirement established by the College of Business and Graduate College for the M.B.A. degree. The comprehensive exam is integrated with MGT 589 Strategic Management. Students passing this course with a grade of "A" or "B" satisfy the comprehensive exam requirement.

**Dual/Concurrent Degree Programs.** See page 89.

## Certificate Programs

**Certificate in Investment Valuation and Management.** This certificate is offered to second-year M.B.A. students with an interest in the field of investment valuation and professional money management. It is intended to provide a comprehensive skill set to those students who wish to pursue careers as security analysts, portfolio/money man-



agers, and investment advisors, brokers, and dealers and to students seeking other investment-oriented positions at banks and bank trust departments, mutual funds, investment advisory firms, money management concerns, brokerage firms, investment banking houses, and other types of financial institutions.

**Certificate in Financial Management and Control.** The objective of the 12-hour financial management and control track is to develop basic skills required for financial management careers.

Completion of one of the four specialty clusters (required for certification) provides the opportunity for students to develop in-depth knowledge and industry specialization that may accelerate their professional careers or be required for recruitment. A certificate provides a strong signal of quality and competence that will be recognized and valued by peers and recruiters. Students who face competition in the employment market from experienced managers and graduates of longer M.B.A. programs (many aspirant programs require 54 to 60 hours of course work) may choose a certificate program to develop a professional career focus and establish equivalent credentials.

**Certificate in Treasury Management.** The Certificate in Treasury Management program is offered to second-year M.B.A. students with an interest in the treasury functions of a corporation. It is intended to provide a comprehensive skill set to those students who wish to pursue careers as corporate treasurers and credit executives.

## MASTER OF COMPUTER SCIENCE

The faculty in the Department of Computer Science and Engineering offer a professional program leading to the Master of Computer Science (M.C.S.) degree. The M.C.S. program provides a professionally oriented, graduate-level education in computer science and engineering. The program reflects the dual nature of computer science as both a scientific and engineering discipline by allowing emphasis on theory as well as practical applications. Students can study topics such as artificial intelligence, computer-aided geometric design, computer architecture, computer graphics, computer science theory, database concepts, digital sys-

tems design, language processing, operating systems, and software engineering.

**Admission.** See the general requirements for admission to the Graduate College on pages 44-46. An applicant for the M.C.S. program should normally have a baccalaureate degree in computer science, computer engineering, or a closely related area. The applicant's undergraduate GPA and depth of preparation in computer science and engineering are the primary factors affecting admission. Every applicant must submit scores for the Graduate Record Examination (verbal, quantitative, and analytical required; subject test in computer science is optional). An international student must also submit the results of the TOEFL. The application deadline for admission in the fall semester is March 15, and the deadline for admission in the spring semester is October 15.

**Program of Study.** Each student defines a potentially unique program of study subject to approval by the department and the Graduate College. The program of study must include three areas of interest, and it must contain a minimum of 30 semester hours of approved graduate-level course work. At least 18 hours must be CSE 500-level credits (excluding CSE 598), and at least 27 hours must be for formal course work. The department may prescribe additional courses based on the background of the candidate.

**Foreign Language Requirements.** None.

**Thesis Requirements.** None.

**Final Examinations.** The student must pass a final examination over the course work taken for the degree and over the appropriate undergraduate prerequisites. Details of the time, content, and format of the examination are available from the department.

## MASTER OF COUNSELING

**Purpose.** The two-year (60-semester-hour minimum) program leads to the professional degree Master of Counseling (M.C.). The M.C. program which focuses on community counseling is accredited by the Council for the Accreditation of Counseling and Related Educational Programs (CACREP). This program is designed to prepare students for counseling as a profession,

and it includes a set of required professional studies supported by elective subjects in related disciplines. Both practitioner and research options are available.

The Master of Counseling degree identifies the recipient as a professional counselor and prepares individuals to work in a variety of human service fields. Certified teachers who complete this degree are eligible for school counselor certification in Arizona and most other states.

**Admission.** A student initiates application for admission to the Master of Counseling degree program with the Graduate College. Admission is determined by a variety of criteria in addition to GPAs. Applications are accepted any time but must be completed before February 15 for admission for the following fall semester. The number of students admitted to the Master of Counseling degree program is limited by the size of the faculty and the facilities available for practica. For more information, applicants should consult the Division of Psychology in Education.

**Supervisory Committee.** Following admission to the Master of Counseling program, a supervisory committee consisting of a chair and two other faculty members are appointed to plan a program of study with the student and to prepare, administer, and evaluate the final examination(s).

**Program of Study.** The program of study should be planned in consultation with the supervisory committee. Candidates for the Master of Counseling degree must complete one course in the College of Education core for master's students, COE 501. See page 176 under "Education Core Courses" for course listing. In addition to course work, the program may include supervised practica in consultation, individual and group counseling, marriage and family counseling, and stress management. These experiences involve a variety of client populations. The program of study must be approved by the supervisory committee, the division director, and the dean of the Graduate College.

**Credit before Admission.** A maximum of 32 semester hours of graduate course work earned in a completed master's degree from an accredited institution may be applied to the

program. In all other circumstances, a maximum of nine semester hours of prior course work may be applied to the Master of Counseling degree program.

**Final Examinations.** Students in the practitioner option are required to take a final written comprehensive examination or prepare a final written paper.

Students in the research option are required to complete a thesis. An oral examination in defense of the thesis is also required.

### MASTER OF EDUCATION

Master of Education (M.Ed.) programs in the College of Education prepare scholarly professionals. Programs are available in Counselor Education, Curriculum and Instruction, Higher and Adult Education, Educational Administration and Supervision, Educational Psychology, Learning and Instructional Technology, Educational Media and Computers, and Special Education. Concentrations within the M.Ed. in Curriculum and Instruction include bilingual education, communication arts, early childhood education, elementary education, English as a second language, Indian education, mathematics education, multicultural education, reading education, science education, secondary education, and social studies education. Within Special Education, M.Ed. areas of concentration are education of the gifted, the mildly handicapped, the multicultural exceptional, and severely and multiply handicapped children.

**Admission.** The College of Education requires above-average performance on the verbal scale of the Graduate Record Examination in addition to the general requirements for admission to the Graduate College. (For some programs the Miller Analogies Test may be substituted for the Graduate Record Examination.) Individual divisions or programs, however, may require superior test scores or GPA for admission. Division admission committees review a variety of evidence presented by applicants for admission consideration. Applicants with lower test scores or grades below minimum levels may be considered for admission recommendation if counterbalancing evidence suggesting the potential for outstanding performance in a master's program is available to division admission committees.

**Program of Study.** A minimum of 30 to 36 semester hours of course work approved by the student's supervisory committee, division director, and the Graduate College is required for the Master of Education degree. Candidates for the Master of Education degree should contact the division offering the graduate degree they are seeking for specific core requirements. *A program of study should be filed as early as possible and not later than upon completion of nine semester hours of graduate course work.*

**Examinations.** All M.Ed. programs require successful completion of written comprehensive examinations. These examinations focus on the specialized content of the specific M.Ed. program of study. Comprehensive examinations are written and evaluated by program faculty. If the student should fail the written comprehensive examination, a re-examination may be administered no sooner than three months and no later than one year from the date of the original examination. Approval of the re-examination must be obtained from the supervisory committee, division director, and the dean of the Graduate College.

### MASTER OF ENVIRONMENTAL PLANNING

The faculty in the School of Planning and Landscape Architecture offer a program leading to the professional degree Master of Environmental Planning (M.E.P.). Three areas of specialty are offered: urban and regional development; urban design; and landscape ecological planning. Graduates acquire the knowledge and skills necessary for leadership roles in the planning profession. Students take a core and select additional courses from the area of specialty. *Urban and regional development* prepares students for employment in areas such as housing, economic and community development, policy analysis, transportation, and the politics of planning. *Urban design* provides a link between the School of Planning and Landscape Architecture and the other disciplines in the College of Architecture and Environmental Design—architecture, interior design, and industrial design. Students selecting this area of specialty should have a degree in design or planning or be prepared to take basic design courses as a prerequisite. Stu-

dents are prepared to work in land-use planning, the design of specific parcels of land, the preparation of development controls, and the drafting of guidelines for development controls and design. *Landscape ecological planning* prepares students for careers in public land management, conservation of renewable and nonrenewable resources, the management of solid and hazardous wastes, environmental impact assessment, and land-use planning. All areas of specialty emphasize environmental and urban planning in rapidly developing metropolitan areas, preparing graduates for advanced careers in either the public or private sector.

A common core of required lecture, seminar, and studio courses provides knowledge of urban and environmental planning issues and fundamental theories, practices, and skills in planning. The areas of specialty in urban design and landscape ecological planning offer a series of fundamental and advanced design studios that enhance knowledge of urban form and land planning.

Individual practical experience in planning is provided through an internship program and independent work on a required final thesis. In addition to the planning faculty, the program is enriched by the interdisciplinary participation of faculty from other academic units of the university as well as leading planning and landscape architecture practitioners from the Phoenix area.

**Admission Requirements and Procedures.** To be considered for the program, the applicant must fulfill all admission requirements of the Graduate College, in addition to meeting admission requirements of the School of Planning and Landscape Architecture. Separate application materials must be submitted.

**School of Planning and Landscape Architecture.** The following materials should be submitted to

SCHOOL OF PLANNING AND LANDSCAPE  
ARCHITECTURE  
COLLEGE OF ARCHITECTURE AND  
ENVIRONMENTAL DESIGN  
ARIZONA STATE UNIVERSITY  
PO Box 872005  
TEMPE AZ 85287-2005

1. a statement of intent (maximum 600 words) explaining (a) the applicant's interest in planning; (b) the applicant's academic back-

- ground, and if appropriate, preparation for the selected area of specialty: urban and regional development, urban design, or landscape ecological planning (these may include written samples or a portfolio); and (c) the applicant's educational objectives;
2. test scores: TOEFL scores from international students whose native language is not English;
  3. three letters of recommendation from references who are qualified to comment on the applicant's potential in the selected area of study; and
  4. a résumé.

International students who wish to be considered for a teaching assistantship and whose first language is not English are required to pass the Test of Spoken English (TSE) administered by the American Language and Culture Center at ASU.

**Application Deadlines.** For fall enrollment, application materials are due in the School of Planning and Landscape Architecture and the Graduate College on March 15.

For spring enrollment, application materials are due in the School of Planning and Landscape Architecture and the Graduate College on October 15.

**Selection Procedures and Notifications.** School faculty evaluate the applications and supporting materials and recommend to the Graduate College whether the applicant should be granted regular or provisional admission or if admission should be denied. If admission is provisional, the Graduate College specifies in its letter of admission the provisions to be met to gain regular status. The school informs successful applicants of the procedures for enrollment.

**Program of Study.** See pages 192-193 for faculty and course listings. An approved program of study is 48 semester hours or 51 with an optional internship. The program has the typical distribution as follows:

Required core courses, including two	
four-hour studios .....	25
Specialization courses .....	15
Optional internship .....	3
Approved elective .....	3
Thesis .....	5
Total .....	51
Total without internship .....	48

Students are encouraged to take the required core courses and then to select an area of specialization. The program of study must be approved by the student's supervisory committee and be completed as specified for graduation. Requests for changes in the program must be made in writing. Some graduate courses may require undergraduate-level prerequisites; specifically, all students are expected to have taken introductory courses in planning and statistics. Inquiries regarding the M.E.P. program should be directed to the School of Planning and Landscape Architecture.

**Foreign Language Requirements.** None.

**Thesis Requirements.** A thesis is required.

**Final Examinations.** A comprehensive oral examination based on the student's thesis is required. The oral examination is administered by the supervisory committee.

### MASTER OF FINE ARTS

The faculty in the School of Art and Departments of Dance and Theatre offer programs leading to the Master of Fine Arts degree with majors in Art, Dance, and Theatre, respectively. The faculty in the Departments of English and Theatre offer an interdisciplinary program leading to the Master of Fine Arts degree with a major in Creative Writing.

#### Major in Art

The Master of Fine Arts degree with a major in Art requires a minimum of 60 hours of graduate work beyond the bachelor's degree. The objective of this degree is to provide advanced study in one or more of the following concentrations: ceramics, drawing, fibers, intermedia, metals, painting, photographic studies, photography, printmaking, sculpture, or wood.

**Admission.** A bachelor's degree from a college or university recognized by ASU is required. All students applying for the M.F.A. degree must submit to the chair of the Graduate Studio Committee a portfolio of 20 slides of their work with a return envelope and postage. Three letters of recommendation and a statement of intent pertaining to the student's educational objectives are also required. Because each area of specialization may have unique require-

ments, students are advised to contact the School of Art for additional information.

**Selection Procedures.** Faculty review committees appointed by the Graduate Studio Committee make the recommendations for regular or provisional admission or the denial of admission. All aspects of the application are evaluated with the purpose of selecting for the available openings those students who have the most reasonable prospect for success in the proposed programs of study. The application deadline is January 15 for the following fall semester. Each student whose application is complete by the deadline date should be advised of admission status within six weeks of the deadline. Qualified students submitting applications after the deadline may be admitted if openings are available.

#### Review Sequence

1. All students admitted on provisional status are reviewed after completing the stipulated nine hours of graduate work.
2. All students are reviewed after completing 15 hours of graduate studio work.
3. A progress review may be called at any time during the course of the graduate program.

Following the 15-semester-hour review, the student must form a supervisory committee to direct the program through the completion of the M.F.A. exhibition and final oral examination. For more information, a student should request a copy of the *Guide to M.F.A. Procedures* from the School of Art.

**Program of Study.** A total of 60 semester hours of graduate credit subject to committee approval is required, including:

1. 27-32 graduate studio hours in the major area(s) of concentration;
2. nine hours of graduate-level art history;
3. nine hours of graduate work outside the area of concentration. These hours may be taken in art history, art auxiliary, art education, or outside the school or college. At least three hours are recommended in a studio discipline; and
4. 10-15 hours of ART 680 Practicum, resulting in an M.F.A. exhibition.

**Credit before Admission.** Subject to the recommendation of the review committee, students with a completed Master of Arts degree in Studio Art may have up to 24 hours (exclusive of thesis or project) applied to the Master of Fine Arts program. In other cases a maximum of 12 semester hours of transfer credit may be applied to the degree program. However, only nine hours of nondegree graduate credit taken before admission at ASU or another institution may be used to fill degree requirements (see "Credit Completed before Admission," pages 53-54).

**Foreign Language Requirements.** None.

**Final Examination.** An oral defense of the M.F.A. exhibition (ART 680) is required.

**Time Limit.** The total program and all requirements for the degree, including transferred course work, must be completed within seven calendar years.

#### Major in Creative Writing

The Master of Fine Arts degree with a major in Creative Writing is an interdisciplinary program offered jointly by the Department of English, in the College of Liberal Arts and Sciences, and the Department of Theatre, in the College of Fine Arts. This interdisciplinary program, involving the faculty research, creative activity, and teaching interests of two academic units, offers students a unique opportunity to tailor a course of study to fit individual needs, talents, and goals. The Department of English administers the program and reviews applications for admission. The 48-hour studio/academic program is designed to provide students of demonstrated intelligence, motivation, and creative talent with the opportunity to work under the direction of faculty who are practicing, published writers. The program includes equal components in literature and writing.

**Admission.** In addition to meeting the general requirements of the Graduate College, applicants must have an undergraduate major in English or Theatre, with a GPA of 3.00 or above. Applicants who do not have an undergraduate major in English or Theatre may be admitted provisionally, on the condition that they make up deficiencies in course work. Deficiencies in

undergraduate preparation may be removed while pursuing the M.F.A. degree; courses taken to remove deficiencies may not be counted toward the degree. Applicants must also submit the following: an acceptable score on the Miller Analogies Test; three letters of recommendation; a professional résumé; a statement of career goals, including the designation of an area of specialization (poetry, drama, fiction, creative nonfiction, or translation); and a manuscript sample of one of the following: 20 pages of poetry; 30 pages of drama; 30 pages of prose fiction or creative nonfiction; or 40 total pages of work in two of these literary forms.

**Selection Procedures.** Completed application forms should be sent directly to the Graduate College. All other materials and manuscripts, including the teaching assistant application form, should be submitted to the Department of English by February 1. The Creative Writing Committee reviews the materials and manuscripts and makes recommendations for admission by March 15. Guidelines for admission recommendations used by the committee include the following: applicant's academic record and capabilities for successful graduate study; talent and promise demonstrated in the manuscript sample; strength of letters of recommendation; quality of applicant's undergraduate background; and compatibility of the applicant's career goals with the purpose of the degree program.

**Program of Study.** The program of study requires a minimum of 48 semester hours of graduate credit approved by the student's supervisory committee, the director of the Creative Writing Committee, and the dean of the Graduate College. Of these, 24 semester hours must be creative writing courses and must include nine hours of ENG 580 or THP 580, nine hours of ENG 455, 594 (which may be taken twice), or 598 or THP 460, 461, or 598. The literature component of 24 hours must include ENG 591 or THE 420 and two of the following courses: ENG 441, 443, 454, 457, 458. For playwrights, THE 504, 505, 520, and 521 are required.

**Credit before Admission.** Subject to the recommendation of the supervisory committee, students with a completed Master of Arts or Doctor of Philosophy degree in English or Theatre may have

up to 15 hours of literature credit applied to the Master of Fine Arts program of study. A maximum of nine hours taken before admission and not as part of a completed degree at ASU and/or another institution may be used to fulfill degree requirements. All course work for the degree must be completed within the six-year time limit.

**Comprehensive Examinations.** A final written comprehensive examination is required and is scheduled once in each semester and once during the summer. Upon completion of course work, the student is required to take the written examination. Official application is made through the Graduate College. The student is also required to notify the Creative Writing Committee of intent to take the examination at least 30 days in advance. A student is not eligible to apply for the written examination until a program of study has been filed. If the candidate fails the examination, a re-examination may be administered no sooner than three months and no later than one year from the date of the original examination. Permission for re-examination must be obtained from the student's supervisory committee, the director of the Creative Writing Committee, and the dean of the Graduate College. Only one re-examination is permitted. Students are examined in the following areas:

1. 20th-Century American Writers: Modern Period;
2. 20th-Century American Writers: Contemporary Period; and
3. 20th-Century Critical Theory.

Playwrights are examined in the following areas: (1) European and American Drama and (2) Dramatic Theory and Criticism. The examination is constructed and graded by members of the Creative Writing Examination Committee.

**Practicum and Performance Requirements.** ENG 580 Practicum is required of all students in the program. For nine semester hours of credit, the student creates a book-length volume of poetry, short stories, novel, drama, translation, or creative nonfiction (except literary criticism). This project must be approved in advance by the student's supervisory committee on the basis of sample pages and a summary of the proposal. The supervisory committee must evaluate and approve the

final project. As the last requirement for the degree, the candidate must read from the practicum project before students and members of the faculty.

**Major in Dance**

The Master of Fine Arts degree with a major in Dance is a 60 semester hour program designed to train professionals in the technique, performance, choreography, and theoretical bases of modern dance. The nature and purposes of the program are to provide an opportunity for the student (1) to acquire a broad understanding and appreciation of the art of dance and its relationship to other fields through the other arts and humanities, and (2) to acquire superior competencies in the areas of dance performance and choreography.

**Admission.** A bachelor's degree with a major in dance or its equivalent is required. Three letters of reference and a résumé must be filed with the Department of Dance for the purpose of assessing the qualifications of the candidate. All applicants must audition for admission to the program. The audition consists of performance of technical phrases in modern dance and ballet as well as the presentation of a solo work of no longer than five minutes, choreographed by the candidate. Videotaped documentation of a group work choreographed by the applicant must also be submitted. For more information, contact the Department of Dance.

**Program of Study.** A total of 60 semester hours of graduate credit is required, including

1. 30 hours of dance studio;
2. 12 hours of dance theory;
3. nine hours of electives; and
4. nine hours of DAN 693 AP: MFA Performance resulting in an M.F.A. performance.

**Credit before Admission.** Upon approval of the supervisory committee, a maximum of 24 semester hours of graduate credit completed before admission may be applied to the program if these courses were part of a completed master's degree in Dance. All course work appearing on the program of study must meet the seven-year time limit requirement.

**Foreign Language Requirements.** None.

**M.F.A. Performance.** A candidate must choreograph and produce a major work and submit both written and video documentation. The document is bound and placed in the library after receiving format approval from the Graduate College.

**Final Examinations.** An oral defense of the M.F.A. performance is required.

**Major in Theatre**

The Master of Fine Arts degree with a major in Theatre is a 60-semester-hour professional program with concentrations in acting, scenography, and theatre for youth. It is a terminal degree for students interested in pursuing careers in professional and educational theatre. The concentration in acting is based on a conservatory concept, offering an integrated core curriculum in voice, speech, movement, script analysis, and scene study with rehearsal/performance projects, including a special focus on the collaborative process of creating new scripts. The concentration in scenography is a comprehensive degree allowing specialization in two areas of design chosen from costuming, lighting, or scenic design; or two areas of technical theatre chosen from costume crafts, lighting and sound technology, or scenic crafts. It is designed to prepare candidates for a career as a designer or technical director for commercial, regional, and academic theatre. The concentration in theatre for youth is designed to prepare candidates for work in elementary and secondary schools as drama specialists; for college and university teaching in the field of theatre for youth; for professional careers in children's theatre; and for work in community theatres, recreational programs, and various social agencies.

**Admission.** Applicants must meet all admission requirements of the Graduate College. In addition, the Department of Theatre requires a minimum of 30 semester hours of course work in theatre, a minimum GPA of 3.20 for all course work in theatre, and acceptable scores on either the Graduate Record Examination (GRE) or Miller Analogies Test (MAT).

For the concentration in acting, requirements include:

1. an audition consisting of two selections, one classical and one contemporary, not to exceed four minutes total;

2. three letters of recommendation; and
3. a statement of educational and career goals.

Dates and sites for auditions may be obtained from the Department of Theatre.

For the concentration in scenography, three letters of recommendation are required from leaders in the field of theatre, education, or art. In addition, applicants must provide a portfolio of 12 slides of their work with a return envelope and postage, as well as a statement of educational and artistic objectives. An interview is recommended; dates and sites may be obtained from the Department of Theatre.

For the concentration in theatre for youth, three letters of recommendation are required from leaders in the field of theatre for youth, theatre education, or recreation, as well as a statement of educational and career goals. Certification at either the elementary or secondary level is strongly recommended but not required for admission.

More detailed information regarding admission requirements for three areas of concentration may be obtained from the Department of Theatre.

**Application Deadline.** The first deadline for receipt of applications and test scores is March 1. After that date, admission is subject to space availability.

**Program of Study.** Each student works closely with a supervisory committee to develop a program of study in required and elective course work. All M.F.A. candidates majoring in Theatre are evaluated at the end of each semester by their supervisory committee, with the responsibility resting on each student for documenting professional development. The advancement of each student through each of the three years in the M.F.A. program is dependent upon a positive recommendation of the supervisory committee.

The program for the acting concentration consists of a minimum of 60 semester hours, distributed as follows: 48 hours of required course work in the major (THE 500, 504, 505, 520, 521, THP 501, 502, 503, 504, 507, 509, 510, 519, 570, 571, 572, 573, 575, 576, 577, 578, 581, 582); six hours of THP 684 Internship; and six hours of THP 693 Applied Project.

The program for the scenography concentration consists of 60 semester hours distributed as follows: 43 hours of required course work in the major (THE 500 [one hour], 504, 505, 520, 521; THP 506, 530, 540, 545, 649 [three hours], 691, six hours each of THP 684 Internship and THP 693 Applied Project); 12 hours of additional design and/or technical theatre classes which may be selected from THE 430, 431, THP 419, 431, 435, 440, 441, 442, 444, 445, 494 e, f, g, h; and five additional hours of electives subject to the approval of the supervisory committee.

The program for theatre for youth consists of 60 semester hours, distributed as follows: 39 hours of required course work in the major (THE 500, 504, 505, 520, 521, 524; THP 411, 511, and 611 or 618, six hours each of THP 684 Internship and THP 693 Applied Project); and 21 hours of approved electives in the major and related areas.

**Credit before Admission.** Subject to approval by the supervisory committee, a maximum of 24 semester hours of graduate work from a completed master's degree program earned at ASU or another accredited institution may be applied to the program of study. In other cases, a maximum of nine semester hours of nondegree graduate work from ASU or another institution may be applied (see "Credit Completed before Admission," pages 53-54). All course work for the degree must be completed within the six-year time limit.

**Foreign Language Requirements.** Optional.

**Final Examinations.** A comprehensive examination or comprehensive review in the area of concentration is required. In addition, students failing to receive a grade of "B" or better in THE 504, 505, 520 and 521 must pass a written comprehensive examination on the subject-matter of those courses. A final project (THP 693 Applied Project, six hours credit), supported by written documentation and defended in an oral defense, is required.

**Deficiencies.** Deficiencies in undergraduate preparation of no more than 12 hours may be removed while pursuing the M.F.A. degree; courses taken to remove deficiencies may not be counted toward the degree.

## MASTER OF HEALTH SERVICES ADMINISTRATION

The Master of Health Services Administration (M.H.S.A.) degree program is designed to prepare qualified individuals for management careers in hospitals, group practices, health maintenance organizations, consulting firms, long-term care facilities, associations, government agencies, and other health services organizations. This preparation is carried out by providing the students with selected theories, tools, and techniques, which are the understanding, analysis, and application essential for effective health services administration.

**Admission.** See the general requirements for admission to the Graduate College on pages 44-46. Applicants are required to submit evidence of their ability to pursue a graduate degree program in health services administration successfully. All students must take the Graduate Management Admission Test (GMAT) or the Graduate Record Examination (GRE). For more information, call 609/771-7330 or write

EDUCATIONAL TESTING SERVICE  
PO Box CN 6108  
PRINCETON NJ 08541-6108

Students applying to the M.H.S.A. degree program should submit an application for admission and two copies of all transcripts directly to the Graduate Admissions Office. Three recommendations commenting on the student's motivation, commitment, achievements, work experience, and opportunity for success in the program should be addressed directly to the School of Health Administration and Policy. In addition, applicants are required to submit a statement of personal objectives for the degree program addressing commitment, goals, qualifications, and reasons for interest in the program. Application deadlines are December 15, March 1, and April 1. Preference for financial assistance will be given to applicants applying by the March 1 deadline. It is strongly recommended that students visit the campus for a personal interview. A student residing more than 250 miles from ASU may ask for a telephone interview with an M.H.S.A. faculty member when the application file is complete. Brochures describing the Master of Health Services Administration are available by calling 602/965-7778 or writing

SCHOOL OF HEALTH ADMINISTRATION  
AND POLICY  
COLLEGE OF BUSINESS  
ARIZONA STATE UNIVERSITY  
PO Box 874506  
TEMPE AZ 85287-4506

Questions may also be directed by e-mail to asuhap@asuvm.inre.asu.edu.

**Program of Study.** The program of study consists of a minimum of 48 semester hours: 15 hours of business administration, 27 hours of health services administration, and six hours of electives. Additional semester hours (prerequisites) may be required to strengthen preparation in a given specialty. Subject to availability, students may complete an optional residency/fellowship for a period of up to one year (following completion of the degree program). While each student's program of study is individually tailored, a typical program is as follows:

### Business Administration Component

ACC 502	Financial Accounting	3
ACC 503	Managerial Accounting	3
FIN 502	Managerial Finance	3
MGT 502	Organization Theory and Behavior	3
QBA 502	Managerial Decision Analysis	3
Total		15

### Health Services Administration Component

HSA 502	Health Care Organization	3
HSA 505	Community Health Care Perspectives	3
HSA 512	Health Care Economics	3
HSA 520	Health Care Organizational Structure and Policy	3
HSA 522	Health Care Management Systems	3
HSA 532	Financial Management of Health Services	3
HSA 542	Health Care Jurisprudence	3
HSA 589	Integrative Seminar	3
HSA 591	S: Health Care Economics	3
Total		27

**Electives Component.** Six semester hours of electives intended to provide interdisciplinary breadth or specialization are taken in consultation with the student's supervisory committee. These six hours must be earned in graduate courses offered in health care administration, business administration, economics, nursing, political science, social work, sociology, or other appropriate disciplines.



**Prerequisites.** Students lacking sufficient background in business fundamentals are encouraged to take a basic financial accounting course. Those without a basic course in computer skills are required to complete CIS 200. Students must demonstrate strong quantitative ability. This may be accomplished by taking either a calculus course (MAT 210) or quantitative business statistics (QBA 221).

**Course Load.** Normal full-time course load is 12 hours per semester. Students may petition to take up to 15 hours per semester.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** All students must successfully complete the comprehensive requirement established by the College of Business and Graduate College for the M.H.S.A. degree.

**Thesis Requirements.** None.

**Concurrent Degree Programs**

A Master of Health Services Administration/Master of Business Administration concurrent degree program is offered through cooperative arrangement between the faculty of the College of Business and the School of Health Administration and Policy. Students must be admitted to both programs and may complete the course work for both degrees in two years of full-time study by meeting the requirements of each degree program. Separate applications are required and admission requirements of **both programs** must be met. Once admitted, in consultation with their respective faculty advisors, students develop programs of study that meet degree requirements.

The College of Law and the School of Health Administration and Policy offer graduate students a program in Law and Health Services Administration that leads concurrently to the degrees of Juris Doctor and Master of Health Services Administration. Students in the concurrent degree program must be regularly admitted to both the J.D. and the M.H.S.A. degree programs. It is recommended that application to the concurrent degree program be made no later than the end of the first year of law school or first year of enrollment in the M.H.S.A. program. All applicants must comply with the minimum requirements and admission procedures

of the Graduate College. Full-time students can expect to complete the concurrent J.D./M.H.S.A. program in four years.

The College of Nursing and the School of Health Administration and Policy offer a concurrent M.H.S.A./M.S. in Nursing (with a concentration in nursing administration) degree program enabling students to pursue concurrent work in health services administration and nursing administration. The concurrent program is designed for nurses whose career goals are focused on management in complex health care delivery systems and offers nurses the opportunity to develop advanced skills in both financial resource management as well as nursing management. Graduates assume leadership positions in hospitals, group practices, HMOs, consulting firms, long-term care facilities, and other health services organizations. Students must be admitted to both programs and may complete the course work for both degrees in three years of full-time study by meeting the requirements of each degree program. Separate applications are required and admission requirements of both programs must be met.

**MASTER OF LAWS**

Through the Graduate College, the faculty in the College of Law offer a graduate program leading to the Master of Laws degree. Applications are not currently being accepted for the Master of Laws degree program.

**MASTER OF MASS COMMUNICATION**

The faculty in the Walter Cronkite School of Journalism and Telecommunication offer a graduate program leading to the professional degree Master of Mass Communication (M.M.C.). The program is designed to help students achieve academic and professional growth, to prepare students for positions in the mass media, and to provide a background to enable persons currently in the media to advance their careers.

**Admission.** In addition to the general requirements for admission to the Graduate College, the M.M.C. program requires applicants to provide three letters of recommendation (including two from professors in the last unit of study from degree-granting institutions),

scores on either the Graduate Record Examination (verbal and quantitative) or the Miller Analogies Test, a biographical sketch that includes all professional media experience, and a 200-500 word statement outlining career aspirations that could be enhanced by admission to the program (the statement is also used as a writing sample). The applicant's undergraduate GPA, letters of recommendation, test scores, and professional media experience are all considered in the admission process. A TOEFL score of 600 or higher is required of all applicants whose native language is not English. Applicants wishing to enroll for fall semester must have all their application materials submitted by March 1.

**Admission Classification.** Applicants who have an undergraduate degree in an area of mass communication, who meet all other requirements, and who receive regular admission may begin in the program in either the fall or spring semester. A two-year program is designed for applicants who have an undergraduate degree in a discipline other than mass communication. The program consists of 45 semester hours. The first-year courses are designed to provide a foundation in journalism knowledge and skills and must be taken in prescribed sequence. Some first-semester courses are prerequisites for courses to be taken in subsequent semesters.

**Registration.** Registration in courses numbered 500 is limited to students who have been admitted to the M.M.C. program or have approval from the director of graduate studies. Nondegree graduate students may not register for 500-level courses in the School of Journalism and Telecommunication during early registration. Undergraduate students wishing to reserve graduate course credit must follow Graduate College guidelines and obtain approval from the director of graduate studies.

**Program of Study.** The program consists of 36 semester hours of graduate credit for students with undergraduate degrees in the areas of mass communication. Requirements are as follows:

1. 12 hours of core course work;
2. six to 12 hours of specialization courses;

3. nine to 15 hours of a related area outside the school; and
4. three hours of supervised applied project (MCO 593).

The program consists of 45 semester hours of credit for students with undergraduate degrees in areas other than mass communication. Requirements are as follows:

1. 15 hours of core course work;
2. 12 hours of specialization courses;
3. six hours of mass communication electives with skills emphasis;
4. nine hours of a related area outside the school; and
5. three hours of supervised applied project (MCO 593).

**Foreign Language Requirements.**

None.

**Thesis Requirements.** None.

**Final Examinations.** An oral examination in defense of the supervised research or creative project is required.

**MASTER OF MUSIC**

The faculty in the School of Music offer a graduate program leading to the professional degree Master of Music (M.M.). Three majors are available: Composition, Music Education, and Performance. For the Music Education major, concentrations are available in

1. choral music;
2. general music; and
3. instrumental music.

For the Performance major, concentrations are available in

1. music theatre musical direction;
2. music theatre performance;
3. performance pedagogy;
4. piano accompanying; and
5. solo performance (voice, keyboard, or instrumental).

**Prerequisites.** A Bachelor of Music degree or its equivalent from an accredited institution is required for admission to the M.M. program.

**Admission.** Admission to all concentrations under the major in Performance, with the exception of music theatre musical direction, is dependent on a successful audition, either in person or by taped performance. For admission to the major in composition, the appli-

cant must submit three major works showing technical facility in composition. *For admission to the M.M. in Music Education degrees, the applicant must have completed all requirements for music teacher certification.* Students majoring in Performance with a concentration in solo performance (voice) and performance pedagogy (voice) are required to take a diction examination in French, German, and Italian during registration week of their first semester. Students who do not pass this examination are required to take the appropriate semester(s) of MUP 250.

*For admission to the concentration in performance pedagogy (piano), a minimum of one semester of prior piano pedagogy study including significant intern teaching experience is required. In addition, the student must submit an in-person or videotaped demonstration of teaching.*

**Program of Study.** The student must complete a minimum of 32 semester hours of graduate courses, of which at least one-third must be in the area of concentration.

**Foreign Language Requirements.**

Solo performance (voice only) and performance pedagogy (voice only) require a total of 16 semester hours of college-level credit in more than one language chosen from French, German, or Italian. The concentration in piano accompanying requires two semesters of college-level study in French, German, or Italian and two semesters of diction (or the equivalent) in the remaining languages in that group. These requirements may be fulfilled in whole or in part through language instruction in secondary and/or undergraduate school or by other means (see the *General Catalog*, page 154). These language requirements are not part of the 32-hour program of study. However, hours toward the requirements may be taken concurrently with the program of study if a deficiency exists.

**Final Examination.** A final written or oral examination, or both, is required. An oral examination in defense of the thesis is also required.

**Composition**

*Composition.* MTC 523 (four semester hours), 525, 599; six hours of music history.

**Music Education**

*Choral Music.* MUE 548, 549, 550 (or 579), 568, 570; six semester hours of music history (including MHL 575); five hours of music theory. One MHL or MTC course must be in 20th-century music.

*General Music.* MUE 548, 549, 550 (or 579), 551, 552; six semester hours of music history; five hours of music theory. One MHL or MTC course must be in 20th-century music.

*Instrumental Music.* MUE 548, 549, 550 (or 579), 564, 566; six semester hours of music history; five hours of music theory. One MHL or MTC course must be in 20th-century music.

**Performance**

*Solo Performance (Voice).* MUP 527, 541 (eight semester hours), 551, 595, 596; performing ensembles (two hours); five hours of music history; five hours of music theory.

*Solo Performance (Keyboard).* MUP 527 (eight semester hours), 551 (or 581), 595, 596; performing ensembles (two hours); five hours of music history and literature; five hours of music theory.

*Solo Performance (Instrumental).* MUP 527 (eight semester hours), 551, 581, 595, 596; performing ensembles (two hours); five hours of music history; five hours of music theory.

*Piano Accompanying.* MUP 527 Studio Instruction (eight semester hours), 511 (or 521 Studio Instruction [four hours]), 588 (four hours), 595, 596; five hours of music history; five hours in music theory.

*Performance Pedagogy.* MUP 527 (eight semester hours), 541 (voice only), 551 and/or 581, 595, 596; performing ensembles (two hours), (piano only: MUP 440, 507, 508, 581 [four hours], or proficiency); five hours in music history; five hours of music theory.

*Music Theatre Musical Direction.* MUP 521 Studio Instruction (four semester hours), 540, 551, 571 (three hours), 591, 595, 596; a three-hour graduate THP course designed for directors (as approved by supervisory committee); musical direction of two musical theatre productions; five hours of music history; five hours of music theory.

*Music Theatre Performance.* MUP 511 Studio Instruction (six semester hours),



551, 570 (three hours), 571 (three hours), 595, 596; a three-hour graduate THP course designed for actors (as approved by supervisory committee); leading roles in two musical theatre productions; five hours of music history; five hours of music theory.

### MASTER OF NATURAL SCIENCE

The Master of Natural Science (M.N.S.) degree offers the opportunity for interdisciplinary graduate training in the natural sciences (biological sciences, mathematics, and physical sciences) and cognate areas. The degree program is especially suited for individuals who desire professional training rather than research training. Because of designed flexibility, the degree also offers the opportunity for individualized professional graduate programs depending upon the backgrounds and goals of the students. The major is Natural Science and the student is expected to emphasize course work in two or more areas of concentration. The program must be interdisciplinary. Additional information about this program can be found under the various majors in the natural sciences in the *Graduate Catalog* and by contacting faculty offering the following concentrations:

1. botany;
2. chemistry;
3. geology;
4. mathematics;
5. microbiology;
6. physics; and
7. zoology.

**Admission.** See pages 44-46 for general admission requirements. A prerequisite for admission is the availability of resources for the proposed program and a faculty member in one of the departments to serve as graduate advisor. The submission of scores on the Graduate Record Examination (verbal, quantitative, and analytical) is required of all applicants.

**Supervisory Committee.** The supervisory committee, consisting of three faculty members, is appointed by the dean of the Graduate College upon the recommendation of the chair of the academic unit in which the graduate advisor serves as a faculty member. The supervisory committee is formed soon after the student has been admitted to the degree program. The graduate ad-

visor and student suggest names of persons to serve on the supervisory committee. The composition of the supervisory committee must reflect the interdisciplinary nature of the program.

**Program of Study.** A program of study is recommended by the supervisory committee after conferring with the student. The minimum number of semester hours required for the degree is 30. An additional number of semester hours may be required by the supervisory committee depending upon the background of the student and the nature of the proposed program. In some cases undergraduate courses may be required in order to remove deficiencies.

**Foreign Language Requirements.** None.

**Thesis Requirements.** A thesis is optional.

**Final Examinations.** A final written or oral examination, or both, is required. Each examination is administered by the supervisory committee.

### MASTER OF PUBLIC ADMINISTRATION

The School of Public Affairs is a professional graduate school in public administration that prepares students for careers in public management, public policy analysis and evaluation, urban management and planning, and public information management. To improve public management, the school maintains public service programs that educate and advise public service practitioners. To improve public policymaking, the school maintains research and service programs that identify issues, disseminate information, and propose solutions to major public problems. To foster the next generation of scholars, the school maintains research programs designed to advance understanding of the processes by which public resources and personnel are organized to formulate, implement, and manage public policy decisions.

Faculty in the School of Public Affairs offer a 42-credit-hour professional Master of Public Administration (M.P.A.) degree. The M.P.A. is an interdisciplinary, professional degree designed to prepare students for public service, public management, and policy analysis at the local, state, and national

levels of government. The M.P.A. degree is accredited by the National Association of Schools of Public Affairs and Administration (NASPAA).

**Admission.** Applicants to the M.P.A. program are considered for admission irrespective of undergraduate major, although students may be required to complete additional courses and/or workshops to prepare themselves for the core courses.

Regular admission may be granted to applicants who have achieved a grade point average of 3.00 (4.00 scale) or better in the last two years of work leading to a bachelor's degree, as well as acceptable GRE (verbal, quantitative, and analytical) scores.

Admission to the program is not guaranteed. Applicants meeting basic requirements may still be denied admission because of enrollment limits.

International students must submit a TOEFL score. The minimum TOEFL score for regular admission is 550. Although application for admission to the program can be made at any time, the M.P.A. committee will review completed applications February 15, March 15, June 15, July 15, and November 15.

Students requesting graduate assistantships and tuition scholarships should have their application files completed for the February 15 M.P.A. Committee review.

All applicants must submit the following materials to the Graduate College:

1. an official application;
2. official transcripts of all undergraduate and graduate work;
3. scores on the GRE (verbal, quantitative, and analytical; special subject tests not required); and
4. TOEFL scores for international students.

All applicants must submit the following materials to the School of Public Affairs:

1. three letters of recommendation, at least two of which should be written by faculty who can evaluate the applicants academic performance;
2. a written statement of applicant's educational and career goals, which is also used as a sample of the applicant's writing abilities; and
3. resume or additional documents as the applicant sees fit.

**Program of Study.** The M.P.A. program consists of forty-two hours of graduate credit. Students take twenty-four of these hours in eight core classes in the School of Public Affairs, and eighteen additional hours in elective courses.

Students are encouraged to develop a concentration with their elective courses. Four areas of concentration are offered:

*Public Management.* PAF 506, 507, 510, 511, 520, 521, 522, 526, and 529.

*Public Policy Analysis and Evaluation.* PAF 502, 504, 505, 540, 541, 546, 548, and 549.

*Urban Management and Planning.* PAF 523, 530, 531, 533, 535, 536, and 562.

*Public Information Management.* PAF 501, 550, 551, 552, 555, and 556.

No more than nine credit hours of ASU graduate credit courses taken before admission to the school and approved by the M.P.A. Committee can be included in the Program of Study.

Students enrolling in core courses must demonstrate minimum competency in statistics, American government, and computer applications. Courses taken to fulfill the competency do not count toward the 42-hour degree program. Competency in statistics or American government is met with a grade of B or better in approved courses, passing a diagnostic test approved by the M.P.A. Committee, or earning a B or higher in such approved courses as PAF 401, POS 401, PSY 230, QBA 221, and SOC 395 for statistics and POS 310 for American government. Competency in computer applications is met by enrollment in university short courses and training seminars.

**Internship.** A public service internship is recommended for M.P.A. students without previous administrative experience in government. The purpose of the internship is to provide students with practical and professional experience in a specific career area. Students work in and for public organizations applying the knowledge, skills, and abilities acquired in their program of study. During the internship experience, students can develop a professional network that will aid them in their pursuit of a career in government or non-profit organizations. Students

can apply three hours of internship credit to the degree program. To receive course credit for an internship, students are required to attend class sessions and submit a paper to the internship coordinator.

**Foreign Language Requirements.** None.

**Thesis Requirements.** None.

**Comprehensive Examinations.** The Master of Public Administration degree requires students to demonstrate competency for public service by synthesizing and applying core course knowledge, skills, and abilities to public service problems. Students demonstrate their public service competency by earning an "A" or a "B" in the M.P.A. capstone course, PAF 508 Public Service.

### MASTER OF SCIENCE IN DESIGN

The Master of Science in Design (M.S.D.) degree with majors in Industrial Design and Interior Design prepares students for leadership positions in teaching. The program has four goals:

1. to provide a graduate program for students who have a baccalaureate degree in Industrial Design, Interior Design, or a related design discipline;
2. to provide the opportunity for the development of specialized research and design skills to support the industrial design and interior design professions;
3. to provide the opportunity for professionals to gain the necessary research and design skills for academic careers; and
4. to provide insights that foster contemporary design critical journalism that nurtures the emerging body of design literature through association with acknowledged authors and publishers.

**Admission Requirements.** Applicants must hold a baccalaureate degree in Industrial Design, Interior Design, or a related design discipline to participate in this terminal degree program. When applying for admission, applicants must declare a major and specify one of three concentrations: facilities planning and management; human factors in design; or design methodology, theory, and

criticism. Admission to the M.S.D. program is selective on a space-available basis.

**Application Procedures.** Applicants must file separate application materials to both the Graduate College and the School of Design.

**School of Design Requirements.** The following materials should be submitted to

SCHOOL OF DESIGN  
COLLEGE OF ARCHITECTURE AND  
ENVIRONMENTAL DESIGN  
ARIZONA STATE UNIVERSITY  
PO BOX 872105  
TEMPE AZ 85287-2105

1. a statement of intent (maximum 600 words) explaining the applicant's interest in pursuing a post-professional research degree in Industrial Design or Interior Design and the reason for selecting the concentration (facilities planning and management; human factors in design; or design methodology, theory, and criticism), the applicant's academic background, and, if appropriate, additional preparation for the selected concentration;
2. TOEFL scores from international students whose native language is not English;
3. three letters of recommendation from persons who are qualified to comment on the applicant's potential in the selected concentration;
4. an additional statement from applicants wishing to be considered for teaching or research assistantships outlining areas in which they feel competent to serve as a teaching or research assistant and inexpensive copies of samples of work that will not be returned (international students who wish to be considered for a teaching assistantship and whose first language is not English are required to pass the Test of Spoken English [TSE] administered by the American Language and Culture Center at ASU); and
5. an 8.5" x 11" folio documenting papers and projects that support the intended concentration.

The portfolio is returned after final admission procedures, provided sufficient prepaid postage is enclosed, or if

the materials are claimed in person within one year of submission. Unclaimed portfolios are retained for only one year. The School of Design assumes no liability for lost or damaged materials.

**Application Deadlines.** Primary consideration is given to completed applications received by the deadlines. Applications for assistantships and scholarships normally are considered at the same time.

All materials must be received by the Graduate College and the school by March 1 for fall semester. Late applications are accepted until all positions are filled.

**Selection Procedures and Notifications.** The faculty evaluate the applications and supporting materials and recommend to the Graduate College whether the applicant should be granted regular or provisional admission or if admission should be denied. If admission is provisional, the Graduate College specifies in its letter of admission the provisions to be met to gain regular status. The school informs successful applicants of the procedures for enrollment.

**Program of Study.** See pages 172-173 for faculty and course listings. The program of study consists of 36 semester hours of course work at the 500 level or above with the following distribution:

DSC 520 Contemporary Design	
Issues .....	3
Approved courses in the concentration .....	12
Practicum .....	3
Approved research methods courses .....	6
Approved electives outside the school .....	6
Thesis or Applied Project .....	6
Total .....	36

**Areas of Concentration.** The *facilities planning and management* concentration focuses on the coordination of the work place and equipment with the people and organizational structure of the institution. The intent is to combine programming and management practices with current professional and technical expertise to provide humane and effective work environments. Facility-related responsibilities to support this concentration cluster into seven functional units: programming (long-range planning); facilities analysis; space management; interior planning and design; human factors; interior

codes; public welfare and safety; and interior installation.

The *human factors in design* concentration identifies the problems, establishes the strategies, and develops the design solutions needed for issues surrounding the human/machine interface. The human/machine interface is the focus although the principles have wider application to other systems and environments. Special emphasis is placed on the relationship between the human and test performance factors. Emphases include qualities of function; methods of forming organizational relationships; factors of environmental control systems (acoustics and illumination); environmental graphics health care design; and human factors in product and interior design. Subject matter also includes the design of equipment, machines and spaces, ergonomics and forms of ergonomic documentation, analysis of relationships between spaces, objects, and people as simulated through computer animation, imaging, and traditional modeling techniques. Because of the significant impact of human factors on the work environment, this concentration shares courses and faculty with the facilities planning and management concentration.

The *design methodology, theory, and criticism* concentration is available to majors with backgrounds in art or design history, industrial design, interior design, architecture, sociology, environmental psychology, or research methods. Two foci exist: (1) the development of critical skills based on understanding the theories and philosophies that form the basis of contemporary design and (2) the ability to recognize and interpret emerging design issues and trends through impact identification and analysis.

Qualitative and quantitative research methods are employed. Applications include design education, design marketing and production decision, and design criticism. The program examines successful design strategies for problem solving and theories related to design forecasting.

*Applicants for this concentration must submit with their school application materials two samples of university level papers indicative of their writing style.*

**Foreign Language Requirements.** None.

**Practicum.** All students must enroll in a three-hour teaching practicum that focuses on the problems and issues surrounding studio instruction. Emphasis is on the techniques of criticism and individual and group studio teaching.

**Thesis or Applied Project.** For students choosing the thesis option, six semester hours of 599 Thesis and 592 Research apply toward the thesis. Guidelines in the *Format Manual* must be followed. For students choosing the applied project option, six hours of 593 Applied Project apply.

**Final Examinations.** An oral examination in defense of the thesis or applied project is required.

### MASTER OF SCIENCE IN ENGINEERING

The faculty in the College of Engineering and Applied Sciences offer professional programs leading to the Master of Science in Engineering (M.S.E.) degree with majors in Aerospace Engineering, Chemical Engineering, Civil Engineering, Electrical Engineering, Engineering Science, Industrial Engineering, and Mechanical Engineering. The programs are designed to bridge the gap between knowledge of engineering sciences and creative engineering practice while at the same time increasing the depth and breadth of knowledge in selected areas of emphasis. The pattern of course work applicable to the degree is potentially unique for each student, although it must conform to the general guidelines for subject matter content for the degree as authorized in the *Graduate Catalog*.

Two options are available within the Master of Science in Engineering degree program. Option 1 requires a thesis and is designed primarily for full-time students. Option 2 is designed for full-time students not intending to write a thesis and for students who hold full-time jobs and must attend university classes on a part-time basis. A thesis or equivalent is not required of students who elect this option.

**Admission.** Applicants are expected to satisfy all requirements for admission to the Graduate College. Entry into this program normally requires a bachelor's degree with a major in engineering or in a closely related bachelor's degree program.

Deficiencies for admission to the graduate degree programs are specified at the time of admission. The verbal, quantitative, and analytical components of the Graduate Record Examination (GRE) are recommended but not required unless specified by the respective academic unit in which the major is offered. TOEFL scores must be submitted by international applicants before admission is considered. Applicants with TOEFL scores of 550 or higher are regularly admitted without requiring further language study. Applicants with scores below 550 are regularly admitted but must complete study in ASU's American Language and Culture Program (ALCP) before enrolling in course work in the academic program.

**Program of Study.** In general, all candidates for the Master of Science in Engineering degree program are required to complete 30 semester hours. Additional courses may be assigned by the supervisory committee depending on the background of the candidate.

*Option 1.* A minimum of six semester hours of research and thesis credit must be included in the 30 hours.

*Option 2.* A minimum of 30 semester hours and a comprehensive examination are required.

**Foreign Language Requirements.** None.

**Thesis Requirements.** Only students who elect option 1 are required to write a thesis.

**Final Examinations.** A final oral examination in defense of the thesis is required for students who choose option 1. A final comprehensive examination is required for students in option 2. Examination format and times should be obtained from the academic unit.

**MASTER OF SOCIAL WORK**

The professional program leading to the Master of Social Work degree prepares social workers for advanced direct practice, planning, administration, and community practice. The program is designed to prepare social workers capable of responding effectively to the needs of special populations in the Southwest—the ethnic groups of the region, the aged, urban and rural poor, children at risk, the disabled, and women who are victims of poverty, dis-

crimination and violence—in its curriculum and its practicum assignments. The Master of Social Work degree program is accredited by the Council on Social Work Education.

**Application Procedures.** Students applying to the graduate program in Social Work must follow the procedures for admission to the Graduate College (see pages 44–46). In addition the applicant must submit the following to

STUDENT SUPPORT SERVICES  
SCHOOL OF SOCIAL WORK  
ARIZONA STATE UNIVERSITY  
PO Box 871802  
TEMPE AZ 85287-1802

1. application to the graduate Social Work program;
2. statement of educational and career goals in sufficient detail to indicate compatibility with the educational objectives and capabilities of the School of Social Work;
3. three letters of reference using the reference letter forms provided by the School of Social Work; and
4. test scores from either the Graduate Record Examination or the Miller Analogies Test.

**Admission**

*Regular Admission.* Applicants must meet admission requirements of the Graduate College and the School of Social Work. Among other considerations for acceptance by the Graduate College, the applicant must have a GPA of 3.00 (4.00 = A) in the last two years of work leading to the bachelor's degree. The applicant's score on an aptitude examination—the Graduate Record Examination or Miller Analogies Test—is also considered.

*Provisional Admission.* Applicants with lower test scores or grades below minimum levels may be considered for provisional admission if there is counterbalancing evidence suggesting the potential of outstanding performance in the Master of Social Work program. Normally, final determination of removal of provisional status is made by the time the student has completed 12 hours of approved graduate study. The provisional student does not begin field work until this status has been changed. However, the student carries the same academic load as a regularly admitted student and is expected to meet the same standards for continuation in the program.

All students are required to successfully complete a course in human biology before enrollment in the graduate program. Additionally, all students must have successfully completed a course in statistics either prior to admission or by the end of the first year in the Master of Social Work program.

Applications to the Master of Social Work program are accepted from November 1 to March 1 preceding the fall semester to which the applicant is seeking admission. All applicants are reviewed for admission for the fall semester only.

**Program of Study.** The standard program consists of 60 hours including both classroom instruction and field practicum. It is divided into a foundation year (core curriculum) and a concentration year. During both years, students spend two days a week in a practicum setting. The foundation curriculum is the same for all students and must be completed before entering the concentration year. The following are the required foundation courses:

SWG 501	Human Behavior in the Social Environment I .....	3
SWG 502	Human Behavior in the Social Environment II .....	3
SWG 510	Direct Practice I .....	3
SWG 511	Direct Practice II .....	3
SWG 520	Practice-Oriented Research ...	3
SWG 531	Social Policy and Services I ..	3
SWG 533	Ethnic Minorities and Social Work .....	3
SWG 541	Field Practicum I .....	3
SWG 542	Field Practicum II .....	3
SWG 580	Community and Organizational Change .....	3
Total .....		30

In the second year, students concentrate in either direct practice or planning, administration and community practice. Six to nine hours of electives are available for students either to take additional course work in their concentration or to increase knowledge and skill in such areas as health and mental health, family and child welfare, or aging.

The following are required concentration courses:

**Direct Practice**

SWG 606	Psychopathology .....	3
SWG 611	Social Work with Families ....	3
SWG 620	Research Methods in Social Work .....	3
SWG 621	Integrative Seminar .....	3

SWG 632	Social Policy and Services II .....	3
SWG 641	Advanced Practicum: Direct Practice I .....	3
SWG 642	Advanced Practicum: Direct Practice II .....	3
One of the following five approved advanced courses .....		3
SWG 613	Social Work with Individuals (3) .....	3
SWG 614	Social Work with Families in Transition (3) .....	3
SWG 616	Social Work with Chemically Dependent Families (3) .....	3
SWG 617	Assessment and Treatment with Children and Adolescents (3) .....	3
SWG 618	Family Violence (3) .....	3
Electives .....		6
Total .....		30

**Planning, Administration and Community Practice**

SWG 623	Agency Research in Social Work .....	3
SWG 632	Social Policy and Services II .....	3
SWG 643	Advanced Practicum: Planning, Social Work Administration, and Community Practice I .....	3
SWG 644	Advanced Practicum: Planning, Social Work Administration, and Community Practice II .....	3
SWG 680	Program Planning in Social Services .....	3
SWG 681	Social Work Administration ..	3
SWG 682	Community Participation Strategies .....	3
Electives .....		9
Total .....		30

Electives may be selected from offerings at the School of Social Work or courses offered through other departments with the approval of student's advisor. The total semester hours for each concentration equals 30.

**Transfer Credit.** Upon recommendation of the admissions committee, the first year of graduate study (up to 30 graduate semester hours) earned at another CSWE accredited school of social work may be transferred and applied toward the Master of Social Work degree at ASU. Under these circumstances, the student must complete the second full year of graduate study (at least 30 semester hours of graduate work) at ASU, resulting in a 60-hour program comprised of the work from both schools. A full report from the school at which the intended transfer credit was obtained is required.

In other cases, with the approval of the supervisory committee, up to nine semester hours of graduate work completed at another university may be transferred as elective credit.

Consideration for acceptance of prior graduate credits must be applied for at the time of admission. The grades of all transfer credit must be a "B" or better.

**Nondegree Course Work.** A maximum of nine graduate semester hours earned as a nondegree student in the ASU School of Social Work or in another graduate degree program at ASU may be applied toward the program of study as elective credit. A combination of credit earned as a nondegree student—at ASU or transferred from another university—may not exceed nine hours.

Course work toward a master's degree must be completed within six consecutive years. The six-year period begins with the first course included on the student's approved program of study.

Consideration for acceptance of nondegree work must be applied for at the time of admission.

**Exemptions and Waiver Examinations.** The number of hours required to complete the M.S.W. degree ranges from 40 to 60 semester hours, with 60 hours representing the standard program. In addition to transferring credit (see policy on transfer credit), admitted students may meet requirements of up to 20 hours of credit towards the degree by (1) exempting up to nine hours of foundation course work without examination or (2) successfully completing examinations in any of the foundation courses except field practicum.

**Exemptions.** Only students from B.S.W. programs accredited by the Council on Social Work Education can be considered for exemptions. In order to be eligible for an exemption from any course, students must have received their B.S.W. degree no more than five years prior to the date of admission or must demonstrate current continuing education credits. Admitted B.S.W. students from ASU are exempted from the courses listed below without examination if they meet the stated GPA requirements. B.S.W. students from other accredited programs may also be exempted from the same

courses, but must submit their course content material (course description, syllabus, and outline) for review by the M.S.W. director for an equivalency review to determine exemption. B.S.W. students may be exempted from the following courses:

1. SWG 502 if the student has at least a 3.50 GPA for both SWU 301 and 402 or equivalent social work courses;
2. SWG 531 if the student has at least a 3.50 GPA for both SWU 331 and 432 or equivalent social work courses; and
3. SWG 533 if the student has at least a "B" in SWU 474 or an equivalent social work course.

**Waiver Examinations.** Students who believe they have successfully completed equivalent undergraduate courses or have related work experience covering content to be taught in the M.S.W. courses listed below can request to take a written waiver examination. Waiver examinations are offered for the following courses:

SWG 501	Human Behavior in the Social Environment I .....	3
SWG 502	Human Behavior in the Social Environment II .....	3
SWG 510	Direct Practice I .....	3
SWG 511	Direct Practice II* .....	3
SWG 520	Practice-Oriented Research ...	3
SWG 531	Social Policy and Services I ..	3
SWG 533	Ethnic Minorities and Social Work .....	3
SWG 580	Community and Organizational Change .....	3

\* Only students who successfully pass the waiver exam for SWG 510 Direct Practice I will be allowed to take the waiver exam for SWG 511 Direct Practice II.

**Comprehensive Examinations.** ASU requires a comprehensive examination for graduation in all professional master's programs that do not have a thesis requirement. All Social Work students must pass a written comprehensive examination, administered by the school, before graduation.

**Academic Standing and Curriculum Sequencing.** In order to remain in good academic standing, the student must maintain an overall GPA of 3.00 at the end of each semester. Most courses in the program are sequential; successful completion of the prior

course in the sequence is required to enroll in the following course. Students may not enroll in any second-year required courses until all foundation courses have been successfully completed.

**Southern Arizona Component.** The School of Social Work offers the full foundation year (30 semester hours of credit) and some concentration-year course work in Tucson. Students are required to commute to Tempe during both semesters of their concentration year. Courses are scheduled, however, so that the minimum of travel time is required of students. For application to the Southern Arizona Component, follow the admissions procedures outlined below.

**Part-Time Program.** A limited number of students are admitted each year to a planned part-time program. Students interested in this option must specifically apply to the part-time program. At least one academic year must be taken on a full-time basis. A maximum of one year of field work may be completed at the agency where the student is employed.

**Financial Assistance.** Recent federal reductions in support of human services and educational programs have severely limited the resources available for stipends. Therefore, it is important that applicants have a sound financial plan to cover expenses for the duration of the degree program.

Financial assistance information is available from Student Financial Assistance Office, Student Services Building, 602/965-3355.

### MASTER OF TAXATION

The Master of Taxation (M.Tax.) degree is a specialized program providing persons with the highly technical and demanding skills required to administer the tax laws in both the private and public sectors of the economy. Students applying to this program must submit scores on the Graduate Management Admission Test. International applicants whose native language is not English must submit scores from the TOEFL and the TSE or SPEAK exams.

**Prerequisites.** Students whose transcripts do not include certain undergraduate courses or their equivalents

must complete these courses. Most persons holding an undergraduate degree in accountancy should have satisfied these requirements. Contact the School of Accountancy for a current list of the program prerequisites.

**Program of Study.** The program of study consists of a minimum of 30 semester hours. The following courses are required:

ACC 515	Professional Practice Seminar .....	3
ACC 521	Tax Research .....	3
ACC 571	Taxation of Corporations and Shareholders .....	3
ACC 573	Taxation of Partners and Partnerships .....	3
ACC 575	Estate and Gift Taxation .....	3
Total	.....	15

Additional courses in accountancy, finance, general business, law, public affairs, or other acceptable areas to complete the degree program are selected in consultation with the student's supervisory committee. The program of study must include a minimum of 15 semester hours of credit in graduate-level accounting courses and a minimum of 24 semester hours of resident credit in courses open exclusively to graduate students. A maximum of six hours may be taken outside the College of Business.

**Course Load.** Students are limited to 13 hours per semester.

**Foreign Language Requirements.** None.

**Thesis Requirements.** A thesis is optional.

**Final Examinations.** A final comprehensive written examination is required of all candidates. In addition, an oral examination in defense of the thesis is required of candidates who elect to write a thesis.

### MASTER OF TEACHING ENGLISH AS A SECOND LANGUAGE

The M.TESL degree is designed for students who seek a professionally oriented graduate education in the teaching of English as a second language.

**Admission Requirements.** All applicants must meet the general requirements for admission to the Graduate

College (see pages 43-46). International students must submit a TOEFL score of at least 550.

**Program of Study.** The program requires a minimum of 30 hours of approved graduate course work and must include LIN 500 RM: Linguistics, 510 English Linguistics, 572 Theories Underlying the Acquisition of English as a Second Language, 574 The Teaching of English as a Second Language, and a three-hour applied project (LIN 593) overseen by the supervisory committee.

**Foreign Language Requirements.** A foreign language is required. International students whose native language is not English may fulfill the foreign language requirement by (1) providing evidence that English is not the medium of instruction at their native-language universities and (2) satisfactory completion of the Test of Spoken English (TSE).

**Applied Project.** A three-hour applied project, LIN 593, which is overseen by the director, chosen from the English department linguistics/TESL faculty, is required. Two additional faculty members serve with the director to form a committee for the final oral examination on the project.

**Final Examinations.** An oral examination on the applied project is required. (See above.)

### MASTER OF TECHNOLOGY

The Master of Technology degree program is offered by the faculty in three departments of the School of Technology: Aeronautical Technology, Electronics and Computer Technology, and Manufacturing and Industrial Technology. Courses are offered at ASU East. The following eight areas of concentration are available:

1. aeronautical engineering technology;
2. aeronautical management technology;
3. electronics engineering technology;
4. graphic communications technology;
5. industrial management and supervision;



6. manufacturing engineering technology;
7. mechanical engineering technology; and
8. welding engineering technology.

The professional programs leading to the Master of Technology degree are intended as preparation for a career in a selected branch of technology or as the foundation for further advanced study. Graduates of this program are provided with technical and professional skills for use in leadership positions in industry and education.

Faculty members administering the program have been selected because of relevant backgrounds in industry and business along with their academic training and teaching experience.

**Admission.** Admission to the Master of Technology degree program requires the completion of all general admission requirements and procedures set forth by the Graduate College. The School of Technology also requires an appropriate baccalaureate degree from an accredited college or university, with a minimum of 30 semester hours in technology or equivalent and 16 hours of physical science and mathematics appropriate to the program pursued. The specific requirements vary within each department.

Graduate work presupposes an adequate technical preparation in a selected technology at the undergraduate level. Deficiencies for admission to the graduate program, if any, are specified at the time of admission. The applicant's past work and professional experience is also evaluated and taken into consideration when determining admission classification.

To be considered for regular admission, a 3.00 GPA is required.

**Program of Study.** The program of study is designed to promote greater depth of understanding and preparation in technology as it can be applied to industry and education. The program of study is planned in consultation with the appointed supervisory committee. It is designed for flexibility, permitting the student to select a combination of courses in a technological area and a supporting area to meet individual career goals.

A minimum of 32 semester hours is required for the Master of Technology degree program. Of these 32 hours, a minimum of 15 hours must be 500-level courses and part of the approved program. Specific credit requirements vary within each department. The minimum requirements are as follows:

Technical area .....	15-18
Supporting area .....	9-12
Research course .....	3
Practicum/Applied Project .....	2
Total .....	32

A maximum of nine semester hours of appropriate course work completed before admission may be included in the program of study for the Master of Technology degree program.

A master's degree candidate forms a supervisory committee, the chair of which is from one of the three technology departments within the School of Technology. The chair and the committee members assist the student in selecting appropriate courses to meet the degree requirements and the student's goals. Specific program patterns are approved by the committee.

The Department of Aeronautical Technology provides students the opportunity to select courses, to be included in the technical area of their program of study, under the concentrations of aeronautical engineering technology and aeronautical management technology.

The Department of Electronics and Computer Technology offers several areas of study within the electronics engineering technology concentration. These include electronic communication systems, digital/computer systems, systems control and instrumentation, microelectronics, and electronics engineering technology education.

The Department of Manufacturing and Industrial Technology provides students the opportunity to select courses to be included in the technical area of their program of study, under the concentrations of industrial management and supervision, graphic communications technology, manufacturing engineering technology, mechanical engineering technology, and welding engineering technology. Students may also select course work from computer integrated manufacturing engineering technology and from robotics and automation engineering technology.

## Doctoral Degrees

### DOCTORAL DISSERTATIONS

The doctoral dissertation is based on a substantial and sustained research project and constitutes a significant contribution to knowledge in the student's discipline. Accordingly, it is presumed that the results should be published in scholarly journals, books, or other appropriate forms, either before or following completion of the doctoral degree. The research on which the dissertation is based should have been conducted during the time of the student's doctoral studies at ASU, under guidance of ASU faculty, and in accord with Graduate College policies and procedures.

The pedagogical function of the dissertation is twofold. On the one hand, students learn to conduct a major, independent research project and to present the results, all under the guidance of an experienced doctoral mentor. On the other hand, the dissertation is a demonstration of the student's ability to conduct a major research project at the highest level of professional competence. The research experience culminates in a final oral exam, commonly known as the "dissertation defense." At ASU, defenses are public; students and faculty from the candidate's unit especially are encouraged to attend. In the successful dissertation defense, doctoral study culminates in a public affirmation of the student's scholarly competence and of his or her new status in the community of scholars.

The doctoral student must submit two final copies of the dissertation or research paper (for DMA students in certain concentrations) to the ASU Bookstore for binding. The student is responsible for the binding fees. Bound copies are placed in the Hayden Library and Archives. See page 50 for information on theses and dissertations.

### Open Dissertation Defenses

Doctoral dissertation defenses are open to all members of the university community. The oral defense engages the supervisory committee and the candidate in a critical, analytical discussion of the research and findings of the study as well as a review of the relation of the dissertation to the specialized

field in which it lies. The presentation of dissertation defenses in an open forum fosters a broader awareness of the state of graduate research at the university, promotes a wider scholarly dialogue among disciplines, and recognizes publicly the scholarly contributions of doctoral candidates. Announcements are posted in prominent places in the student's department. Members of the university community are invited to dissertation defenses through announcements published in *ASU Insight*, the university's weekly news bulletin. If circumstances warrant, the supervisory committee may conduct the final part of its questioning in closed session. Committee deliberations and the final vote are conducted in closed session.

#### **Coauthored Work in Doctoral Dissertations**

The Graduate Council recognizes the necessity of collaborative research by graduate students with their mentors and with other graduate students. These efforts often result in coauthored works such as journal articles and presentations at meetings. When data or information contained in coauthored works or the actual coauthored works themselves appear in a doctoral dissertation, the graduate author should obtain necessary permission from involved parties (such as written consent from coauthors and the journal that holds the copyright), credit the sources and inspiration of the research, and properly acknowledge the coauthors.

#### **Course Work after Admission to Doctoral Program**

A student with an appropriate master's degree must complete at ASU a minimum of 54 to 60 semester hours of approved graduate work, including 24 hours of dissertation and research (or recital for Music majors), after admission to the doctoral degree program. A student without an appropriate master's degree usually must complete 84-90 semester hours of work at ASU.

#### **Research and Dissertation Credits on Programs of Study**

The doctoral program of study generally consists of appropriate graduate course work and 24 hours of 792 Research and 799 Dissertation. No more than 24 hours of 799 Dissertation may be included on the doctoral program of study.

#### **Thesis Credit on Doctoral Programs of Study**

A maximum of six hours of thesis credit may be included in a doctoral program of study. The thesis credit must be recorded, the thesis successfully defended, and the degree conferred.

#### **College of Law Credit**

The Graduate College accepts a numerical grade of 70 or above for courses taken in the College of Law at ASU as part of an approved program of study for a doctoral degree program, if the ASU law courses are deemed appropriate. These grades are not used in the two GPAs calculated for graduation, i.e., the courses on the program of study and all courses numbered 500 and above.

#### **Withdrawal Policy**

A doctoral degree student who does not enroll for three calendar years is considered withdrawn and must reapply for admission to a degree program.

#### **DOCTOR OF EDUCATION**

The Doctor of Education (Ed.D.) degree is primarily a professional degree, designed for persons who wish to pursue careers as leaders in education or as applied researchers. Emphasis is on application of research and theory in education, and on acquisition of professional skills. Prospective students must demonstrate superior scholarship and leadership in professional education. Each student is expected to acquire broad knowledge in the major field and to produce a dissertation addressing a significant educational issue or problem.

**Admission.** Applicants must meet the general requirements established by the Graduate College as well as College of Education requirements. Satisfaction of these requirements does not guarantee admission. All divisions require submission of a two-page formal letter of application describing the applicant's prior relevant experience and accomplishments and specifying areas of greatest interest as well as career goals. Individual divisions or programs may have standards higher than these minimums or may require submission of additional materials. Applicants should consult the division director or program coordinator for specific admission requirements.

**Program of Study.** The program requires a minimum of 60 semester hours beyond the master's degree. Of these, at least six hours must be in internship. Candidates for the doctorate must complete the College of Education core for doctoral students, which amounts to 12 semester hours. The core courses are COE 502, 503, 504, and 505; see page 176 under "Education Core Courses" for a listing. The recommendation for the program committee is reviewed simultaneously with the program of study.

The quality of student work is evaluated through written comprehensive examinations, formal oral and written presentation of the dissertation proposal, and a final oral examination in defense of the dissertation. Students must demonstrate competence both in the application of research findings and in conducting research. The dean of the Graduate College, upon recommendation of the division director, appoints the dissertation committee for each Ed.D. student. This committee reviews and evaluates the student's dissertation proposal and conducts the final oral examination.

**Residency.** The minimum residence requirement for the Ed.D. degree is completion of 30 semester hours within a period of 18 consecutive months after admission to the doctoral program at ASU. Not more than 10 semester hours of research (792), applied project (793), and dissertation (799) credit may be included in the course work used to meet the 30-hour residence requirement.

**Continuous Enrollment and Re-entry.** Graduate students in the College of Education who have not been in attendance at ASU for one or more semesters must apply to the Graduate College for re-entry and, following approval of the re-entry application, must register for a minimum of one semester hour of graduate credit in the degree area during each of the following semesters. Applications for re-entry are considered along with all other new applications to the degree program.

Re-entry is not an issue for students who maintain continuous enrollment and make satisfactory progress toward their degrees. If a program of study must be interrupted for one or more semesters, the student must apply to the supervisory committee and the division director for leave status, not to exceed one calendar year.



**Foreign Language Requirements.** None.

**Comprehensive Examinations.** When students have essentially completed the course work in an approved program of study, they should request permission from the Graduate College to take the comprehensive examinations. The written and oral examinations are designed to assess the student's mastery of the field of specialization. Failure in the comprehensive examinations is considered final unless the supervisory committee and the director of the division recommend, and the dean of the Graduate College approves, a re-examination. A re-examination may be administered no sooner than three months and no later than one year from the date of the original examination. Only one re-examination is permitted.

**Candidacy.** Doctoral students should apply for admission to candidacy immediately after they have met all requirements for the degree, except the dissertation. These requirements include passing the comprehensive examinations and other requirements specified by the division.

**Research and Dissertation Requirements.** The dissertation should demonstrate advanced analytic competence and contribute to the understanding and improvement of professional practice. Each candidate must register for a combined total of 24 semester hours of credit for research (792) and dissertation (799). The final copy of the dissertation must be reviewed by the supervisory committee and the staff of the Graduate College at least three weeks before the degree conferral date. Copies of the *Format Manual* are available in the Graduate College.

**Final Examinations.** The final oral examination in defense of the dissertation is mandatory and must be held on the campus of ASU. The oral defense is scheduled by the supervisory committee with the approval of the dean of the Graduate College.

**Graduation.** The student is eligible for graduation when the Graduate College scholarship requirements have been met, the final oral examination has been passed, and the dissertation has been approved by the supervisory committee and accepted by the director of the division and the dean of the Graduate College.

Applications for graduation should be made no later than the date specified in the Graduate College calendar.

## DOCTOR OF MUSICAL ARTS

The Doctor of Musical Arts is a professional degree program designed for students desiring a high level of performance proficiency as well as for those students preparing for teaching positions at the university level. The major is Music with five concentrations: choral music, general music, instrumental music, music composition, and solo performance.

**Admission.** Students seeking admission normally hold the Master of Music degree. Applicants with other degrees are considered if they have received graduate training similar to that normally expected in a Master of Music degree program. The application for admission must be accompanied by an applicant's statement relating to goals, preparation, and educational background. The applicant must submit scores for the Graduate Record Examination (quantitative and verbal) or the Miller Analogies Test. Three letters of recommendation are required. Applicants must perform a satisfactory audition or submit a tape recording of performances or compositions as appropriate to the concentration. The deadline is February 15 for teaching assistantship applications.

**Supervisory Committee.** When the program of study is filed, the supervisory committee is appointed by the dean of the Graduate College upon recommendation of the director and the graduate committee of the School of Music. The committee consists of five members; at least three should be from the major field.

**Program of Study.** A total of 90 semester hours beyond the bachelor's degree is required. Only 36 hours from a master's degree or other postgraduate work will be counted toward the 90 hour requirement.

**Residency.** In general, the D.M.A. degree student should expect to spend at least the equivalent of three academic years beyond the bachelor's degree in the program. At least two semesters following the first year (30-32 semester hours) of graduate study must be spent in continuous full-time residence

at ASU. After the first year (30-32 semester hours), at least 54 hours must be completed in residence.

**Foreign Language Requirements.** Competency in at least one foreign language is required for solo performance and composition concentrations. Some concentrations require two foreign languages.

**Comprehensive Examinations.** During the final semester of course work, the student must apply to the Graduate College, through the supervisory committee and the school director, for permission to take the comprehensive examinations. These written and oral examinations are designed to assess the student's competency in the major and supportive fields. Failure in the comprehensive examinations is considered final unless the supervisory committee recommends, and the dean of the Graduate College approves, a re-examination. A re-examination may be administered no sooner than three months and no later than one year from the date of the original examination. Only one re-examination is permitted.

**Candidacy.** Doctoral students should apply for admission to candidacy immediately after they have met all requirements for the degree, *except the dissertation*. These requirements include passing the comprehensive examinations and foreign language examination, if applicable, and meeting other requirements specified by the academic unit.

**Dissertation, Research Papers, and Recitals.** The general music, instrumental music, and music composition concentrations require a dissertation of an original and creative nature. The choral music concentration requires either a dissertation or a series of projects and a research paper. Both the choral music and instrumental music concentrations require a conducting recital. The general music concentration requires an equivalent in-service workshop. The solo performance concentration requires at least three recitals following admission to the program and a research paper. All candidates must enroll for a total of 24 semester hours of credit in recital (MUP 796), research (MUP 792), and dissertation (MUP 799) as appropriate to the concentration. An oral review of the dissertation/

research paper/recitals must be held no later than three weeks before the degree conferral date.

**Final Examinations.** The final oral examination in defense of the dissertation or research paper is scheduled by the Graduate College. The exam is conducted by the supervisory committee and others appointed by the dean of the Graduate College. All final oral examinations must be conducted at least one week before the degree conferral date.

**Graduation.** The student is eligible for graduation when the final oral examination has been passed, Graduate College scholarship requirements have been met, and the dissertation/research paper has been approved by the supervisory committee, the director of the school, and the dean of the Graduate College.

Applications for graduation should be made no later than the date specified in the Graduate College calendar.

**Maximum Time Limit.** D.M.A. candidates must complete all requirements within five years after the comprehensive exams have been passed.

#### DOCTOR OF PHILOSOPHY

The Doctor of Philosophy degree is granted upon evidence of excellence in research and the demonstration of independent, creative scholarship culminating in a dissertation.

**Admission.** The general requirements for admission to the Graduate College are given on pages 44-46. Graduate students may apply for admission to the Ph.D. program by filing a written application with the Graduate Admissions Office.

**Program Committee.** Upon the recommendation of the head of the academic unit, the dean of the Graduate College appoints the program committee, consisting of a chair and at least two other members. The program committee advises the student in planning the program of study. The recommendation for the program committee is reviewed simultaneously with the program of study.

**Comprehensive Examination Committee.** Ph.D. comprehensive examinations are administered by a committee

consisting of three to five members, depending on the requirements of the academic unit.

**Dissertation Committee.** Upon the recommendation of the head of the academic unit, the dean of the Graduate College appoints the student's dissertation committee, consisting of a chair and at least two other members. This committee must approve the subject and title of the dissertation. The members of the dissertation committee have the necessary knowledge and skills to advise the student during the formulation of the research topic and during the completion of the research and the dissertation. The chair of the program committee may serve as the chair of the dissertation committee. In some cases, the same members serve on both committees. However, the two different committees may have memberships with overlapping functions.

If the head of the academic unit recommends changes in membership for either committee after the committee has been appointed, the student must submit a change of committee form to the Graduate College and receive the approval of the dean of the Graduate College.

**Program of Study.** The program of study should be submitted as early as possible and must have the approval of the student's supervisory committee, head of the academic unit, and the dean of the Graduate College. The program of study is reviewed simultaneously with the recommendation for the program committee. In general, Ph.D. degree students should expect to devote to the program of study the equivalent of at least three academic years (84 semester hours) beyond the bachelor's degree. A minimum of 84 semester hours is required; 24 of these hours must be a combination of research (792) and dissertation (799). Of the 84 semester hours, at least 30 hours (which may include research credit) of the approved Ph.D. program and 24 research and dissertation hours must be completed *after admission* to a Ph.D. program at ASU. No more than 24 hours of 799 Dissertation may be included on the 84-hour program of study. On the Ph.D. program of study, a student may use up to six hours (maximum) of thesis credit from the master's degree. The master's thesis must have been defended and the hours must have been used as part of a completed master's program.

**Continuous Enrollment.** Once admitted to a Ph.D. degree program, the student is expected to be enrolled continuously, excluding summer sessions, until all requirements for the degree have been fulfilled. Continuous enrollment promotes steady progress toward the completion of the degree and an ongoing relationship between the student and faculty offering the program. If additional credit is not required toward the Ph.D. degree, the student may enroll for Continuing Registration 595, 695, or 795. Continuing Registration does not carry credit; no grade is given. If a program of study must be interrupted for one or more semesters, the student may apply for leave status, not to exceed one calendar year. A student on leave is not required to pay fees, but is not permitted to place any demands on university faculty or use any university facilities. A student who interrupts a program without obtaining leave status may be removed automatically from the Graduate College, under the assumption that the student has decided to discontinue the program. A student removed from the Graduate College for this reason may reapply for admission; the application is considered along with all other new applications to the degree program.

An application for leave status, endorsed by the members of the student's supervisory committee and the head of the academic unit, must be approved by the dean of the Graduate College. This request must be filed and approved no later than the last day of registration in the semester of anticipated absence.

**Residency.** In general, Ph.D. degree students should expect to devote to their program of study the equivalent of at least three academic years (84 semester hours) beyond the bachelor's degree. At least two consecutive semesters subsequent to admission to the Ph.D. program must be spent in full-time residence at ASU. At least 30 hours of the approved Ph.D. program in which they are enrolled, in addition to dissertation and research hours, must be completed after admission to the Ph.D. at ASU. These courses must appear on an approved program of study.

It is expected that, during the period spent in residence, full time (nine semester hours minimum or six semester hours for graduate assistants) is devoted to graduate studies. This period is designed to provide an opportunity

for students to avail themselves of university resources and to interact fully with faculty and fellow graduate students. This time represents total involvement in the academic major of the program in which they are enrolled.

**Foreign Language Requirements.** Language requirements are determined by the academic unit concerned. For information concerning certification of proficiency, see page 50.

**Comprehensive Examinations.** When students have essentially completed the course work in an approved program of study, they should request permission from the Graduate College to take the comprehensive examinations. Some academic units may require that the foreign language requirements be fulfilled before taking the comprehensive examinations. These written and oral examinations are designed to test the student's mastery of the field of specialization. Ph.D. comprehensive examinations are administered by a committee consisting of three to five members, depending on the requirements of the academic unit. Failure in the comprehensive examinations is considered final unless the supervisory committee and the head of the academic unit recommend, and the dean of the Graduate College approves, a re-examination. A re-examination may be administered no sooner than three months and no later than one year from the date of the original examination. Only one re-examination is permitted.

**Candidacy.** Ph.D. students will achieve candidacy status in a letter from the Graduate College dean upon:

1. passing the foreign language examination, if applicable;
2. passing the comprehensive examinations; and
3. successfully defending the dissertation prospectus.

Students must enroll for a minimum of 12 hours of 792 Research and 799 Dissertation credit (combined) in subsequent semesters, following the semester in which they are advanced to candidacy.

**Research and Dissertation Requirements.** Each candidate must register for a combined total of 24 semester hours of credit for 792 Research and 799 Dissertation. No more than 24 hours of 799 Dissertation may be in-

cluded on the 84-hour program of study. Courses or semester hours taken beyond the listed requirements should not be included on the program of study. The final copy of the dissertation must be reviewed by the supervisory committee and the Graduate College at least three weeks before the degree conferral date. Copies of the *Format Manual* are available in the Graduate College.

**Final Examinations.** The final oral examination in defense of the dissertation is mandatory and must be held on the campus of ASU. The oral defense is scheduled by the supervisory committee with the approval of the dean of the Graduate College.

**Graduation.** The student is eligible for graduation when the Graduate College scholarship requirements have been met, the final oral examination has been passed, and the dissertation has been approved by the supervisory committee and accepted by the head of the academic unit and the dean of the Graduate College.

**Maximum Time Limit.** The candidate must take the final oral examination in defense of the dissertation within five years after passing the comprehensive examinations. Any exception must be approved by the supervisory committee and the dean of the Graduate College and ordinarily involves repetition of the comprehensive examinations.

## DOCTOR OF PUBLIC ADMINISTRATION

The purpose of the Doctor of Public Administration (D.P.A.) degree program is to prepare skilled professional public administrators for high-level positions in the public sector. The program is designed to emphasize both normative and conceptual content pertaining to value assessments, theoretical assumptions, ethics, and modes of decision making, as well as practitioner problem-solving skills in budgeting, public personnel management, public finance, planning, program evaluation, and policy analysis.

The D.P.A. degree program is interdisciplinary in nature and is offered by faculty from various colleges. One of the unique features of this interdisciplinary program is that, because it utilizes faculty research and teaching interests from a number of academic units, a student may tailor a course of study to fit

individual needs and goals. The D.P.A. degree program is administered by an executive committee appointed by and responsible to the dean of the Graduate College. The director of the executive committee is a faculty member of the School of Public Affairs.

**Admission.** Applications are reviewed by an admissions committee appointed by the director of the executive committee. Recommendations for admission are made by the director of the executive committee to the dean of the Graduate College. Minimum Graduate College admission requirements, as stated on pages 44-46, must be met. Additionally, each applicant must provide a letter of career goals and statement of reasons for seeking the D.P.A. degree, a Graduate Record Examination test score, a professional résumé, and six letters of recommendation (three from faculty and three from professional public administrators). International students must submit both TOEFL and TSE scores. Admissions recommendations are made only once each year, with admitted students beginning their studies in the fall semester. The application deadline is January 15. Only applicants already holding a master's degree are considered. If deficiencies exist in public administration course work at the master's level, appropriate classes are prescribed.

**Program of Study.** When the program of study is filed, a supervisory committee consisting of at least three persons is appointed by the dean of the Graduate College upon the recommendation of the director of the executive committee. The chair of the supervisory committee serves as the student's graduate advisor. The supervisory committee advises the student in developing a program of study and assumes primary responsibility in assessing the student's progress in the program. The program consists of a minimum of 60 semester hours of graduate work beyond the master's degree. Of the 60 semester hours, at least 24 must be dissertation and research credit. A minimum of 30 semester hours of approved course work, exclusive of dissertation and research, must be taken at ASU after admission to the program. A sequence of four core courses is required of all students, followed by a screening examination.

**Residency.** The minimum residency requirement for the D.P.A. degree consists of 30 semester hours of doctoral program credit within a period of 24 consecutive months.

**Comprehensive Examinations.** Upon completion of course work, and before dissertation research, the student is given a written examination in each of the areas of specialization. The written examinations are followed by a single oral examination. If the student should fail one or more components of the examination, a re-examination may be administered no sooner than three months and no later than one year from the date of the original examination. Approval for this re-examination must be obtained from the supervisory committee, the director of the executive committee, and the dean of the Graduate College. A second failure is considered final and dismissal from the program is recommended to the Graduate College.

**Candidacy.** Doctoral students should apply for admission to candidacy immediately after they have met all requirements for the degree, *except the dissertation*. These requirements include passing the comprehensive examinations and other requirements specified by the executive committee.

**Dissertation Requirements.** A dissertation is required of each student. The dissertation must consist of a fully documented written analysis demonstrating a high level of skill and competence. Each student must register for a minimum of 24 hours of dissertation and research. The dissertation is supervised by a committee of at least three faculty members appointed by the dean of the Graduate College.

**Final Examinations.** The final oral examination in defense of the dissertation is scheduled by the dean of the Gradu-

ate College and conducted by the student's dissertation committee. A candidate must pass the final examination within five years after completing the comprehensive examination. Any exception must be approved by the dissertation committee, the director of the executive committee, and the dean of the Graduate College.

**Graduation.** The student is eligible for graduation when the Graduate College scholarship requirements have been met, the final oral examination has been passed, and the dissertation has been approved by the supervisory committee and accepted by the director of the executive committee and the dean of the Graduate College.

Applications for graduation should be made no later than the date specified in the Graduate College calendar.



# Graduate College

**Bianca L. Bernstein, Ph.D.**

*Dean*

Through the faculty, Arizona State University's Graduate College offers programs to meet the educational needs of those who already hold bachelor's and master's degrees. While many students prepare for careers in research, the professions, and the arts, others work for personal enrichment. Both part-time and full-time students are enrolled in 94 master's and 48 doctoral majors encompassing hundreds of concentrations and specialties. Other students explore new areas of interest or prepare for career advancements quite apart from formal degree programs.

The size, strength, and diversity of the graduate community reflect the university's commitment to high quality education. As a major center for graduate education, ASU supports cultural and intellectual activity as well as research in a broad range of arts and sciences and professional disciplines; in addition, the university conducts research addressing the social, cultural, and economic growth and development of Arizona and the Southwest.

One distinctive project that magnifies our dedication to graduate students is our Preparing Future Faculty program, funded by the Pew Charitable Trusts. The program is designed to educate students about faculty roles and prepare doctoral students specifically for faculty positions in our nation's colleges and universities.

This past year, about 250 of our exceptional graduate students won national fellowships, which include prestigious awards from the National Science Foundation, the National Institute of Health, Fulbright, NASA, and the Ford Foundation. This year alone, our graduate students in 40 disciplines received more than \$2 million in fellowship awards. Noteworthy is an award the Graduate College received from the federally funded Patricia Robert Harris program for 25 fellowships; the award was the largest funded by the program to any university this year.

The university's research grant and contract awards exceeded \$85 million for 1994-95; these funded programs, together with our more than 30 research centers and institutes provide assistantships and training for many of our graduate students; further, the centers coordinate conferences, colloquia, and special seminars to heighten the learning experience. The Office of the Vice President for Research and Strategic

Initiatives provides seed money to empower our faculty and students to work at the frontiers of knowledge. Such activities continually encourage the creative embrace of change and experimentation.

ASU provides numerous choices in student life, for personal enrichment as well as cultural interaction. Many internationally known speakers present lectures here, bringing together faculty, graduate students, and the community to engage in stimulating dialogue. During the past year, lectures were presented by such prominent persons as Senator Barry Goldwater, Senator Sam Nunn, author and activist Gloria Steinem, author and scholar Cornell West, educator and physicist Ernest Lynton, and journalist Bill Moyer. Upcoming events include lectures by former Surgeon General Joycelyn Elder, Pulitzer Prize-winning author and former presidential advisor Doris Kearns Goodwin, scholar and author William Julian Wilson, and paleontologist Stephen Jay Gould.

## GRADUATE PROGRAMS

### Degree Programs

Although graduate degree programs differ in many ways, they all share two important characteristics. First, in comparison to bachelor's programs, they demand a deeper and broader understanding of a body of knowledge in a recognized discipline or profession. Second, in master's and especially in doctoral programs, graduate students prepare to make original contributions to their fields through research and other creative activities of a high order. In contrast, then, to the broad-based bachelor's degree, graduate degrees are specialized. ASU offers several types and levels of postbaccalaureate degrees.

**Master's and Doctoral Work.** Many students pursue a master's degree to satisfy their own quest for learning. In some disciplines, such as dance or architecture, the master's degree is normally the terminal or final degree. In other fields, students enter master's programs as the first step toward more advanced work, such as doctoral studies, which prepare students for a lifetime of intellectual inquiry and creativity or for the application of knowledge to professional practice.

**Research Degrees.** Students at ASU may pursue research-oriented or practice-oriented degrees. Research-oriented degree programs—the Master of Arts (M.A.), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.)—prepare students for careers of research and scholarship in governmental, business, and industrial organizations, or in university or college teaching. Students in these programs develop abilities to evaluate existing knowledge critically and extend it into fresh areas of inquiry and scholarship.

**Professional Degrees.** The professional or practice-oriented degree programs have slightly different names and distinct academic missions. The names of the degrees are commonly tied to the academic unit offering the program, for example, Master of Business Administration (M.B.A.), Master of Music (M.M.), Master of Social Work (M.S.W.), and Doctor of Public Administration (D.P.A.). With the objective of preparing students for professional practice, such programs require rigorous preparation in the fundamental literature and scholarship of the field. Some degrees require demonstrated

mastery through an internship, an exhibition (art), a performance (dance), or a recital (music). Examples of ASU fields in which academic units offer professional programs include architecture and design, business, education, engineering, health services administration, law, nursing, public administration, and social work.

#### Nondegree Graduate Study

Many serious students enter graduate studies not intending to obtain a new degree but rather to enhance personal knowledge. They may want to advance in their present career, acquire the background to make a career change, or make up academic deficiencies before entering a degree program. All graduate students, degree or nondegree, enjoy the benefits of cultural and intellectual activities at the university, such as colloquia, seminars, and conferences focusing on the latest scholarship in the field. By consulting with appropriate academic units, students can learn which courses are suitable to their needs.

**Admission Procedures for Nondegree Study.** The Graduate Admissions Office offers a streamlined admission pro-

cedure for nondegree students. Applicants with a bachelor's degree fill out a simple one-page form requesting nondegree status. Students may request application forms by mail or phone or in person at the Graduate Admissions Office in Wilson Hall. Completed forms may be left at the counter or mailed. Formal written notification of admission for nondegree status is mailed within a few days of receipt. During registration periods, the form is processed immediately so that students who apply in person may register for classes the same day.

**Student Services for Nondegree Students.** The Graduate College maintains an Advisement Office open year-round. The advisors routinely handle inquiries about financial aid, course selection, entrance requirements, and the curricula of specific majors. Students requiring additional information are referred to appropriate advisors in academic units. The Advisement Office also maintains a file of campus services. Walk-ins are welcome, although appointments are recommended. Appointments may be made in person or by calling 602/965-3521.

### Interdisciplinary Graduate Degrees, Majors, and Concentrations Overseen by the Graduate College

Major	Degree	Administered by
Creative Writing Curriculum and Instruction Concentrations: curriculum studies, early childhood education, educational media and computers, elementary education, English education, exercise and wellness education, music education, physical education, reading education, science education, special education	M.F.A. Ph.D.	Creative Writing Committee Interdisciplinary Committee on Curriculum and Instruction
Exercise Science Concentrations: biomechanics, motor behavior/sport psychology, physiology of exercise	Ph.D.	Committee on Exercise Science
Gerontology Justice Studies Concentrations: criminal and juvenile justice; dispute resolution; law, justice and minority populations; law, policy, and evaluation; women, law, and justice	Certificate Ph.D.	Adult Development and Aging Program Committee on Law and Social Sciences
Public Administration Science and Engineering of Materials	D.P.A. Ph.D.	Committee on Public Administration Committee on the Science and Engineering of Materials
Speech and Hearing Science Concentrations: developmental neurolinguistic disorders, neuroauditory processes, neurogerontologic communication disorders	Ph.D.	Committee on Speech and Hearing Science
Statistics	M.S.	Committee on Statistics



### Graduate Studies and University Environment

The Graduate College spans the university in supervising graduate studies and offering all postbaccalaureate degrees except the Juris Doctor, which is administered by the College of Law. Since more than 1,500 ASU faculty members teach graduate students in more than 115 instructional units, the Graduate College works closely with the other colleges and academic units. In most cases, graduate instruction is offered by units that also provide related undergraduate programs.

**Interdisciplinary Study.** Although most graduate programs are offered by academic units, diverse interdisciplinary programs cross academic disciplines and come under the supervision of the Graduate College. Many majors are in fields that are still emerging as recognized academic disciplines and, therefore, do not customarily form the academic basis for departments. Other fields of study are inherently interdisciplinary and do not fit well with conventional disciplines around which departments are formed. Curricula must reflect intrinsically broad disciplinary affinities, and faculty must be drawn from more than one academic unit.

Currently, the Graduate College oversees eight interdisciplinary programs and has joint responsibility with the College of Education for another; several others are planned. Existing programs include the Adult Development and Aging Program (Certificate in Gerontology), Creative Writing (M.F.A.), Curriculum and Instruction (Ph.D.) (jointly administered with the College of Education), Exercise Science (Ph.D.), Justice Studies (Ph.D.), Public Administration (D.P.A.), Science and Engineering of Materials (Ph.D.), Speech and Hearing Science (Ph.D.), and Statistics (M.S.).

Other interdisciplinary degree programs include Communication (Ph.D.) (administered by the College of Public Programs), Humanities (M.A.) (administered by the College of Liberal Arts and Sciences), and Molecular and Cellular Biology (Ph.D.) (administered by the College of Liberal Arts and Sciences).

Each of these programs utilizes resources and faculty from several disciplines. They promote cooperative research and instruction among faculty

who share common interests but are housed in different academic units. They allow students to pursue degrees that are intellectually coherent but that bring together diverse strengths of the university. See the "Interdisciplinary Graduate Degrees, Majors, and Concentrations Overseen by the Graduate College" table (page 80).

**Interdisciplinary Committee on Linguistics.** Linguistics at ASU is interdisciplinary in nature. The linguistics faculty come from the Departments of Anthropology, Communication, Computer Science, English, Languages and Literatures, Philosophy, Psychology, and Speech and Hearing Science, and from the College of Education.

The Interdisciplinary Committee on Linguistics coordinates linguistics courses and programs, provides advising, and hosts conferences and lectures.

Faculty from three departments (Anthropology, English, Languages and Literatures) offer programs with concentrations in linguistics. The programs are: M.A. in Anthropology, M.A. in English, M.A. in Spanish, and the Master of Teaching English as a Second Language.

**Certificate Programs.** A number of certificate programs are offered by various academic units or programs on campus:

**Adult Development and Aging Program**  
Gerontology

**Arizona Center for Medieval and Renaissance Studies**  
Medieval Studies  
Renaissance Studies

**Department of Anthropology**  
Museum Studies

**ASU West**  
Accountancy

**College of Business**  
Financial Management and Control  
Investment Valuation and Management  
Treasury Management

**Department of History**  
Scholarly Publishing

**Department of Languages and Literatures**  
Translation

**School of Technology**  
Hazardous Materials and Waste Management

See page 11 for more information.

**Research Programs.** Over the past two decades, ASU has emerged as a major research institution, now a Research I University. As attention has been focused on its research mission, the campus has become increasingly successful in attracting sponsored projects funded by federal and state agencies, local government sources, nonprofit foundations and organizations, and private firms. The Office of the Vice President for Research provides leadership in obtaining external funding and in coordinating and administering sponsored projects. During 1994-95, funding exceeded \$85.6 million. Many graduate students receive financial support and gain first-hand experience as they participate with faculty members in carrying out these research projects.

Much of this work is associated with campus research centers that help to develop proposals, coordinate activities, and bring together in colloquia and conferences students and faculty with common intellectual interests. Such centers include the Center for Solid State Science, the Plant Sciences Center, the Hispanic Research Center, and the Preventive Intervention Research Center. For further information on centers and institutes, refer to pages 28-34.

**Research Facilities.** The university lends support to research in diverse ways, including extensive facilities for research and instructional programs. Less than five years old are an architecture building, a fine arts complex, the Goldwater Center for Science and Engineering, an addition to the Life Sciences Center, and the Computing Commons. The Engineering Research Center, built as part of the Engineering Excellence Program, houses advanced facilities such as the Molecular Beam Epitaxy laboratory and a clean room for microelectronic device fabrication. Other facilities supporting research on campus are the Institute for Studies in the Arts, in the College of Fine Arts; the Facility for High Resolution Electron Microscopy, in the College of Liberal Arts and Sciences; and the Southwest Archaeological Collection of the Department of Anthropology.

**Library System.** The ASU library system is a major research facility (see also page 26). It contains more than 2.9 million volumes of books and approximately 5.9 million pieces of microforms and subscribes to more than 32,000 journals and serials. Among the nation's research libraries, it is in the top quarter in annual volume acquisition. It is especially strong in amassing current monographs and serials to support graduate programs. Some of the most important research collections include manuscripts and rare photographs on Arizona and Southwest topics and an excellent collection of social science materials on Southwestern and border studies topics, including materials on northwestern Mexico. In the humanities, the main library has a fine collection of literary works and literary criticism from small and major presses in American and English literature. The collection on child drama is also outstanding. A growing rare book and manuscript collection supports the research interests of academic units. The Arthur Young Tax Library emphasizes accounting and law. The Noble Science and Engineering Library is a designated U.S. Patent Depository and as such is one of fewer than 30 U.S. academic libraries to receive copies of all new patents. The entire collection of U.S. patents in microfilm is housed in the Noble Library.

The libraries contain extensive U.S. and Arizona government documents and selected international documents.

Branch libraries provide important specialized collections. The Music Library contains scores and sound recordings. The Architecture and Environmental Design Library houses a nationally recognized set of materials on solar energy and research collections on the work of Frank Lloyd Wright and Paolo Soleri as well as other Arizona architects.

The libraries offer excellent support to researchers interested in electronic information sources. The online library system incorporates the usual catalog to ASU library holdings as well as several other important electronic reference databases and gateways. Bibliographic information on the library holdings can be accessed from any location in the world via a modem-equipped microcomputer.

The library system belongs to the Center for Research Libraries, permitting access to the center's vast collec-

tions of materials for extended loan periods.

### **Graduate Student Academic Support and Services**

Providing academic support to students is an important part of the Graduate College mission. Services addressed to individual students include advising, private mentoring for disadvantaged students, and financial support. Other forms of support include orientation sessions, workshops, and research conferences.

**Advising.** Graduate College advisors inform students about graduate study in general as well as about specific degree programs. They answer questions on admission procedures and requirements, provide information about campus services, and refer students to departmental advisors when appropriate. See "Student Services for Nondegree Students," page 80, for office hours.

All academic units that offer graduate programs provide student advising services. Students interested in a particular degree program should contact the appropriate unit to discuss application procedures and how their interests and goals relate to the unit's requirements and program. Newly admitted students should meet with an advisor in their academic unit to discuss program regulations and requirements, course enrollment, the development of a program of study, the selection of a supervisory committee, and the existence of any unusual program requirements such as an internship or practicum.

**Recruiting and Support for Graduate Student Diversity.** The Graduate College actively recruits and supports the enrollment of minority, disadvantaged, and other underrepresented groups. The college provides academic mentoring as well as financial support to selected first-year students with special needs. Over the past decade, the college has been highly successful in securing fellowships under the U.S. Department of Education's Patricia Roberts Harris Fellowship program. The college also works closely with academic units in recruiting and supporting a diverse student body. All scholarships and assistantships are awarded only by nominations made by academic units. Applicants should consult with the director of graduate study in the academic unit.

**Orientation.** Each semester during orientation week, the Graduate College

conducts orientation meetings and workshops for nondegree and degree students. Staff members and advanced graduate students from throughout the university join Graduate College staff in offering specific information about many aspects of ASU. They provide an overview of what to expect in graduate studies and discuss such practical topics as financial assistance, degree requirements, career services, and advisement. A special, required orientation for new teaching assistants is held at the beginning of orientation week in the fall semester.

**Workshops for Undergraduate Students Considering Graduate Education.** The Graduate College holds workshops to address the issues that students contemplating graduate study should consider. The purpose of graduate study, the choices among research and professional degrees, the selection of schools to apply to, and the types and sources of financial support are among the topics discussed.

**Publications Program.** The Graduate College publishes a number of brochures, fliers, and other items during the year. *Grad Line* is an informational tabloid-size newspaper sent during the spring semester to students who have inquired about or applied for graduate study. A flier with information specifically for new students is prepared each summer for the academic year. Orientation fliers and announcements are prepared each spring and fall. Fliers detailing the steps to take in registering are available shortly after the opening of online registration each semester. Fliers on housing, testing information useful to applicants, financial assistance, and nondegree study are also available. The college publishes a directory of resources each summer to assist incoming students in identifying campus offices and services and off-campus agencies for establishing themselves on campus and in Arizona. *Grad News* appears periodically throughout the academic year and lists important application information about grants and fellowships available for graduate study. The college also distributes a *Format Manual* to assist students in preparing their theses and dissertations. To obtain the latest materials, students should check the publication display in the center lobby of Wilson Hall.



**Research and Travel Grants.** The Graduate Student Research Office (GSRO) funds small grants to support graduate student research. These grants usually are made to defray expenses incurred by students completing their theses or dissertations. The Graduate College funds travel grants for doctoral students who wish to present their research results at regional and national conferences. Meeting scholars in their fields and participating with faculty in professional organizations presents opportunities for students to get involved in activities that will become central to their professional lives.

**Financial Support.** The university provides several kinds of financial support for graduate students. The Graduate College, along with academic units, offers many scholarships and assistantships, providing financial support for which the student is not obliged to perform any duties. Each spring the college awards the Herman E. DeMund Scholarship and the Phelps Dodge Scholarship to outstanding students nominated by their academic units.

The James J. Sweitzer Memorial Scholarship is awarded annually to a high scholarship student enrolled in the Agribusiness graduate program. Several hundred Graduate Tuition Scholarships (GTS) and Graduate Academic Scholarships (GAS) are awarded by the college based upon nominations made by the academic units. The GTS waives nonresident tuition while the GAS waives the registration fees required of all students. In addition, the Graduate College regularly applies for funds, such as those from the U.S. Department of Education's Patricia Roberts Harris Fellowship program, to support other financial awards. Announcements of national and institutional awards, along with application forms, are available at the Graduate College.

Many students are supported through graduate assistantships, which often provide valuable professional experience as the student fulfills teaching and research obligations under the direction of ASU faculty. Most academic units make assistantship awards for teaching, research, or a combination of those tasks, depending on the particular unit and its needs. Research assistants are often hired to work in sponsored projects. These awards are made through academic units by the project directors. Assistantship stipends vary

depending on the number of hours worked and on the departmental schedule of compensation.

Many academic units cooperate with national professional organizations in distributing information and application forms for fellowships and other awards unique to particular disciplines. Among these awards are internships, which usually carry a stipend and offer course credit. The graduate advisors for these areas should be consulted to obtain the appropriate information.

The Student Financial Assistance Office arranges primarily need-based aid from other sources and screens applications from graduate students interested in work study and loans. Applications for this kind of aid are made directly to the office, located in the Student Services Building. Awards and loans are made based upon the information filed by applicants on the Free Application for Federal Student Aid (FAFSA). Other student employment opportunities are available through the Student Employment Office and the Career Services Office.

**Student Organization.** The Graduate Student Council is part of the Associated Students of Arizona State University (ASASU), the student government for the university. The Graduate Research Support Office represents graduate student interests within ASASU and the Office of Student Life. It assists the Graduate College in planning orientations and other student-related activities and funds small research grants to support graduate students' thesis and dissertation projects. In addition to the Council, many other special interest organizations are open to graduate students.

**Admissions Procedures for Degree Programs.** The Graduate Admissions Office receives applications, fees, transcripts, and the TOEFL if required. When each file is complete with the required materials, the Admissions Office sends the application file to the appropriate academic unit. Test scores such as the GRE are sent to the academic unit as they arrive. If the academic unit has a specific deadline, the applicant must submit all required application materials to the Admissions Office *in advance of the deadline* to allow processing.

The individual units then evaluate this material along with such additional

information as letters of recommendation, a statement of purpose, a writing sample, or a portfolio of artistic works. International applicants whose native language is not English are required to submit scores from the Test of English as a Foreign Language (TOEFL). Some academic units (e.g., College of Business) also require scores from the Test of Spoken English (TSE).

The unit recommends admission or denial to the Graduate College after which the Graduate College reviews the recommendation and notifies the applicant of the outcome.

The entire admission procedure may take from a few days to a few months, depending on when transcripts and other supporting materials become available and the time it takes for faculty committees in the academic units to review files. Applications from international students usually take longer to process. These students are urged to apply early and become familiar with the procedures outlined in the Graduate College brochure for international students.

**Intellectual Environment.** About 11,000 students from all 50 states and more than 100 nations are enrolled in graduate study at the university. The size and diversity contribute to a cosmopolitan setting that is ideal for intellectual discourse and stimulation. As a balance to this large grouping of students, individual graduate programs conduct small colloquia and seminars where students and faculty discuss their work in an intimate, intellectual environment supportive of student development. The result is a spirited, lively atmosphere in which students and faculty members get to know each other through collaborative research and intellectual exchange.

### Graduate Council

The Graduate Council establishes general policies for graduate programs and serves as an advisory board to the dean. As part of its duties, the council reviews proposals for new degree programs and concentrations, regularly conducts reviews of established graduate programs, and sets policies and general standards for admissions. Sixteen faculty and one student serve on the council, representing a wide variety of degree programs, with at least one member representing each college in the university. Council members are

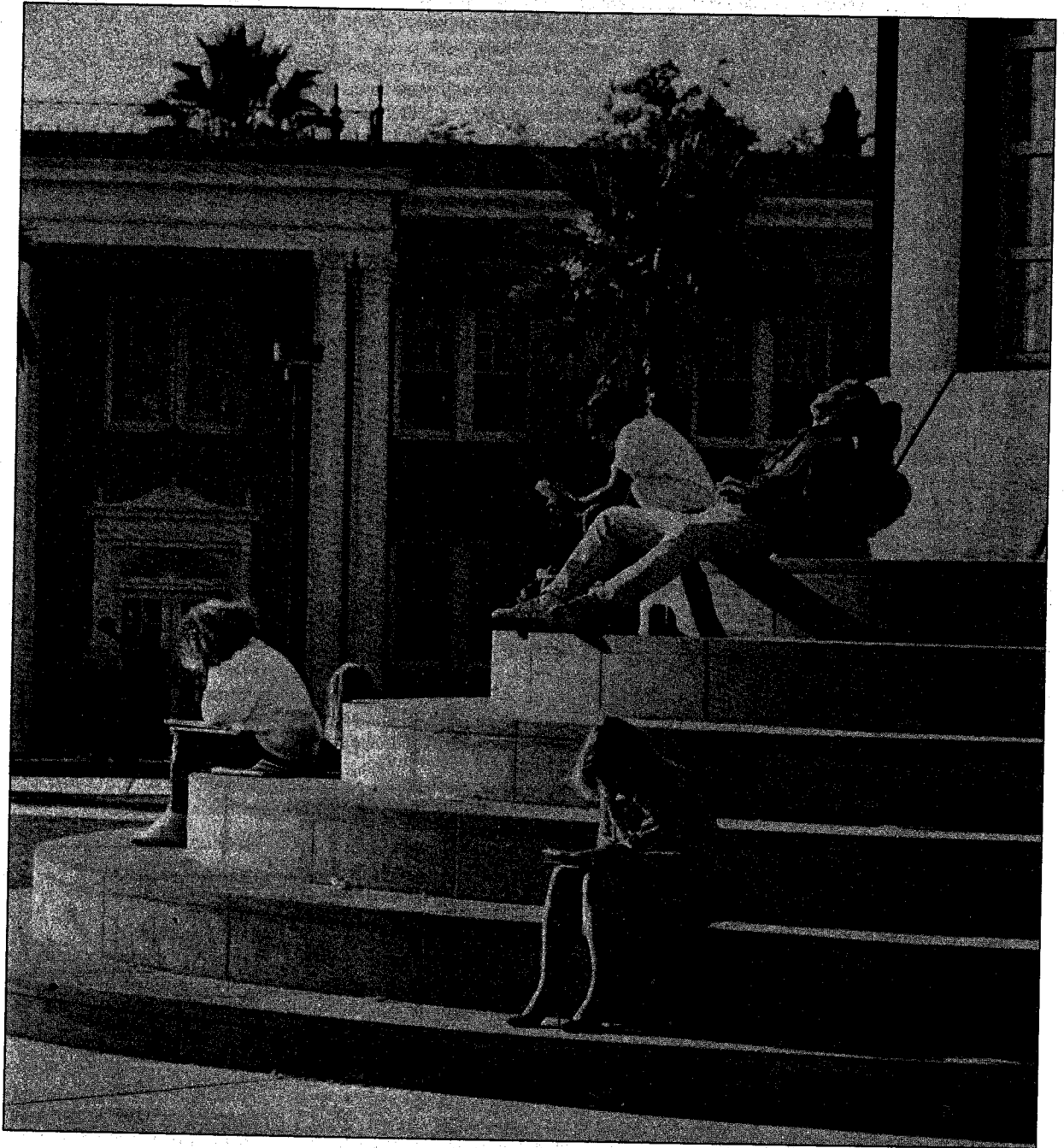
appointed by the president of the university.

#### **Offices of the Graduate College**

The general offices of the college, including those of the dean, admissions, operations, and advisement, are located on the first floor of Wilson Hall in the center of campus. College offices are open from 8:00 a.m. to 6:00

p.m. Monday through Thursday; 8:00 a.m. to 5:00 p.m. on Friday. The Advisement Office is open year-round. The telephone number for the Advisement Office is 602/965-3521. Advisors provide general information about policies, procedures, requirements, and support services. Students with regular admission status should contact their academic unit for degree program advise-

ment and program of study planning. Printed forms, deadline schedules, format booklets, and scholarship announcements are available in the lobby located in the center of the building or by calling 602/965-3521. The Admissions Office is located at the west end of the building and may be reached by calling 602/965-6113.



# College of Architecture and Environmental Design

John Meunier, M.Arch.  
*Dean*

## PURPOSE

The college provides graduate education for professional, research, and academic careers in architecture, design, environmental resource management, and urban planning. Students in the master's programs benefit from small classes, seminars, and studios, from close, individual contact and faculty mentorship, and from an interdisciplinary curriculum. Students and faculty make full use of the Phoenix metropolitan area and the Sonoran region as research bases and profit from strong interaction with the professional communities. The faculty have earned national reputations in energy-efficient design, computer-assisted design, corporate interior design, design for special populations, urban design, and environmental policy. Programs of study, including internship and trainee opportunities, give graduates the best possible start on academic, research, and professional careers.

## ORGANIZATION

The college has three academic units: the School of Architecture, the School of Design, and the School of Planning and Landscape Architecture. The units and their faculty have strong ties with programs and faculty in business, computer science, construction, engineering, fine arts, geography, biological sciences, agribusiness, and public affairs.

## GRADUATE PROGRAMS

The new Ph.D. degree program with a major in Environmental Design and Planning is a collegewide interdisciplinary degree offered by faculty representing the different disciplines comprising the Schools of Architecture, Design, and Planning and Landscape Architecture. Three areas of concentration are available: design; planning; and history, theory and criticism.

Faculty in the College of Architecture and Environmental Design offer six master's degree programs through the Graduate College: a professional program leading to the NAAB accredited degree Master of Architecture (the two-year as well as three-plus-year programs), a professional graduate program leading to the PAB accredited Master of Environmental Planning degree, a research and applications Master of Science degree with a major in

Building Design, a Master of Science degree with a major in Environmental Resources, and the Master of Science in Design degree with majors in Industrial Design and Interior Design. Faculty in the School of Architecture offer the Master of Architecture and the Master of Science degrees with a major in Building Design. Faculty in the School of Planning and Landscape Architecture offer the Master of Environmental Planning and the Master of Science with a major in Environmental Resources degrees. Faculty in the School of Design offer the professional Master of Science in Design degree.

## ADMISSION REQUIREMENTS

Applicants to each of the seven graduate degree programs must meet Graduate College admission requirements, in addition to requirements of the academic unit offering the program. For application requirements and deadlines of the Graduate College, see pages 44-46. For application requirements and deadlines of each program, see the following pages: Ph.D. with a major in Environmental Design and Planning, pages 190-191; Master of Architecture, pages 55-58; Master of Environmental Planning, pages 60-61; Master of Science with a major in Building Design, pages 136-137; Master of Science with a major in Environmental Resources, pages 193-194; and Master of Science in Design with majors in Industrial Design and Interior Design, pages 68-69.

**Doctor of Philosophy Degree in Environmental Design and Planning.** Applicants to the Ph.D. program must have completed a master's degree in architecture, industrial design, interior design, landscape architecture, or planning, or must be able to demonstrate equivalent standing. The degree is structured as a 54-hour post-master's program, and not as an 84-hour postbaccalaureate program. The following test scores are required: GRE scores and TOEFL score of at least 600 from applicants whose native language is not English.

**Master of Architecture.** Applicants to the two-year program must have completed a four-year baccalaureate degree with a major in architectural studies or a similar preprofessional degree in architecture. The degree should be from

## College of Architecture and Environmental Design Graduate Degrees, Majors, and Concentrations

Major	Degree	Administered by
Architecture	M.Arch.	School of Architecture
Building Design Concentrations: computer-aided design, energy performance and climate responsive architecture, facilities development and management	M.S.	School of Architecture
Environmental Design and Planning Concentrations: design; history, theory, and criticism; planning	Ph.D.	Environmental Design and Planning Executive Committee
Environmental Planning Concentration: urban planning	M.E.P.	School of Planning and Landscape Architecture
Environmental Resources	M.S.	School of Planning and Landscape Architecture
Industrial Design Concentrations: design methodology, theory, and criticism; facilities planning and management; human factors in design	M.S.D.	School of Design
Interior Design Concentrations: design methodology, theory, and criticism; facilities planning and management; human factors in design	M.S.D.	School of Design

an institution offering a National Architectural Accreditation Board-accredited degree in architecture. Applicants to the three-plus-year program must have completed a four-year baccalaureate degree in any discipline. International applicants whose native language is not English must achieve a TOEFL score of 550 or above.

**Master of Science Degree in Building Design.** Students who have completed a professional baccalaureate degree in architecture (five or six years) or a baccalaureate degree in engineering or a related area and wish to pursue advanced study and research may apply for admission to this program. International applicants whose native language is not English must achieve a TOEFL score of at least 550.

**Master of Environmental Planning.** Applicants must hold a baccalaureate degree. International applicants whose native language is not English must achieve a TOEFL score of 550 or above.

**Master of Science Degree in Environmental Resources.** Applicants are expected to have completed 18 semester hours in environmental sciences or closely related subjects and hold a baccalaureate degree.

### Master of Science in Design Degree in Industrial Design or Interior Design.

Applicants must hold a baccalaureate degree in Industrial Design, Interior Design, or a related design discipline as determined by the School of Design Graduate Program Committee. International applicants whose native language is not English must achieve a TOEFL score of 550 or above.

### SPECIAL PROGRAMS

A concurrent Master of Architecture and Master of Business Administration degree program is available. The School of Architecture also offers programs for study in Paris and Italy. Also, a selective summer internship program places highly qualified students in nationally known American firms.

The Master of Environmental Planning program has special ties with the professional planning community and offers students considerable interaction with practitioners in the field, as well as experience in local planning offices and agencies.

The Master of Science in Environmental Resources program often works with state and federal agencies concerned with a range of investigations from hydrology research and shrub con-

trol to livestock and wildlife concerns.

All of the master's programs are interdisciplinary in focus and require or strongly recommend course work in other programs, departments, and colleges. Each program works with affiliated and associated faculty from other units within the college. Also, faculty from such areas as geography, engineering, public affairs, business, transportation, environmental studies, and fine arts collaborate with the faculty and graduate students of the college.

### COLLEGE FACILITIES

With the opening of the award-winning expansion to the Architecture building in spring of 1989, the college consolidated its facilities into a single complex and more than doubled the space available for instruction, research, and service activities. Expanded facilities include the library, the shop, studios, faculty and administrative offices, and research facilities. Research and special project rooms include a high-bay research laboratory, a lighting laboratory, community outreach and design excellence studios, a materials resource center, as well as a solar instrumentation laboratory and a rooftop outdoor solar and daylighting testing area. The college is especially

proud of its computer facilities and the faculty-graduate student computer research laboratory. The university also maintains a computer site in the building and there is a local area network that ties together faculty, studio, and library resources. Emphasis is on mini- and microcomputer modeling, simulation, and design applications. (Also refer to the description of computing facilities and services on page 28.)

Teaching and research activities are also supported by a media center with photography and video services and a slide and media library. Individual studio workspace is available to graduate students and the expansion features extensive jury, review, and display space.

As a branch of the university library, the college library is located in the expansion and provides easy access to books, periodicals, and reference materials for students and faculty. The collection includes approximately 35,000 volumes. Special research collections on the work of Paolo Soleri and Frank Lloyd Wright are located in an archival quality special collections suite.

The Gallery of Design is one of eight university galleries and museums. It

provides premium space for traveling exhibitions and exhibitions of student and faculty work.

#### ADVISING

**Architecture.** Students should contact the graduate secretary for general information about the school's programs and procedures. In addition, a graduate coordinator is available for preadmission and general advising. Upon enrollment, each student is assigned a faculty advisor for continuing assistance. Call 602/965-3536 for more information.

**Design.** Preadmission information, advising, and continued support are provided by the director of the school and the graduate program coordinator. Call 602/965-4135 for more information.

**Planning.** The school director provides preadmission information and general advising. Each admitted student is initially assigned a faculty advisor but may later select a supervisory chair. This faculty member later serves as a chair of the committee. Call 602/965-7167 for more information.

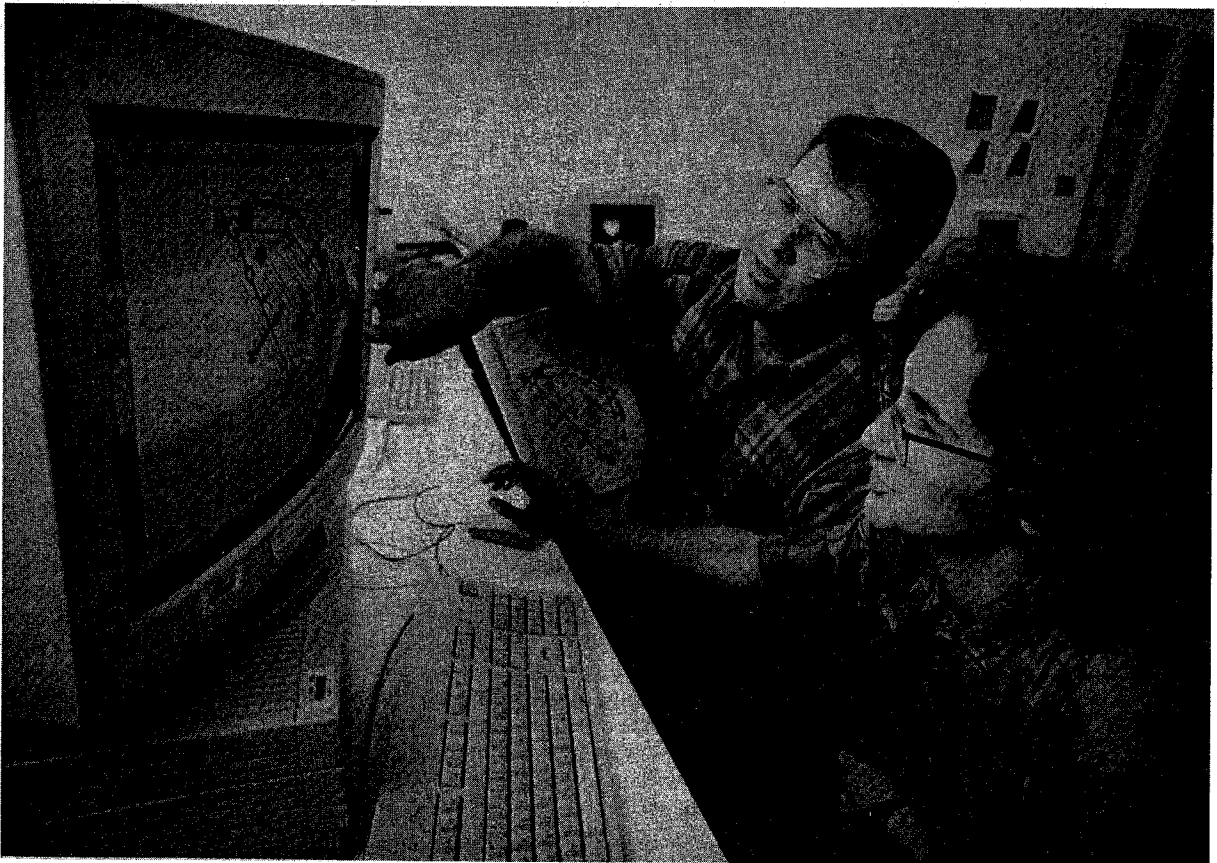
#### ACCREDITATION

The Master of Architecture is fully accredited by the National Architectural Accrediting Board (NAAB). The Master of Architecture requires a minimum of three years of study following an unrelated bachelor's degree or two years following a related preprofessional bachelor's degree. This professional degree is structured to educate those who aspire to registration/licensure as architects. See pages 17-18 for more information.

The School of Architecture is a full member of the Association of Collegiate Schools of Architecture, the Environmental Design Research Association, and the Architectural Research Centers Consortium.

The programs in the School of Planning and Landscape Architecture are affiliated with the Association of Collegiate Schools of Planning and the Council of Educators in Landscape Architecture.

The Master of Environmental Planning program is accredited by the Planning Accreditation Board.





# College of Business

Larry E. Penley, Ph.D.  
Dean

## PURPOSE AND MISSION

The College of Business is a professional school that pursues excellence in instruction and research. The pursuit of excellence in programs of instruction implies that the college admits only students who are especially well qualified for the study of business and who will, upon graduation, compete successfully for highly desirable positions, both nationally and internationally.

The mission of the College of Business is to expand the knowledge of business and to educate men and women for managerial leadership through research activities and professional educational programs that address issues of importance to future managers in a world characterized by racial, cultural, and gender diversity in the work force; demands for continuous improvements in quality; growing technological sophistication; and globalized markets.

The College of Business is a comprehensive research school of business that selects and retains faculty based on their ability to use their teaching and research skills to fulfill its mission.

The College of Business, through its research support, its Seidman Institute programs and centers, and its doctoral programs develops knowledge that is important to managers and the management of organizations. It endorses joint research projects that are not only supported by business but include managers as partners in the research objectives, process, and outcomes.

The College of Business anticipates that its mission will lead to research and professional degree programs that will result in its being recognized among the top schools of business in the U.S. Strategies to achieve its mission include an emphasis on the M.B.A. degree, increasing its quality such that it is competitive with the best 25 programs found at other large public schools of business, and developing a curriculum that incorporates the knowledge, skills and abilities identified in the mission of the college.

Strategies also include, relative to the doctoral program, raising admission standards, increasing stipends, assuring that students possess the teaching and research skills necessary for placement at peer schools of business. Consistent with the mission, an additional strategy

is to improve retention and graduation rates of minority students through programs at the M.B.A. and doctoral levels.

Finally, the college will, through its Seidman Institute, increase the level of funded research by adding support services to facilitate grant preparation and by clarifying the mission of research centers as liaisons between faculty and businesses.

## ORGANIZATION

The college's eight academic units and several centers serve more than 1,400 graduate students enrolled in eight graduate degree programs. Academic units contributing to graduate offerings include the Departments of Accountancy, Business Administration, Decision and Information Systems, Economics, Finance, Management, and Marketing, and the School of Health Administration and Policy. The Seidman Institute serves as the college's focal point for applied research, and several centers are organized in conjunction with the Seidman Institute: the Arizona Real Estate Center, the Center for Advanced Purchasing Studies, the Center for Business Research, the Center for Financial Systems Research, the Economic Outlook Center, the First Interstate Center for Services Marketing, and the Lincoln Center for Ethics.

## GRADUATE PROGRAMS

The M.B.A. program is the premier professional degree in the College of Business. The college offers the traditional full-time program, an Executive M.B.A. program, and an evening program for working managers. The faculty also offer the Doctor of Philosophy degree in Economics and in Business Administration, with concentrations in accountancy, decision and information systems, finance, health services research, management, marketing, and purchasing and logistics management. Other master's offerings include the Master of Accountancy, Master of Health Services Administration, and Master of Science degree in Decision and Information Systems and in Economics, an interdisciplinary program leading to a Master of Science degree in Statistics, and the Master of Taxation.

### College of Business Graduate Degrees, Majors, and Concentrations

Major	Degree	Administered by
Accountancy	M.Acc.	School of Accountancy
Business Administration	M.B.A.	College of Business
Business Administration Concentrations: accountancy, decision and information systems, finance, health services research, <sup>1</sup> management, marketing, purchasing and logistics management	Ph.D.	College of Business
Decision and Information Systems	M.S.	Department of Decision and Information Systems
Economics	M.S., Ph.D.	Department of Economics
Health Services Administration	M.H.S.A.	School of Health Administration and Policy
Statistics	M.S. <sup>2</sup>	Committee on Statistics
Taxation	M.Tax.	School of Accountancy

<sup>1</sup> Applications for this program are not being accepted at this time.

<sup>2</sup> This program is administered by the Graduate College. See the "Graduate College" section of this catalog.

#### Admission Requirements

Applicants to all degree programs must meet the minimum Graduate College academic requirements. Acceptance is based on the applicant's previous college record, all relevant data provided with the application, and scores from the Graduate Management Admission Test or the Graduate Record Examination. Some degree programs require the submission of a statement of purpose from applicants and letters of recommendation. In addition, TOEFL and TSE scores are required of international applicants whose native language is not English.

#### Special Programs

**Dual/Concurrent Degree Programs.** The College of Business and the American Graduate School of International Management (Thunderbird) have developed a dual degree and cross-registration graduate program for students interested in both business administration and international management. Thunderbird is an internationally recognized private graduate school, located in the Phoenix metropolitan area, offering course work in international studies, modern languages and world business. The dual degree program is designed to allow qualified graduate students to pursue a Master of Business Administration (M.B.A.) degree at ASU and a Master of International Management (M.I.M.) degree at Thunderbird. Consequently, students in the dual degree program may earn

their degrees earlier than those who pursue the degrees separately. Applicants must be regularly admitted to both the M.B.A. and M.I.M. programs and must petition for acceptance into the dual degree program through the school of initial attendance. Dual degree program participants and regularly admitted full-time students in the M.B.A. program may petition to take selected course work at Thunderbird at no additional tuition fees after completion of one year and prerequisites for Thunderbird are complete.

The College of Business and the Groupe Ecole Supérieure de Commerce Toulouse have developed a dual degree program for students interested in business administration and international management. Call 602/965-3332 for more information.

The college also offers the following concurrent degrees: Master of Business Administration/Master of Architecture, Master of Science in Economics/Juris Doctor, Master of Business Administration/Juris Doctor, Master of Business Administration/Master of Health Services Administration, Master of Health Services Administration/Juris Doctor, and Master of Health Services Administration/Master of Science in Nursing.

**L. William Seidman Research Institute.** The L. William Seidman Research Institute encourages, promotes, and supports multidisciplinary, cross-disciplinary, and applied research on a wide range of business topics. The in-

stitute serves as the "port-of-entry" for applied business research in the College of Business as well as an incubator to transfer knowledge to the business community. The institute also acts as a facilitator for post-doctoral, continuing, and executive business education that is taught by ASU faculty and contributes funding for operations.

**Arizona Real Estate Center.** The Arizona Real Estate Center collects and analyzes data concerning the multifaceted real estate market to provide insight into solutions for problems confronting the real estate industry.

**Center for Advanced Purchasing Studies.** The Center for Advanced Purchasing Studies is a national affiliation agreement between the College of Business at ASU and the National Association of Purchasing Management. The center conducts in-depth research into the problems facing the purchasing profession today and the requirements of the future.

**Center for the Advancement of Small Business.** Endowed with private funding, the center's mission is to enhance the formation and management of small- and medium-sized companies to enable them to compete in the global economy of the 21st century. The primary goal is to ensure that ASU students from all disciplines are provided with programs that prepare them for positions of leadership in small- and medium-sized businesses.

**Center for Business Research.** The Center for Business Research collects, analyzes, and disseminates information on the economy and business climate of Arizona. Analyses of Gross State Product, prices, income, employment, and demographic data for Arizona are made available to business and the general public. The center coordinates interdisciplinary sponsored-research efforts to provide useful information to business and a learning experience for students and faculty researchers.

**Center for Financial System Research.** The Center for Financial System Research serves the national financial, policymaking, and academic communities through research, publications, conferences, and educational programs. The focus of these activities is on the changing nature of the domestic and international financial system with such specific areas as the interaction between financial markets, deposit insurance reform, the deregulation of financial institutions, the financing of mergers acquisitions, securitization, and the effect of government policy on financial markets receiving recent attention.

**Economic Outlook Center.** The Economic Outlook Center serves as the economic forecasting unit of the college and is responsible for the publication of the Arizona Blue Chip, Western Blue Chip, and Blue Chip Job Growth Update. The center sponsors seminars and workshops on the national and regional economies.

**First Interstate Center for Services Marketing.** The First Interstate Center for Services Marketing is North America's leading university-based center for the study of services marketing and management. The center conducts extensive research in the field, offers specialized education and training to services executives, and provides the latest services information to organizations engaged in banking, insurance, health care, tourism, transportation and other service industries. Its charter members include some of America's foremost services firms and non-services firms that are using service and quality as a competitive edge.

**Joan and David Lincoln Center for Ethics.** The Joan and David Lincoln Center for Ethics conducts research and offers educational programs on ethical issues in business, government, and the professions.

**Industry-University Cooperative Center for Health Management Research.** This cooperative research program, sponsored by the National Science Foundation, the Network for Healthcare Management, the School of Health Administration and Policy, and a group of corporate members representing the health care industry, pools the resources of 14 universities across the United States and Canada. The center pursues research on behalf of its corporate (industrial) members, and disseminates information about research and successful innovations and management practices from other industries, countries, and health care organizations.

**Dean's Council of 100.** The Dean's Council of 100, a prestigious group of area business leaders, represents the college's innovative partnership between business and education. A major goal of the council is development of private support for the priority needs of the College of Business. Membership is by invitation only.

**Economic Club of Phoenix.** The Economic Club of Phoenix is composed of business, labor, government, and academic leaders who recognize that, as frontrunners in one of the nation's fastest-growing metropolitan areas, they need information and access to expertise to deal effectively with rapid economic changes. Its programs bring current and future leaders together and provide them with the opportunity to meet and hear influential speakers.

**Council of Emeritus Advisers.** The Council of Emeritus Advisers founded by the College of Business and Dean's Council of 100, is a select group of retired executives who advise the dean and invite nationally known experts to Arizona as visiting scholars, lecturers, and speakers.

**Dean's Board of Excellence.** The Dean's Board of Excellence is comprised of young business and community leaders committed to promoting excellence by awarding outstanding student and faculty performance. The

Dean's Board of Excellence also enhances relations between the college and the business community through a discussion forum and communications with the dean.

**M.B.A. Council.** The M.B.A. Council plays an active role in linking students with business leaders and the corporate community to enhance the M.B.A. student experience. The M.B.A. Council also assists to unite alumni and promote the national reputation of the M.B.A. program.

**Washington Campus.** The one-month Washington Campus program at Georgetown University provides graduate business students with an in-depth understanding of the federal government and its relationship to the business community. ASU is one of 16 select universities that offer this unique opportunity each summer. Participants earn graduate credit, observe the intricacies of national politics, and enjoy the excitement of the nation's capital. Competitive scholarships are available to business graduate students to cover the costs of lodging, meals, and instructional expenses.

#### **College Facilities**

The College of Business offers one of the most modern and sophisticated environments available for professional graduate study. The college facilities provide attractive and comfortable classrooms, computer systems, study areas, a television studio, modern auditoriums, and a graduate student reading room and lounge. Both mainframe interactive and networked microcomputer facilities are available free of charge to graduate students throughout the two business buildings. Also refer to the description of computing facilities and services on page 28.

#### **M.B.A. Association**

The M.B.A. Association at ASU is an independent, professional organization whose purpose is to provide a fully recognized, formally structured representative body through which M.B.A. students may act or communicate in concert on items of interest. The M.B.A. Association sponsors an intensive agenda of experiences outside the classroom which include leadership development activities, executive presentations, career enhancement seminars, and social events.



### **Black Student M.B.A. Association**

The Black M.B.A. Association is an organization of ASU M.B.A. students dedicated to enhancing the educational experience of its members, promoting attributes of the M.B.A. program to the local business community, promoting awareness within the African-American community of business, education, and economic development, and assisting the development of career opportunities for its members.

### **Hispanic M.B.A. Student Association**

The Hispanic M.B.A. Student Association (HMBASA) was created to meet the needs of Hispanic M.B.A. students. Members participate in a wide range of community services, coordinate a variety of professional development programs, and are offered the opportunity to become members of HMBASA's professional affiliated organization, the National Society of Hispanic M.B.A.s. All M.B.A. students are encouraged to join and participate in HMBASA activities.

### **Graduate Women in Business**

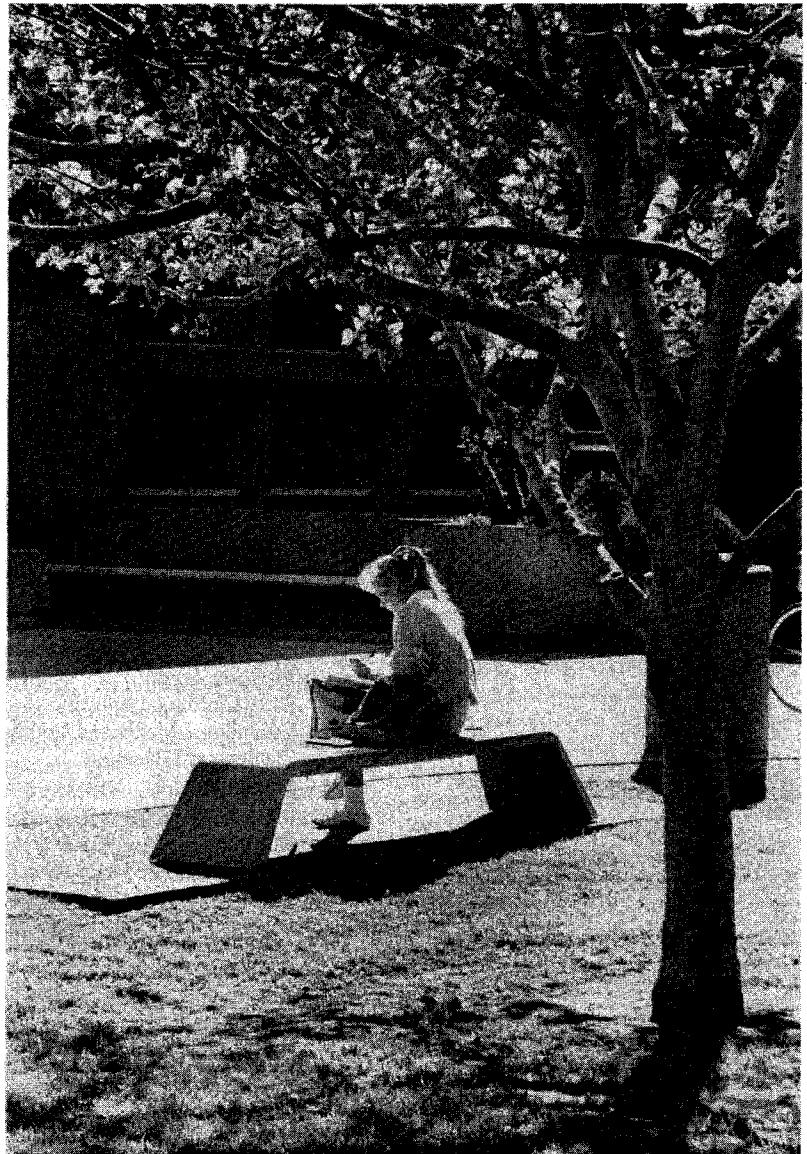
The purpose of the Graduate Women in Business (GWB) is to promote the professional and personal development of women graduate students. As part of the National Network of Graduate Business School Women, GWB provides a link among women graduates in accredited business programs nationwide. The ASU chapter is open to men as well as women and offers activities and seminars in professional development and gender issues.

### **Collegiate Volunteer Council**

The Collegiate Volunteer Council (CVC) was created to foster volunteerism incorporating the assistance of students, faculty, and staff. Its goal is to provide value-added contributions to the community by assisting those in need. Traditional projects have included volunteering at the Special Olympics, the Papago Park Clean-up, the Jingle Bell Run for Arthritis, and holiday food and toy drives.

### **M.B.A. Student Ambassadors**

The ASU M.B.A. Student Ambassadors are dedicated to promoting, developing, and participating in the community relations and recruitment activities of the M.B.A. Program. The ambassadors interact with many different



groups including students, alumni, faculty, and administrative staff.

### **Masters Consulting Group**

The Masters Consulting Group (MCG) is a fully incorporated, non-profit organization run solely by M.B.A. students. MCG provides opportunities for M.B.A. students to work as professional consultants in different functional specialties. Thus, students can complement their course work with real world experience.

### **Advising**

Information sessions are held daily (Monday, Wednesday, and Friday at 10:00 a.m. and Tuesday and Thursday

at 2:00 p.m.) in the M.B.A. Program Office, BA 140. M.B.A. brochures may be obtained at the office or by calling 602/965-3332.

### **Accreditation**

The College of Business and its School of Accountancy are accredited by the American Assembly of Collegiate Schools of Business (AACSB). The AACSB is the recognized accrediting agency in the field of business education. The School of Health Administration and Policy is accredited by the Accrediting Commission on Education for Health Services Administration.

# College of Education

Leonard A. Valverde, Ph.D.  
*Dean*

## PURPOSE

The College of Education is committed to the development of innovative programs that prepare graduate students for leadership roles in solving educational problems. The college provides a stimulating, challenging forum in which research and practice are viewed as essential and complementary. Faculty members are dedicated to producing quality scholarship and research that lead to excellence in teaching, professional practice, and administration of educational institutions.

## ORGANIZATION

The College of Education is organized into three divisions, as described below:

### Division of Curriculum and Instruction

Sheryl L. Santos, Director  
(ED 409) 602/965-1644

#### *Program Areas*

Early Childhood Education  
Educational Media and Computers  
Elementary Education  
Multicultural Education  
Reading and Library Science  
Secondary Education  
Special Education

*Degrees:* M.A., M.Ed., Ed.D.

Graduate programs offered by faculty of the Division of Curriculum and Instruction, through the Graduate College, prepare students for positions in schools, colleges, universities, government agencies, and public or private organizations. Graduates work as educational leaders, researchers, media and computer specialists, and librarians. This division offers programs that prepare students for Arizona State teacher certification in the following areas: special, elementary, or secondary education. It is designed for students who have graduated from accredited colleges or universities with majors other than education. If desired, a master's degree may be pursued concurrently with teacher certification.

The M.A., M.Ed. and Ed.D. degrees in Curriculum and Instruction offer areas of concentration in bilingual education, communication arts, early childhood education, elementary education, English as a second language, Indian

education, mathematics education, multicultural education, reading education, science education, secondary education, and social studies education. The Ed.D. also offers a concentration in curriculum studies.

The division is committed to research. Members of the faculty edit several national, scholarly journals, publish and present research papers, and direct funded research. Faculty members encourage and assist graduate students in conducting research, writing for publication, and making presentations at professional conferences. Particular research interests of the faculty are noted under each degree major.

### Division of Educational Leadership and Policy Studies

Thomas H. Metos, Director  
(ED 108) 602/965-6248

#### *Program Areas*

Education Policy Studies  
Educational Administration  
Higher Education

*Degrees:* M.A., M.Ed., Ed.D., Ph.D.

Graduate programs in this division are designed to develop leaders, researchers, and policy analysts for careers in schools, colleges, and private and government agencies. Graduates will be able to examine educational institutions, theories, and practices within broad economic, historic, political, social, and intellectual contexts in this country and abroad.

Two basic emphases exist within the division's programs. One strand focuses on the administration and policies of educational practices from preschool through secondary education. The other strand focuses on the administration and policies of postsecondary education. Specific details of these strands are given under the headings of the degree offerings in Educational Administration and Supervision, Educational Leadership and Policy Studies, Higher and Adult Education, and Social and Philosophical Foundations.

Faculty within the division are involved in both data-based and theoretical research. Qualitative and quantitative paradigms are employed. Students have the opportunity to work on research projects in the College of Education and in school districts and educational agencies throughout the country.

### Division of Psychology in Education

Gail Hackett, Director  
(EDB 301) 602/965-3384

#### Program Areas

Counseling Psychology  
Counselor Education  
Learning and Instructional Technology  
Lifespan Developmental Psychology  
Measurement, Statistics and  
Methodological Studies  
School Psychology

Degrees: M.A., M.Ed., M.C., Ed.D.,  
Ph.D.

All program areas within this division strongly emphasize research activities. Areas of concentration within Educational Psychology include lifespan developmental psychology; measurement, statistics and methodological studies; and school psychology. The Ph.D. program in Counseling Psychology and Educational Psychology concentration in school psychology are accredited by the American Psychological Association and are based upon the scientist-practitioner model. The Master of Counseling program in community counseling is accredited by the Council for the Accreditation of Counseling and Related Educational Programs (CACREP).

Members of the faculty are actively involved in a variety of research and other scholarly activities, including basic and applied educational research, editing and reviewing for a number of refereed journals, publishing and presenting research papers, and seeking external funding for research projects. The faculty encourage and assist graduate students' research, publications, and presentations at professional conferences. Particular research interests of the faculty are noted under each degree major.

### GRADUATE PROGRAMS

The College of Education offers degrees for the practitioner and for the academic researcher. The Master of Education and the Doctor of Education are designed for teachers and other practitioners working directly with students and schools. The Master of Counseling is designed to prepare helping professionals for work in a variety of counseling settings. The Master of Arts and Doctor of Philosophy degrees are designed for persons interested in careers in universities and other re-

search settings. The M.A. and Ph.D. programs emphasize theory development, research methods, and acquisition of a broad base of knowledge about education, as well as in-depth knowledge of a chosen field of specialization.

The Interdisciplinary Committee on Curriculum and Instruction offers an interdisciplinary graduate program leading to the Doctor of Philosophy degree in Curriculum and Instruction. Areas of concentration are as follows: Curriculum Studies, Early Childhood Education, Educational Media and Computers, Elementary Education, English Education, Exercise and Wellness Education, Music Education, Physical Education, Reading Education, Science Education, and Special Education. The interdisciplinary committee sets guidelines and supervises programs of study, while an executive committee, appointed by the dean of the College of Education and the dean of the Graduate College, has primary responsibility for the operation of the program. It is composed of faculty representing the various concentrations.

Most graduate programs of the College of Education include a core of courses designed to give students an understanding of the context of American education and of the methods of scholarship by which the understanding of the educational system is deepened.

Core course requirements along with specific requirements for the various types of degrees are given under the appropriate majors. The table presents a summary of those degrees authorized by the Arizona Board of Regents. Contact the division offices for further information about degrees offered through each faculty group. Several of the degrees have various concentrations.

### ADMISSION REQUIREMENTS

Applicants must meet the general admission requirements established by the Graduate College. For the M.Ed. and M.C. degrees, test scores from the Miller Analogies Test or the Graduate Record Examination are required.

Individual divisions or programs may have admission standards higher than these minimums. Also, some units are limited by the number of faculty members or resources they have, and in keeping with the college's goals of providing a high quality education for all

enrolled students, only a small proportion of the qualified students who apply are admitted. Students should consult the division director or program coordinator for specific admission requirements.

### SPECIAL PROGRAMS

Research and services to students and the community are provided through two centers authorized by the Arizona Board of Regents: the Center for Bilingual/Bicultural Education and the Center for Indian Education. The College of Education offers graduate course work pertaining to the development and education of children and youth from diverse cultural, linguistic, and racial/ethnic populations. Faculty affiliated with multicultural education are actively involved in research related to effective schooling for children of Hispanic American and American Indian heritage, parents as partners in education, bilingual education, and English as a second language.

The college's Technology Based Learning and Research Facility conducts research activity related to software evaluation and the use of microcomputers in schools.

### CERTIFICATION AND ENDORSEMENT

Postbaccalaureate programs that lead to initial teaching certification are designed for people who hold bachelor's degrees in areas other than education. Postbaccalaureate programs are available in one of the following areas: elementary education, principalship, secondary education, special education, superintendent, and supervisor. Programs to earn endorsements, which are added to teaching certificates, include bilingual education, educating the gifted, library science, middle school education, reading, and teaching English as a second language. Programs that prepare students for certification by the State as a school counselor are offered by the Counselor Education Program.

### COLLEGE FACILITIES

In addition to the special programs mentioned above, other administrative units and centers provide services to students and the community. These include the College of Education Pre-school, which provides young children

### College of Education Graduate Degrees, Majors, and Concentrations

Major	Degree	Administered by
Counseling	M.C.	Division of Psychology in Education
Counseling Psychology	Ph.D.	Division of Psychology in Education
Counselor Education	M.Ed.	Division of Psychology in Education
Concentration: counseling and student personnel		
Counselor Education	Ed.D. <sup>1</sup>	Division of Psychology in Education
Curriculum and Instruction	M.A., M.Ed.	Division of Curriculum and Instruction
Concentrations: bilingual education, communication arts, early childhood education, elementary education, English as a second language, Indian education, mathematics education, multicultural education, reading education, science education, social studies education, secondary education		
Curriculum and Instruction	Ed.D.	Division of Curriculum and Instruction
Concentrations: bilingual education, communication arts, curriculum studies, early childhood education, elementary education, English as a second language, Indian education, mathematics education, multicultural education, reading education, science education, social studies education, secondary education		
Curriculum and Instruction	Ph.D. <sup>2</sup>	Interdisciplinary Committee on Curriculum and Instruction
Concentrations: curriculum studies, early childhood education, educational media and computers, elementary education, English education, exercise and wellness education, music education, physical education, reading education, science education, special education		
Educational Administration and Supervision	M.A., M.Ed., Ed.D.	Division of Educational Leadership and Policy Studies
Educational Leadership and Policy Studies	Ph.D.	Division of Educational Leadership and Policy Studies
Educational Media and Computers	M.Ed.	Division of Curriculum and Instruction
Concentration: business education <sup>3</sup>		
Educational Psychology	M.A., M.Ed.	Division of Psychology in Education
Educational Psychology	Ph.D.	Division of Psychology in Education
Concentrations: lifespan developmental psychology; measurement, statistics, and methodological studies; school psychology		
Higher and Adult Education	M.Ed., Ed.D.	Division of Educational Leadership and Policy Studies
Concentrations; adult education, <sup>1</sup> higher education		
Learning and Instructional Technology	M.A., M.Ed., Ed.D. <sup>1</sup>	Division of Psychology in Education
Learning and Instructional Technology	Ph.D.	Division of Psychology in Education
Concentrations: instructional technology, leaning		
School Library Science	M.A., <sup>1</sup> M.Ed. <sup>1</sup>	Division of Curriculum and Instruction
Social and Philosophical Foundations of Education	M.A.	Division of Educational Leadership and Policy Studies
Special Education	M.A.	Division of Curriculum and Instruction

<sup>1</sup> Applications for this program are not being accepted at this time.

<sup>2</sup> This program is administered jointly by the College of Education and the Graduate College. See the "Graduate College" section of this catalog.

<sup>3</sup> The only formalized concentration for this major; other areas of study are available.

Major	Degree	Administered by
Special Education Concentrations: gifted, mildly handicapped, multicultural exceptional, severely/ multiply handicapped	M.Ed.	Division of Curriculum and Instruction

<sup>1</sup> Applications for this program are not being accepted at this time.

<sup>2</sup> This program is administered jointly by the College of Education and the Graduate College. See the "Graduate College" section of this catalog.

<sup>3</sup> The only formalized concentration for this major; other areas of study are available.

a variety of learning experiences designed to encourage the development of thinking skills, intellectual curiosity, creative expression, and the foundation upon which academic skills will later be built. The preschool provides on-site observation opportunities for students preparing to become early childhood teachers, serves as a model preschool program for early childhood educators, and provides an opportunity for researchers to investigate how very young children grow and develop in an environment that encourages their personal and intellectual development.

The Arizona Educational Information System (AEIS) offers member school districts a computerized information retrieval system with access to thousands of educational topics.

The Center for Academic Precocity provides academic services to intellectually advanced students in grades K-11. These services include individual

assessment, talent identification, and a variety of courses.

The Counselor Training Center provides counseling for ASU students, faculty, staff, and the community-at-large in personal and career development, stress management, and marriage and family issues. Counseling is conducted by graduate students in Counseling and Counseling Psychology under the supervision of certified psychologists.

Other units within the college offering specialized research and educational services include the Office of Field Services; the Office of Diversity, Recruitment and Support Programs; and instructional resource libraries and collections in a number of curricular areas.

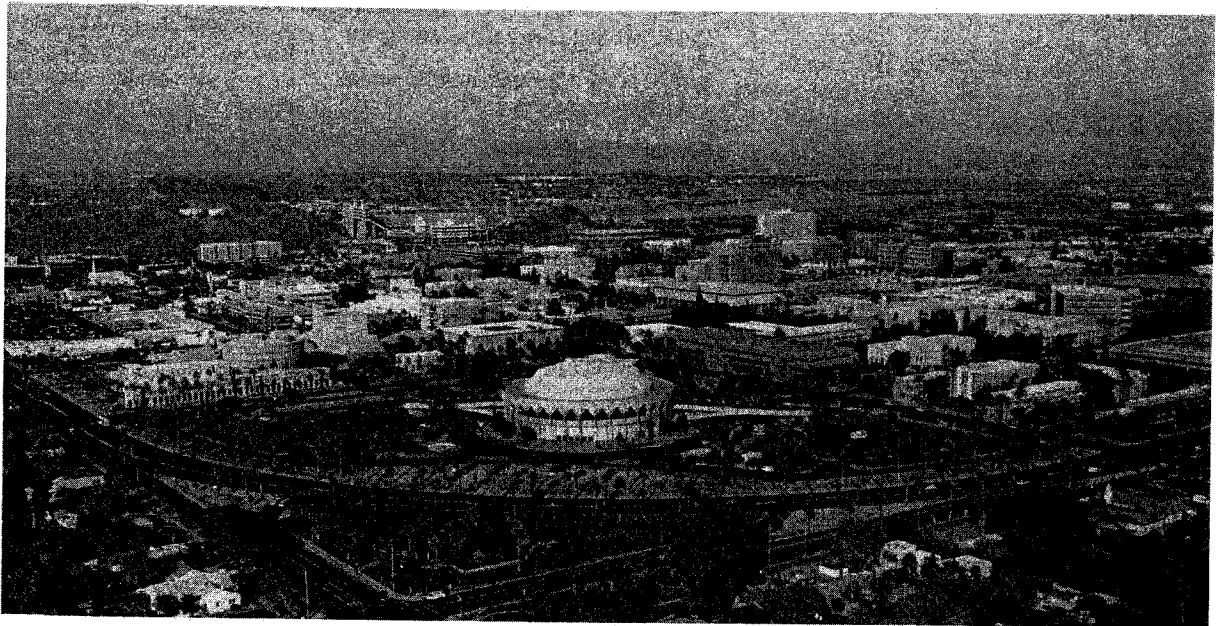
#### ADVISING

General career advisement in a program area can be obtained by contacting the director of the division or the

coordinator of the program area in which a degree program is offered. After admission to a degree program, specific advice related to degree activities is provided by supervisory committees.

#### ACCREDITATION AND AFFILIATION

The Ph.D. programs in Counseling Psychology and Educational Psychology concentration in School Psychology are accredited by the American Psychological Association. The School Psychology program is also approved by the National Association of School Psychologists. The Master of Counseling is accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP). The College of Education is approved by the State Board of Education (Arizona). The college is affiliated with the University Council for Educational Administration, The Holmes Group, and is a member of AACTE.



# College of Engineering and Applied Sciences

Peter E. Crouch, Ph.D.  
Dean

## PURPOSE

Faculty in the College of Engineering and Applied Sciences offer opportunities for graduate study through the School of Agribusiness and Resource Management, the Del E. Webb School of Construction, the School of Engineering, and the School of Technology. Degrees offered include the Doctor of Philosophy in the fields of engineering and computer science, the Master of Science in Engineering, the Master of Science in the fields of engineering and computer science, the Master of Science degree in Agribusiness, the Master of Computer Science, the Master of Science degree in Construction, and the Master of Technology.

The primary purpose of a graduate education is to provide the student with advanced training for a professional, teaching, or research career. The graduate program in the School of Engineering is designed to bridge the gap between knowledge of engineering sciences and creative engineering practice, while at the same time increasing the student's depth and breadth of knowledge in an area of emphasis. The performance of scholarly research and the acceptance of professional responsibility for the documented results are considered essential requirements for graduate degrees and entrance into professional careers.

## ORGANIZATION

The College of Engineering and Applied Sciences is organized as follows:

### Del E. Webb School of Construction

#### School of Agribusiness and Resource Management

#### School of Engineering

Department of Chemical, Bio and Materials Engineering

Department of Civil and Environmental Engineering

Department of Computer Science and Engineering

Department of Electrical Engineering

Department of Industrial and Management Systems Engineering

Department of Mechanical and Aerospace Engineering

#### School of Technology

Department of Aeronautical Technology

Department of Electronics and Computer Technology

#### Department of Manufacturing and Industrial Technology

Each academic unit, headed by a chair, offers various undergraduate and graduate degree programs. Faculty from these academic units participate in the research programs offered through the college research centers as well as individual laboratories and facilities. Drawing on the interests, strengths, and resources of academic units in the College of Engineering and Applied Sciences and other schools and colleges within the university, interdisciplinary research centers coordinate research, sponsor conferences and continuing education courses, and serve as liaison between the academic and industrial or technical communities.

## ADMISSION REQUIREMENTS

Applicants must meet the general admission requirements established by the Graduate College. Additional supporting materials may be required by individual academic units. These materials may include test scores from the Graduate Record Examination, letters of recommendation, and statements of educational and professional goals. International applicants whose native language is not English must also submit scores from the TOEFL. See the requirements listed under each major in this catalog for specific TOEFL information.

## GRADUATE PROGRAMS

Through the Graduate College, faculty in the College of Engineering and Applied Sciences offer various graduate programs leading to the following degrees: Master of Science, Master of Science in Engineering, Master of Computer Science, Master of Technology, and Doctor of Philosophy.

The college is committed to becoming a nationally prominent center for graduate research. Faculty members conduct research on government or industry-sponsored programs in such areas as aerodynamics, biotechnology, computer design, computer-integrated manufacturing, environmental fluid dynamics, innovative engineering education, microelectronics manufacturing, power systems, semiconductor materials and devices, signal processing, solar energy, solid-state electronic devices, structural dynamics, telecommunications, thermosciences, and transportation systems. The research activities of



**College of Engineering and Applied Sciences  
Graduate Degrees, Majors, and Concentrations**

<b>Major</b>	<b>Degree</b>	<b>Administered by</b>
<b>School of Agribusiness and Resource Management</b>		
Agribusiness Concentrations: agribusiness management and marketing, food quality assurance	M.S.	School of Agribusiness and Resource Management (Courses are offered at ASU East.)
<b>Del E. Webb School of Construction</b>		
Construction Concentrations: construction science, facilities, management	M.S.	Del E. Webb School of Construction
<b>School of Engineering</b>		
Aerospace Engineering	M.S., M.S.E., Ph.D.	Department of Mechanical and Aerospace Engineering
Bioengineering	M.S., Ph.D.	Department of Chemical, Bio and Materials Engineering
Chemical Engineering Concentrations: biomedical and clinical engineering, chemical process engineering, chemical reactor engineering, energy and materials conversion, environmental control, solid state processing, transport phenomena	M.S., M.S.E., Ph.D.	Department of Chemical, Bio and Materials Engineering
Civil Engineering Concentrations: environmental/sanitary, geotechnical/soil mechanics, structures, transportation, water resources/hydraulics	M.S., M.S.E., Ph.D.	Department of Civil and Environmental Engineering
Computer Science	M.C.S., M.S., Ph.D.	Department of Computer Science and Engineering
Electrical Engineering	M.S., M.S.E., Ph.D.	Department of Electrical Engineering
Engineering Science	M.S., M.S.E., Ph.D.	School of Engineering
Industrial Engineering Concentrations: computer-aided processes, computer-integrated manufacturing, human factors, information systems, operations research, organization control, quality control/reliability	M.S., M.S.E., Ph.D.	Department of Industrial and Management Systems Engineering
Mechanical Engineering	M.S., M.S.E., Ph.D.	Department of Mechanical and Aerospace Engineering
Science and Engineering of Materials	Ph.D.*	Committee on the Science and Engineering of Materials
<b>School of Technology</b>		
Technology Concentrations: aeronautical engineering technology, aeronautical management technology, electronics engineering technology,  graphic communications technology, industrial management and supervision, manufacturing engineering technology, mechanical engineering technology, welding engineering technology	M.Tech.	(Courses are offered at ASU East.)  Department of Aeronautical Technology  Department of Electronics and Computer Technology Department of Manufacturing and Industrial Technology

\* This program is administered by the Graduate College. See the "Graduate College" section of this catalog.

the academic units within the college are complemented and supported by the work of centers for research and development.

Faculty and graduate students in the college participate in programs of the Center for Solid State Electronics Research, coordinating the work of researchers from various units. The center emphasizes the development of solid state electronics research and teaching and facilitates interaction with the electronics industry. The center operates modern, sophisticated research facilities, organizes colloquia and symposia, collaborates with external researchers, and sponsors visiting professorships.

The Center for Professional Development coordinates continuing education services for the local, national, and international technical community, sponsoring conferences, seminars, institutes, and short courses for professionals in the rapidly changing fields of science and technology.

Focusing on Arizona's resources, industries, and institutions, the Center for Research in Engineering and Applied Sciences supports faculty and student collaboration in defining and developing solutions to current and anticipated problems in the state.

The college's Telecommunications Research Center focuses, plans, and promotes the research activities of the faculty with interests in antennas, propagation, and scattering; microwave circuits, devices, and measurements; optical communications; signal processing; and switching and data communications. The center conducts research, develops technologies, and provides educational programs. Industrial and multidisciplinary programs are encouraged. The center operates modern research laboratories, including an excellent, spacious electromagnetic anechoic chamber.

The Center for Agribusiness Policy Studies promotes research, development, and management of new crops and products important to agribusiness.

Research in design and manufacturing takes place in the Computer Integrated Manufacturing Systems Research Center. A multidisciplinary endeavor of faculty and graduate students throughout the college, the center emphasizes computer-integrated manufacturing in several well-equipped laboratories.

The Center for Advanced Transportation Systems Research also draws on the interests and expertise of researchers throughout the college and university. This center investigates all modes of transportation and their effects in social, economic, and environmental contexts. Current research efforts include the transportation of hazardous materials, pavement evaluation, and technology transfer.

The Energy Systems Research Center coordinates all energy-related investigations within the college to encourage cross-disciplinary exchange. Nearly 50 faculty from various academic units participate in research pertinent to state, regional, and local concerns.

The Center for Systems Science and Engineering is jointly sponsored by the College of Engineering and Applied Sciences and the College of Liberal Arts and Sciences. Its main goals are the creation and enhancement of interdisciplinary and cooperative research, graduate education, and public service programs in the areas of systems science, applied mathematics, and computation. The center's focal areas include nonlinear and adaptive systems, large scale systems, and scientific computing and simulation.

Established to promote aerospace research, the Aerospace Research Center provides a focal point in aerospace in the college and the university. The cross-departmental unit also provides a mechanism within the academic infrastructure to foster interdisciplinary research activities. The center offers students a rich multidisciplinary environment for postgraduate education, yet allows them to specialize in key aerospace topics. These topical areas include aerodynamics and fluid mechanics; propulsion and space power; advanced structures and materials; flight mechanics, guidance, control and avionics; robotics and automation; and air transportation.

The purpose of the Center for Innovation in Engineering Education is to promote and encourage visionary approaches to educating engineering students by supporting the research, development, and assessment of new educational paradigms, unique curricula, improved courses, and new delivery systems that embrace a range of learning models, alternative classroom management strategies, improved pedagogies, and advanced educational technologies.

The center also develops and offers workshops and seminars to encourage wide-scale implementation of those approaches that are shown to be effective in developing the attributes that will be needed by engineering graduates in the decade ahead.

The State of Arizona, the College of Engineering and Applied Sciences, and the business and industrial community of the Phoenix area have united efforts and pooled resources to broaden the scope of engineering education and research at ASU under the guidance of the ASU Advisory Council for Engineering Excellence. The program has achieved many of its first goals, including the addition of some 70 faculty and creation of 245,000 square feet of new research space. The program continues to foster collaboration among government, industry, and academic agencies and researchers, emphasizing areas of specialization of greatest interest to local industry, such as computer-aided processes, energy systems, thermosciences, solid state electronics, computers and computer science, transportation, and telecommunication.

The College of Engineering and Applied Sciences serves the high-technology community through the Interactive Instructional Television Program. The system allows employees of participating companies to attend graduate credit courses, special interest seminars, and video teleconferences, without leaving their place of employment.

## COLLEGE FACILITIES

Numerous well-equipped laboratories, extensive library holdings, and widely available computer services encourage the best in research and graduate training. Laboratories include facilities for energy conversion and materials engineering, instrumentation and biomechanics research, transmission microscopy, and surface research, to name only a few of the diverse capabilities of the college's physical resources. Supporting the work of researchers, a well-equipped and well-staffed development shop makes special-purpose equipment for student and faculty projects. For more information about laboratories, consult the descriptions of individual programs and centers for research in this catalog.

The College of Engineering and Applied Sciences offers extensive comput-



ing facilities to its faculty and graduate students. The college centrally maintains a general purpose Sun SPARCenter 2000 superserver with four processors and 14 Gb of disc space, one DEC VAX 6000-410 running the VMS operating system, and several special purpose application servers. Distributed throughout the college are hundreds of networked UNIX workstations, DOS microcomputers attached to Novell LANs, and Apple Macintoshes on Appletalk LANs, all used for research and instruction. UNIX workstations are provided by manufacturers such as Sun Micro Systems, Hewlett-Packard, and Silicon Graphics. All of these college computing facilities are networked via TCP/IP on ethernet or FDDI and connected to the Internet.

The University Computer Center centrally provides a cluster of five IBM RS/6000-580 UNIX workstations on an FDDI ring, an IBM 3090/500E with three vector facilities, an IBM 3081 model K, a DEC 6000-420, more than 500 IBM or IBM-compatible microcomputers and Apple Macintosh microcomputers.

There are numerous workstations located throughout the campus for general student use. These small computers and microcomputers are available to students for word processing, computer graphics, access to large computers, process control, data acquisition and reduction, and simulation.

### ADVISING AND STANDARDS

General information on admission, programs support, expenses, and other such topics may be obtained from the Office of the Associate Dean for Academic Affairs. Specific questions on a program, however, should be addressed to the academic unit.

**Retention.** A student who has been admitted to a graduate program of study in the College of Engineering and Applied Sciences, on either a regular or provisional basis, must maintain a 3.00 or higher GPA in all work taken for graduate credit as well as an overall 3.00 GPA in all studies at ASU.

A student is placed on academic probation if

1. the student's GPA falls below 3.00 in the approved program of study;



2. the student's overall GPA for all postbaccalaureate courses taken at ASU falls below 3.00;
3. the student receives a "D" or "E" in a required deficiency or in a course at the 400 level or above; or
4. for reasons other than above, the student fails to make satisfactory progress toward a degree.
2. the student receives a "D" or lower grade while on academic probation for any reason;
3. the student fails to obtain at least a 3.00 GPA in all courses cited as deficiencies upon admission to a graduate program;
4. the student fails to meet any other conditions imposed as part of the probation; or
5. for reasons other than above, the student fails to make satisfactory progress toward a degree.

A student is recommended for withdrawal from a graduate program if

1. the student is on academic probation because his or her GPA has fallen below 3.00 in the approved program of study or for all postbaccalaureate courses taken at ASU and fails to bring the GPA to 3.00 or above by the time the next nine semester hours are completed;

A student may appeal any action concerning academic probation and withdrawal by petitioning the graduate affairs committee within the student's academic unit.

# College of Fine Arts

J. Robert Wills, Ph.D.  
Dean

## PURPOSE

The College of Fine Arts offers pre-professional and professional education in the arts disciplines and opportunities for nonmajors to become culturally literate through participation and involvement in the creative and performing arts.

At the graduate level, the college provides students the opportunity to participate with faculty mentors in research, performance and performance practices, and other creative activities.

As the largest and most diverse fine arts academic unit in the Southwest, and one of the largest in North America, the College of Fine Arts has an implicit responsibility to maintain quality and leadership in all aspects of its activities. Through its programs in art, dance, music, and theatre, the college reflects a wide range of challenges facing the artist and scholar into the 21st century.

## ORGANIZATION

The College of Fine Arts houses the School of Art, the Department of Dance, the School of Music, the Department of Theatre, the ASU Art Museum, and the Institute for Studies in the Arts. An average of 2,000 students per semester enroll as majors in various degree programs offered through these units. Approximately one third of these are graduate students.

## GRADUATE PROGRAMS

Faculties in the School of Art, Department of Dance, School of Music, and Department of Theatre offer both research and professional degrees through the Graduate College: the M.A., M.F.A., M.M., D.M.A., and Ph.D. degrees. A full range of majors and concentrations is available.

## ADMISSION REQUIREMENTS

Admission requirements vary according to degree programs. However, applicants must first meet all admission requirements of the Graduate College. Most programs require a bachelor's degree with a major in the selected area; many of them also require an audition. See the specific degree program for pertinent admission requirements.

## SPECIAL PROGRAMS

Together with faculty, visiting scholars, and artists-in-residence, graduate students in all fields of the College of Fine Arts participate in dynamic, innovative programs. The creative energy that infuses the visual and performing arts finds expression in research and study.

The Visual Arts Research Studios in the School of Art conduct research in historical and contemporary technologies in the visual arts. This program provides the only studio environment of its kind in this country. It brings together artists, master printers, and photographers to encourage collaboration and research. Graduate students are appointed to assist studio personnel in the planning and production of projects in the Print Research Facility, the Photography Collaborative facility, and the Pyracantha Press.

The School of Art also offers opportunities to explore and refine a new artistic medium: computer graphics. Students may work with software for "painting," solid modeling, animated solid modeling, and live video mapping. While computer graphics makes use of the latest technology, other areas preserve and revitalize established media. The newly established neon studio contributes to the revival of interest in neon as an artistic medium and trains students in this difficult craft. The School of Art publishes *The History of Photography Monograph Series*, which receives international acclaim. The Northlight Gallery has also become known internationally for photographic exhibitions. Graduate students gain valuable experience in the gallery.

Recognized as one of the top programs in the country, the Department of Dance emphasizes the choreography, performance, and theory of modern dance. Nationally prominent faculty and visiting artists create repertory for dance majors and for the Dance Arizona Repertory Theatre (DART), a student touring repertory company. An ambitious performance program offers to the public several concerts each year with additional works created and performed by graduate and undergraduate students. Students work closely with major artists and companies who visit campus annually, and with researchers in the areas of dance science, dance in relation to technology, dance music

## College of Fine Arts Graduate Degrees, Majors, and Concentrations

Major	Degree	Administered by
Art Concentrations: art education, art history	M.A.	School of Art
Art Concentrations: ceramics, drawing, fibers, intermedia, metals, painting, photographic studies, photography, printmaking, sculpture, wood	M.F.A.	School of Art
Composition	M.M.	School of Music
Creative Writing	M.F.A. *	Creative Writing Committee
Dance	M.F.A.	Department of Dance
Music Concentrations: ethnomusicology, music history and literature, music theory	M.A.	School of Music
Music Concentrations: choral music, general music, instrumental music, music composition, solo performance	D.M.A.	School of Music
Music Education Concentrations: choral music, general music, instrumental music	M.M.	School of Music
Performance Concentrations: music theatre musical direction, music theatre performance, performance pedagogy, piano accompanying, solo performance (instrumental), solo performance (keyboard), solo performance (voice)	M.M.	School of Music
Theatre	M.A.	Department of Theatre
Theatre Concentrations: acting, scenography, theatre for youth	M.F.A.	Department of Theatre
Theatre Concentration: theatre for youth	Ph.D.	Department of Theatre

\* This program is administered by the Graduate College. See the "Graduate College" section of this catalog.

composition, labanotation, and sound and video production. ASU students and faculty have consistently taken top honors at the regional and national festivals of the American College Dance Festival Association. The department recently was selected to host the National Festival, which produced seven concerts and over 50 master classes in four days.

As the research center for the College of Fine Arts, the Institute for Studies in the Arts serves as a laboratory for the development and funding of creative ideas and for the exploration of new tools and technologies for artistic expression, a network for communication among creative scholars both within and outside the arts, and a resource base for the documentation, evaluation, and dissemination of research in the arts. Through technical

and monetary support, the institute sponsors a wide variety of projects that address its mission of experimentation and innovation.

Faculty in the School of Music include a wide range of performers, teachers, conductors, composers, and scholars, whose knowledge and guidance support the training of students in the Doctor of Musical Arts and master's degree programs. Individuals who hold graduate degrees from ASU's School of Music hold prestigious performing and university teaching positions throughout the nation. The graduate programs are indeed comprehensive and provide for wide and diverse opportunities for students in performance, course work, and research.

Three concentrations are available in the M.F.A. in Theatre program: acting, scenography, and theatre for youth.

The Ph.D. in Theatre program also offers a concentration in theatre for youth. The newly established M.F.A. concentration in acting is based on a conservatory model, providing performance opportunities in mainstage and studio production. The Department of Theatre, with its strong playwriting program, has a special interest in new scripts that bring a wealth of professional productions and workshops to campus for the benefit of all students. In recent years, two plays by Pulitzer prize-winning playwrights have premiered on campus, and The Genesis Project of new play workshops is co-sponsored annually with the Arizona Theatre Company, the state League of Resident Theatres (LORT) company. The Department of Theatre takes special pride in its nationally and internationally acclaimed theatre for youth

program, which provides comprehensive graduate training and attracts students, scholars, and visitors from around the world. Graduate students are challenged to excel in every aspect of theatrical training. They are offered acting, directing and other production opportunities for mainstage, studio and touring shows, as well as research and teaching opportunities on and off campus. Students also organize and participate in a biennial International Youth Arts Festival that brings many multi-talented artists and thousands of students to campus. The program has developed Hayden Library's Child Drama Collection, which includes rare books, plays, and personal and national association archives. It is the most complete and comprehensive collection in the English-speaking world.

Students in the scenography program are actively involved in all aspects of design and technology for mainstage and studio productions and receive regional and national awards on a regular basis for their work. Students may specialize in a single design area or the more comprehensive scenography.

A multi-ethnic theatre program provides opportunities for students to view and work with professional and semi-professional multi-ethnic productions on campus.

The playwriting program enriches graduate study and brings together talented students with those who practice the theatrical arts. The M.F.A. in Creative Writing encourages graduate students to work closely with writers of drama, fiction, and poetry, and with directors and producers from the Departments of English and Theatre. This interdisciplinary program, involving the artistic, research, and teaching interests of faculty in these departments, offers students a unique opportunity to tailor a course of study to fit individual needs, talents, and goals.

### COLLEGE FACILITIES

The arts programs are housed in the following buildings: Art Building; Dixie Gammage Hall; Physical Education Building East; Gammage Center for the Performing Arts; Matthews Center; Matthews Hall; the J. Russell and Bonita Nelson Fine Arts Center, which includes the University Art Museum; the 500-seat Paul V. Galvin Theatre; six theatre studios; a 7000-square-foot Experimental Dance Lab; and a

video lab. The Music Building and expansion wing house four performance halls ranging in size from the 125-seat Recital Hall to the 500-seat Music Theatre and the 350-seat Katzin Concert Hall, which is used primarily for solo and chamber music recitals. The Katzin Concert Hall contains a nine-foot Hamburg Concert Steinway piano. The new 175-seat Organ Hall was designed to house the Paul Fritts Tracker Organ, an instrument reflecting the aesthetics and style of North Germany organ building in the 17th century. The Theatre Department also stages student series in the renovated Lyceum Theatre. Many of these facilities are equipped with studios and laboratories, where needed.

The University Art Museum's collections are housed in a large complex of galleries and art study rooms in two locations: the Nelson Fine Arts Center and the second floor of the Matthews Center. The Oliver B. James Collection of American Art ranges from the early 18th century to the contemporary and includes major works by Stuart, Ryder, Homer, and the Ash Can School painters. Master works by great print-makers such as Durer, Rembrandt, Whistler, and Hogarth are often featured in special exhibitions selected from the university's extensive print collection.

The gallery devoted to Latin American art features folk art as well as paintings by celebrated 20th-century artists Rivera, Siqueros, and Tamayo. The museum also displays many fine ex-

amples of 19th- and 20th-century crafts, paintings, and sculpture.

The contemporary art holdings include works by Vernon Fisher, Leon Golub, Sue Coe, Luis Jimenez, and Robert Colescott. Exhibitions curated by the museum emphasize contemporary art and new media, crafts, and Mexican art.

All units have developed computer facilities for graduate student training. Also refer to the description of computing facilities and services on page 28.

### ADVISING

Advisement is handled as a decentralized activity within the college. To offer personalized attention, each academic unit establishes its own graduate advisement procedures. Students are encouraged to make appointments through the central office of their major discipline.

### ACCREDITATION

While all of the arts programs in the college meet or exceed standards established by various arts accrediting agencies, the School of Music and the Departments of Dance and Theatre hold formal memberships. The Department of Dance is fully accredited by the National Association of Schools of Dance (NASD), the School of Music by the National Association of Schools of Music (NASM), and the Department of Theatre by the National Association of Schools of Theatre (NAST).



# College of Law

**Richard J. Morgan, J.D.**  
*Dean*

## PURPOSE

The prime function of the College of Law is to educate students in the law so that they may assume the various societal roles involved with the law. Some of its graduates turn to government legal service, to legal aid and public defender offices, to law enforcement work, to the world of business, to education, and the many other avenues opened by legal training. Some students, while yet in school, develop programs of study involving fields and disciplines outside the law in its conventional sense. Through the university, the College of Law provides many of those wider avenues of study.

The students of the College of Law seek to develop an understanding, in formal courses and in clinical experience, of the very heavy responsibilities borne in society by the legal profession, and to learn of the satisfactions that come from discharging, at a high standard, the duties of counselor and advocate. In addition, the College of Law has a responsibility to contribute to the quality of justice administered in society.

## ORGANIZATION

The law school has a distinguished faculty, a professional course of study constructed for the modern era, and a unique and highly functional law building especially designed for modern legal education. Classrooms are located on the ground floor along with seminar rooms, offices for the Law School Clinics, Student Services offices, including a Career Planning Resource Center, informal student lounge areas, a modern trial courtroom equipped with modern sound and video equipment, and the Willard H. Pedrick Great Hall, a unique, full-bench setting that seats 400. Faculty, staff and administrative offices are located at the mezzanine level.

The award-winning John J. Ross-William C. Blakley Law Library, named in memory of two prominent Phoenix attorneys, is one of the finest law libraries in the Southwest with a collection of more than 310,000 volumes and microform volume equivalents. The collection includes a broad selection of Anglo-American case reports and statutes as well as legal treatises, periodicals, encyclopedias, digests, citators, and administrative materials. The collection also includes growing special collections in the areas of international law, Indian law, Mexican law, and law and technology. In addition, the library has a 30-station computer lab as well as LEXIS and WESTLAW rooms each containing 10 stations, 27 meeting and study rooms, a microforms facility and a classroom. The library is also a selective U.S. government depository.

Students have ready access to the other campus libraries, including the Charles Trumbell Hayden Library, the Daniel E. Noble Science and Engineering Library, the Architecture and Environmental Design Library, and the Music Library. The collections of the university's libraries comprise more than three million volumes.

**GRADUATE PROGRAMS**

### Juris Doctor Degree

The College of Law offers a three-year program of professional studies at the graduate level leading to the degree of Juris Doctor (J.D.).

### Master of Laws Degree

Through the Graduate College, the faculty in the College of Law offer a graduate program leading to the Master of Laws (LL.M.) degree. Applications currently are not being accepted.

### Dual/Concurrent Degree Programs

Juris Doctor/Master of Health Services Administration (with College of Business)

Juris Doctor/Master of Business Administration (with College of Business)

Juris Doctor/Ph.D. in Justice Studies (with the Committee on Law and Social Sciences)

## ADMISSION REQUIREMENTS

Each applicant for admission to the Juris Doctor (J.D.) program must have earned an undergraduate degree from an accredited four-year college or university (B.A., B.S., or other equivalent). The College of Law Admissions Office considers an applicant's file complete only if it includes each of the following:



1. a completed Application for Admission form;
2. a completed Domicile Affidavit if claiming Arizona residency;
3. a \$35.00 application fee;
4. a personal statement that does not exceed three typed pages in length; and
5. a Law School Data Assembly Service (LSDAS) report with all transcripts and the Law School Admissions Test (LSAT) score(s) from the Law School Admission Services (LSAS).

To be assured consideration, all application materials must be complete by March 1.

### SPECIAL PROGRAMS

#### Center for the Study of Law, Science, and Technology

The Center for the Study of Law, Science and Technology is a multidisciplinary research center created by the Arizona Board of Regents in 1984. The center publishes research studies, sponsors seminars and symposia, and houses visiting scholars and teachers. Through these programs, the center seeks to contribute to the formulation

and improvement of law and public policy affecting science and technology and to the wise application of science and technology in the legal system.

The College of Law offers a substantial number of courses in the law, science, and technology area including law as relating to areas such as the environment, evolutionary biology, health care, intellectual property, land use, the media, medicine, microcomputers, natural resources, patents, psychiatry, social sciences, and water as well as regulatory problems in law, science, and technology and economic analysis of law.

In cooperation with the American Bar Association Section on Science and Technology, and under the leadership of a faculty editor, second- and third-year students edit the *Jurimetrics Journal of Law, Science and Technology*.

#### Indian Legal Program

The College of Law offers an Indian Legal Program whose missions are to assist tribal courts and governments in improving justice in Indian country and to develop education and scholarship in Indian law. Students have the opportunity to participate in all phases of the Indian Legal Program and gain in-depth understanding of the legal issues affect-

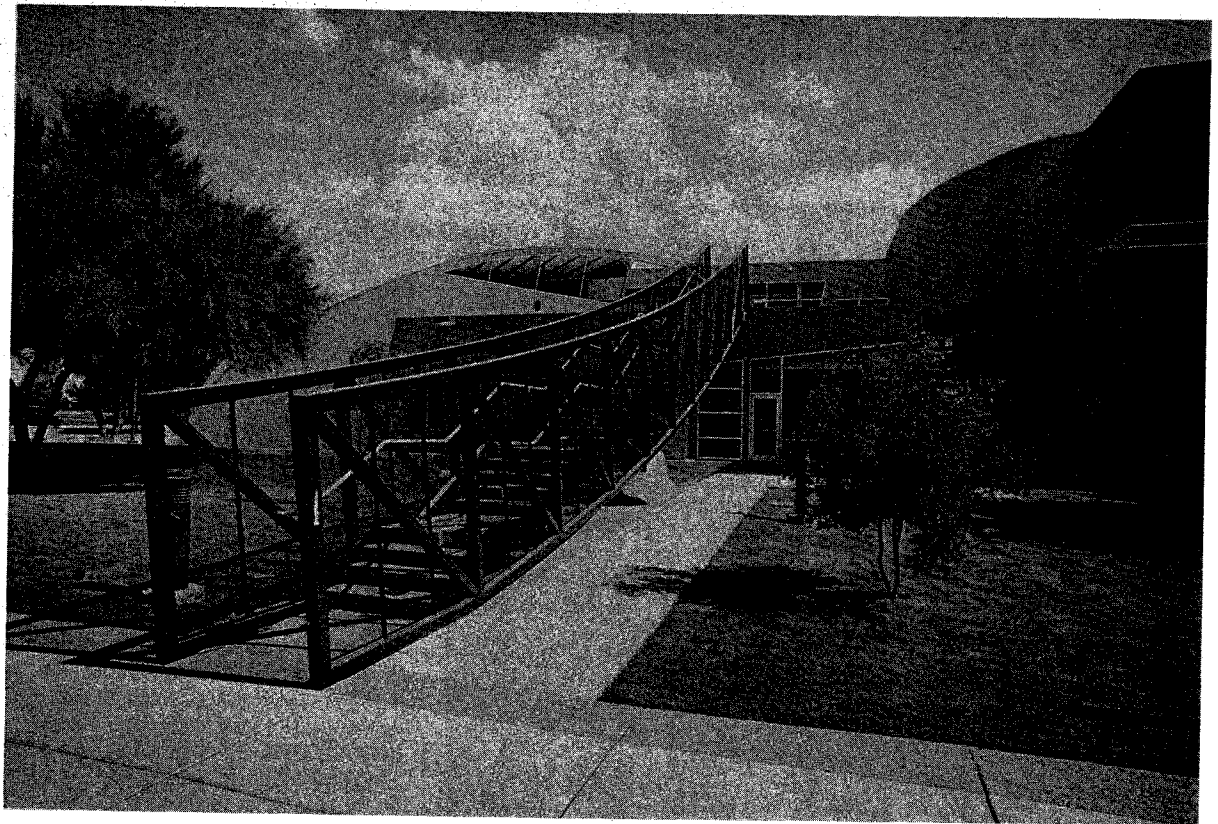
ing Indian tribes and peoples. Courses on Federal Indian law and seminars on advanced Indian law topics such as Tribal Court dispute resolution, economic development, American Indian cultural resources protection, and tribal environmental law are part of the curriculum. Students may also participate in externships with the local tribal courts or spend a semester in Washington, D.C. working with the Senate Select Committee on Indian Affairs. This variety of academic and work experience provides the students an outstanding legal education with a firm grounding in both the theoretical and practical aspects of Indian law.

### ADVISING

Preadmission information, advisement, and continued support for the J.D. is provided by the College of Law Admissions Office, 602/965-1474.

### ACCREDITATION

The college is fully accredited by the American Bar Association and is a member of the Association of American Law Schools.



# College of Liberal Arts and Sciences

Gary S. Krahenbuhl, Ed.D.  
*Dean*

## PURPOSE

The graduate programs in the College of Liberal Arts and Sciences are characterized by both a diversity of disciplines and a commonality of purpose. The disciplinary diversity of the college is broad by intent, embracing those branches of learning most central to the foundations of society in the humanities and the sciences. Unity of purpose is achieved through a common commitment to intellectual integrity, to research, and to the preservation of freedom of academic inquiry, as well as through informal exchanges and cross-disciplinary centers.

The College of Liberal Arts and Sciences has active research programs in all units offering advanced degrees. In fiscal year 1994-95 nearly half of the external research grants to the university came to the College of Liberal Arts and Sciences, accounting for \$36.9 million of the \$85.6 million total received. In recent years, the rapid addition of excellent faculty has enhanced the cadre of senior scholars and scientists with whom graduate students work.

## ORGANIZATION

The College of Liberal Arts and Sciences, which offers graduate study in the humanities, the mathematical and the natural sciences, and the social sciences, brings together highly qualified faculty and advanced students to share learning and discovery in 20 academic units and in a number of interdisciplinary centers. In lectures and seminars, in laboratories and libraries, in creative endeavors, field experiences, and research projects, faculty and students cooperate in preserving, evaluating, and expanding knowledge.

## GRADUATE PROGRAMS

In cooperation with the Graduate College, faculty affiliated with various departments and units within the College of Liberal Arts and Sciences offer three research-oriented degrees: the Master of Arts, the Master of Science, and the Doctor of Philosophy. In addition, three professional degrees are offered: the Master of Natural Science, the Master of Teaching English as a Second Language, and the Master of Fine Arts, an interdisciplinary creative writing program offered in cooperation with the College of Fine Arts. The interdisciplinary master's program in Humanities draws faculty expertise from

the Departments of Anthropology, Art, Dance, English, History, Languages and Literatures, Philosophy, and Religious Studies. Interdisciplinary programs leading to the Doctor of Philosophy degree are offered in Exercise Science, Molecular and Cellular Biology, Science and Engineering of Materials, and Speech and Hearing Science. Many departments within the college participate in the Master of Education, Doctor of Education, and Doctor of Philosophy degrees offered and administered through the College of Education. Members of the Department of Mathematics faculty participate in the interdisciplinary Master of Science degree in Statistics (with College of Business faculty); members of the Departments of Botany, Chemistry and Biochemistry, Microbiology, and Zoology participate in the interdisciplinary M.S. and Ph.D. in Molecular and Cellular Biology; members of the faculty in the Departments of Anthropology, History, Languages and Literatures, Philosophy, Political Science, Psychology, Religious Studies, and Sociology participate in the interdisciplinary Ph.D. in Justice Studies program; members of the Departments of Geography, Political Science, and Sociology faculty contribute to the interdisciplinary Doctor of Public Administration program; and members of the Departments of English, Family Resources and Human Development, Sociology, and Speech and Hearing Science faculty participate in the interdisciplinary Ph.D. in Communication degree.

One of the unique features of an interdisciplinary program is that it draws upon faculty research and teaching interests from a number of academic units; thus a student may tailor a course of study to fit individual needs and goals.

## Admission Requirements

Applicants to graduate programs within the College of Liberal Arts and Sciences must meet general requirements for admission established by the Graduate College (see pages 44-46). In addition, academic units usually require submission of test scores (such as Graduate Record Examination and Miller Analogies Test), letters of recommendation, and a statement of purpose. Consult the individual degree programs for particular requirements. International applicants must also



### College of Liberal Arts and Sciences Graduate Degrees, Majors, and Concentrations

Major	Degree	Administered by
Anthropology Concentrations: archaeology, bioarchaeology, linguistics, medical anthropology, museum studies, physical anthropology, social-cultural anthropology	M.A.	Department of Anthropology
Anthropology Concentrations: archaeology, physical anthropology, social-cultural anthropology	Ph.D.	Department of Anthropology
Botany Concentrations: ecology, <sup>1</sup> photosynthesis <sup>1</sup>	M.S., Ph.D.	Department of Botany
Biological Sciences	M.S.	Departments of Botany, Microbiology, and Zoology
Chemistry Concentrations: analytical chemistry, biochemistry, geochemistry, inorganic chemistry, organic chemistry, physical chemistry, solid state chemistry	M.S., Ph.D.	Department of Chemistry and Biochemistry
Communication Disorders	M.S.	Department of Speech and Hearing Science
Creative Writing	M.F.A. <sup>2</sup>	Creative Writing Committee
English Concentrations: comparative literature, English linguistics, literature and language, rhetoric and composition	M.A.	Department of English
English	Ph.D.	Department of English
Exercise Science Concentrations: biomechanics, motor behavior/sport psychology, physiology of exercise	Ph.D. <sup>2</sup>	Committee on Exercise Science
Exercise Science/Physical Education	M.S.	Department of Exercise Science and Physical Education
Family Science Concentration: marriage and family therapy <sup>1</sup>	Ph.D.	Department of Family Resources and Human Development
Family Resources and Human Development Concentrations: family studies, general family resources and human development	M.S.	Department of Family Resources and Human Development
French Concentrations: comparative literature, language and culture, literature	M.A.	Department of Languages and Literatures
German Concentrations: comparative literature, language and culture, literature	M.A.	Department of Languages and Literatures
Geography	M.A., Ph.D.	Department of Geography
Geology	M.S., Ph.D.	Department of Geology
History Concentrations: Asian history, British history, European history, Latin American history, public history, U.S. history, U.S. Western history	M.A.	Department of History
History Concentrations: Asian history, British history, European history, Latin American history, U.S. history	Ph.D.	Department of History
Humanities	M.A.	Graduate Committee on Humanities
Mathematics	M.A., Ph.D.	Department of Mathematics
Microbiology	M.S., Ph.D.	Department of Microbiology
Molecular and Cellular Biology	M.S., Ph.D.	Interdisciplinary Committee on Molecular and Cellular Biology

<sup>1</sup> This is a formalized concentration; other areas of study are available.

<sup>2</sup> This program is administered by the Graduate College. See the "Graduate College" section of this catalog.

Major	Degree	Administered by
Natural Science Concentrations: Botany Chemistry Geology Mathematics Microbiology Physics Zoology	M.N.S.	Department of Botany Department of Chemistry and Biochemistry Department of Geology Department of Mathematics Department of Microbiology Department of Physics and Astronomy Department of Zoology
Philosophy	M.A.	Department of Philosophy
Physics	M.S., Ph.D.	Department of Physics and Astronomy
Political Science Concentrations: American politics, comparative politics, international relations, political theory	M.A., Ph.D.	Department of Political Science
Psychology Concentrations: behavioral neuroscience, clinical psychology, cognitive/behavioral systems, developmental psychology, environmental psychology, social psychology	Ph.D.	Department of Psychology
Religious Studies	M.A.	Department of Religious Studies
Science and Engineering of Materials	Ph.D. <sup>2</sup>	Committee on the Science and Engineering of Materials Department of Languages and Literatures
Spanish Concentrations: comparative literature, language and culture, linguistics, literature	M.A.	Department of Languages and Literatures
Spanish	Ph.D.	Department of Languages and Literatures
Speech and Hearing Science Concentrations: developmental neurolinguistic disorders, neuroauditory processes, neurogerontologic communication	Ph.D. <sup>2</sup>	Department of Languages and Literatures Committee on Speech and Hearing Science
Sociology	M.A., Ph.D.	Department of Sociology
Statistics	M.S. <sup>2</sup>	Committee on Statistics
Teaching English as a Second Language	M.TESL	Department of English
Zoology Concentration: ecology <sup>1</sup>	M.S., Ph.D.	Department of Zoology

<sup>1</sup> This is a formalized concentration; other areas of study are available.

<sup>2</sup> This program is administered by the Graduate College. See the "Graduate College" section of this catalog.

submit TOEFL scores and are advised to submit application materials well in advance of deadlines.

### Special Programs

The college is characterized by the development of program thrusts in new areas, many of which are interdisciplinary in content. There is special strength, for example, in planetary geology, as well as in more traditional geological subdisciplines; in geochemistry, as well as in biochemistry and solid state and materials science; and in magnetic properties of materials, as well as nuclear physics and surface physics. In psychology, traditional social, developmental, and clinical research is augmented by a new interest in preventive mental health. Flexibility and forward-looking program develop-

ment pervade all college programs. The interdisciplinary degree in Exercise Science is internationally recognized. The graduate Creative Writing program brings talented students together with distinguished poets, playwrights, and novelists. The Teaching English as a Second Language program attracts students from all over the world.

The Southwest environment has favorably affected program development in a number of ways, ranging from research activities in water resources, archaeology, and fluvial geomorphology to distinguished programs in Hispanic language, literature, culture, and history.

In addition to traditional and innovative programs within departments, there are multidisciplinary research centers

within the college, bringing together faculty from various departments. These include the Centers for Asian Studies, Exercise and Sport Research, Hispanic Research, Latin American Studies, Medieval and Renaissance Studies, Meteorite Studies, and Solid State Science. Centers sponsor colloquia, workshops, conferences, and visiting scholars. They administer international exchange programs, enhance library holdings and other collections, publish papers and monographs, maintain archives, and employ graduate research assistants.

### Facilities

Strong and nationally funded research facilities, like the Facility for High Resolution Electron Microscopy

and the Planetary Geology Laboratory have attained national and international prominence. Important research collections include one of the largest meteorite collections in the world, the holdings of the anthropology archives and museum, the space photography collection, the Herbarium, and extensive library holdings, including important manuscript collections in late 19th-Century British literature and historical documents of the Southwest.

Graduate students in all disciplines have access to outstanding computer facilities. Mainframe computing for research is provided free of charge. There are substantial microcomputer facilities within individual academic units as well as clusters serving the hu-

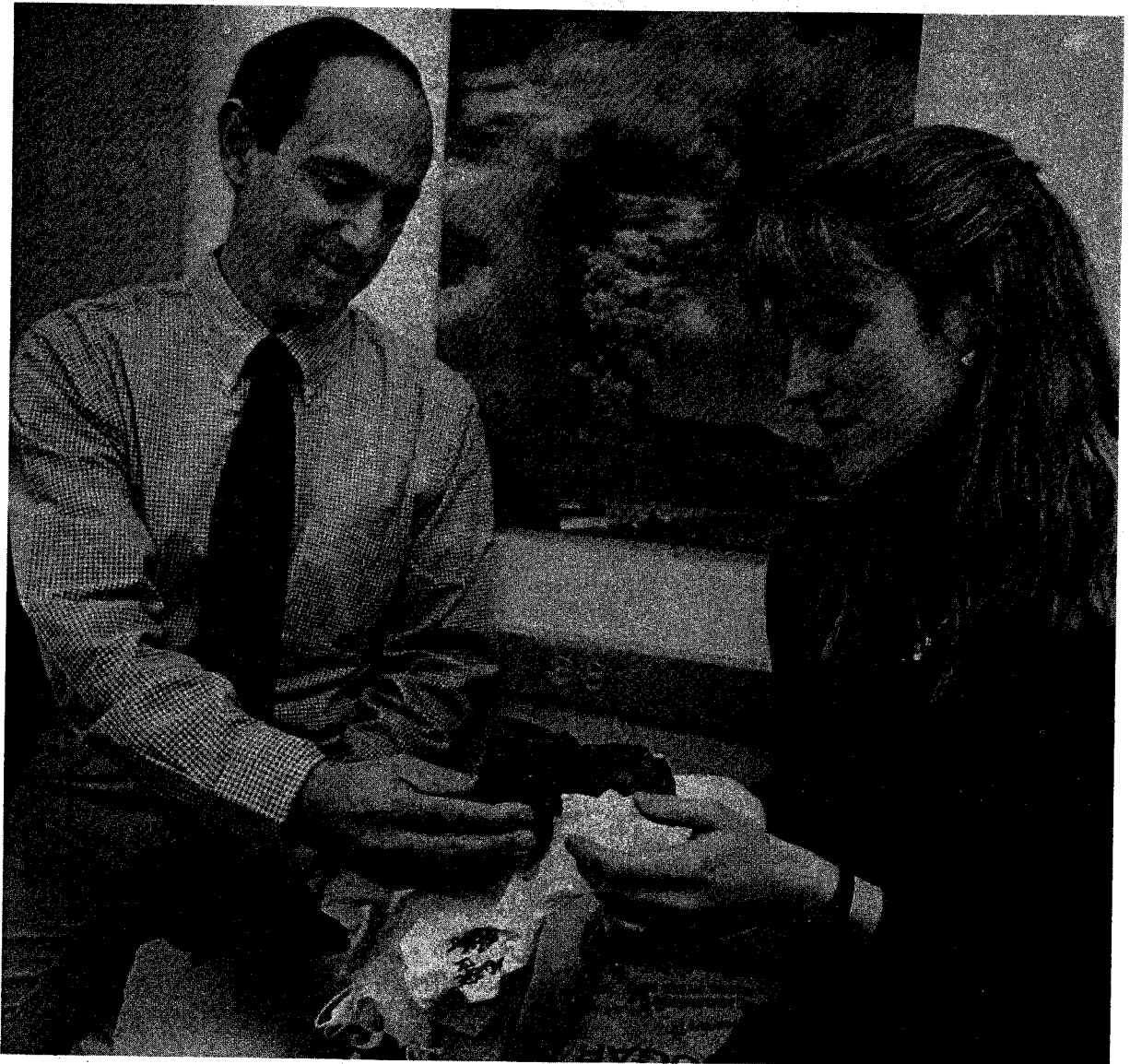
manities and social sciences. Minicomputer capabilities are found in various academic units. Also refer to the description of computing facilities and services on page 28.

#### **Financial Assistance and Support**

In addition to the usual support for graduate students in the form of stipends and teaching and research assistantships, there is a vigorous funding program to support graduate student research. Not only do graduate students obtain grants from external sources to support their research projects, they also receive support from the college and university to present papers at professional meetings.

#### **Advising**

Faculty advisors in each academic unit provide guidance to graduate students from admission through completion of the program. Consult the director of graduate studies in the appropriate academic unit. Graduate students must follow an approved program of study filed with the Graduate College. The calendar for enrollment activities is published in the schedule of classes for each semester. Teaching and research assistants, who are required to be enrolled in at least six hours, as well as those enrolled for individual project, thesis and dissertation credit, are subject to the same calendar deadlines as students enrolled in regularly scheduled classes.



# College of Nursing

Barbara A. Durand, Ed.D.  
Dean

## PURPOSE

The faculty of the College of Nursing acknowledges its responsibility to health care consumers for the preparation of individuals who will provide nursing care of professional quality through teaching, research, and service. The College of Nursing provides educational programs that prepare professional nurses to meet the nursing care needs of individuals, groups, and communities. To achieve this purpose, the college offers the baccalaureate, the graduate, and the continuing education programs. Within the context of a liberal education, the degree programs prepare professional nurses who

1. understand and respond to changing health and social needs and services;
2. influence nursing practice and health care through leadership and participation in professional and sociopolitical activities; and
3. utilize scientific knowledge to advance professional nursing practice.

The continuing education program provides opportunities for nurses to improve and expand their nursing practice, to meet the health care needs of various populations, and to further their own professional development.

## ORGANIZATION

The College of Nursing recognizes the three major missions of the university, i.e., teaching, research, and service. The responsibility of the associate dean for graduate programs and research is two-fold: to oversee the master's program, including the progression of students through the program; and to work with faculty and students to facilitate research activities, such as research development. The associate dean for undergraduate programs and extended education is responsible for undergraduate degree programs, progression of students through the program, and extended and continuing education.

The faculty are grouped under four divisions of major clinical areas within nursing: adult health/medical-surgical nursing; community health nursing; psychosocial nursing systems; parent-child nursing. Each division has a chair, and each faculty member belongs to a division.

## GRADUATE PROGRAM

The graduate curriculum leads to the Master of Science degree with a major in Nursing. The graduate program provides an academic environment that fosters scholarship, critical thinking, and creativity, while preparing nurses for leadership as nurse specialists and beginning researchers. The program offers advanced-level courses that can be used as a base for doctoral study and for functional role development in teaching, management, or practice as a nurse clinician/practitioner.

Students may select one area of concentration from the following offerings:

Adult health nursing  
Community health nursing  
Community mental health/  
psychiatric nursing  
Nursing administration  
Parent-child nursing with the options of:  
childbearing family  
nursing of children

The curriculum also provides elective study in teaching, management, and practitioner roles, including adult, child, family, psychiatric, and women's health nurse practitioner roles.

A student may concurrently pursue the Master of Science degree in Nursing (nursing administration concentration) and the Master of Health Services Administration (College of Business).

## SPECIAL PROGRAMS AND SERVICES

### Continuing Education Program.

This program presents a variety of non-credit offerings on the main campus, west campus, and off-campus locations. These offerings are designed to assist practicing professional nurses in maintaining and enhancing their competencies, broadening their scientific knowledge base, and further developing their skills in the changing health care environment. Workshops, conferences, institutes, short evening courses, and special programs are offered at times convenient to the working professional. Some offerings are multidisciplinary and are also open to individuals in professions outside of nursing.

**Student Services.** The Student Services Office in the College of Nursing provides academic advisement, general advisement, and referral to university resources. Prospective students with

academic questions relating to the College of Nursing should contact the College of Nursing Student Services Office.

**Scholarships and Financial Assistance.** Information about scholarships and loan funds for nursing students may be obtained from the Student Financial Assistance Office, College of Nursing Office of Student Services, or the associate dean for academic programs.

**College Council of Nursing Students.** The council is a member of ASASU (Associate Students of Arizona State University) and serves as the governing body of all student activities in the college. The Nursing College Council provides for communication, cooperation, and understanding among undergraduate students, graduate students, and faculty, and represents the college in university and nonuniversity affairs.

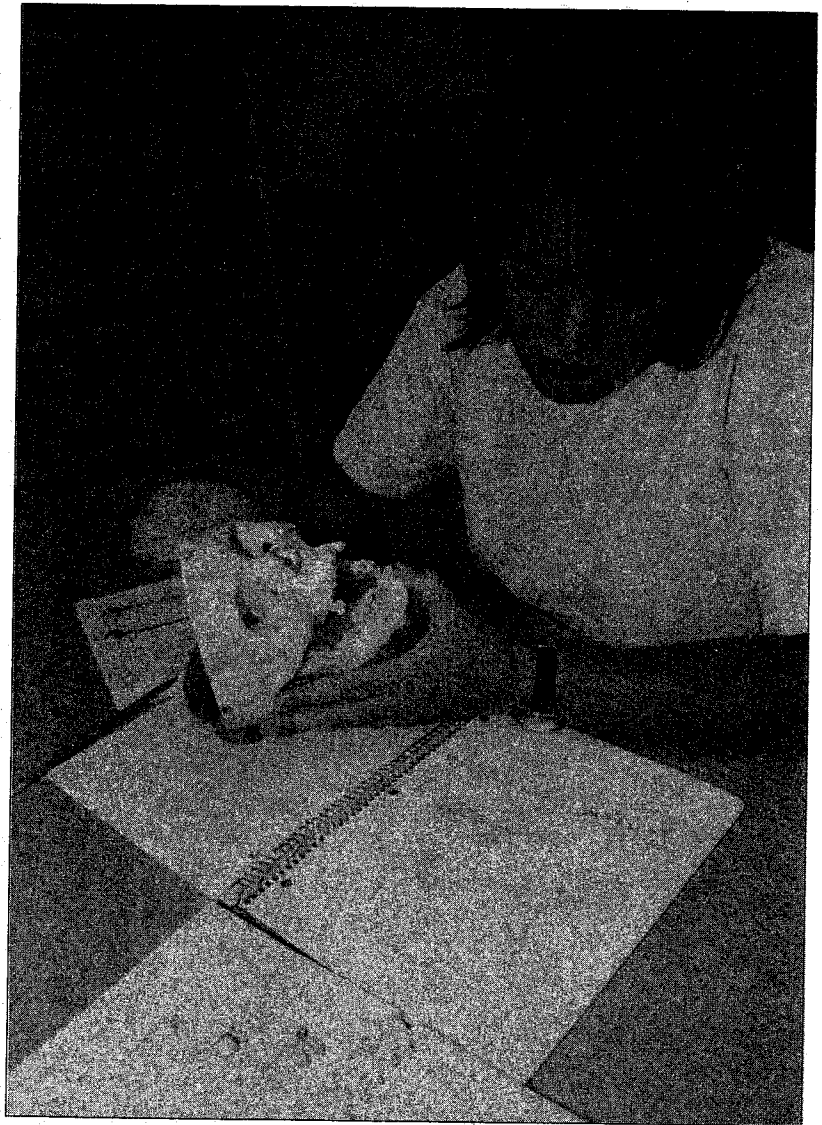
**Graduate Nurse Organization.** The Graduate Nurse Organization (GNO) is the coordinating body for nursing students in the graduate program. It provides programs, information, and orientation services for graduate students and complements their academic experiences.

**Sigma Theta Tau.** Beta Upsilon Chapter of Sigma Theta Tau was chartered at the ASU College of Nursing in 1976. Membership in Sigma Theta Tau is an honor conferred on students in baccalaureate and graduate programs who have demonstrated outstanding academic and professional achievement.

### COLLEGE FACILITIES

Learning experiences with patients and their families are provided under the supervision of qualified faculty with the cooperation of a variety of federal, state, county, and private health agencies. The College of Nursing has contracts with more than 240 agencies in the Phoenix metropolitan area and also operates a unique nurse-managed clinic in a community setting.

**Computer Facilities.** Computers are available for student use in the Learning Resource Center of the college. Also refer to the description of computing facilities and services on page 28.



### ADVISING

Students are advised by the Student Services Office before admission to the graduate program. Upon admission, each student is assigned a faculty advisor within the area of concentration. Questions may also be directed to the associate dean for graduate programs and research.

### ACCREDITATION

The baccalaureate and master's programs of the College of Nursing are accredited by the Arizona State Board of

Nursing and the National League for Nursing. The continuing education program is accredited by the Western Regional Accrediting Committee of the American Nurses' Association as a provider of Continuing Education for Nursing. The college is a member of the Council of Member Agencies for the Baccalaureate and Higher Degree Programs of the National League for Nursing, the Western Institute of Nursing, and the American Association of Colleges of Nurses.

# College of Public Programs

Anne L. Schneider, Ph.D.  
Dean

## PURPOSE

The College of Public Programs offers a wide range of course work, in both on-campus and off-campus settings, to full-time and part-time students. Through the Graduate College, faculty offer various programs leading to graduate degrees. Each academic unit of the college not only assumes responsibilities in preparing its own majors, but also provides a variety of service courses for the rest of the university. The college is committed to excellence in teaching, research, and public service. College units work closely with numerous public and private agencies at the national, state, and local levels.

## ORGANIZATION

The College of Public Programs consists of five academic units: the Department of Communication, the Walter Cronkite School of Journalism and Telecommunication, the Department of Recreation Management and Tourism, the School of Public Affairs, and the School of Justice Studies. Each academic unit is administered by a chair or director.

**Department of Communication.** The faculty in the Department of Communication advance the understanding of message-related human behavior in part through the Master of Arts program with a major in Communication. The focus of the M.A. degree program is research in one of five areas: intercultural communication, interpersonal communication, performance studies, organizational communication, and rhetoric/public address.

Faculty in the Department of Communication participate in offering the interdisciplinary Ph.D. in Communication degree program. The program is designed to prepare scholars for research-oriented careers in universities and in the public and private sectors and offers areas of concentration in communicative development, intercultural communication, and organizational communication.

**Walter Cronkite School of Journalism and Telecommunication.** The faculty in the Walter Cronkite School of Journalism and Telecommunication offer the Master of Mass Communication degree (M.M.C.). The M.M.C. is designed to accommodate students who

wish to study in the fields of journalism, broadcasting, or public relations. The program provides broader training for professionals employed in the media and for those who wish to enter media fields.

**Department of Recreation Management and Tourism.** The faculty in the Department of Recreation Management and Tourism offer a graduate program leading to the Master of Science degree with a major in Recreation. The degree is designed to prepare students to analyze critical topics and issues pertinent to the field of leisure and recreation. The program is structured to provide students with the opportunity to build a multidisciplinary knowledge of the interrelationship between recreation/leisure and contemporary cultural, social, geographical, political, and economic conditions. Four general areas of concentration exist: outdoor recreation, recreation administration, social/psychological aspects of leisure, and tourism and commercial recreation.

**School of Public Affairs.** The faculty in the School of Public Affairs offer a professional graduate program leading to the Master of Public Administration degree. Courses are offered in the evenings to fit the scheduling needs of working students. The diversity of the school's program offerings accommodates both preservice students and mid-career public administrators. State and local government internships are available to those with no previous public sector experience. Students work with faculty on the school's active research and publications program, including public policy reports for the Arizona Town Hall and other community service projects for state and local governments in Arizona.

The school also administers the interdisciplinary Doctor of Public Administration program under the auspices of the Graduate College. Faculty of the School of Public Affairs participate in offering this degree program.

**The School of Justice Studies.** The School of Justice Studies provides an interdisciplinary social science perspective for studying law and justice, crime, and social deviance. The Master of Science curriculum focuses on criminal, juvenile, civil, and administrative regulations, and the behavior these regulations are designed to influence.



on dispute resolution, and on issues of social and economic justice. Its faculty have academic backgrounds in anthropology, criminology, history, law, public administration, psychology, political science, and sociology.

Faculty in the School of Justice Studies also participate in offering the interdisciplinary programs leading to the Doctor of Philosophy degree with a major in Justice Studies and the Doctor of Public Administration degree. The school administers the interdisciplinary Ph.D. program in Justice Studies under the auspices of the Graduate College.

### GRADUATE PROGRAMS

Graduate degree programs as shown in the "College of Public Programs Graduate Degrees, Majors, and Concentrations" table are offered by the faculty within the College of Public Programs.

One of the unique features of an interdisciplinary program is that, because it uses faculty research and teaching interests from a number of academic units, a student may tailor a course of study to fit individual needs and goals.

### ADMISSION REQUIREMENTS

Admission requirements of all advanced degree programs within the college are connected with those required by the Graduate College. In addition, individual units may require further supporting materials such as letters of recommendation, scores on the Graduate Record Examination or the Miller Analogies Test, statements of educational and career goals, and writing samples. Applicants should refer to requirements specified by the academic unit under each degree program in this catalog.

### SPECIAL PROGRAMS

**Concurrent M.A. in Anthropology and M.S. in Justice Studies.** Graduate students in the School of Justice Studies and the Department of Anthropology may pursue a concurrent Master of Science degree in Justice Studies and Master of Arts degree in Anthropology with a concentration in social-cultural anthropology. The purpose of the program is to prepare individuals with combined, complementary knowledge and skills

for basic and applied research, and administrative and educational activities related to both disciplines. Students must be admitted separately to each program, following the guidelines established by the Graduate College, Department of Anthropology, and School of Justice Studies. Additional information on concurrent degrees may be obtained from the respective academic units.

Other research and service programs within the college include the Center for Urban Studies, the Morrison Institute for Public Policy, the Office of Hazard Studies, the Media Research Program, and the Advanced Public Executive Program, which provides training leading to certification as a public manager.

**Ph.D. in Justice Studies/J.D.** The purpose of the Ph.D. in Justice Studies/J.D. is to provide a rigorous education for highly qualified students interested in pursuing academic careers in law, law and the social sciences, or law and philosophy.

### College of Public Programs Graduate Degrees, Majors, and Concentrations

Major	Degree	Administered by
Communication	M.A.	Department of Communication
Communication	Ph.D.	Committee of Faculty
Concentrations: communicative development, intercultural communication, organizational communication		
Justice Studies	M.S. <sup>1</sup>	School of Justice Studies
Justice Studies	Ph.D. <sup>2</sup>	Committee on Law and Social Sciences
Concentrations: criminal and juvenile justice; dispute resolution; law, justice, and minority populations; law, policy, and evaluation; women, law, and justice		
Mass Communication	M.M.C.	Walter Cronkite School of Journalism and Telecommunication
Public Administration	M.P.A.	School of Public Affairs
Concentrations: public information management, public management, public policy analysis and evaluation, urban management and planning		
Public Administration	D.P.A. <sup>2</sup>	Committee on Public Administration
Recreation	M.S.	Department of Recreation Management and Tourism
Concentrations: outdoor recreation, recreation administration, social/psychological aspects of leisure, tourism and commercial recreation		

<sup>1</sup> Graduate students in the School of Justice Studies and the Department of Anthropology are able to pursue a concurrent M.S. degree in Justice Studies and M.A. degree in Anthropology.

<sup>2</sup> This program is administered by the Graduate College. See the "Graduate College" section of this catalog.



### COLLEGE FACILITIES

Microcomputer training and remote site terminal access are available to students in all programs within the College of Public Programs. Academic units provide facilities, equipment, and support for student research, including laboratory space, computer terminals connected to the mainframe computer, and personal computers for individual student use. Also refer to the description of computing facilities and services on page 28.

Broadcast laboratories within the School of Journalism and Telecommunication have the latest in-studio and ENG-EFP equipment, and provide fa-

cilities for performance, writing, and the other necessary broadcast skills.

### ADVISING

Advisement of graduate students is normally handled by senior faculty members within the academic unit under the direction of a graduate faculty or committee. Once admitted, students are typically assigned a temporary faculty advisor in the potential areas of specialization who will assist in planning a course of study. For those degree programs requiring the completion of a thesis, a chair and thesis supervisory committee are selected by the director of graduate studies, in consulta-

tion with the student, and appointed by the dean of the Graduate College.

### ACCREDITATION

The Walter Cronkite School of Journalism and Telecommunication is accredited by the Accrediting Council on Education in Journalism and Mass Communication (ACEJMC). The Master of Public Administration program is accredited by the National Association of Schools of Public Affairs and Administration. The School of Justice Studies is a member of the American Association of Doctoral Programs in Criminal Justice and Criminology.



# School of Social Work

**Emilia E. Martinez-Brawley, Ed.D.**

*Dean*

## MISSION AND PURPOSE

The ASU School of Social Work has designed a graduate curriculum that prepares students for an empirical approach to social work practice. Research and practice in service effectiveness represent a challenging agenda for future scholarly inquiry and provide the basis of graduate training for researchers and practitioners.

As evidenced by its activities in teaching, research, and service, the school addresses the kinds of social problems that affect underserved populations. However, while theoretical frameworks and practice models continue to be stressed, a major new frame of reference is the establishment of an empirical context for practice. The goal is to practice social work on the basis of effectiveness. When subjected to scholarly inquiry, critique, and analysis, empirical data can provide answers to some of the questions that social scientists, practitioners, and policy makers have been asking for generations.

Empirically based social work practice among underserved populations presents a sizable challenge but holds the potential for filling a critical need. The challenge is the development of a valid and reliable database for use in measuring effectiveness of services provided to all types of clients with many different needs. The ultimate benefit of such a system is the concentration of resources where they are most effective. Many billions of federal, state, local, and private dollars are allocated every year to social service programs. Are these dollars contributing toward the abatement of social problems in this country? For the most part, no answers exist, but with the development of an empirically based approach to social work practice, the groundwork is laid that ultimately will provide answers.

## ORGANIZATION AND GRADUATE PROGRAMS

Through the Graduate College, faculty offer two graduate programs in the field of social work: the Master of Social Work degree and the Doctor of Philosophy with a major in Social Work. As one of the smaller colleges on campus, the School of Social Work has an enrollment of about 375 undergraduate and 550 graduate students in programs offered by 30 faculty members. The

size of the college encourages interaction between faculty and students and emphasizes individual attention.

The master's degree program has two options in the second year, Direct Practice (DP) and Planning, Administration and Community Practice (PAC). In considering the PAC option, students need to be aware that because of the space availability, preference will be given for significant previous experience. The M.S.W. program offers foundation-level courses in Tucson as part of its Southern Arizona component.

The number of semester hours required to complete the M.S.W. degree ranges from 40 to 60, with 60 hours representing the standard program.

The Doctor of Philosophy degree program requires at least 36 semester hours of course work beyond the master's degree and 84 semester hours beyond the baccalaureate degree. The program of study includes: micro/macro theories and perspectives on critical issues in social work and social welfare; quantitative/qualitative research methodologies; and professoriate training and mentoring in research, teaching, and service.

## ADMISSION REQUIREMENTS

In addition to the general requirements of the Graduate College, the following admission criteria have been established for the Master of Social Work program:

1. a 3.00 GPA in the last two years of bachelor's degree work (under exceptional circumstances provisional admission may be granted with less than a 3.00);
2. demonstrated motivation to pursue professional social work education, to work with populations served by social workers, and to work with special populations of the Southwest;
3. evidence of successful work experiences in human services; and
4. Graduate Record Examination or Miller Analogies Test scores, which indicate potential for doing graduate work.

All students are required to successfully complete a course in human biology before enrolling in the graduate program. Additionally, all students

must have successfully completed a course in statistics either prior to admission or by the end of the first year in the Master of Social Work program.

The following criteria for admission have been established for the Doctor of Philosophy degree program:

1. Graduate Record Examination scores, which indicate potential for doing doctoral-level work;
2. outstanding academic performance at undergraduate and graduate levels of study;
3. evidence of leadership and competent work experience in human services;
4. demonstrated ability to write for publication;
5. motivation to contribute to the social work body of knowledge through research, publication, practice, and teaching; and
6. strong interest in focusing research and scholarly inquiry on social and personal problems faced by underserved populations.

#### Financial Assistance

Financial assistance is severely limited. It is important that students have a sound financial plan for covering expenses while pursuing the degree program. Financial awards are made only when an applicant has been approved for admission.

#### SPECIAL PROGRAMS

Because of the size of the M.S.W. and Ph.D. degree programs, the school has chosen to tailor programs to individual interests rather than to structure formal specializations. At the master's level, all students select either direct practice (DP) or planning, administration, and community practice (PAC). In addition, through the advising system, students have the opportunity to identify course work and field education experiences that contribute toward the building of a specialized expertise. By combining elective courses, field experiences, research, and specialized study, students may focus on one or more of several fields of service, such as health, mental health, aging, employment and economic support, or other areas. Students with special interests in African-American studies, Hispanic studies, Native American studies, or women's studies may also tailor their programs to address these interests. These interests may sometimes be pursued in courses offered by other academic units.

#### Certificate in Gerontology

An interdisciplinary Certificate in Gerontology (see page 206) is available to students who are interested in this area of specialization. The program is offered by the Adult Development and Aging Program.

#### COLLEGE FACILITIES

The School of Social Work is located in West Hall in the center of the main campus, directly opposite Hayden Library. All administrative and faculty offices are located in West Hall. Videotaping, playback, and critique of student interviewing performances are regularly incorporated into the teaching of direct practice skills. Extensive use is made of personal computers in training students to monitor client performance and manage information. Also refer to the description of computing facilities and services on page 28.

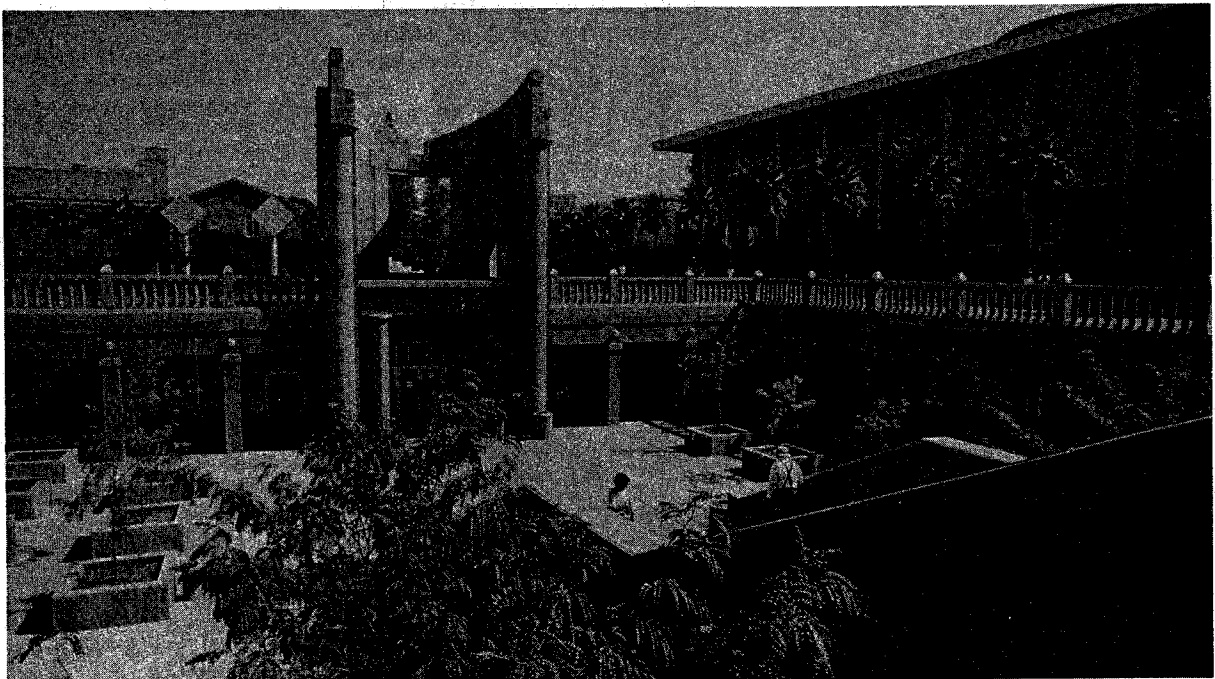
#### ADVISING

Student Support Services handles all early inquiries about admission, scheduling, planning a course of study, and financial assistance. Once a student has been admitted to the program, a faculty advisor is assigned. The primary function of the faculty advisor is to help students select electives, to explore career opportunities, and to counsel students should academic difficulties arise.

Social work students must meet with an academic advisor before registering for any courses.

#### ACCREDITATION

The School of Social Work is fully accredited by the Council on Social Work Education.



# Graduate Programs and Descriptions of Courses

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## Accountancy

Philip M. Reckers  
*Director*  
(BA 223) 602/965-3631

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### PROFESSORS

BOATSMAN, BOYD, FLAHERTY,  
JOHNSON, KAPLAN, MCKENZIE,  
PANY, RECKERS, RENEAU,  
SCHULTZ, SHRIVER,  
R. SMITH, TIDWELL,  
WILKINSON, WYNDELTS

### ASSOCIATE PROFESSORS

CHRISTIAN, GOLEN, KNEER,  
MOECKEL, O'DELL, PEI, REGIER

### ASSISTANT PROFESSORS

GRASSO, GUPTA, HWANG,  
K. SMITH, J. SMITH-DAVID

### SENIOR LECTURERS

JONES, MAGILL

### LECTURER

TORMEY

The faculty in the School of Accountancy, College of Business, offer a specialized professional program leading to the Master of Accountancy degree. The degree provides an opportunity for students to develop specialized knowledge in accounting information systems management (i.e., management advisory services, computer systems design and security, and EDP audit). In addition, a program leading to the Master of Taxation degree is offered to provide students with the specialized knowledge required of a tax professional. The student, in consultation with the faculty advisor, must prepare a program of study composed of common required courses, required courses for a particular area of study, and elective courses from those available which meet the candidate's specific needs. For information concerning these degrees, refer to pages 55 and 72. The faculty also participate in offering the programs leading to the Master of Business Administration and Ph.D. in Business Administration degrees. For information concerning these degrees, refer to pages 58-59 and 137-142.

## Research Activity

The research interests of the School of Accountancy faculty and graduate students cover most areas of accounting, broadly defined. The following list of project areas is intended to be illustrative—but not all-inclusive—of the work being done: processing of information by decision makers at the individual and group level, behavior decision theory, information systems, modeling of internal control systems, database management systems architecture, design of computer networks, mini-computer security, analytical reviews in auditing, managerial influence on internal auditors' professional judgments, heuristics for audit sampling, adequacy of financial statement disclosures, effect of segment reporting on prediction of earnings and cash flow, financial reporting of changing prices, accounting policy formulation, real asset risk determinants of systematic risk, reporting for accounting changes, social and psychological influences related to tax, audit and general accounting issues, tax planning models, partnership taxation, tax policy and practice, microeconomic aspects of tax law changes, and behavioral research in taxation.

## ACCOUNTANCY

**ACC 502 Financial Accounting.** (3) F, S  
Financial accounting concepts and procedures for external reporting. Prerequisites: calculus; computer literacy; graduate degree program student.

**503 Managerial Accounting.** (3) F, S  
Managerial accounting concepts and procedures for internal reporting. Prerequisites: ACC 502; ECN 502; QBA 502.

**511 Taxes and Business Strategy.** (3) F  
Economic implications of selected management decisions involving application of federal income tax laws. Recognition of tax hazards and tax savings. Prerequisite: ACC 502 or equivalent.

**515 Professional Practice Seminar.** (3) F, S  
History, structure, environment, regulation, and emerging issues of the accounting profession.

**521 Tax Research.** (3) F, S  
Tax research source materials and techniques. Application to business and investment decisions. Prerequisite: ACC 430.

**533 EDP Auditing.** (3) S  
Analysis of EDP audit techniques and evaluation methods. Emphasis on current topics such as distributed processing and microcomputers. Prerequisite: ACC 450.

**541 Managerial Accounting Controls.** (3) F  
Impact of internal reporting systems on organizational decisions and human behavior. Design, implementation, and evaluation problems. Prerequisite: ACC 350 or 503.

**557 Microcomputers in Accounting Information Systems.** (3) A  
Development of conceptual understanding of microcomputer technology and business applications from strategic planning and managerial control perspectives. Prerequisite: ACC 330.

**567 Financial Models in Accounting Systems.** (3) S  
Development and application of financial models by accountants. Analysis of decision support systems as financial modeling environments. Prerequisite: ACC 330.

**571 Taxation of Corporations and Shareholders.** (3) F, S  
Tax aspects of the formation, operation, reorganization, and liquidation of corporations and the impact on shareholders. Prerequisite: ACC 430.

**573 Taxation of Partners and Partnerships.** (3) A  
Tax aspects of the definition, formation, operation, liquidation, and termination of a partnership. Tax planning is emphasized. Prerequisite: ACC 430.

**575 Estate and Gift Taxation.** (3) A  
Tax treatment of wealth transfers at death and during life time, with emphasis on tax planning. Prerequisite: ACC 430.

**577 Taxation of Real Estate Transactions.** (3) A  
Income tax aspects of acquisition, operation, and disposal of real estate; syndications, installment sales, exchanges, dealer-investor issues, alternative financing, and planning. Prerequisite: ACC 521 or instructor approval.

**582 Auditing Theory and Practice.** (3) N  
Function and responsibility of the auditor in modern society. Advanced topics in auditing theory and methods. Contemporary issues in auditing. Prerequisite: ACC 450.

**586 Problems in Financial Accounting.** (3) F  
Accounting theory and practice for external reporting. Prerequisite: ACC 503.

**587 Computerized Accounting Systems.** (3) F  
Design and evaluation of computer-based accounting information system. Development of computer-based financial models for planning and control. Prerequisite: ACC 330.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Aerospace Engineering

Don L. Boyer  
Chair  
(EC G346) 602/965-3291

### PROFESSORS

BICKFORD, BOYER, HIRLEMAN, LIU,  
REED, SARIC, SO, WALLACE

**ASSOCIATE PROFESSORS**  
CHATTOPADHYAY, KOURIS,  
LAANANEN, MIGNOLET,  
RANKIN, WELLS

**ASSISTANT PROFESSORS**  
LEE, PUIG-SUARI

**PROFESSOR EMERITUS**  
CHEN

The faculty in the Department of Mechanical and Aerospace Engineering offer graduate programs leading to the degrees of Master of Science, Master of Science in Engineering, and Doctor of Philosophy with a major in Aerospace Engineering. A number of areas of study may be pursued, including aerodynamics, design, dynamics and control, propulsion, and structures. The faculty also offer graduate degree programs in Mechanical Engineering and Engineering Science. All of the department's graduate programs stress a

sound foundation leading to a specialized area of study.

**Graduate Record Examination.** All applicants are required to take the Graduate Record Examination; the subject test in Engineering is highly recommended but not required.

### MASTER'S DEGREES

For information on the Master of Science degree, see pages 53-55. For information on the Master of Science in Engineering degree, see pages 69-70.

### DOCTOR OF PHILOSOPHY DEGREE

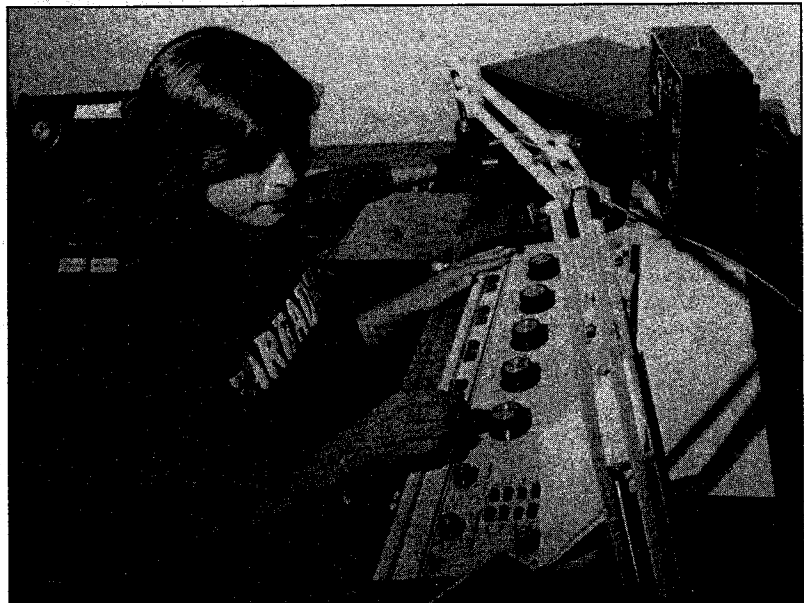
The Doctor of Philosophy degree is conferred upon evidence of excellence in research leading to a scholarly dissertation that is an original contribution to knowledge in the field of aerospace engineering. See pages 76-77 for general requirements.

**Program of Study.** The program of study must be established no later than the first semester after successfully completing the qualifying examination.

**Qualifying Examinations.** The purposes of the qualifying criteria are to assess if the student is prepared to continue in the doctoral program and to detect deficiencies in the student's background that can be corrected by appropriate course work and individual

## Adult Development and Aging

See "Gerontology," page 206.





study. Within the first year of graduate studies at ASU, graduate students pursuing a Ph.D. in Aerospace Engineering or Engineering Science must complete three (3) 500-level core courses in the major area of interest, and one (1) 500-level mathematics course; an average GPA of 3.25 or above in this course work is required. Specific qualifying course requirements for each major area are available from the department.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Written and oral comprehensive examinations are required. The examinations are administered by the program committee.

**Dissertation Requirements.** A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required.

**Final Examinations.** A final oral examination in defense of the dissertation is required.

#### Research Activity

The department has established a wide variety of theoretical and experimental research programs in Aerospace Engineering to prepare graduate students for careers with industry, universities, and government agencies. The faculty are organized into groups pursuing research topics directly related to general improvement of knowledge in engineering fields or to the application of engineering principles to problems of high national priority.

Some recent and current examples of faculty and student research projects include studies in: acoustic fatigue; aeroelasticity; aerospace vehicle dynamics, guidance, and control; aerospace structures; aerospace vehicle design and performance optimization; aircraft crashworthiness; applied computational methods; atmospheric dynamics and surface layers; biomechanics; boundary-layer transition; combustor modeling; composite materials; concurrent engineering; convection heat transfer in complex flows; finite element techniques; flow-induced vibrations; fracture mechanics; fluid-structure interactions; heat transfer in airbreathing and space propulsion systems; high speed aerodynamics; hydrodynamic stability; hypersonics; laminar flow control; laser

diagnostics in combustion and flows; micromechanics; modal analysis; modeling and optimal design of rotor-bearing systems; noise control; nonlinear vibrations and structural dynamics; nonlinear waves and dynamics; perturbation methods; rotorcraft aerodynamics and acoustics; separated and transitional flows; spray combustion; structural optimization; supersonic flows; thermionics; three-dimensional boundary layers; transonic aerodynamics; turbulent flow modeling; turbine cooling; and unsteady aerodynamics.

Experimental investigations are carried out in a number of specialized laboratories and facilities: computer-aided engineering and expert systems laboratory; computer-aided design/computer-aided manufacturing laboratory; combustion laboratory; composite materials laboratory; direct energy conversion laboratory; dynamics and controls laboratory; heat transfer laboratory; laser diagnostics laboratory; hydrodynamic stability laboratory; stratified flow laboratory; supersonic wind tunnel laboratory; robotics laboratory; thermoscience laboratory; turbulent fluid mechanics laboratory; unsteady wind tunnel facility; and vibrations and dynamics laboratory. Equipment fabrication is supported by the college's well-equipped development shop with a staff of machinists and electronic technicians.

#### Computer Resources and Facilities

Aerospace Engineering graduate education and research is supported by an extensive array of college- and university-supported computer hardware and software, in addition to laboratory minicomputers and microcomputers. The ASU Computing Commons is equipped with three IBM RS/6000-590s, one MASPAR, several DEC VAX 5000s, numerous Sun Sparc servers, and many other platforms. Access to these computers is via the ASU Advanced Communications Support System (ACSS) broadband network as well as via dial-in lines. The university also operates microcomputer sites with more than 400 IBM and Apple Macintosh systems.

#### MECHANICAL AND AEROSPACE ENGINEERING

*The faculty in the Department of Mechanical and Aerospace Engineering offer graduate programs leading to the degrees of Master of Science, Master of Science in Engineering,*

*and the Doctor of Philosophy with majors in Aerospace Engineering and Mechanical Engineering. The courses supporting both majors are offered under the common MAE prefix. See pages 235-237 for the courses that support the degree programs in Aerospace Engineering. Additional courses at the 300 and 400 level, which may be used to remove deficiencies, are described in the General Catalog.*

## Agribusiness

**Eric P. Thor**  
*Director*  
(ASU East) 602/965-3585

#### PROFESSORS

CHALQUEST, EDWARDS, GORDON,  
KAGAN, STILES, THOR

#### ASSOCIATE PROFESSORS

RACCACH, SEPERICH

#### ASSISTANT PROFESSORS

PATTERSON, RICHARDS

The Agribusiness faculty in the School of Agribusiness and Resource Management offer a program leading to the Master of Science degree with a major in Agribusiness. Courses are offered at the ASU East site. Concentrations are available in agribusiness management and marketing and food quality assurance. The program is designed to prepare students for managerial and administrative positions in agribusiness and government. Students receive broad training in agribusiness functional areas and complete technical course work. To apply the knowledge and skills gained in course work, each student conducts a research project and writes a thesis.

**Admission.** Applicants to the program are expected to meet the minimum requirements for admission to the Graduate College. In addition, scores from the Graduate Record Examination (GRE), Miller Analogies Test (MAT), or Graduate Management Admission Test (GMAT) are recommended. Applicants are expected to have completed 18 hours of agribusiness or other closely related course work, with at least nine hours specifically in agribusiness. Applicants not meeting this last requirement may be considered for admission with deficiencies.

**Program of Study.** Candidates must complete a minimum of 30 semester hours of approved graduate-level

course work, excluding courses taken to remove deficiencies. A minimum of 12 semester hours should consist of regularly scheduled course work within the agribusiness core, not including hours taken in research, thesis, reading and conference, special topics, or courses of a similar nature. Students must complete the following courses:

AGB 508	Advanced Agribusiness Marketing .....	3
	or AGB 511 Advanced Agribusiness Management II (3)	
AGB 510	Advanced Agribusiness Management I .....	4
AGB 532	Advanced Agribusiness Finance .....	3
	Research and Thesis .....	6

In addition, each student is required to successfully complete a course in statistics at the graduate level; other course work may be required in order to tailor an effective graduate program for each individual.

**Dual/Concurrent Degree Program.**

The School of Agribusiness and Resource Management and the American Graduate School of International Management (Thunderbird) have a cooperative agreement for students interested in both agribusiness and international management. Thunderbird is an internationally recognized private graduate school, located in the Phoenix metropolitan area, offering course work in international studies, modern languages, and world business. This agreement enables students of ASU and Thunderbird to complete the graduation requirements of the institution in which the student is enrolled (home institution) by receiving up to nine semester hours for course work completed at the visiting institution. The dual degree program is designed to allow qualified graduate students to pursue simultaneously the Master of Science degree in Agribusiness at ASU and the Master of International Management (M.I.M.) at Thunderbird. Students must be regularly admitted to both degree programs and must petition for acceptance into the dual degree program through the school of initial attendance. Dual degree program participants and regularly admitted students may petition to take selected course work at the visiting institution at no additional fee. The goal of this agreement is to enhance the educational opportunities available to

qualified students of both institutions while making optimal use of the resources and facilities of both institutions.

**Foreign Language Requirements.**

None.

**Comprehensive Examinations.** Each student must pass a written comprehensive examination covering materials presented in the Agribusiness program of study above.

**Thesis Requirements.** All students are required to write a thesis.

**Final Examinations.** An oral examination in defense of the thesis is required.

**Research Activity**

The research projects in agribusiness reflect the varied interests of the faculty. Marketing studies involving agricultural products are conducted to determine consumer desires or the attitudes of institutional personnel toward foods. Management studies designed to improve the efficiency of agribusiness or to identify the job stress factors of the employees represent another sector. Finance studies examine the capacity of financial institutions to provide capital for agribusiness firms or the ability of managers to optimize the returns to financial resources under their control. In addition, the research conducted by the food industry faculty is directed toward the safety and wholesomeness of food, both at the institutional and consumer levels.

**AGRIBUSINESS**

**AGB 402 Agricultural Cooperatives.** (3) N Organization, operation, and management of agricultural cooperatives.

**404 Sales and Merchandising in Agribusiness.** (3) N

The principles and techniques of selling and commodity merchandising in the agricultural industries.

**412 Agricultural Commodities.** (3) F Trading on futures markets. Emphasis on the hedging practices with grains and meats. Prerequisite: AGB 312 or 1 marketing or finance course.

**413 Financial Commodities.** (3) S Trading on futures markets. Emphasis on the hedging practices with financial and currency instruments. Prerequisite: AGB 332 or FIN 300.

**414 Advanced Commodity Trading.** (3) N Advanced analysis of trading techniques, with emphasis on hedging in the futures markets. Prerequisite: AGB 412 or 413.

**423 Food and Industrial Microbiology.** (4) F Food and industrial related microorganisms; deterioration and preservation of industrial commodities. Lecture, lab. Prerequisite: MIC 205 or 206 or instructor approval.

**424 Food and Industrial Fermentations.** (4) S Management, manipulation, and metabolic activities of industrial microbial cultures and their processes. Lecture, lab. Prerequisite: AGB 423 or instructor approval.

**425 Food Safety.** (3) S Control, prevention, and prediction of microbial and chemical food borne diseases. Prerequisite: AGB 423 or instructor approval.

**426 Food Chemistry.** (4) S The biochemical and chemical interactions that occur in raw and processed foods. Lecture, lab. Prerequisites: CHM 115, 231.

**428 Comparative Nutrition.** (3) N Effects of nutrition on animal systems and metabolic functions. Prerequisite: CHM 231.

**433 Diseases of Domestic Animals.** (3) N Control and prevention of infectious and non-infectious diseases of domestic animals. Prerequisite: MIC 206 or 220.

**435 Animal Physiology I.** (4) F Control and function of the nervous, muscular, cardiovascular, respiratory, and renal systems of domestic animals. Prerequisites: BIO 181; CHM 113.

**439 Veterinary Practices.** (3) F, S Observation of and participation in veterinary medicine and surgery supervised by local veterinarians. Prerequisite: advanced pre-veterinary student.

**440 Food Marketing.** (3) S Food processing, packaging, distribution, market research, new food research and development, and social implications. Prerequisite: AGB 312.

**443 Agribusiness Management II.** (3) F Principles of human resource management, with emphasis on the special problems of agribusiness systems. Prerequisite: AGB 302.

**444 Agribusiness Analysis.** (3) S Analysis of agribusiness firm decisions in the ecological, economic, social, and political environments. Special emphasis on ethical issues surrounding food production and consumption. Prerequisites: AGB 312 and 332 or equivalents. *General Studies: L2.*

**450 International Agricultural Development.** (3) F Transition of developing countries from subsistence to modern agriculture. Technology transfer and food improvement programs are emphasized. *General Studies: G.*

**452 World Food Dynamics.** (3) N Transition and development of raw agricultural commodities into nutritional food products. Emphasis given to food expansion in developing countries. *General Studies: G.*

**453 World Agricultural Resources.** (3) S World production and consumption of agricultural products, international relationships, and agencies concerned with world agricultural development problems. *General Studies: G.*

**454 International Agricultural Trade.** (3) N Dimensions, locations, mix, methods, and changes of international trade in agricultural products. Prerequisite: AGB 312.



**455 Agricultural Marketing Channels.** (3) S  
Operational stages of agricultural commodities in normal distribution systems and implementation of marketing strategies. Prerequisite: AGB 312.

**458 International Agribusiness.** (3) N  
Identification and analysis of methods, problems, and future of international agribusiness operations. Emphasizes special problems associated with international agribusiness systems. Prerequisite: AGB 312. *General Studies: G.*

**460 Agribusiness Management Systems.** (4) S  
The development and use of decision support systems for agribusiness management and marketing. Lecture, lab. Prerequisite: AGB 302.

**474 Agribusiness Policy and Government Regulations.** (3) F  
The development and implementation of government food, drug, pesticide, and farm policies and regulations that affect the management of agribusiness. Prerequisite: AGB 302.

**490 Recent Advances in Agribusiness.** (1) F, S  
Reports and discussions of current topics and problems associated with agribusiness. May be repeated for credit.

**505 Commodity Analysis.** (3) N  
Analysis of commodity markets. Prerequisite: 1 year of economics or marketing.

**508 Advanced Agribusiness Marketing.** (3) F  
Theory and analysis of marketing farm commodities, risks, and the effect of future trading on cash prices.

**509 Advanced Agribusiness Marketing Channels.** (3) S  
Analysis of agribusiness market channel systems. Formulation of marketing strategies.

**510 Advanced Agribusiness Management I.** (4) F  
Managing and financing agribusiness emphasizing environmental and economic sustainability in a global economy undergoing radical change. Prerequisite: AGB 342.

**511 Advanced Agribusiness Management II.** (3) S  
Analysis of organization behavior, change, and resource requirements within agribusiness systems. Prerequisite: AGB 342.

**512 Food Industry Management.** (3) S  
Operations and management of food-processing factories, food distribution centers, and retail food-handling firms.

**516 International Agricultural Techniques.** (3) N  
Coordination of production and marketing techniques to consumption objectives with agricultural products in foreign countries.

**518 World Agricultural Development.** (3) N  
Factors that influence production, processing, and marketing of agricultural products in developing countries.

**520 Advanced Agribusiness Analysis I.** (4) S  
Vertical integration and differentiation in food and agricultural industries. Lecture, recitation. Prerequisites: AGB 508 or 510.

**521 Agribusiness Coordination.** (4) N  
Organizational alternatives for agribusiness, with emphasis on cooperatives and trading companies. Lecture, recitation. Prerequisites: AGB 508 or 510.

**525 Advanced Agribusiness Management Systems.** (3) N  
Development and use of decision support systems for agribusiness management decision making. Prerequisite: AGB 510.

**527 Agribusiness Research Methods.** (3) N  
The use of model building, hypothesis testing, and empirical analysis in solving agribusiness problems.

**530 Advanced Agribusiness Policy.** (3) N  
Policy-making history, structure, and process. Prerequisite: AGB 342.

**532 Advanced Agribusiness Finance.** (3) F  
Financial management of agribusiness firms; agribusiness financial analysis, investment analysis, agricultural risk management, and introduction to agricultural financial intermediaries. Prerequisites: computer literacy and 1 finance course or instructor approval.

**535 Advanced Food Science.** (3) N  
Chemical and physical nature of processed foods. Emphasis on food product development. Prerequisite: AGB 364.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Anthropology

Barbara L. Stark

Chair

(ANTH A124) 602/965-6213

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### REGENTS' PROFESSOR TURNER

#### PROFESSORS

BAHR, BRANDT, CARR, CHANCE,  
CLARK, COWGILL, EDER, KINTIGH,  
KOSS-CHIOINO, MARTIN,  
MERBS, MORRIS, NASH,  
REDMAN, SCHOENWETTER,  
STARK, WILLIAMS

#### ASSOCIATE PROFESSORS

AGUILAR, ALVAREZ, BARTON,  
FALCONER, FIRESTONE, HEDLUND,  
HUDAK, MARZKE, M. NELSON,  
RICE, SPIELMANN

#### ASSISTANT PROFESSORS

HEGMON, B. NELSON,  
STEADMAN, WELSH

#### LECTURER

WINKELMAN

#### PROFESSORS EMERITI DITBERT, GAINES, STEWART

The faculty in the Department of Anthropology offer graduate programs with a major in Anthropology leading to the Master of Arts and Doctor of Philosophy degrees. Concentrations are available at the master's level in archaeology, social-cultural anthropology,

physical anthropology, linguistics, museum studies, medical anthropology, and bioarchaeology. Concentrations are available at the doctoral level in archaeology, social-cultural anthropology, and physical anthropology.

**Admission.** In addition to the general requirements for admission to the Graduate College, the Department of Anthropology requires applicants to provide a statement of their interests and professional goals, and three letters of recommendation. Applicants who received their B.A. during the past ten years must also submit scores on the Graduate Record Examination. Undergraduate course work in anthropology is not a prerequisite for admission to the M.A. program. Admission to the Ph.D. program normally presumes an M.A. in Anthropology; students may be admitted without such a background on the condition that they acquire a knowledge of general anthropology in a manner to be specified at the time of admission.

**Program of Study.** Special training programs designed to terminate with a master's degree are possible at the discretion of the student and faculty advisors. The concentrations in anthropological linguistics, museum studies, medical anthropology, and bioarchaeology, for example, are specifically at the master's level. The primary purpose and scope of the graduate program in anthropology, however, is intended to lead to the Ph.D. degree.

The doctoral program is divided into three phases. The first consists of 24 semester hours of course work and readings, usually within a subdiscipline and closely allied areas, followed by six semester hours for the M.A. thesis (or publishable paper). The faculty may require additional hours of course work or other preparation for entering students who are unfamiliar with the concepts of general anthropology at a level equivalent to that of the Arizona State undergraduate anthropology core. Mastery of the phase I course material is demonstrated by successful completion of a written qualifying examination in social/cultural anthropology or, in physical anthropology, bioarchaeology, and archaeology, by successful completion of a sequence of core courses.

Admission to phase II of the doctoral program is granted to students on the basis of performance in phase I, the

quality of M.A. research, prior course work, faculty recommendations, and other relevant information. The second phase consists of 30 semester hours of course work, reading in anthropology and related fields, and directed research designed to prepare the student for the dissertation project. Proficiency in one foreign language or quantitative methods may be required by the supervisory committee. The second phase is completed when the following have been met: (1) passing a written comprehensive examination, and (2) passing the oral defense of the dissertation proposal. The successful student is then advanced to candidacy.

The final phase consists of 24 semester hours of research and dissertation.

**Certificate in Museum Studies.** The certificate is awarded to nondegree or graduate students who are accepted into the certificate program and who complete 12 hours of required course work and a six-semester hour internship at an approved museum. The certificate may be taken independently or in conjunction with the M.A. degree in Anthropology with a concentration in museum studies.

**Concurrent M.A. Anthropology and M.S. Justice Studies.** Graduate students in the Department of Anthropology and the School of Justice Studies are able to receive a concurrent Master of Arts in Anthropology with a concentration in social-cultural anthropology and a Master of Science degree in Justice Studies. The principal purpose of the program is to prepare individuals with complementary knowledge and skills for basic and applied research, in addition to administrative and educational activities related to justice studies and anthropology.

Students must be admitted separately to each program, following the guidelines of the Graduate College, Department of Anthropology, and School of Justice Studies. Additional information on the M.A. in Anthropology and the M.S. in Justice Studies may be obtained from each academic unit.

#### **Research and Teaching Activities**

Faculty in the Department of Anthropology are actively engaged in research on a wide range of problems and in a variety of geographical settings, with special strength in the American Southwest, Southeast Asia, Mesoamerica, the

Near East, and the Arctic. Individual faculty conduct research in Arizona, New Mexico, Ohio, Florida, Alaska, Canada, Guatemala, Mexico, England, Spain, Jordan, Morocco, Kenya, New Guinea, Thailand, Indonesia, and the Philippines.

While most research and teaching center on problems associated with one of the traditional subfields of anthropology, many departmental programs include faculty from various branches of anthropology. Research and teaching in archaeology center on archaeological theory, research methods, quantitative methods, computer and statistical applications, paleoecology of hunter-gatherers, and the archaeology of social complexity. The program in social-cultural anthropology emphasizes social organization, religion, ecology and demography, research methods, human biology and social behavior, and anthropological linguistics. The physical anthropology program stresses osteology, dental anthropology, primatology, functional morphology, growth and development, paleoanthropology, human biological variation, disease ecology, and human origins. The program in museum studies includes emphases in curation, exhibition, educational programming, and administration. The medical anthropology program emphasizes biocultural perspectives on the study of health and illness behavior. The bioarchaeology program applies a holistic, ecological perspective in considering biological, environmental, demographic, and cultural processes at regional and local scales. The program in linguistics is interdisciplinary and has strengths in American Indian and Southeast Asian languages, bilingualism, language renewal, language and education, and ethnopoetics.

Among the research resources of the department are large archaeological, ethnographic, dental, and osteological collections; a majority of available fossil hominid casts; numerous archaeology and physical anthropology laboratories; departmental computers; radiographic, serologic, and pollen facilities; ethnographic and linguistic archives. The department publishes a monograph series, *Anthropological Research Papers*, and two series of field reports, *Anthropological Field Studies* and *OCRM Reports*. The department also maintains the Office of Cultural Re-

source Management and the Arizona State University Museum of Anthropology. The department operates the Deer Valley Rock Art Center in north Phoenix, a research and interpretive center situated at the largest concentration of petroglyphs in the Phoenix area. The Museum of Anthropology, which is housed in the Anthropology Building, works closely with the Heard Museum of Native American Cultures and Art, the Desert Botanical Gardens, the Pueblo Grande Museum, the Tempe Historical Society, and other museums in the area.

#### **ANTHROPOLOGY (ASB)**

##### **ASB 400 Cultural Factors in International Business.** (3) S

Anthropological perspectives on international business relations; applied principles of cross-cultural communication and management; regional approaches to culture and business. Cross-listed as IBS 400. *General Studies: G.*

**411 Kinship and Social Organization.** (3) S Meanings and uses of concepts referring to kinship, consanguinity, affinity, descent, alliance, and residence in the context of a survey of the varieties of social groups, marriage, rules, and kinship terminological systems. Prerequisite: 6 hours of anthropology or instructor approval.

**412 History of Anthropology.** (3) F Historical treatment of the development of the culture concept and its expression in the chief theoretical trends in anthropology between 1860 and 1950. Prerequisite: ASB 102 or instructor approval. *General Studies: L2/SB.*

**416 Economic Anthropology.** (3) F Economic behavior and the economy in preindustrial societies; description and classification of exchange systems; relations between production, exchange systems, and other societal subsystems. Prerequisite: ASB 102 or instructor approval. *General Studies: L2/SB.*

**417 Political Anthropology.** (3) A Comparative examination of the forms and processes of political organization and activity in primitive, peasant, and complex societies. Prerequisite: ASB 102 or instructor approval.

##### **462 Medical Anthropology: Culture and Health.** (3) F '96

Role of culture in health, illness, and curing; health status, provider relations, and indigenous healing practices in United States ethnic groups. Lecture, discussion. *General Studies: C.*

##### **463 Anthropology and International Business.** (3) S '98

Anthropological perspectives on international business relations; applied principles of cross-cultural communication and management; regional approaches to culture and business.

**471 Introduction to Museums.** (3) F History, philosophy, and current status of museums. Exploration of collecting, preservation, exhibition, education, and research activities in different types of museums. Prerequisites: ASB 102 and ASM 101 or instructor approval.

- 480 Introduction to Linguistics.** (3) F  
Descriptive and historical linguistics. Survey of theories of human language, emphasizing synchronic linguistics. *General Studies: SB.*
- 481 Language and Culture.** (3) S  
Application of linguistic theories and findings to nonlinguistic aspects of culture; language change; psycholinguistics. Prerequisite: ASB 102 or instructor approval. *General Studies: SB.*
- 483 Sociolinguistics and the Ethnography of Communication.** (3) N  
Relationships between linguistic and social categories; functional analysis of language use, maintenance, and diversity; interaction between verbal and nonverbal communication. Prerequisites: ASB 480 and ENG 213 (or FLA 400) or instructor approval. *General Studies: SB.*
- 529 Culture and Political Economy.** (3) N  
Origin and spread of Western capitalism and its impact on non-Western societies. Ethnographic and historical case studies are utilized. Prerequisite: graduate standing.
- 530 Ecological Anthropology.** (3) A  
Relations among the population dynamics, social organization, culture, and environment of human populations, with special emphasis on hunter-gatherers and extensive agriculturalists.
- 532 Graduate Field Anthropology.** (2-8) S  
Independent research on a specific anthropological problem to be selected by the student in consultation with the staff. May be repeated for credit. Prerequisites: ASM 338 or equivalent; instructor approval.
- 535 Public Archaeology.** (4) N  
Theoretical and practical applications of cultural resources legislation and policy. Legal and administrative requirements; conservation, development, and management of cultural resources; CRM research design formulation. Seminar, field work. Prerequisites: regular graduate student standing; 12 completed graduate hours in archaeology; instructor approval.
- 536 Ethnohistory of Mesoamerica.** (3) N  
Indigenous societies of southern Mexico and Guatemala at Spanish contact and their postconquest transformation. Emphasis is on the Aztec Empire. Prerequisite: graduate standing.
- 537 Topics in Mesoamerican Archaeology.** (3) N  
Changing organization of pre-Columbian civilizations in Mesoamerica is explored through interpretive issues, such as regional analysis, chiefdoms, urbanism, and exchange. Prerequisite: instructor approval.
- 540 Method and Theory of Sociocultural Anthropology and Archaeology I.** (3) F  
Basic issues concerning concepts of social and ethnic groups, cultural and sociological theory, and the nature of anthropological research. Prerequisite: instructor approval.
- 541 Method and Theory of Social and Cultural Anthropology.** (3) S  
Continuation of ASB 540. Prerequisite: ASB 540 or instructor approval.
- 542 Method and Theory of Archaeology II.** (3) S  
Models of human evolution, culture change, and interpretation of hunter-gatherer and tribal societies, ceramic, lithic, and faunal materials. Prerequisite: instructor approval.
- 543 Method and Theory of Archaeology III.** (3) F  
Covers concepts of social complexity along with economy, demography, and social dynamics, followed by archaeological research design. Prerequisite: instructor approval.
- 544 Settlement Patterns.** (3) N  
Spatial arrangement of residences, activity sites, and communities over landscape. Emphasis on natural and cultural factors influencing settlement patterns. Prerequisite: instructor approval.
- 546 Pleistocene Prehistory.** (3) F  
Development of society and culture in the Old World during the Pleistocene epoch, emphasizing technological change through time and the relationship of people to their environment. Prerequisite: ASB 361 or equivalent.
- 547 Issues in Old World Domestication Economies.** (3) S  
Archaeological evidence for transitions in Old World subsistence economies from hunting and gathering to dependence on domesticated plants and animals. Prerequisite: ASB 362 or equivalent.
- 550 Economic Archaeology.** (3) N  
Prehistoric economies in hunter-gatherer, tribal, and complex societies. Subsistence strategies, craft production and specialization, and exchange covered. Prerequisite: instructor approval.
- 551 Prehistoric Diet.** (3) N  
Includes (1) a critical review of techniques for recovering dietary information and (2) theoretical models concerned with explaining diet and nutrition. Prerequisite: instructor approval.
- 555 Complex Societies.** (3) S  
Structural variations in hierarchically organized societies, along with origins, dynamics, and collapse, are examined. Seminar.
- 559 Archaeology and the Ideational Realm.** (3) N  
"Post-processual" and other views concerning relevance of mental phenomena for understanding sociocultural change. Various approaches to inferring prehistoric meanings.
- 563 Hunter-Gatherer Adaptations.** (3) N  
Evolution of prehistoric hunter-gatherer societies in the Old and New Worlds from the most ancient times through protohistoric chiefdoms. Prerequisite: instructor approval.
- 567 Southwestern Archaeology.** (3) S  
Broad coverage of Southwestern cultural developments focusing on current debates and rigorous use of archaeological data in making cultural inferences.
- 568 Intrasite Research Strategies.** (3) F  
Research issues within a single site context. Topics include quantitative spatial analysis, site definition, sampling, distributional analysis, and substantive interpretation.
- 571 Museum Principles.** (3) F  
History, philosophy, and current status of museums. Exploration of collecting, preservation, exhibition, education, and research activities in different types of museums. Prerequisites: ASB 102 and ASM 101 or instructor approval.
- 572 Museum Collection Management.** (3) S  
Principles and practices of acquisition, documentation, care, and use of museum collections; registration, cataloging, and preservation methods; legal and ethical issues. Prerequisite: ASB 571 or instructor approval.
- 573 Museum Administration.** (3) S  
Formal organization and management of museums; governance; personnel matters; fund raising and grantsmanship; legal and ethical issues. Prerequisite: ASB 571 or instructor approval.
- 574 Exhibition Planning and Design.** (3) S  
Exhibition philosophies and development; processes of planning, designing, staging, installing, evaluating, and disassembling temporary and long-term exhibits. Prerequisites: ASB 571 and 572 or instructor approval.
- 575 Computers and Museums.** (3) F  
Basics of museum computer application; hardware and software; fundamentals of database management; issues of research, collections management, and administration.
- 576 Museum Interpretation.** (3) F  
Processes of planning, implementing, documenting, and evaluating educational programs in museums for varied audiences—children, adults, and special interest groups. Lecture, discussion. Prerequisite: ASB 571.
- 577 Principles of Conservation.** (3) S  
Preservation of museum objects: nature of materials, environmental controls, and causes of degradation; recognizing problems, damage, and solutions; proper care of objects. Prerequisites: ASB 571 and 572 or instructor approval.
- 582 Linguistic Theory: Syntax.** (3) N  
Contemporary theories of the grammatical structure of languages. Prerequisite: ASB 480 or FLA 400 or instructor approval.
- 585 Linguistic Theory: Phonological Systems.** (3) F  
Origins and development of contemporary phonological systems with particular attention to non-Western languages. Prerequisite: ASB 480 or FLA 400 or instructor approval.
- 591 Seminar.** (3) N  
Selected topics in archaeology, linguistics, and social-cultural anthropology.  
(a) Archaeological Ceramics  
(b) Archaeology of North America  
(c) Cultural Anthropology  
(d) Culture and Personality  
(e) Evolution and Culture  
Cross-listed as ASM 591.  
(f) Historical Archaeology  
(g) Interdepartmental Seminar  
Cross-listed as ASM 591.  
(h) Linguistics  
(i) Museum Studies  
(j) Problems in Southwestern Archaeology  
(k) Problems in Southwestern Ethnology  
(l) Social Anthropology
- Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## ANTHROPOLOGY (ASM)

### ASM 435 Archaeological Pollen Analysis.

(3) F  
Theory, methodology, and practice of pollen analytic techniques. Compares uses in botany, geology, and archaeology. 2 hours lecture, 3 hours lab, possible field trips. Prerequisite: instructor approval.

**452 Dental Anthropology.** (4) F  
Human and primate dental morphology, growth, evolution, and genetics. Within- and between-group variation. Dental pathology

and behavioral-cultural-dietary factors. 3 hours lecture, 3 hours lab. Prerequisite: instructor approval. *General Studies: S2.*

**454 Comparative Primate Anatomy.** (4) S Functional anatomy of the cranial, dental, and locomotor apparatus of primates, including humans, emphasizing the relation of morphology to behavior and environment. Lectures, lab, dissections, demonstrations. 3 hours lecture, 3 hours lab. Prerequisite: instructor approval.

**455 Primate Behavior Laboratory.** (3) N Instruction and practice in methods of observation and analysis of primate behavior. Discussion of the relationship between class work on captive animals and field techniques for studying free-ranging groups. Directed readings, 6 hours lab. Prerequisites: ASM 343; instructor approval. *General Studies: L2.*

**465 Quantification and Analysis for Anthropologists.** (3) S Statistical, quantitative, and geometric strategies for envisioning and exploring archaeological, physical anthropological, bioarchaeological, and sociocultural data. Univariate and multivariate methods. Prerequisites: introductory statistical course; instructor approval.

**548 Geoarchaeology.** (3) F Geologic context relevant to archaeological research. Topics include sediments, deposition environments, soils, anthropogenic and biogenic deposits, and Quaternary chronology. Prerequisite: instructor approval.

**555 Advanced Human Osteology.** (3) N Laboratory and field techniques in dealing with the human skeleton. Emphasis on preparation, identification, radiography, sectioning, microscopy, and data processing. 1 hour lecture, 6 hours lab. Prerequisite: ASM 341 or instructor approval.

**565 Quantitative Archaeology.** (3) S Formal methods of structuring, codifying, and analyzing data for archaeological problems. Designing research to yield data amenable to productive analysis.

**566 Advanced Topics in Quantitative Archaeology.** (3) F Archaeological issues associated with quantitative analysis, e.g., Bayesian and Monte Carlo approaches, simulation, diversity. May be repeated for credit. Prerequisite: ASM 565 or instructor approval.

**573 Lithic Analysis.** (3) N Analysis and interpretation of chipped stone artifacts. Focus on both techniques and underlying concepts and their application to real collections. Prerequisite: instructor approval.

**591 Seminar.** (3) N Selected topics in archaeology and physical anthropology.

- (a) Bioarchaeology
- (b) Evolution and Culture  
Cross-listed as ASB 591.
- (c) Interdepartmental Seminar  
Cross-listed as ASB 591.
- (d) Physical Anthropology
- (e) Primates and Behavior

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Architecture

**Ron McCoy**  
*Director*  
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**REGENTS' PROFESSOR**  
COOK

**PROFESSORS**  
BOYLE, EL DIASTY, McCOY,  
McSHEFFREY, MEUNIER,  
PETERSON, RAPP,  
SCHEATZLE, UNDERHILL

**RESEARCH PROFESSOR**  
JONES

**ASSOCIATE PROFESSORS**  
LOOPE, McINTOSH, OZEL,  
SHEYDAYI, UNDERWOOD, ZYGAS

**ASSISTANT PROFESSORS**  
BILN, HARDIN, HARTMAN, INABA,  
KROLOFF, SPELLMAN, WOOLSEY

**PROFESSORS EMERITI**  
CHRISTENSEN, ELLNER, HINSHAW,  
JAKOB, OLIVER, RUMMEL,  
STRAUB, WHIFFEN

The faculty in the School of Architecture offer a professional program leading to the Master of Architecture degree and a research-based graduate program leading to the Master of Science degree with a major in Building Design. For information concerning these degree programs, refer to pages 55-58 and 136-137.

The faculty in the school also participate in offering the new Ph.D. in Environmental Design and Planning program. For information about the Ph.D. degree program, see pages 190-192.

### Research Activity

Faculty and students in the graduate programs of the School of Architecture are involved in the following areas of research: energy-conscious design, computer graphics, housing, urban design, building technology, environmental analysis, arid region design, and architectural history and theory.

The School of Architecture maintains laboratories for solar, structural, and materials testing, including a 1,500-square-foot rooftop testing laboratory for solar research.

Facilities for basic research activities and community service oriented programs in energy technology, design,

real estate development, and planning are also provided by the College of Architecture and Environmental Design through the Herberger Center for Design Excellence and the joint urban design program.

### Architecture

Courses offered by the faculty of the School of Architecture are categorized in the following instructional areas:

**Architectural Administration and Management (AAD).** AAD courses investigate the organization and managerial aspects of contemporary architectural practice. These studies examine the overall processes relative to management coordination, administration procedures, ethics, legal constraints, and the financial controls and measures of contemporary architectural practice.

**Architectural Design and Technology Studios (ADE).** ADE encourage synthesis of the knowledge and understanding the student has gained from previous and parallel course work and from other sources, toward the comprehensive design of architectural projects. The laboratories integrate the needs, limitations, and determinants of design problems: applying analytical methods and technical skills in seeking and comparing alternative solutions for assigned problems.

**Architectural Philosophy and History (APH).** APH develops an understanding of architecture as both a determinant and a consequence of man's culture, technology, human needs, and behavior in the past and present. These studies are concerned with the rationale for the methods and results of design and construction.

**Architectural Technology (ATE).** ATE develops knowledge of the technical determinants, resources, and processes of architecture. These studies are concerned primarily with the science and technology of design and construction, including materials, structural systems, construction systems, environmental control systems, active and passive solar systems, acoustics and lighting.

**Architecture Professional Studies (ARP).** ARP provides students with residency and off-campus opportunities and educational experience in group

and individual studies relative to specific student interests and faculty expertise.

The program also offers several opportunities to study abroad. In addition, various required and optional field trips are undertaken in course work. (Supplemental fees are assessed for these offerings.)

**Environmental Analysis and Programming (ANP).** ANP develops capabilities to analyze and program environmental and human factors as pre-conditions for architectural design. These studies are concerned with the existing and emerging methods used by the profession to evaluate and analyze. A variety of courses on computer utilization is included in this area.

#### ARCHITECTURAL ADMINISTRATION AND MANAGEMENT

**AAD 551 Architectural Management I.** (3) S Organizational, human performance, and market influences on architecture firms and projects. Readings, case studies, and analysis of managerial problems and solutions. Lecture, discussion. Prerequisite: graduate-level standing. Corequisite: ADE 522.

**552 Architectural Management II.** (3) F Design delivery, coordination of construction documents, cost estimating, bidding and negotiations, construction observation, and post-construction services. Case studies. Lecture, discussion. Prerequisite: AAD 551. Corequisite: ADE 621.

**553 Advanced Architectural Management.** (3) A Current issues in the business and practice of architecture. Financial management, project management, and design delivery strategies. Includes case studies. Lecture, discussion. Prerequisite: AAD 551 or instructor approval.

**554 Advanced Construction Contract Administration.** (3) N Advanced topics and problems in construction contract administration. Prerequisite: AAD 552 or instructor approval.

**555 Architect as Developer.** (3) A Development building, real estate, construction funding, land acquisition, and the sources for capital. Prerequisite: instructor approval.

**558 Advanced Specifications and Cost Analysis.** (3) N Coordination of working drawings, construction specifications, and cost estimates. Emphasis on methods, office procedures, contract conditions, bonds, and bidding procedures. Prerequisite: instructor approval.

#### 560 Contemporary Architectural Practice.

(3) A Advanced issues and directions in design delivery, firm and project management, global markets and expanding cultural responsibilities. Includes case studies. Seminar. Prerequisite: instructor approval.

**681 Professional Seminar: Capstone.** (3) S Examination of ethical, political, social, economic, ecological, and cultural issues confronting the practice of architecture. Readings and case studies. Seminar. Prerequisite: AAD 552. Corequisite: ADE 622.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

#### ARCHITECTURAL DESIGN AND TECHNOLOGY STUDIOS

##### ADE 510 Foundation Architectural Studio.

(6) SS Fundamentals of architectural design, methodology, visualization, and representation. Lecture, studio, and field trips. Prerequisite: admission to graduate program.

**511 Core Architectural Studio I.** (6) F Application of design fundamentals in architectural problems, including construction, technology, programmatic and environmental determinants. Lecture, studio, and field trips. Prerequisites: ADE 510; APH 200, 509. Corequisite: ATE 353.

**512 Core Architectural Studio II.** (6) S Application of architectural design fundamentals to increasingly complex problems, including specific sites and activities. Lecture, studio, and field trips. Prerequisite: ADE 511.

**521 Advanced Architectural Studio I.** (5) F Design problems emphasizing theory, aesthetics, and tectonics as influences on architectural form. Lecture, studio, and field trips. Prerequisite: admission to graduate program.

**522 Advanced Architectural Studio II.** (5) S Design problems emphasizing the comprehensive integration of building systems and technologies as influences on architectural form. Lecture, studio, and field trips. Corequisites: AAD 551; ADE 521.

**621 Advanced Architectural Studio III.** (5) F Design problems emphasizing the urban context, planning issues, and urban design theory as influences on architectural form. Lecture, studio, and field trips. Corequisites: AAD 552; ADE 522; instructor approval.

**622 Advanced Architectural Studio IV.** (5) S Individual, student-initiated project reflecting a culminating synthesis of architectural ideas. Studio. Prerequisites: ADE 621; ANP 681. Corequisite: AAD 681.

**661 Bioclimatic Design Studio.** (6) A Sustainable architectural and site synthesis at a variety of scales emphasizing bioclimatic criteria and the use of passive and low-energy systems. Prerequisite: professional degree or instructor approval. Corequisite: ATE 558.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

#### ENVIRONMENTAL ANALYSIS AND PROGRAMMING

##### ANP 530 Computer Graphics in Architecture.

(3) A Fundamentals of computer graphics programming in architecture, including graphics hardware, device independent packages, 2- and 3-dimensional transformations, and data structures. 2 hours lecture, 3 hours lab. Prerequisite: ANP 475 or instructor approval.

##### 561 Architectural Information Processing Systems.

(3) A Applications of information processing systems to architectural problems. Analysis of computing tools with respect to assumptions and theories. Lecture, lab. Prerequisites: graduate standing; instructor approval.

##### 562 Information Systems for Facilities Management.

(3) N Introduction to database design and implementation. Assessment of facility management problems from information system points of view. Seminar, lab. Prerequisites: ANP 477 or 561; graduate standing.

##### 576 Community Housing.

(3) N History, practices, trends, and forms of housing; includes growth of public programs, national and local programs, zoning law, housing distribution, planning principles and policies, design review, standards, and private development practice.

##### 577 Housing Environments.

(3) A Contemporary housing environments, housing types, and life styles as determined by user preference, density, development and property standards, cost, community and privacy, security, identity, movement, and the need for open space.

##### 581 Urban Structure and Design.

(3) F The nature and dynamics of urbanization and its relationship to architecture and urban design, including growth, decay, socialization, planning processes, and visual perception. Case studies. Prerequisite: professional-level standing.

##### 681 Project Development.

(3) F '96 Definition and elaboration of major ideas for implementation in ADE 622 Advanced Architectural Studio IV in relation to contemporary theory and practice. Seminar. Prerequisite: ADE 522.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

#### ARCHITECTURAL PHILOSOPHY AND HISTORY

**APH 509 Foundation Seminar.** (3) SS Historical, technical, theoretical, environmental, and professional issues in architecture. Lecture, seminar, field trips. Prerequisite: ADE 510.

**511 Energy Environment Theory.** (3) F Solar and other energy sources in designed and natural environments; architectural, urban, and regional implications of strategies using other renewable resources.

##### 681 Architectural Theory.

(3) S An examination of architectural theory. Emphasis on application of theory to practice. Seminar. Prerequisite: instructor approval.

**682 Architectural Criticism.** (3) F  
An examination of architectural criticism, emphasizing specific methods of criticism and their application for aesthetic judgment. Seminar. Prerequisite: instructor approval.

**683 Critical Regionalism.** (3) N  
Critical inquiry in cultural grounding the definition of place in architectural theory and practice. Lecture, field studies. Prerequisite: APH 446 or 447.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**ARCHITECTURAL TECHNOLOGY**

**ATE 501 Introduction to Solar Energy.** (3) N  
Introduction to theoretical and practical aspects of use of solar radiation and nocturnal cooling for control of building environments.

**521 Building Environmental Science.** (3) F  
Scientific principles relating to comfort and environmental control. Heat and moisture transfer. Solar/natural energies for heating, cooling, and lighting. Lecture, lab. Prerequisite: MAT 290 or equivalent.

**522 Desert Habitation Technology.** (3) N  
Analysis of habitation approaches in nontechnological and technological societies arising from the nature of desert areas.

**530 Daylighting Design.** (3) S  
Daylight analysis, availability, design sky measurements, modeling and simulation. Integration with passive heating, cooling, building design, and energy considerations. Lecture, lab.

**533 Building Performance Simulation and Visualization.** (3) S

Simulating, analyzing, and evaluating building energy, lighting, and acoustic systems using computer software packages. Lecture, lab.

**534 Earth Sheltering.** (3) S  
Fundamentals of earth-atmosphere interaction, thermal and moisture effects, soil appraisal, underground passive techniques, comfort and energy efficiency. Lecture, lab.

**550 Passive Cooling in Buildings.** (3) N  
Theory, analysis, and application of passive and low energy cooling systems for thermal comfort in buildings. Prerequisite: ATE 521.

**551 Passive Heating in Buildings.** (3) N  
Theory, analysis, and application of passive and low energy heating systems for thermal comfort in buildings. Prerequisite: ATE 521.

**552 Energy Parameters in Buildings.** (3) N  
Advanced modeling. Transient and multidimensional analysis of thermal and daylight performance using variable weather data. Prerequisite: ATE 551 or instructor approval.

**553 Building Systems III.** (3) F  
Design and integration of building systems, including mechanical, electrical, plumbing, security, communications, fire protection, and transportation. Prerequisite: admission to upper division or instructor approval.

**554 Building Energy Efficiency.** (3) S  
Impact of building design on energy performance. Climate responsiveness, operations dynamics, and subsystems integration in thermal comfort and efficiency. Prerequisite: ATE 452.

**557 Construction Documents I.** (3) S  
Production of architectural working drawings; legal status, organization, layout, site survey plans, sections, elevations, details, schedules, and coordination. Lecture, Lab. Prerequisite: admission to upper division.

**558 Bioclimatic Parameters.** (3) S  
Theory, analysis, and application of energy-related parameters of site, climate, human comfort, and building program for design synthesis.

**560 Building Energy Analysis.** (3) F  
Computer simulation of building thermal behavior. Software review. Detailed study of selected simulation models using case study projects. Lab. Prerequisites: ANP 475 or 477; ATE 582.

**561 Energy Analysis Techniques.** (3) F  
Mathematical models of building envelope and comfort conditioning systems as bases for optimization techniques. Prerequisite: ATE 560.

**562 Experimental Evaluation.** (3) A  
Instrumentation, measurement and computational techniques for analysis of building components, and assessment of thermal and luminous performance. Prerequisite: ATE 521.

**563 Building Structures III.** (3) F  
Analysis, design, and detailing of steel buildings and frames. Lateral analysis of small rigid and braced frame systems. Lecture, lab. Prerequisite: ATE 462 or equivalent.

**564 Advanced Structures: Concrete.** (3) A  
Analysis, design, and detailing of concrete systems, considering continuity, multistory frames and shear walls, and lateral analysis. Computer application. Prerequisite: ATE 563 or instructor approval.

**565 Advanced Structures: High Rise.** (3) A  
Developments in high-rise construction. Effects of wind and seismic forces. Preliminary analysis, design, and detailing considering code requirements. Lecture, lab. Prerequisite: ATE 563 or instructor approval.

**582 Environmental Control Systems.** (3) A  
Heating, ventilation, and air-conditioning systems. Loads, psychometrics, refrigeration cycle, air/water distribution, controls, energy performance standards, and utility rates. 2 hours lecture, 3 hours lab, field trips. Prerequisites: ATE 451 or 521.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**ARCHITECTURE PROFESSIONAL STUDIES**

**ARP 684 Professional Internship.** (2-6) S  
Field experience in an architectural firm specializing in an area directly related to the student's advanced study. Integration of theory and state-of-the-art practices. Credit/no credit. Prerequisite: instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**Art**

**Julie F. Codell**

*Director*

(ART 102) 602/965-3468

**PROFESSORS**

ALQUIST, BRECKENRIDGE, BRITTON, CHOU, CODELL, COLLINS, ECKERT, ERICKSON, FRONSKE, GASOWSKI, GILLINGWATER, JAY, KAIDA, LOVELESS, MAGENTA, MEISSINGER, PILE, PIMENTEL, RISSEEUW, SCHMIDT, SHARER, STULER, SWEENEY, J.R. TAYLOR, WHITE

**ASSOCIATE PROFESSORS**

COCKE, DeMATTIES, DETRIE, DUNCAN, FAHLMAN, GULLY, HAJICEK, JENKINS, KROEGER, KRONENGOLD, MAXWELL, PATEL, PITTSLEY, SCHLEIF, SCHOEDEL, SCHUTTE, SERWINT, STOKROCKI, UMBERGER, VERSTEGEN, WEISER, B. YOUNG, J. YOUNG

**ASSISTANT PROFESSORS**

ATER, CROSKREY, PESSLER, SANFT, WOLFFHAL

**PROFESSORS EMERITI**

BROADLEY, FINK, GOO, GRIGSBY, HAHN, HELLER, JACOBSON, KELLY, LINDERMAN, SCHAUMBURG, SHIPP, J.J. TAYLOR, WAGNER, WATSON, WOODS

The faculty in the School of Art offer a program with a major in Art leading to the Master of Arts degree with concentrations in art education and art history. The faculty also offer a program with a major in Art leading to the Master of Fine Arts degree. For information concerning the M.F.A., refer to pages 61-64.

A Doctor of Education degree program option, with a concentration in art education, is available. The Ed.D. is offered and administered through the College of Education. See pages 74-75 for program description.

Students admitted to the Master of Education degree program with a major in Secondary Education may also elect art as the subject matter field.



**MASTER OF ARTS DEGREE****Art Education**

**Admission.** An applicant must have a bachelor's degree from an accredited college or university with a major of not less than 45 semester hours of art, including 12 hours of art history and six hours of art education. Additional hours may be required by the school.

An applicant must have a GPA of at least 3.00 in undergraduate course work during the junior and senior years. Applicants who do not meet these requirements must submit scores from the Miller Analogies Test or the Graduate Record Examination. Applicants should submit a formal art education research paper for review.

**Program of Study.** The degree program requires a minimum of 30 semester hours of credit in art education, including 18 hours of core courses, six hours of special topics on research related to integrating the teaching of studio art, art history, and criticism or aesthetics, and six hours of research and thesis.

To meet the core requirements, students must take the following core courses:

ARE 510	Art Education Colloquium	....	3
ARE 520	Issues in Teaching Art History	.....	3
ARE 525	Research on Teaching Art History	.....	3
ARE 530	Issues in Teaching Studio Art	.....	3
ARE 535	Research on Teaching Studio Art	.....	3
ARE 540	Teaching Art in Cultural Contexts	.....	3

Before the end of the first semester of course work (six or more semester hours), a program of study must be submitted to the Graduate College. Additional program requirements are indicated in the *Guidelines for the M.A. in Art Education*.

**Qualifying Research Paper.** A qualifying research paper must be submitted at the end of the semester in which the student completes the first 15 hours of course work. This paper must be judged satisfactory by the art education faculty before the start of the following semester, or the student is put on probation. During the semester following the qualifying research paper review, the student on probation may not enroll in more than nine semester hours of course work (these may not be thesis

hours). To continue in the program, the student must submit a satisfactory research paper before the end of that semester.

**Thesis Requirements.** A written thesis is required.

**Final Examinations.** A final oral examination in defense of the thesis is required.

**Art History**

**Admission.** An applicant must have a bachelor's degree with an undergraduate major or minor in art history, or at least four upper-division art history courses, in which an average GPA of 3.00 was maintained. Graduate Record Examination (aptitude test) scores must be submitted in support of the application, along with three letters of recommendation. Applicants should submit one formal research paper for review and a one-page statement of intent indicating their objectives for graduate study. The application deadline is February 1.

**Program of Study.** The degree program requires 33 semester hours of credit including a minimum of 21 hours in art history, with at least 12 of these earned in 500-level seminars. At least one course must be taken in each of the four core areas: Non-Western, Ancient/Medieval, Renaissance/Baroque, and Modern. Satisfactory completion of ARS 500 Research Methods is required during the first semester of residence. The remaining hours include ARS 599 Thesis, approved electives, and other courses specified by the faculty.

For more information, a student should request a copy of the *Procedural Guidelines for the M.A. Program in Art History* from the School of Art.

**Foreign Language Requirements.** Demonstration of a reading knowledge of one foreign language (French, German, or with faculty approval, another language appropriate to the field of study) is required. Depending upon the student's chosen area of study, reading knowledge of an additional language may be required.

**Qualifying Research Paper.** In order for the student to continue graduate study, a qualifying research paper, submitted in the semester in which 15 hours will be completed, must be judged satisfactory by the faculty.

**Thesis Requirements.** A written thesis is required.

**Final Examinations.** A final oral examination in defense of the thesis is required.

**MASTER OF FINE ARTS DEGREE****Art**

The Master of Fine Arts degree with a major in Art requires a minimum of 60 semester hours of graduate work beyond the bachelor's degree. The objective of this degree is to provide advanced study in one or more of the following concentrations: ceramics, drawing, fibers, intermedia, metals, painting, photographic studies, photography, printmaking, sculpture, or wood. For information concerning this degree program, see pages 61-64.

**Research Activity**

Faculty and student research is conducted in the following areas:

**Art History.** American art, Chinese art, art criticism, history of photography, Native American art, Pre-Columbian art, ancient, medieval, renaissance, Baroque, modern art, and critical theory.

**Art Education.** Teaching and learning in studio art and art history with an emphasis on elementary, secondary, and higher education settings; multi-cultural and cross-cultural art; curriculum and instruction; development of instructional resources (e.g., video and computer instruction); developmental studies; assessment in art; theoretical issues; historical, philosophical, and qualitative/quantitative research in art education.

**Studio Art.** Painting and drawing, intermedia, fine art printing and bookmaking, papermaking, sculpture, lithography, screenprinting, intaglio and monoprinting, computer graphics, video art, fine art photography, ceramics, metalworking, wood, and fibers. Studio faculty and graduate students pursue ongoing research in various materials and techniques and investigate images and concepts in contemporary and historical art forms.

Resources for studio art research include the Visual Arts Research Studios, which incorporate the Print Research Facility, the Photography Collaboration Facility, and the Pyracantha Press (typography and limited edition books).

Research activities are enhanced greatly by active programs utilizing visiting artists/scholars, guest lecturers



and by the resources of the ASU Art Museum and Hayden Library, the Phoenix Art Museum, and the Heard Museum of Anthropology and Primitive Arts.

## ART

- ART 401 Nonsilver Photography.** (3) F, S  
Recognition of the inherent characteristics of nonsilver processes and their use in communicating ideas. 6 hours a week. May be repeated for credit. Prerequisite: ART 304 or instructor approval.
- 403 Senior Photographic Projects.** (3) F, S  
Technical and philosophical refinement of personal aesthetic with various photographic media. 6 hours a week. May be repeated for credit. Prerequisite: ART 304 or instructor approval.
- 404 Portraiture Photography.** (3) F, S  
Photographing people. Critical discussions and slide lectures on issues in portraiture. 6 hours a week. May be repeated for credit. Prerequisites: ART 304 or instructor approval.
- 405 Advanced Color Photography.** (3) F, S  
Intensive use of subtractive color process in photographic printing. 6 hours a week. May be repeated for credit. Prerequisite: ART 305 or instructor approval.
- 406 Photo Techniques.** (3) F, S  
Camera and darkroom techniques with emphasis on creative control of the black and white print. 6 hours a week. Prerequisite: ART 301 or instructor approval.
- 407 View Camera.** (3) F, S  
View camera and darkroom techniques. Studio, lab. Prerequisite: ART 301 or instructor approval.
- 409 Photographic Exhibition.** (3) A  
Care of photographic prints, print presentation, and exhibition. Practical experience in gallery operations. 6 hours a week. May be repeated for credit. Prerequisite: ART 304 or instructor approval.
- 411 Advanced Drawing.** (3) F, S  
Visual and intellectual concepts through problem solving and independent study. Emphasis on the individual creative statement. 6 hours a week. May be repeated for credit. Prerequisites: ART 311; instructor approval.
- 414 Advanced Life Drawing.** (3) F, S  
Various media and techniques on an advanced level. The human figure as an expressive vehicle in various contexts. 6 hours a week. May be repeated for credit. Prerequisite: ART 315 or instructor approval.
- 415 Art Anatomy.** (4) N  
Study of human anatomical structures as applied to the practice of figure oriented art. 3 hours lecture, 5 hours studio a week. Prerequisite: ART 214.
- 421 Painting Materials and Techniques.** (3) A  
Traditional and modern materials and techniques of painting. Experimental problems in tempera, encaustic, casein emulsions, Maroger's Medium, and synthetic media. 6 hours a week. Prerequisite: instructor approval.
- 423 Advanced Painting.** (3) F, S  
Continuation of ART 324. 6 hours a week. May be repeated for credit. Prerequisite: ART 324.
- 425 Advanced Figure Painting.** (3) F, S  
Continuation of ART 325. 6 hours a week. May be repeated for credit. Prerequisites: ART 315, 324, 325.
- 427 Advanced Watercolor.** (3) F, S  
Continuation of ART 327. More advanced formal, conceptual, and technical problems in contemporary watercolor. 6 hours a week. May be repeated for credit. Prerequisite: ART 327.
- 431 Special Problems in Sculpture.** (3) F, S  
Development of a personal approach to sculpture, emphasis on form, individual problems, and related color technology. Professional practices and presentation. 6 hours a week. May be repeated for credit. Prerequisites: ART 332; instructor approval.
- 432 Neon Sculpture.** (3) F  
Techniques for creating neon in an art context. Glass tube bending and fabrication. Construction of artworks utilizing light generating gasses. 6 hours a week. May be repeated for credit. Prerequisite: instructor approval.
- 436 Architectural Sculpture.** (3) N  
Sculptural concepts as related to architecture and other man-made environments. Scale drawing, models, and relief sculpture. 6 hours a week. May be repeated for credit. Prerequisite: ART 332 or instructor approval.
- 437 Dimensional Animation.** (3) F  
Production of short 16mm films that feature articulated sculptural objects, models, dolls, puppets, and graphics through the use of single frame filming techniques. 6 hours a week. May be repeated for credit. Prerequisite: instructor approval.
- 438 Experimental Systems in Sculpture.** (3) S  
Simple electrical and mechanical systems that can be utilized in the context of studio art and installations. Active production of studio art works required. 6 hours a week. May be repeated for credit. Prerequisite: instructor approval.
- 439 Mixed Media.** (3) F, S  
Exploring visual effects by combining traditional and nontraditional methods, techniques, and concepts. 6 hours a week. May be repeated for credit. Studio. Prerequisites: ART 113 and 115 and 6 hours additional studio requirements or instructor approval.
- 440 New Media Concepts.** (3) F, S  
Continued experiments with new media and interdisciplinary concerns in art. 6 hours a week. May be repeated for credit. Prerequisite: ART 340. Corequisite: ART 441.
- 441 Video Art.** (1) F, S  
Utilizing video and audio equipment essential to the production of broadcast quality video art. 2 hours a week. May be repeated for credit. Corequisite: ART 440.
- 442 Folk/Outsider Art.** (3) F  
Exploration of ideas, attitudes, and art of contemporary "self-taught," "visionary," and "outsider" artists. Research and studio practice. Lecture, studio. Prerequisites: ART 115 or instructor approval.
- 443 Intermedia.** (3) F, S  
Experimental, conceptual, and interdisciplinary studio art with emphasis on new media and technologies. 6 hours a week. May be repeated once for credit. Prerequisites: ART 340 or instructor approval.
- 446 Computer Art II.** (3) A  
Three-dimensional modeling, lighting, surface attributes, and special effects for art applications. Emphasis on explicit commands. Studio. Prerequisite: ART 444 or instructor approval. *General Studies: N3.*
- 449 Computer Animation II.** (3) F, S  
Advanced principles and applications of 3-dimensional animation for art and design. Emphasis on lighting, surfaces, and camera motion. Studio. Prerequisite: ART 448 or instructor approval.
- 452 Advanced Lithography.** (3) F, S  
Continuation of ART 352. 6 hours a week. May be repeated for credit. Prerequisite: instructor approval.
- 454 Advanced Screen Printing.** (3) A  
Continuation of ART 354. 6 hours a week. May be repeated for credit. Prerequisite: instructor approval.
- 455 Advanced Photo Processes for Printmaking.** (3) A  
A continued study of photomechanical techniques and applications to printmaking or photographic processes. Prerequisite: ART 355 or instructor approval.
- 456 Fine Printing and Bookmaking I.** (3) A  
Letterpress printing and typography as fine art. Study of history, alphabets, mechanics of hand typesetting, presswork, and various forms of printed matter. Prerequisite: instructor approval.
- 457 Fine Printing and Bookmaking II.** (3) A  
Continuation of ART 456. Bookbinding, book design and printing, advanced typography, theory, and presswork. May be repeated for credit. Prerequisites: ART 456; instructor approval.
- 458 Papermaking.** (3) F, S  
History, theory, demonstrations, sheet forming, collage treatments, and 3-dimensional approaches. 6 hours a week. May be repeated for credit. Prerequisite: instructor approval.
- 459 Monoprinting.** (3) F, S  
The nonmultiple printed image using a variety of technical approaches. 6 hours a week. May be repeated for credit. Prerequisites: ART 311, 323 or any 300-level printmaking class; instructor approval.
- 460 Ceramic Clay.** (3) A  
Research into various clay body formulations, local natural materials, slip glazes, and engobes. 6 hours a week. Prerequisites: ART 360 and 364 or instructor approval.
- 463 Ceramic Glaze.** (3) A  
Glaze formulation and calculation using various glaze surfaces and colors. 6 hours a week. Prerequisite: ART 460 or instructor approval.
- 466 Special Problems in Ceramics.** (3) F, S, SS  
Emphasis on personal expression within structure of seminars, critiques, and studio work. Professional methods of presentation/documentation of work. 6 hours a week. May be repeated for credit. Prerequisite: ART 364 or instructor approval.
- 472 Advanced Jewelry.** (3) F, S  
Jewelry making with emphasis on developing personal statements and craftsmanship. 6 hours a week. May be repeated for credit. Prerequisites: ART 372; instructor approval.

**473 Advanced Metalworking.** (3) A

Forging and forming techniques in individualized directions. 6 hours a week. May be repeated for credit. Prerequisites: ART 373; instructor approval.

**474 Advanced Wood.** (3) F, S

Extended experience and advanced techniques in the use of wood to create functional works of art. 6 hours a week. May be repeated for credit. Prerequisites: ART 374; instructor approval.

**476 Fibers: Multiple Harness Weaving.** (3) F, S

Advanced loom techniques and computer pattern design. Emphasis on individual design and loom application. Prerequisites: ART 113 or 115 or 376 or instructor approval.

**477 Printed Textiles.** (3) A

Techniques for screen printing on fabric exploring pattern as a compositional element. Various stencil methods including photographic processes. Studio. May be repeated for credit. Prerequisite: ART 377 or instructor approval.

**530 Two-Dimensional and Three-Dimensional Computer Art.** (3) A

Integration of 2-Dimensional and 3-Dimensional computer imaging for art. Emphasis upon new directions for computer imaging which accounts for media characteristics. Studio.

**540 Advanced Computer Art.** (3) A

Study of motion for 3-dimensional models, light sources, and surface effects. Course assumes students have a comprehension of complex modeling, mapping, and lighting. Studio. Prerequisite: ART 446 or instructor approval.

**551 Intaglio Projects.** (3) F, S

The materials and methods of Intaglio as a matrix for exploring various contemporary issues. Specifically structured to accommodate the graduate level drawing with no printmaking background. Studio.

**621 Studio Problems.** (3) F, S, SS

Advanced study in the following areas:

- (a) Drawing
- (b) Painting
- (c) Photography
- (d) Printmaking
- (e) Sculpture
- (f) Ceramics
- (g) Metals
- (h) Wood
- (i) Fiber Art
- (j) Studio Art

6 hours a week each section. May be repeated for credit. Prerequisite: instructor approval.

**680 Practicum: M.F.A. Exhibition.** (1-15) F, S, SS

Studio work in preparation for required M.F.A. exhibition. Public exhibit to be approved by the student's supervisory committee and accompanied by a final oral examination. Photographic documentation and written statement of problem. Prerequisite: approval of the student's supervisory committee.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**ART EDUCATION****ARE 450 Studio Art: Art History I.** (3) A

Art traditions before the 20th century as a basis for studio and art history instruction. 2 hours lecture, 2 hours studio. Pre- or corequisite: ARE 460

**460 Art Education and Design.** (3) A

Electronic imaging in design, design in social and cultural contexts, hypermedia in design education. 2 hours lecture, 2 hours studio. ARS 101 and 102 and ART 113 and 115 or instructor approval.

**470 Art Criticism: Aesthetics.** (3) F

Traditions of aesthetics and art criticism; conceptual issues in contemporary art; education in the visual arts. 2 hours lecture, 2 hours studio. Prerequisite: ARE 460 or instructor approval.

**482 Studio Art: Art History II.** (3) S

Art traditions of the 20th century as a basis for studio and art history instruction. 2 hours lecture, 2 hours studio. Must be taken before enrollment in ARE 486. Students are recommended to take ARE 470 concurrently. Prerequisite: ARE 450.

**486 Art Education: Strategies and Applications.** (3) F

The implementation and evaluation of art instruction for K-12 population. Includes teaching of Saturday classes in the Children's Art Workshop. Prerequisite: ARE 482.

**496 Methods and Assessment of Learning in Art.** (3) S

Individual or group research on the assessment of art learning incorporating theory and practice. Prerequisites: ARE 470 and 486 or instructor approval.

**510 Art Education Colloquium.** (3) F

Historical foundations of art education and faculty presentation of positions regarding teaching and research related to the visual arts. Must be taken in the first 6 hours of study.

**515 Art Foundations of Art Education.** (3) A

Foundations of art education, with an emphasis on psychological, philosophical, and historical frames of reference.

**520 Issues in Teaching Art History.** (3) A

Critical examination of issues concerning teaching art history to different populations of students. Historical and philosophical foundations and emphasis on developing inquiry into historical and cultural contexts of art. Recommended to be taken before ARE 525.

**525 Research on Teaching Art History.** (3) A

Review of empirical and historical research, research methods, learning theory, and assessment of learning in art history. Pilot studies on the effects of instruction upon learning. Recommended to be taken after ARE 520.

**530 Issues in Teaching Studio Art.** (3) A

Critical examination of issues concerning teaching studio art to different populations of students. Historical and philosophical foundations. Emphasis on how concepts for representation are developed. Recommended to be taken before ARE 535.

**535 Research on Teaching Studio Art.** (3) A

Review of empirical and historical research methods, learning theory, and assessment of learning in studio art, including developmental studies and their limitations. Pilot studies on the effects of instruction upon learning. Recommended to be taken after ARE 530.

**540 Teaching Art in Cultural Contexts.** (3) A

Relationship of multicultural perspectives to teaching/learning art criticism, aesthetics, studio art, and art history.

**550 Aesthetic Inquiry.** (3) A

Literature on aesthetics, methods of inquiry, and implications for art education.

**570 Analyzing Works of Art.** (3) N

The critical examination of art or statements about art and the development of ways for guiding this examination.

**610 Issues and Trends in Art Education.** (3) N

Doctoral-level investigation of historical and contemporary issues related to teaching and research in art education.

**611 Curriculum Development in Art Education.** (3) N

Doctoral-level inquiry into the philosophical, psychological, and sociological foundations of curriculum development.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**ART HISTORY****ARS 400 History of Printmaking.** (3) A

History of the print as an art form and its relation to other modes and forms of artistic expression. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies:* HU, H.

**410 Early Christian and Byzantine Art.** (3) A

Art and architecture of the early church and the Byzantine Empire from the 4th to the 15th century. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies:* HU.

**412 Early Medieval Art.** (3) N

Painting, sculpture, architecture, and the minor arts from Migration, Carolingian, and Ottonian periods considered within religious, social, and economic contexts. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies:* HU, H.

**417 Late Gothic Art in Central Europe.** (3) N

Sculpture, painting, and architecture of the late-Gothic style (ca. 1350-1525), considered within religious, social, economic, and political contexts. Prerequisites: ARS 101 and 102 or instructor approval.

**418 Renaissance Art in Northern Europe.** (3) A

Graphics, painting, sculpture, and architecture ca. 1450-1550. Reformation themes and Renaissance style considered within religious, political, social, and economic contexts. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies:* HU.

**420 Early Renaissance Art in Italy.** (3) N

Painting, sculpture, and architecture in Italy from 1300 to 1500. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies:* HU, H.

**424 Italian Baroque Art.** (3) A

Italian painting, sculpture, and architecture of the 17th century. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies:* HU, H.

**426 Art of the 17th Century in Northern Europe.** (3) A

Baroque painting, sculpture, and architecture in Flanders, the Netherlands, France, and England. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies:* HU, H.

- 434 Realism and Impressionism: European Art 1840–1880.** (3) N  
Social, political, aesthetic forces affecting art. Concentration on Courbet, Daumier, Manet, Monet, Degas, and tensions between avant-garde and Academic art. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies: HU.*
- 436 Art at the Turn-of-the-Century: 1885–1914.** (3) A  
History of European avant-garde movements. Concentration on post-impressionism, symbolism, expressionism, and cubism. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies: HU.*
- 438 Art of the 20th Century I.** (3) A  
Developments and directions in art between 1900 and World War II. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies: HU, H.*
- 439 Art of the 20th Century II.** (3) A  
Art since World War II, with consideration of new concepts and experimentation with media and modes of presentation. Prerequisites: ARS 101 and 102 and 438 or instructor approval. *General Studies: HU, H.*
- 452 Facets of Modernism.** (3) A  
The origins of modern art, photography between 1915–1920, and the influence of these ideas on contemporary imagemakers. Lecture, discussion, papers. Prerequisites: ARS 350, 351.
- 453 Issues in Contemporary Photography.** (3) A  
A discussion seminar identifying, defining, and researching the issues and ideas that influence the appearance and criticism of contemporary images. Seminars, lectures, presentations, papers. Prerequisites: ARS 350, 351.
- 454 Research and Writing in Photography.** (3) A  
Principles and practice of research and writing in the history and criticism of photography. Papers required. Prerequisites: ARS 450 and 451 or instructor approval; ENG 101 and 102 or equivalents.
- 455 Photo Studies.** (3) A  
A seminar comprising lectures, presentations, and discussions on issues in education, history, gallery management, writing criticism, and the medium's future. Seminar, lectures, presentations, papers.
- 457 History of Art Criticism.** (3) N  
Theories of criticism of the visual arts from late 18th century to present. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies: H.*
- 458 Critical Theories in the Visual Arts.** (3) N  
Examines current critical theories through their application to all visual arts. May include new historicism, Marxism, deconstruction, post-structuralism, semiotics, Lacanian psychoanalysis, feminism, postmodernism. Lecture, discussion, student presentations. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies: HU.*
- 459 Writing Art Criticism.** (3) N  
Traditional and contemporary approaches to the criticism of art. Students will write critical essays. The latter half of the semester will stress the criticism of contemporary art in various media. Prerequisite: ARS 458 or instructor approval.
- 463 Precolumbian Art II.** (3) A  
Architecture, sculpture, ceramics, textiles, and other art of South America prior to European contact with focus on the Central Andes. Satisfies non-Western art history requirement. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies: HU, H.*
- 466 Native American Art of the Southwest.** (3) A  
American Indian art in the southwestern states from its origins to the present day. Meets non-Western art history requirement. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies: HU, C/H.*
- 468 Art of the Arctic and Northwest Coast.** (3) N  
Art associated with ceremony, shamanism, and daily life in the Arctic and on the Northwest Coast. Meets non-Western art history requirement. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies: HU.*
- 469 Mexican Art.** (3) A  
Art of Mexico and related Central American cultures from the prehistoric to the contemporary schools. Meets non-Western art history requirement. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies: HU, H.*
- 472 Art of China.** (3) A  
Study of major forms in Chinese art: ritual bronze, sculpture, ceramic, calligraphy, painting, and architecture. Satisfies non-Western art history requirement. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies: HU.*
- 485 Women in the Visual Arts.** (3) S  
Historical study of art by women in various media; related social, political, educational issues; representation of women in art. Lecture, discussion. Prerequisite: ARS 101 or 102 or instructor approval. *General Studies: L2.*
- 501 Methodologies and Art History.** (3) F  
The history of the discipline and an exploration of various methodologies, critical theory, and bibliographies used by art historians. Seminar.
- 502 Critical Studies in Egyptian Art.** (3) N  
Egyptian art from pre-Dynastic to New Kingdom periods. Focus on aesthetic, philosophical, and cultural context. Research paper and readings required.
- 504 Critical Approaches to Greek Art.** (3) A  
Art and architecture of Aegean civilizations (Cycladic, Minoan, Mycenaean) and of Greece to end of Hellenistic period. Research paper and readings required.
- 506 Critical Studies in Roman Art.** (3) A  
Art and architecture of Etruria, the Roman Republic, and the Roman Empire. Research paper and/or supplemental readings required.
- 514 Critical Approaches to Romanesque Art.** (3) N  
Sculpture, painting, architecture, and the minor arts in western Europe, ca. 1030–1200, considered within religious, economic, and social contexts. Research paper required.
- 516 Critical Approaches to Gothic Art.** (3) N  
Architecture, sculpture, painting, and the minor arts in western Europe, ca. 1150–1350, considered within religious, social, and economic contexts. Research paper required.
- 517 Critical Approaches to Late Gothic Art.** (3) N  
Art of the late-Gothic style (ca. 1350–1525) considered within religious, social, economic,
- and political contexts. Research or reading project required.
- 522 Sixteenth Century Italian Art.** (3) A  
Critical study of painting, sculpture, and architecture in 16th century Italy in its religious and historical context.
- 528 Eighteenth Century Art in Europe.** (3) A  
Critical study of European art from the late Baroque to the early years of Neoclassicism.
- 530 Art of Spain and New Spain.** (3) A  
Critical study of architecture, painting, and sculpture from 1500 to 1800. Lecture, conference.
- 532 Art, Politics, and Patronage 1770–1850.** (3) F  
Critical analyses of political events in Europe. Issues of patronage, art as propaganda examined. Impact of war and revolution on visual arts.
- 534 Studies in Modern European Art, 1850–1914.** (3) A  
Critical study of visual arts using primary source material from mid-19th century to WWI within philosophical, socio/economic contexts. Lecture, tutorial. Prerequisite: instructor approval.
- 542 Critical Issues in American Painting I.** (3) A  
Explores themes and social issues in American art with a critical study of American painting from the 18th century to 1850. Lecture, discussion. Prerequisites: ARS 101 and 102.
- 543 Critical Issues in American Painting II.** (3) A  
Explores themes and social issues in American art with a critical study of American painting from 1850 to 1900. Lecture, lab. Prerequisite: instructor approval.
- 544 American Modernism and Realism, 1900–1945.** (3) A  
Critical study of the social, political, and artistic changes in American art during the first half of the twentieth century. Prerequisites: ARS 101 and 102 or 340.
- 549 Gender and Representation in Photography.** (3) N  
An examination of gender issues in photography. Research paper. Lecture, discussion. Prerequisites: ARS 101 and 102 or instructor approval.
- 562 Art of Ancient Mesoamerica.** (3) F  
Critical study of art and architecture of Mexico and Maya area before Spanish contact. Lecture, conference.
- 565 Native Art of North America.** (3) A  
A critical examination of Native American art within culture, prehistory to the present. Prerequisites: ARS 101 and 102 or instructor approval.
- 574 Studies in Japanese Art.** (3) A  
A critical examination of the nature and history of Japanese art, its rich heritage and its indebtedness to foreign sources. Lecture, discussion. Prerequisites: ARS 101 and 102 or instructor approval.
- 575 Approaches to Chinese Painting.** (3) F  
A critical history of Chinese painting from Eastern Chou to 1911. Emphasis on masters, regional developments, and conceptual underpinnings. Lecture, discussion. Prerequisites: ARS 101 and 102 or instructor approval.

**591 Seminar. (3-6) A**

Graduate seminar in topics selected from the following. Problems or criticism in:

- (a) Chinese Art
- (b) Ancient Art
- (c) Medieval Art
- (d) Renaissance Art
- (e) Baroque Art
- (f) Modern Art
- (g) American Indian Art
- (h) Pre-Columbian Art
- (i) Photographic History
- (j) American Art

Prerequisite: instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**ART AUXILIARY COURSES**

**ARA 460 Gallery Exhibitions. (3) F, S**  
Practical experience in all phases of department gallery operations and preparation of gallery publications. May be repeated for credit. Prerequisite: instructor approval.

**488 Understanding Art. (3) F, S**  
Understanding art as an emergent cultural phenomenon with an emphasis on a critical examination of conceptual issues in art. Writing required. Prerequisites: ARS 101 and 102 or instructor approval. *General Studies: L2/HU.*

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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**Bioengineering**

Eric J. Guilbeau  
*Chair*

(EC G202) 602/965-3313

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**PROFESSORS**  
GUILBEAU, TOWE

**ASSOCIATE PROFESSORS**  
GARCIA, HE, YAMAGUCHI

**ASSISTANT PROFESSORS**  
KIPKE, PIZZICONI, SWEENEY

**PROFESSOR EMERITUS**  
DORSON

The Bioengineering faculty within the Department of Chemical, Bio and Materials Engineering offer graduate programs leading to the Master of Science and Doctor of Philosophy degrees with a major in Bioengineering. Areas of study include biochemical engineering, bioelectrical engineering, biomechanical engineering, biosystems/biotransport engineering, bioinstrumentation, biomaterial engineering, and biocontrol engineering. Research topics include artificial organs, biocontrol

systems, biomechanics, bioinstrumentation, biomaterials, biosystems engineering, biotechnology, cardiovascular engineering, cellular and tissue bioengineering, neural bioengineering, noninvasive imaging, and rehabilitation engineering.

**Graduate Record Examination.**

Graduate Record Examination (GRE) scores are required from all students.

**Transition Program.** Students applying to the Bioengineering Master of Science or Doctor of Philosophy degree programs may have an undergraduate B.S. degree in a major field other than Bioengineering. The qualifications of transition students are reviewed by the department graduate committee and a special program of transition course work is designed for successful applicants. In general, transition students should have had, or be prepared to take, calculus through ordinary differential equations, physics, inorganic chemistry, and a number of undergraduate engineering courses in order to be prepared for graduate Bioengineering courses. Other course work from the undergraduate program may be required depending upon the research topic selected by the student. Transition students should contact the graduate coordinator to evaluate the undergraduate transcript.

**MASTER OF SCIENCE DEGREE**

For information concerning the Master of Science degree, refer to pages 53-55.

**Program of Study.** All candidates for the degree Master of Science with a major in Bioengineering are required to complete an approved program of study consisting of the minimum required semester hours, including research and thesis. Special course requirements for the different areas of study are established by the faculty and are available from the Department of Chemical, Bio and Materials Engineering. Part-time students must successfully complete a research seminar course for at least three semesters during the course of study. Candidates whose undergraduate degree was in a field other than bioengineering may be required to complete more than 30 semester hours of credit on the program of study.

**Research Seminar Requirements.** In addition to the course work and thesis requirements, all full-time master's degree students must successfully complete a research seminar course during each semester of attendance.

**Thesis Requirements.** A written thesis is required.

**Final Examinations.** A final oral examination in defense of the thesis is required.

**DOCTOR OF PHILOSOPHY DEGREE**

See pages 76-77 for general requirements.

The Doctor of Philosophy degree with a major in Bioengineering is conferred upon evidence of excellence in research resulting in a scholarly dissertation that is a contribution to knowledge.

**Program of Study.** Upon admission of the applicant with regular or provisional status, a supervisory committee (program committee) is appointed. This committee is responsible for the guidance and direction of the student's graduate program of study. The program committee is composed of a minimum of three faculty members, including a chair. Generally, the student's graduate advisor serves as chair of the program committee. The program committee advises the student in developing a program of study and assumes primary responsibility in assessing the student's progress in the program.

**Research Seminar Requirements.** In addition to the course work and dissertation requirements, all full-time doctoral students must successfully complete a research seminar course during each semester of attendance.

**Qualifying Examination.** A qualifying exam is administered to test the student's mastery of basic engineering fundamentals. The examination is usually taken early in the student's program of study (after two semesters of residence at ASU, and no later than three semesters). A student must express in writing the intention to take the exam to the department graduate committee through the graduate coordinator.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** When the Ph.D. student has essentially completed the course work in the approved program of study, the student is given a written comprehensive examination covering the field of study. The written examination is followed by an oral exam.

**Admission to Candidacy and Appointment of Dissertation Committee.** After the student passes the comprehensive examinations, a dissertation committee composed of at least five faculty members is appointed. The dissertation committee meets to approve the student's dissertation prospectus. Generally, the prospectus should include a pertinent review of the literature, a statement of the proposed study, the hypothesis to be tested, a description of the research design, a discussion of the specific data to be collected, and a description of the means by which the data is to be analyzed. After the dissertation committee has approved the prospectus, the student applies to the Graduate College for admission to candidacy.

**Dissertation Requirements.** A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required. The dissertation is expected to reflect and contribute significantly to knowledge. It must clearly indicate mastery of research methods.

**Final Examinations.** A final oral examination in defense of the dissertation is required.

### Research Activity

**Biosystems Engineering/Biotransport.** Artificial organs, medical device design and development, physiological transport phenomena, mathematical simulation of physiological processes, biophysical property correlations, optimization of health delivery systems, cardiovascular engineering, immunomodulation, and organ preservation.

**Biomaterials.** Soft and hard tissue replacement, biocompatibility, composite materials for medical applications, biocompatibility, blood/material interactions, and tissue/material interactions.

**Bioinstrumentation.** Noninvasive medical imaging, biosensors, bioelectric signal processing, electrophysiol-

ogy, bioelectronic device design, bioelectronics, and neurostimulation.

**Biomechanics.** Orthopedic replacement devices, orthotic devices, artificial muscle, rehabilitation engineering, aids for the handicapped, spinal biomechanics, and sport biomechanics.

**Biocontrol.** Optimal strategies for human movement, head and neck coordination/movement, gait analysis, control of anthropomorphic and neuroprosthetic systems, and control strategies for patients with spinal cord injuries.

**Biotechnology.** Hybrid artificial organs, biosensor, biological separations, tissue engineering, and membrane separation processes.

## BIOENGINEERING

**BME 411 Biomedical Engineering I.** (3) F Review of diagnostic and prosthetic methods using engineering methodology. Introduction to transport, metabolic, and autoregulatory processes in the human body. Cross-listed as CHE 411. Prerequisite: instructor approval.

**412 Biomedical Engineering II.** (3) S Review of electrophysiology and nerve pacing applications, introduction to biomechanics and joint/limb replacement technology, cardiovascular and pulmonary fluid mechanics, and the application of mathematical modeling. Cross-listed as CHE 412. Prerequisite: instructor approval.

**414 Biomedical Instrumentation II.** (3) N *Effective through fall 1996.* Principles of applied biophysical measurements using bioelectric and radiological approaches. Prerequisite: BME 413 and ECE 333 or 334, MAT 274 or instructor approval.

**414 Biomedical Measurements.** (3) N *Effective starting spring 1997.* Principles of applied biophysical measurements using bioelectric and radiological approaches. Prerequisite: instructor approval.

**415 Biomedical Transport Processes.** (3) A Principles of momentum, heat, and mass transport with applications to medical and biological systems and medical device design. Prerequisites: MAT 274; PHY 131.

**416 Biomechanics.** (3) F Mechanical properties of bone, muscle, and soft tissues. Static and dynamic analysis of human movement tasks such as locomotion. Prerequisite: BME 318.

**417 Biomedical Engineering Capstone Design I.** (3) F Technical, regulatory, economic, legal, social, and ethical aspects of medical device systems engineering design. Lecture, field trips. Prerequisites: BME 318 (grade of "C" or higher), 334 (grade of "C" or higher).

**419 Biocontrol Systems.** (3) S Application of linear and nonlinear control systems techniques toward analysis of neuromusculoskeletal, cardiovascular, thermal, and mass transfer systems of the body. Prerequisites: ECE 301; MAT 274.

**435 Physiology for Engineers.** (4) F Physiology of the nervous, muscular, cardiovascular, endocrine, renal, and respiratory

systems. Emphasizes use of quantitative methods in understanding physiological systems. Lecture, lab. Prerequisites: BIO 181; CHM 116; PHY 131 or instructor approval.

**461 Health Physics Principles and Radiation Measurements.** (3) S Sources, characteristics, dosimetry, shielding, and measurement techniques for cosmogenic, terrestrial, and anthropogenic radiation. Ionizing and nonionizing radiation theory. ALARA concept. Emphasis on instrumentation, detectors, and environmental monitoring. Lecture, lab. Prerequisite: ECE 301.

**465 Clinical Nuclear Engineering I.** (3) N Fundamentals of clinical nuclear engineering and medical health physics practice. Radiation biology, dosimetry, and shielding for radiotherapy and diagnostic procedures. Prerequisite: instructor approval.

**470 Microcomputer Applications in Bioengineering.** (4) S *Effective through fall 1996.* Use of microcomputers for real-time data collection, analysis, and control of experiments involving actual and simulated physiological systems. Lecture, lab. Prerequisites: BME 435; CSE 181 or basic programming experience; ECE 334.

**470 Microcomputer Applications in Bioengineering.** (4) S *Effective starting spring 1997.* Use of microcomputers for real-time data collection, analysis, and control of experiments involving actual and simulated physiological systems. Lecture, lab. Prerequisites: BME 435; ECE 100, 334.

**490 Biomedical Engineering Projects.** (1-5) F, S, SS *Effective through fall 1996.* Individual projects in medical systems or medical device design and development.

**511 Biomedical Engineering.** (3) A Diagnostic and prosthetic methods using engineering methodology. Transport, metabolic, and autoregulatory processes in the body.

**512 Biomedical Engineering II.** (3) A Electrophysiology and nerve pacing applications, introduction to biomechanics and joint/limb replacement, technology, cardiovascular and pulmonary fluid mechanics, and mathematical modeling.

**513 Biomedical Instrumentation I.** (3) A Principles of medical instrumentation. Studies of medical diagnostic instruments and techniques for the measurement of physiologic variables in living systems.

**514 Advanced Biomedical Instrumentation.** (3) F Principles of applied biophysical measurements using bioelectric and radiological approach. Prerequisites: ECE 334; MAT 274 or equivalent.

**515 Biomedical Transport Processes.** (3) N Principles of momentum, heat, and mass transport with applications to medical and biological systems and medical device design. Cross-listed as CHE 515. Prerequisite: instructor approval.

**516 Topics in Biomechanics.** (3) S Mechanical properties of bone, muscle, and soft tissues. Static and dynamic analysis of human movement tasks, including in-depth project. Prerequisites: ECE 312 and 313 or instructor approval.



**517 Medical Transport Devices I. (3) N**

Heat, mass, and momentum transfer concepts are developed from first principles and applied to the design and application of medical devices. Emphasis is an extracorporeal treatment of blood with channel dimensions which greatly exceed cellular dimensions. Cross-listed as CHE 517. Prerequisites: partial differential equations; at least 1 course in heat, mass, or momentum transfer.

**518 Introduction to Biomaterials. (3) F**

Topics include structure property relationships for synthetic and natural biomaterials, biocompatibility, and uses of materials to replace body parts. Cross-listed as CHE 518. Prerequisite: ECE 313 or instructor approval.

**519 Topics in Biocontrol Systems. (3) F**

Linear and nonlinear control systems analysis of neuromusculoskeletal, cardiovascular, thermal, and mass transfer systems of the body, including in-depth project. Prerequisite: MAT 274.

**520 Bioelectric Phenomena. (3) N**

Study of the origin, propagation, and interactions of bioelectricity in living things; volume conductor problem, mathematical analysis of bioelectric interactions, and uses in medical diagnostics.

**521 Neuromuscular Control Systems. (3) S**

Overview of sensorimotor brain structures. Application of nonlinear, adaptive, optimal, and supervisory control theory to eye-head-hand coordination and locomotion.

**522 Biosensor Design and Application. (3) A**

Theory and principles of biosensor design and application in medicine and biology. Principles of measurements with biosensors. Prerequisite: instructor approval.

**523 Physiological Instrumentation Lab. (1) F**

Laboratory experience with problems, concepts, and techniques of biomedical instrumentation in static and dynamic environments. Lab. Pre- or corequisites: AGB/BME 435; BME/CHE 413; ECE 333 or 334.

**524 Fundamentals of Applied Neural Control. (3) A**

Fundamental concepts of electrical stimulation and recording in the nervous system with the goal of functional control restoration. Pre- or corequisite: BME 435 or instructor approval.

**525 Surgical Techniques. (2) S**

Principles of surgical techniques, standard operative procedures, federal regulations, guidelines, and state-of-the-art methods. Lecture, lab.

**532 Prosthetic and Rehabilitation Engineering. (3) A**

Analysis and critical assessment of design and control strategies for state-of-the-art medical devices used in rehabilitation engineering. Pre- or corequisites: BME 416 (or EPE 610), 419, 435; ECE 312, 313.

**533 Transport Processes I. (3) F**

Unified treatment of momentum, heat, and mass transfer from molecular theory, and continuum points of view. Continuum equations of microscopic and macroscopic systems and multicomponent and multiphase systems. Cross-listed as CHE 533.

**534 Transport Processes II. (3) S**

Continuation of BME/CHE 533, emphasizing mass transfer. Cross-listed as CHE 534. Prerequisite: BME/CHE 533.

**543 Thermodynamics of Chemical Systems. (3) F**

Classical and statistical thermodynamics of nonideal physicochemical systems and pro-

cesses; prediction of optimum operating conditions. Cross-listed as CHE 543.

**544 Chemical Reactor Engineering. (3) S**

Reaction rates, thermodynamics, and transport principles applied to the design and operation of chemical reactors. Cross-listed as CHE 544. Prerequisite: BME/CHE 543.

**551 Movement Biomechanics. (3) S**

Mechanics applied to the analysis and modeling of physiological movements. Computational modeling of muscles, tendons, joints, and the skeletal system with application to sports and rehabilitation. Prerequisite: BME 416 or instructor approval.

**566 Medical Imaging Instrumentation. (3) N**

Design and analysis of imaging systems and nuclear devices for medical diagnosis, therapy, and research. Laboratory experiments using diagnostic radiology, fluoroscopy, ultrasound, and CAT scanning. Lecture, lab. Prerequisite: BME 465 or EEE 465 or instructor approval.

**568 Medical Tomography. (3) S**

CT, SPECT, PET, and MRI. 3-dimensional *in vivo* measurements. Instrument design, physiological modeling, clinical protocols, reconstruction algorithms, and quantitation issues. Prerequisite: EEE 465.

**569 Radiochemistry and Radiopharmaceutical Production. (3) N**

Advanced principles of cyclotron design, targetry, operation, and utilization. Novel synthesis, tracer preparation, quality control, and biodistribution studies. Prerequisite: BME 465 or EEE 465.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.



## Biological Sciences

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(LS E218) 602/965-3414

**Edward A. Birge, Chair**  
Department of Microbiology  
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**James Collins, Chair**  
Department of Zoology  
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The faculty in the Departments of Botany, Microbiology, and Zoology jointly offer a graduate program with a major in Biological Sciences leading to the Master of Science degree. The faculty also participate in the programs leading to the Master of Natural Science degree (see page 67) when the primary or secondary area of concentration is in botany, microbiology, or zoology. Students interested in pursuing the M.N.S. degree through an interdisciplinary program emphasizing any of these areas should contact the appropriate department for additional information.

Students admitted to the Master of Education degree program with a major in Secondary Education may elect the biological sciences as the subject matter field. Refer to page 60 for information concerning the M.Ed. degree.

### MASTER OF SCIENCE DEGREE

The program is designed to serve students with an interest in an interdisciplinary program in the biological sciences.

**Graduate Record Examination.** Submission of acceptable scores on the Graduate Record Examination (verbal, quantitative, analytical, and advanced sections) is required for admission to this graduate program.

**Program of Study.** A minimum of 30 semester hours, distributed approximately equally in the Botany, Microbiology, and Zoology Departments, is required. At least one advanced course is required from each of the following areas: genetics, ecology, physiology, systematics-morphology, and microbiology. A list of courses by subject area is available from the departmental offices. Each student has a supervisory commit-

tee consisting of a chair and an additional faculty member from each department.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Not required.

**Thesis Requirements.** A thesis or equivalent culminating in a written report is required.

**Final Examinations.** The thesis or equivalent must be defended in a final oral examination that includes related subject matter.

### BIOLOGY

#### **BIO 410 Professional Values in Science.** (2-3) A

Considers issues related to values in science such as collaboration, finances, legal issues, media, mentoring, ownership of ideas, scientific integrity. Discussion, student projects. Cross-listed as HPS 410.

#### **415 Biometry.** (4) F

Statistical methods applied to biological problems, design of experiments, estimation, significance, analysis of variance, regression, correlation, chi square, and bioassay; the use of computers. Does not satisfy laboratory requirements for the liberal arts general studies program. 3 hours lecture, 3 hours lab. Prerequisite: MAT 210 or equivalent. *General Studies: N2.*

#### **420 Computer Applications in Biology.** (3) F

Computer analysis techniques in biology, emphasizing data entry, management and analysis, and graphic portrayal. Employs mainframe and microcomputers. Prerequisites: BIO 182 and MAT 117 and 118 or instructor approval. *General Studies: N3.*

#### **426 Limnology.** (4) S

Structure and function of aquatic ecosystems, with emphasis on freshwater lakes and streams. 3 hours lecture, 3 hours lab or field trip. Prerequisite: BIO 320 or instructor approval. *General Studies: L2.*

#### **428 Biogeography.** (3) F

Environmental and historical processes determining distributional patterns of animals and plants, emphasizing terrestrial life. Prerequisites: BIO 182 or equivalent; junior standing. *General Studies: L2.*

#### **430 Advanced Developmental Biology.** (3) S

Current concepts and experimental methods involving differentiation and biosynthetic activities of cells and organisms, with examples from microorganisms, plants, and animals. Prerequisite: ZOL 330.

#### **441 Cytogenetics.** (3) F '97

Chromosomal basis of inheritance. Prerequisite: BIO 340.

#### **442 Cytogenetics Laboratory.** (2) F '97

Microscopic analysis of meiosis, mitosis, and aberrant cell division. 6 hours lab. Pre- or corequisite: BIO 441.

#### **445 Organic Evolution.** (3) F

Processes of adaptive change and speciation in sexual populations. Prerequisite: BIO 340 or ZOL 241.

#### **464 Photobiology.** (3) F '96

Principles underlying the effects of light on growth, development, and behavior of plants, animals, and microorganisms. Prerequisites: CHM 231 or 331; 12 hours of courses in life sciences.

#### **480 Methods of Teaching Biology.** (3) S

Methods of instruction, experimentation, organization, and presentation of appropriate content in biology. Prerequisite: 20 hours in the biological sciences.

#### **512 Transmission Electron Microscopy.** (3) F

Theory, use, and methods of preparing biological materials for transmission electron microscopy. Materials fee. Lecture, lab. Prerequisite: instructor approval.

#### **515 Scanning Electron Microscopy.** (3) S

Theory, use, and methods of preparing biological materials for scanning electron microscopy. Materials fee. 2 hours lecture, 3 hours lab. Prerequisite: instructor approval.

#### **520 Biology of the Desert.** (2) N

Factors affecting plant and animal life in the desert regions and adaptations of the organisms to these factors. Prerequisite: 10 hours of biological sciences or instructor approval.

#### **524 Ecosystems.** (3) F '97

Structure and function of terrestrial and aquatic ecosystems, with emphasis on productivity, energetics, biogeochemical cycling, and systems integration. Prerequisite: BIO 320 or equivalent.

#### **526 Quantitative Ecology.** (3) N

Sampling strategies, spatial pattern analysis, species diversity, classification, and applications of multivariate techniques to ecology. 2 hours lecture, 3 hours lab. Prerequisites: BIO 415 or equivalent; a course in ecology.

#### **529 Advanced Limnology.** (3) N

Recent literature, developments, methods, and limnological theory; field and lab application to some particular topic in limnology. Prerequisite: BIO 426.

#### **532 Advanced Cell Biology.** (3) S

Applications of contemporary electron microscopic and biochemical/molecular techniques for studying eukaryotic cell functions. Mechanisms of intracellular protein trafficking. Prerequisites: BIO 332 or BOT 360 or ZOL 360 or equivalent; CHM 231 or 331 or equivalent.

#### **535 Biomembranes.** (3) N

Structure and function of biological membranes, emphasizing synthesis, fluidity, exocytosis, endocytosis, and cell responses to hormones and neurotransmitters. Prerequisites: BIO 332 or equivalent; CHM 231 or 331 or equivalent.

#### **543 Molecular Genetics.** (3) F

Nature and function of the gene; emphasis on the molecular basis of inheritance and gene expression in prokaryotes and eukaryotes. Prerequisites: BIO 340; a course in organic chemistry.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.



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## Botany

J. Kenneth Hooper  
*Chair*  
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### PROFESSORS

ARONSON, BACKHAUS, HOOBER,  
 KLOPATEK, NASH,  
 PINKAVA, SOMMERFELD,  
 TRELEASE, VERMAAS

### ASSOCIATE PROFESSORS

CLARK, FRASCH, PIGG, ROBERSON,  
 STUTZ, SZAREK, TOWILL, WEBBER

### ASSISTANT PROFESSORS

DAY, MARTIN

### PROFESSORS EMERITI

CANRIGHT, PATTEN, SWAFFORD

### ACADEMIC PROFESSIONALS

BINGHAM, LANDRUM,  
 LoBRUTTO, SHARP

The faculty in the Department of Botany offer programs leading to the Master of Science and Doctor of Philosophy degrees with a major in Botany. Among other areas of study, two concentrations are available: ecology and photosynthesis. Select faculty collaborate with the faculty in the Departments of Chemistry and Biochemistry, Microbiology, and Zoology in offering programs leading to the Master of Science and Doctor of Philosophy degrees in Molecular and Cellular Biology (see page 239). The faculty participate in programs leading to the Master of Natural Science degree when one of the concentrations is botany (see page 67). The faculty also collaborate with the faculty in the Departments of Microbiology and Zoology in offering programs leading to the Master of Science degree with a major in Biological Sciences (see page 133). Applicants for these degree programs must submit scores on the Graduate Record Examination (aptitude). Graduate Record Examination scores in the advanced subject area are recommended. The graduate programs are designed to prepare students for careers in teaching and in research on various aspects of plant biology, in educational institutions, industry, or government agencies.

## MASTER OF SCIENCE DEGREE

**Prerequisites.** Completion of the requirements for an undergraduate major in the plant sciences, biology, or related discipline, and an adequate background in related courses in chemistry, mathematical, and physical sciences.

**Program of Study.** A minimum of 30 semester hours of graduate credit is required. The program must include at least three semester hours of research, three semester hours of thesis, one semester of the core course BOT 598 ST: Perspectives in Plant Sciences, and one hour of participatory seminar (BOT 591). The program is planned by the student in consultation with the supervisory committee.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Not required.

**Thesis Requirements.** A thesis is required.

**Final Examinations.** A final research seminar and an oral examination covering the thesis and related subject matter are required.

## MASTER OF NATURAL SCIENCE DEGREE

The faculty of the Department of Botany participate in the programs leading to the Master of Natural Science degree (see page 67) when the primary or secondary area of concentration is in botany. Students interested in pursuing the M.N.S. degree through an interdisciplinary program emphasizing any of these areas should contact the Department of Botany for additional information.

## DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

**Program of Study.** A minimum of 84 semester hours of graduate credit is required. The program must include at least 24 hours of research and dissertation credit and at least 30 hours of formal graduate course work. One semester of the core course BOT 598 ST: Perspectives in Plant Sciences and one hour of participatory seminar (BOT

591) are also required. Courses numbered 590 or 790 (Reading and Conference) are not considered formal courses. The program is planned by the student in consultation with a program committee that also administers and evaluates the comprehensive examinations.

**Foreign Language Requirements.** Completion at the undergraduate level of a one-year course with a grade of "C" or better is required. Additional study may be required by the student's supervisory committee.

**Comprehensive Examinations.** Written and oral comprehensive examinations administered and evaluated by the student's program committee are required.

**Dissertation Requirements.** A dissertation based on original work of high quality, demonstrating proficiency in the student's area of interest, is required. (See dissertation requirements, pages 73-74.)

**Final Examinations.** A final oral examination in defense of the dissertation is required. It is administered by a dissertation committee consisting of three to five members who previously served on the student's program committee.

### Research Activity

Major areas of research by the faculty, professional staff, and graduate students in Botany include emphasis in the following subject areas:

*Biochemistry/Cell Biology/Physiology.* Cell fractionation and protein biochemistry, organelle biogenesis and metabolism in oil seeds, enzyme cytochemistry, structures and mechanisms of enzymes in photosynthetic light reactions using magnetic resonance spectroscopy and x-ray crystallography, photobiology of vascular and nonvascular plants, physiology of the fern haplophase.

*Ecology/Environmental.* Environmental studies spanning organismic to regional levels of organization, including effects of enhanced UV-B radiation upon plants, leaf optics, leaf gas exchange and photosynthesis, adaptations to environmental stresses (life cycle, morphology, physiology, and reproduction), evolutionary biology of cacti and leaf succulents, lichenology, quantitative ecology, effects of air pollution on plants and ecosystems, dendroecology,

mineral cycling and restoration, landscape ecology, human impacts on ecosystems and ecosystem response to perturbation, interdisciplinary studies of riparian ecosystems.

**Molecular Genetics/Molecular Biology.** Targeted mutagenesis of photosynthesis genes in cyanobacteria and plants, functional and structural analysis of genetically engineered mutants, transformation of green algae, chloroplast gene expression, and biogenesis of thylakoid membrane-protein complexes.

**Nonvascular Plants/Protists.** Fungal and algal cell wall chemistry, ultrastructure and storage products, developmental morphology and life cycles of algae and fungi, phytoplankton ecology and water quality, and apical growth in fungi.

**Organismic Research.** Paleobotany, paleopalynology, particularly of Cretaceous and Tertiary horizons, and anatomically preserved plants from Carboniferous coal swamps and from the Permian and Triassic of Gondwana, origin and diversification of seed plants.

**Systematics/Taxonomy.** Cytogenetics and hybridization studies in the Cactaceae, floristics of the southwestern U.S. and northern Mexico, chemosystematics of plants, particularly the Compositae, and chemical ecology.

**Urban Horticulture.** Tissue-culture of drought-tolerant plants, molecular basis for rubber formation, plant pathology, particularly of the physiology of plant-fungal pathogen interactions, landscape horticulture, environmental stress physiology, computer simulation modeling, and nursery production and marketing.

The research mission of the department is supported by well-equipped research laboratories, greenhouses, environmental and radioisotope rooms, computer laboratory and personal computers, photographic and darkroom facilities, herbarium, the electron microscopy laboratory, and the electron paramagnetic resonance spectroscopy facility.

## BOTANY

**BOT 410 Lichenology.** (3) S '97  
Chemistry, ecology, physiology, and taxonomy of lichens. 2 hours lecture, 3 hours lab. Prerequisite: BIO 182 or equivalent.

**420 Plant Ecology.** (4) S  
Plants in relation to environments, emphasizing terrestrial population, community and eco-

system processes. 3 hours lecture, 3 hours lab or field trip, 1 weekend field trip. Prerequisite: BIO 320 or equivalent.

**425 Plant Geography.** (3) N  
Plant communities of the world and their interpretation, emphasizing North American plant associations. Prerequisite: BIO 182 or equivalent or instructor approval.

**434 General Mycology.** (3) S  
Fundamentals of fungal morphology and systematics with an introduction to fungal cell biology, growth and development, ecology, and economic significance. 2 hours lecture, 3 hours lab. Prerequisite: BIO 182 or MIC 206 or equivalent.

**445 Morphology of the Vascular Plants.** (4) S '98  
Comparative form and evolutionary trends in the major groups of vascular plants. 3 hours lecture, 3 hours lab. Prerequisite: BOT 300 or equivalent.

**448 Palynology.** (3) S  
Significance of fossil and extant pollen, spores, and other palynomorphs to systematics, evolution, ecology, and stratigraphy. 2 hours lecture, 1 hour lab. Prerequisite: instructor approval.

**450 Phycology.** (4) S  
The algae (both fresh water and marine forms), emphasizing field collection and identification of local representatives. Morphological, ecological, and economic aspects of the algae. 3 hours lecture, 3 hours lab. Prerequisite: BIO 182 or instructor approval.

**461 Physiology of Lower Plants.** (3) N  
Cellular physiology and biochemistry of algae and fungi; responses of these organisms to chemical and physical stimuli and their process of morphogenesis. Prerequisites: BIO 182 or equivalent; CHM 231.

**465 Plant Growth and Development.** (3) S '97  
Molecular basis of development, role of signal transduction pathways/gene regulation in control of organ formation, pollination, germination and growth. Prerequisites: BIO 182 or instructor approval.

**475 Angiosperm Taxonomy.** (3) S '98  
Principles underlying angiosperm phylogeny. 2 hours lecture, 3 hours lab. Prerequisite: BOT 370 or instructor approval.

**480 Plants: Pleasures and Poisons.** (3) N  
Poisonous, medicinal, and other drug plants. Plant products and their effects on humans; historical and modern perspectives. Prerequisites: BIO 100, 182; BOT 108 or equivalent; CHM 231 or equivalent.

**485 Plant Pathology.** (3) F  
Identification and control of biotic and abiotic factors that cause common disease problems to plants. Prerequisite: BOT 360. *General Studies: L2.*

**488 Greenhouse/Nursery Management.** (3) F '96  
Greenhouse structures, environment, and nursery operation. Includes irrigation, nutrition, and other principles relative to container-grown species. Prerequisites: BOT 381; ERA 325.

**490 Paleobotany.** (4) S '97  
A broad survey of plant life of the past, including the structure of plant fossils, their geologic ranges, geographic distribution, and paleoenvironment. 3 hours lecture, 3 hours lab or field trip. Prerequisite: BIO 182 or equivalent.

**510 Experimental Design.** (3) S '98  
ANOVAS, 1-way classification of factorial and partially hierarchic designs; introductory multivariate statistics. 1 3-hour lecture at night. Prerequisite: BIO 415 or equivalent.

**520 Plant Structural Adaptation.** (2-3) F '96  
Adaptive traits of leaf size/unique growth form on energy transfer efficiency; stomatal architecture and water-use efficiency; applications of stable isotopes. Prerequisite: BIO 320 or BOT 350 or 360 or equivalent.

**525 Plant Photosynthetic Adaptation.** (3) F '97  
Evolution and ecology of C<sub>4</sub> and CAM; adaptive traits improving competitive ability in natural environments; comparative physiology of desert plants. Prerequisite: BOT 360 or instructor approval.

**560 Plant Molecular Biology.** (2) S '98  
Biochemistry and molecular biology of plant organelles, including protein targeting, plant viruses, and molecular designs for plant improvements. Prerequisite: instructor approval.

**562 Plant Genetic Engineering.** (3) S '98  
Plant transformation utilization of transgenic plants, transient gene expression assays, and applications of plant genetic engineering. Prerequisite: instructor approval.

**563 Plant Genetic Engineering Laboratory.** (2) S '98  
Plant transformation, utilization of transgenic plants, transient gene expression assays, and applications of plant genetic engineering. 6 hours lab. Prerequisite: instructor approval.

**564 Plant Metabolism.** (3) N  
General plant metabolism and typical plant products, emphasizing biosynthesis and functions of storage products, cell wall constituents, plant acids, pigments, hormones, and numerous secondary products. Prerequisite: BOT 360 or CHM 231 or instructor approval.

**568 Molecular Mechanisms of Photosynthesis.** (3) S '98  
Structure and function of photosynthetic complexes; mechanism of energy conversion in plants, bacteria and model systems. Cross-listed as CHM 568. Prerequisite: instructor approval.

**570 Plant Secondary Chemistry.** (3) N  
Biosynthesis and distribution of plant natural products within various plant taxa. 3 hours lecture. Prerequisite: CHM 332 or equivalent.

**581 Plant Tissue and Cell Culture.** (3) N  
Aseptic, clonal propagation of plants and in vitro culture of cells, tissues, and organs. 2 hours lecture, 3 hours lab. Prerequisite: BOT 360 or 381.

**585 Diagnosis of Plant Problems.** (4) N  
Principles and techniques for diagnosis of biotic and abiotic agents that cause problems in economic plants. 2 hours lecture, 2 3-hour labs. Prerequisite: BOT 485.

**591 Seminar.** (1) F, S  
Topics may be selected from the following participatory seminars:

- (a) Algae/Fungi
- (b) Biosystematics
- (c) Ecology
- (d) Horticulture
- (e) Photosynthesis
- (f) Plant Physiology

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Building Design

Ron McCoy  
*Director*  
 (AED 162) 602/965-3536

### REGENTS' PROFESSOR COOK

**PROFESSORS**  
 BOYLE, EL DIASTY, MCCOY,  
 MCSHEFFREY, MEUNIER,  
 PETERSON, RAPP,  
 SCHEATZLE, UNDERHILL

### RESEARCH PROFESSOR JONES

**ASSOCIATE PROFESSORS**  
 LOOPE, McINTOSH, OZEL,  
 SHEYDAYI, UNDERWOOD, ZYGAS

**ASSISTANT PROFESSORS**  
 BERTELSEN, BILN, HARDIN,  
 HARTMAN, KROLOFF,  
 SPELLMAN, WOOLSEY

The faculty in the School of Architecture offer a graduate program leading to the Master of Science degree with a major in Building Design. Concentrations are available in computer-aided design, energy performance and climate responsive architecture, and facilities development and management. The program provides advanced study at the postprofessional level for architects, and at the specialist level for nonarchitects who have a degree in a related area such as engineering, business, computer science, and the physical and environmental sciences. The purpose of the program is the development of knowledge useful to the arts and sciences of building design and the integration of that knowledge in the design process. Within this context, the program emphasizes (1) the ecological importance of energy-conscious design and construction, as well as the high social value placed on buildings in which natural forces and systems are utilized rather than suppressed, and (2) the development of research, information systems and management processes suited to the planning and design of complex buildings in urban settings.

The faculty in the school also participate in offering the new Ph.D. in Environmental Design and Planning program. For information about the Ph.D. degree program, see pages 190-191.

## MASTER OF SCIENCE DEGREE

### Admission Requirements

Applicants considered for admission to the program must hold a baccalaureate or graduate degree from a college or university recognized by ASU and meet the minimum GPA and requirements for admission established by the Graduate College.

It is preferred that applicants have at least one year of professional employment or comparable field/research experience in building design in addition to their academic experiences. Applicants are accepted on a space-availability basis, and must specify an area of research concentration upon application. International applicants whose native language is not English must submit a TOEFL score of 550 or above. International students should write the Graduate Admissions Office at least one year prior to the date they plan to begin study.

**Application Procedures.** Applicants must submit separate application materials to the Graduate College and the School of Architecture.

**School of Architecture.** In addition to the Graduate College admission requirements, applicants must file all of the following admission materials with the graduate secretary, Master of Science with a major in Building Design, School of Architecture, Arizona State University, Tempe, Arizona 85287-1605. Applicants are encouraged to contact the graduate secretary to ascertain that all materials have been received, at 602/965-2507.

**Statement of Intent.** A personal narrative (maximum 600 words or two pages typed) indicating the applicant's interest, previous academic and practical background, and personal and professional educational objectives must be submitted.

**Letters of Recommendation.** A minimum of three letters of recommendation in support of the applicant must be mailed directly to the Graduate Admissions Committee, School of Architecture. The references should be from professionals or educators familiar with the applicant's experience and capability for graduate work.

**Portfolio.** Applicants must submit a folio documenting projects, papers, creative endeavors, and, if appropriate, work experience (maximum size 9" x 12").

The portfolio is returned after final admission procedures, *provided* the applicant encloses a self-addressed return mailer with sufficient prepaid postage, or if the applicant appears in person to claim the materials within one year of submission. Unclaimed portfolios are retained for only one year. The School of Architecture assumes no liability for lost or damaged materials.

**Research Teaching Statement.** Students wishing to be considered for teaching or research assistantships should include an additional statement outlining areas in which they feel competent to serve as a teaching or research assistant. International students who wish to be considered for a teaching assistantship and whose native language is not English are required to pass the Test of Spoken English (TSE) administered by the American Language and Culture Program at ASU.

**Program of Study.** The program requires a minimum of 30 semester hours of approved course work at the advanced level, including six hours of thesis credit.

The Master of Science degree, major in Building Design, is based on concepts of research and decision-making emphasized by the College of Architecture and Environmental Design.

Students admitted to the program are required to take a research methods core, certain courses in their area of concentration, additional elective course work as approved and directed by the supervisory committee, and write and defend a thesis. While the minimum requirement is 30 semester hours, most students require at least four semesters of course work and work on their thesis to successfully complete this degree program.

The concentrations include the following: computer-aided design, energy performance and climate responsive architecture, and facilities development and management.

### Computer-Aided Design and Facilities Development and Management Concentrations

Research methods core .....	6
Area of concentration requirements .....	6
Approved electives .....	12
Thesis .....	6
Minimum total .....	30

The *computer-aided design* concentration features investigations of com-

puter-aided design methods and techniques and their application to problem-solving issues in the built environment. The goal of the program is to provide a fundamental understanding of computer-aided design methods and to explore critically the application and potential of these techniques in practice. Topics studied include computer graphics, geometric modeling, design databases, interactive graphic environments for design, comprehensive computer-aided design systems, computer-aided energy-conscious design and analysis, databases for facilities planning, and computer applications in urban design and building construction. The computer-aided design requirements (six semester hours) consist of ANP 530 Computer Graphics in Architecture and ANP 598 ST: Computer-Aided Design Methods.

The *facilities development and management* concentration is concerned with the decision-making processes in building development and design firm management. The goal of the program is the advancement of knowledge about the interactions between design and managerial processes. This concentration addresses the following topics: spatial decision models, building development processes and financing, market structure and strategy, pricing and cost control, design automation and group decision-making, architectural programming and post-occupancy evaluation, and professional ethics. The program benefits from ties to various professional groups and other academic units concerned with business and facilities management. The facilities development and management requirements (six semester hours) consist of AAD 552 Architectural Management II or AAD 555 Architect as Developer, and AAD 593 Applied Projects.

**Energy Performance and Climate Responsive Architecture**

Research methods core .....	6
Area of concentration requirements .....	12
Approved electives .....	6
Thesis .....	6
Minimum total .....	30

The energy performance and climate responsive architecture concentration is concerned with the relationships among climate and site, thermal and visual comfort, and energy demand and consumption. Courses in this concentration establish a basic core of knowledge

on the principles of the natural energies available at the building boundary due to climate and site; thermal and optical behavior of building materials and components; passive and low-energy architectural systems for heating, cooling, and lighting; and appropriate integration with mechanical systems. Additional courses are available to support advanced study and research in a variety of related specialties.

Examples of the areas of advanced study that are available are climate responsive architecture and analysis of building energy performance. In climate-responsive architecture, a student applies the principles of "bioclimatic" building design in a studio setting to maximize the use of renewable energy resources in particular locations and building programs. In analysis of building energy performance, a student applies physical and economic analysis, computer simulation, and/or measurement as tools in determining component or whole-building performance relative to energy, climate, and cost-efficiency. The student is concerned with climate responsive, low-energy building design through resource-efficient building concepts, materials, components, and systems such as daylighting, passive solar heating, passive cooling, and earth sheltering.

Most students address these problems with an emphasis on either a design-oriented approach in a studio setting or with an emphasis on an analysis-oriented approach through the application of the most current building energy simulation and analysis tools. Some students want to combine these approaches in their thesis problem. The energy performance and climate responsive architecture requirements (six semester hours) consist of ATE 521 Building Environmental Science and ATE 582 Environmental Control Systems.

**Foreign Language Requirements.** None.

**Thesis Requirements.** A thesis is required. Each candidate devotes research effort of six semester hours of thesis/research credit in preparation of a thesis. The thesis must conform to School policies and meet Graduate College format requirements.

**Final Examinations.** A final oral examination in defense of the thesis is required.

**Research Activity**

Faculty and students in the graduate programs of the School of Architecture may be involved in the following areas of research: solar architecture design, energy performance in buildings, computer-aided design and graphics, facilities development and management, environments for aging, housing, urban design, building technology, environmental analysis and programming, passive cooling and heating, ecotechniques, arid region building and systems design, and architectural history.

The College of Architecture and Environmental Design maintains 1,500 square feet of rooftop testing laboratory for solar research.

The college's Research and Service Foundation provides facilities for basic research and community service activities in energy technology, design, and planning.

**BUILDING DESIGN**

*For courses supporting the Building Design major, see pages 124-125.*

**Business Administration**

The faculty in the College of Business offer a Ph.D. degree with a major in Business Administration, a Master of Business Administration (M.B.A.) degree, and an M.B.A. for Executives program, along with several other professional master's degrees. The M.B.A. program is supported by academic units within the College of Business. For faculty, research activity, and courses, refer to pages 138-139. Other professional master's degrees offered through the College of Business are described in this catalog under their respective degree program headings.

**DOCTOR OF PHILOSOPHY DEGREE**

The Ph.D. in Business Administration prepares candidates for scholarly careers at leading educational institutions and for positions in business and government organizations where advanced research and analytical capabilities are required. Major emphasis is placed upon the development of expertise in a chosen subject area, a disciplined and inquiring mind, competence in research methodology, and skill in

effectively communicating advanced business concepts.

Students are encouraged to work closely with the faculty from the beginning of their programs. A ratio of resident doctoral students to faculty of less than one to one ensures that faculty may serve effectively as mentors for doctoral students.

**Admission.** A completed application for admission to the Ph.D. in Business Administration degree program includes

1. application for admission to the Graduate College,
2. undergraduate and postgraduate transcripts,
3. Graduate Management Admission Test (GMAT) score or scores from the Graduate Record Examination (GRE),
4. applicant's letter of personal career objectives and rationale for pursuing the Ph.D. program,
5. three letters of recommendation,
6. Test of Spoken English (TSE) score for applicants whose native language is not English, and
7. Test of English as a Foreign Language (TOEFL) score for applicants whose native language is not English and who have not completed a degree from a U.S. college or university.

Admission is granted for fall semesters only. The deadline for receipt of all required application materials is February 1.

**Areas of Concentration.** The Ph.D. student may choose from among seven areas of concentration: accountancy, decision and information systems, finance, health services research, management, marketing, and purchasing and logistics management. The *accountancy* specialization area includes financial accounting, managerial accounting, tax policy, auditing, and information systems. Research activities in *decision and information systems* encompass areas of theory and application in computer information systems, management science, operations management, and statistics. Research interests of the finance faculty offering the *finance* concentration focus on corporate finance, investments, financial markets, and banking. *Health services research* focuses on organization, delivery and financing of health services,

and on the relationships of structures and processes of health services to outcomes such as quality of care and health status changes. The *management* concentration requires three core courses: organizational theory, organizational behavior, and research methodology. In addition to these core courses, students choose one of two specialty tracks: strategic management or human resource management. Research conducted by the marketing faculty offering the *marketing* concentration is focused in several areas: advertising, buyer behavior, distribution channels, services marketing, and other dimensions of marketing, including sales management, industrial marketing, and public-policy implications of marketing. The purchasing and logistics management faculty in the Department of Business Administration offer the *purchasing and logistics management* concentration and are actively involved in the input-conversion-output process.

**Program of Study.** See pages 76-77 for general requirements. The Ph.D. degree program requires mathematical competence through linear algebra and calculus and computer skills. The program of study includes graduate study in economics, behavioral sciences, and quantitative/statistical analysis. The advanced program is composed of an area of concentration and supporting course work that best prepares students for conducting scholarly work in their areas of interest.

**Comprehensive Examinations.** A written comprehensive examination, designed to ascertain the candidate's knowledge and orientation in the major field of study and fitness to proceed to the completion of a dissertation, is required at the end of coursework. An additional written comprehensive examination on a candidate's supporting coursework is a departmental option. An oral examination after completion of written examinations is also a departmental option.

**Dissertation Requirements.** The candidate must present an acceptable dissertation based on original investigation. The dissertation must represent a significant contribution to knowledge, be written in a scholarly manner, and demonstrate the ability of the candidate to do independent research of high quality.

**Final Examinations.** A final oral examination in defense of the dissertation is required. The examination covers the subject matter of the dissertation and the field most nearly corresponding with that of the dissertation.

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## School of Accountancy

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For faculty, research activity, and courses, refer to pages 116-117.

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## Department of Business Administration

Larry R. Smeltzer  
*Chair*

(BA 318) 602/965-3231

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### PROFESSORS

J. CARTER, P. CARTER,  
GUNTERMANN, HENDRICK,  
JENNINGS, METCALF, SMELTZER

### ASSOCIATE PROFESSORS

ARANDA, BOHLMAN, BUTLER,  
DANIEL, DAVIS, DUNDAS,  
LEONARD, LOCK, LYNCH,  
MURRANKA, PEARSON

### ASSISTANT PROFESSORS

ELLRAM, FERRIN, REISS

### SENIOR LECTURERS

FLYNN, GEISS

### REGENTS' PROFESSOR EMERITUS

FARRIS

### PROFESSORS EMERITI

BATY, BOGGS, FEARON, GARCIA,  
HENNINGTON, JACKS, LEWIS,  
MYLER, REUTER, A. SMITH,  
C. SMITH, TATE

### SENIOR LECTURER EMERITUS

WIGGINS

### Research Activity

The faculty of the Department of Business Administration have a strong commitment to scholarly research in a wide variety of areas. Although the faculty have published in a number of business and interdisciplinary journals, the research can generally be divided into four areas: business law, management communication, purchasing and logistics management, and real estate.

The business law faculty have been conducting research on antitrust and labor disputes in the sports industry, standards of disclosure, strategic legal planning, and commercial contract negotiations. The relationship between business law and business ethics is a major focus of this group. Collaborative writing, negotiations, and patterns of strategies for communicating organizational change are some of the areas in which management communication faculty are conducting research.

The research conducted by purchasing and logistics management faculty includes purchasing performance, forecasting, vendor evaluation, contract negotiation, materials management and acquisition, transportation regulation and policy, in addition to other related areas. In the area of real estate, research topics include the impact of discount points on housing value, a rational expectations model of housing price, the time on the market, inflation, interest rates, and cost of housing.

#### LEGAL AND ETHICAL STUDIES

**LES 411 Real Estate Law.** (3) A  
Legal and ethical aspects of land ownerships, interests, transfer, finance development and regulations of the real estate industry.

**412 Insurance Law.** (3) N  
Legal concepts and doctrines applicable to the field of insurance. Prerequisite: professional program business student.

**532 Negotiation Agreements.** (3) F, S  
Course develops negotiation competencies to build partnerships and create lasting agreements with internal/external customers, suppliers, work teams, and external constituencies. Lecture and substantial student interaction through team exercises.

**579 Legal, Political, and Ethical Issues for Business.** (3) N  
Study of legal, ethical, and political components of business decisions; self-regulation and social responsibility as regulatory and political strategies. Prerequisites: ACC 503; FIN 502; MGT 502; MKT 502.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

#### BUSINESS ADMINISTRATION

**BUS 431 Business Report Writing.** (3) N  
Organization and preparation of reports incorporating electronic databases, word processing, and graphics. Prerequisite: BUS 301.

**451 Business Research Methods.** (3) N  
Methods of collecting information pertinent to business problem solving, including design, collection, analysis, interpretation, and presentation of primary and secondary data.

**502 Managerial Communication.** (3) F, S, SS  
Analysis of various business problems, situations, and development of appropriate communication strategies. Prerequisite: MGT 502.

**504 Professional Report Writing.** (3) A  
Preparation and presentation of professional reports.

**507 Business Research Methods.** (3) N  
Techniques for gathering information for business decision making. Selection, design, and completion of a business-oriented research project.

**591 Seminar.** (3) N  
Selected managerial communication topics.

**594 Study Conference or Workshop.** (3) N

**700 Research Methods.** (3) N

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

#### PURCHASING AND LOGISTICS MANAGEMENT

**PLM 405 Urban Transportation.** (3) N  
Economic, social, political, and business aspects of passenger transportation. Public policy and government aid to urban transportation development. Prerequisite: upper-division standing or instructor approval.

**432 Materials Management.** (3) F, S  
Study of managing the productive flow of materials in organizations, including MRP/II, JIT, quality, facility planning, and job design. Prerequisites: OPM 301; professional program business student.

**440 Productivity and Quality Management.** (3) F, S  
Productivity concepts at the national, organizational, and individual levels. Quality management and its relationship to productivity in all organizations. Prerequisite: professional program business student.

**455 Purchasing Research and Negotiation.** (3) F, S  
Current philosophy, methods, and techniques used to conduct both strategic and operations purchasing research and negotiation. Includes negotiation simulations. Prerequisites: OPM 301; PLM 355 (grade of "C" or higher), 432; professional program business student.

**460 Carrier Management.** (3) N  
Analysis of carrier economics, regulation, management, and rate-making practice; evaluation of public policy issues related to carrier transportation. Prerequisite: upper-division standing or instructor approval.

**463 International Transportation and Logistics.** (3) A  
Logistics activities in international business with special emphasis on transportation, global sourcing, customs issues, and facility location in international environment. Prerequisite: PLM 345 or instructor approval.

**479 Purchasing and Logistics Strategy.** (3) F, S  
Synthesis of purchasing, production, transportation to provide a systems perspective of materials management. Development of strategies. Prerequisites: PLM 345, 355 (grade of "C" or higher), 432; professional program business student.

**532 Supply Chain Design and Development Strategies.** (3) F  
A strategic orientation toward the design and development of the supply chain for purchasing, materials, and logistics systems.

**541 Supply Chain Management and Control.** (3) S  
Management and control of purchasing and logistics management systems. Total Quality Management to assess and assure customer satisfaction. Global strategies.

**545 Supply Chain Continuous Improvement Strategies.** (3) S  
Leading edge strategies such as reengineering high-performance teams and expert systems for continuous improvement of the supply chain. Seminar.

**591 Seminar.** (3) N  
Topics such as the following are offered:

- (a) Purchasing
- (b) Logistics and Transportation

**791 Doctoral Seminar.** (3) A  
Topics may be selected from the following:

- (a) Logistics, Transportation, and Physical Distribution Management.
- (b) Purchasing and Materials Management.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

#### REAL ESTATE

**REA 401 Real Estate Appraisal.** (3) A  
Factors affecting the value of real estate. Theory and practice of appraising and preparation of the appraisal report. Appraisal techniques. Prerequisites: REA 300; professional program business student.

**441 Real Estate Land Development.** (3) A  
Neighborhood and city growth. Municipal planning and zoning. Development of residential, commercial, industrial, and special purpose properties. Prerequisites: REA 300; professional program business student.

**456 Real Estate Investments.** (3) A  
Analysis of investment decisions for various property types. Cash flow and rate of return analysis. Prerequisites: FIN 300; professional program business student.

**461 Current Real Estate Topics.** (3) N  
Current real estate topics of interest are discussed and analyzed. Prerequisites: REA 300; professional program business student.

**591 Seminar in Selected Real Estate Topics.** (3) N

Topics may be selected from the following:

- (a) Real Estate Market Analysis.  
Analytical techniques used in performing market research to assess the feasibility of proposed residential, retail, office, and other developments.
- (b) Real Estate Finance and Investments.  
Basic techniques for analyzing the financial feasibility of real estate investments. Includes cash flow, yield and risk analysis; taxation, form of ownership, and management.
- (c) Real Estate Development.  
Development process covering feasibility, site selection, planning, design, financing, and construction. Relationship of land use controls and regulations to the private sector.
- (d) Real Estate Research.  
Reviews current research in areas such as market studies, mortgage securment, valuation, development, investments, and government regulation.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.



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### Department of Decision and Information Systems

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For faculty, research activity, and courses, refer to pages 170-172.

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### Department of Economics

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For faculty, research activity, and courses, refer to pages 173-176.

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### Department of Finance

Herbert M. Kaufman  
*Chair*  
(BAC 519) 602/965-3131

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#### PROFESSORS

COLES, JOEHNK, KAUFMAN, POE,  
SMITH, SUSHKA

#### ASSOCIATE PROFESSORS

BESSEMBINDER, BOOTH, CESTA,  
CHAN, GALLINGER, HERTZEL,  
HOFFMEISTER, MARTIN, WILT

#### ASSISTANT PROFESSOR

LEMMON

#### PROFESSORS EMERITI

ANDERSON, DAUTEN,  
STEVENSON, TENNEY

#### Research Activity

The Department of Finance has a strong commitment to academic and professional research. This emphasis on quality research, both empirical and theoretical, is evidenced by the many ongoing and recently completed studies in the areas of corporate finance, investments, and banking. Topics of some recent studies include technical trading rules in the Asian stock markets; mean reversion in equilibrium asset prices; bid-ask spreads in the interbank foreign exchange markets; intraday bid-ask spread pattern in the stock and option market; empirical analysis of antitrust legal disputes; causality tests of the real stock return; industry effects of interfirm lawsuits; integrating the financial services sector in Europe; determinants of contract choice; news

content of the prime rate; seasoned common stock issues following an IPO; risk premia in futures markets; return autocorrelations; price volatility, trading volume, and market depth; futures trading activity and stock price volatility; systematic risk, hedging pressure and risk premiums; forward contracts and firm value; exchange rate exposure; contract costs, bank loans and the cross-monitoring hypothesis; imperfect information and cross-autocorrelation; index arbitrage, spot and futures volatility, and spot market volume; option price and stock price relationships; lead-lag relationship between cash market and stock index futures market; intraday volatility in the stock market; managerial vote ownership; employee stock ownership plans; valuation of community goodwill; causality test of short sales on NYSE; relationship between liquidity, capital structure and firm value; using daily stock returns in event studies; market discounts and shareholder gains; earnings and risk changes; stock repurchase effects; volatility of asset returns; central bank behavior and money stock determination; private placement discounts/Rule 144A; value of bank durability; informational externalities of seasoned equity issues; deregulation, contestability and airline acquisitions; intra-industry effects of going private announcements; restructuring transactions by bank holding companies; external monitoring and common stock issues; corporate sale and leasebacks; market valuation effects of reserve regulation.

These studies use a number of databases including Compustat, CRSP, Citibank, Extel, DRI and TAQ. The databases are available for research by faculty and students. The studies represent the strong commitment to research and the generation of new knowledge by the Department of Finance, indicative of the department's goal of becoming an outstanding research department.

#### FINANCE

**FIN 502 Managerial Finance.** (3) A Theory and practice of financial decision making, including risk analysis, valuation, capital budgeting, cost of capital, and working capital management. Prerequisites: ACC 502; ECN 502; QBA 502.

**521 Investment Management.** (3) A Valuation of equities, fixed incomes, and options/financial futures in an individual security and portfolio context; mathematical asset allocation approaches. Not open to students with credit in FIN 421. Prerequisite: FIN 502.

**531 Capital Markets and Institutions.** (3) A Recent theoretical and operational developments in economic sectors affecting capital markets and institutions. Not open to students with credit in FIN 431. Prerequisite: FIN 502.

**551 Financial Statement Analysis.** (3) A Analysis of corporations' financial statements to ascertain their financial strength and default risk. Emphasis is on studying cash flows. Lecture, cases. Prerequisites: ACC 502; FIN 502.

**556 International Financial Management.** (3) A Behavior of real and nominal currency exchange rates, management of international investment portfolios, corporate exchange exposure, and hedging exchange risk. Lecture, class discussion. Prerequisite: FIN 502.

**561 Financial Management Cases.** (3) N Case-oriented course in applications of finance theory to management issues. Acquisition, allocation, and management of funds within the business enterprise. Working capital management, capital budgeting, capital structure, and financial strategy. Not open to students with credit in FIN 461. Prerequisite: FIN 502.

**581 Applied Corporate Finance.** (3) A Application of theories in corporate finance. Market efficiency, capital structure, "principal-agent" theory, corporate control, dividend policy, and capital budgeting. Prerequisite: FIN 502.

**781 Theory of Finance.** (3) A Fundamental tools of financial economics; asset pricing, arbitrage, option pricing, capital structure, dividend policy, asymmetric information, and transaction-cost economics. Prerequisites: FIN 502, 521, 531.

**791 Doctoral Seminar in Finance.** (3) A

- (a) Investments.  
Investments and market theory; efficient markets hypothesis; option and commodity markets. Prerequisite: FIN 581.
- (b) Financial Institutions and Markets.  
Economic and monetary theory applied to financial markets and institutions; implications of financial structure for market performance and efficiency. Prerequisite: FIN 581.
- (c) Financial Management.  
Financial theory pertaining to capital structure, dividend policy, valuation, cost of capital, and capital budgeting. Prerequisite: FIN 581.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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### School of Health Administration and Policy

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For faculty, research activity, and courses, refer to "Health Services Administration," pages 206-207.

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**Department of Management**

**William H. Glick**  
*Chair*  
 (BA 323) 602/965-7586

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**PROFESSORS**

BOHLANDER, CARDY, GLICK,  
 GOMEZ-MEJIA, HOM, KINICKI,  
 MANZ, PENLEY

**ASSOCIATE PROFESSORS**

BRENENSTUHL, COOK, KEATS,  
 KELLER, MOORHEAD, OLIVAS,  
 ROBERSON, VAN HOOK

**ASSISTANT PROFESSORS**

BLANCERO, WISEMAN

**SENIOR LECTURERS**

DORAN, KREITNER, LEA

**PROFESSORS EMERITI**

COCHRAN, DAVIS, GROSSMAN,  
 HEIER, INSKEEP,  
 SCHABACKER, WHITE

**Research Activity**

The faculty of the Department of Management have a strong commitment to scholarly research. Evidence of this commitment is the large number of recently published articles in scholarly journals. Although members of the department have published research concerning leadership, international management, group processes, and organizational communication, the department focuses its research within two broad areas: strategic management and human resources management.

Representative topics in the strategic management area are stages of strategic sophistication, cognitive modeling for strategic decision making, competitive positioning of the firm, strategic management for the public firm, organizational characteristics and the environment, and ethical aspects of managerial decision making.

Representative topics in the human resources area include the following: applicant gender and selection decisions; employee responses to acquisitions, mergers, and downsizing; realistic job preview; retention and turnover; the organizational environment and grievance system; and evaluation processes.

**MANAGEMENT**

**MGT 413 Compensation Management.** (3) A Establishing base and incentive pay with job analysis, job evaluation, and wage surveys; performance appraisal; conformance to compensation laws. Prerequisites: MGT 311; professional program business student.

**422 Training and Development.** (3) N Learning theory, orientation and basic level training, management development, resource materials and methods. Prerequisites: MGT 311; professional program business student.

**423 Employee-Management Relations.** (3) F, S Employment relationship in union/nonunion setting. Employee-management rights/responsibilities, complaint administration, negotiations, union structure, and mock government negotiations.

**424 Employee Selection and Appraisal.** (3) F, S Concepts and methods of personnel selection and performance appraisal. Includes job analysis, measurement, and legal issues. Experiential exercises emphasized. Prerequisite: MGT 311.

**433 Management Decision Analysis.** (3) F, S Decision-making concepts and methods in the private and public sectors and their application to organizational problems. Understanding of individual and group decision making. Prerequisites: MGT 301; professional program business student.

**434 Social Responsibility of Management.** (3) F, S Relationship of business to the social system and its environment. Criteria for appraising management decisions. Managers as change agents. Prerequisites: MGT 301; professional program business student.

**440 Entrepreneurship.** (3) A Opportunities, risks, and problems associated with small business development and operation.

**441 Venture Design and Development.** (3) N Analysis, design, and development of a business plan for a new venture. Prerequisite: ACC 240.

**442 Small Business Management.** (3) N Students, acting as management consultants, apply business principles and make recommendations to small businesses while learning to manage small firms. Prerequisite: business core except MGT 463.

**447 Management and the Impact of Technology.** (3) N The impact of technology on strategic planning and human resources management in business organizations.

**452 Organizational Behavior Applications.** (3) A The complex set of behavioral forces and relationships that influence organizational effectiveness. Intervention strategies and application skills. Prerequisites: MGT 352; professional program business student.

**459 International Management.** (3) A Concepts and practices of multinational and foreign firms. Objectives, strategies, policies, and organizational structures for operating in various environments. Prerequisite: MGT 301.

**468 Management Systems.** (3) F, S Systems theory and practice applied to organization process and research. Organizations seen as open systems interacting with changing environments. Prerequisite: MGT 301.

**494 Special Topics.** (3) N Chosen from topics in human resources, strategic management, and international management, including seminars in international management in Asia or Europe.

**502 Organization Theory and Behavior.** (3) F, S Important concepts and applications in management including motivation, leadership, group dynamics, organization design, decision-making, communication, and organization change. Prerequisites: calculus; computer literacy; graduate degree program student.

**503 Complex Organizations.** (3) N Concepts and applications in macro organization theory. Topics include organization structure, strategic choice, culture, boundary spanning, effectiveness, and different perspectives of interorganizational relations.

**504 Competitive Strategy.** (3) N Industry, competitor, and firm strategic positioning analysis aimed at gaining sustainable competitive advantage. Lecture, discussion. Prerequisites: ECN 502, FIN 502, MGT 502, MKT 502.

**520 Problems in Personnel Management.** (3) A Selecting, developing, maintaining, and utilizing a competent labor force. Case studies of personnel problems. Preparation of a written personnel program.

**522 Labor Relations and Public Policy.** (3) A State and federal legislation. Recent decisions of courts and labor boards. Legal rights and duties of employers, unions, and the public.

**559 International Comparative Management.** (3) A Analysis of comparative management practices, problems, and issues. Management strategies for the multinational organization. Impact of national and cultural environments.

**589 Strategic Management.** (3) F, S Formulation of strategy and policy in the organization, emphasizing the integration of decisions in the functional areas. Prerequisites: ACC 503; BUS 502; CIS 502; ECN 502; FIN 502; MGT 502; MKT 502; OPN 502; QBA 502; completion of at least 36 hours of program of study credits.

**591 Seminar.** (3) N Topics such as the following will be offered:  
 (a) Competitive Strategy  
 (b) Ethics  
 (c) Human Resources Systems  
 (d) Managerial Planning and Control

**598 Special Topics.** (3) N Graduate special topics chosen from human resources, strategic management, and international management, including special topics in international management in Asia or Europe.

**791 Seminar: Doctoral Seminar in Management.** (3) A

Topics such as the following will be offered:

- (a) Compensation
- (b) Human Resource Management
- (c) Organizational Behavior
- (d) Organizational Theory
- (e) Research Design and Methodology
- (f) Strategic Management

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Department of Marketing

**Michael P. Mokwa**  
*Chair*

(BAC 400) 602/965-3621

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### PROFESSORS

BROWN, GWINNER, HUTT, JACKSON,  
KUMAR, LASTOVICKA, MOKWA,  
OSTROM, REINGEN, SCHLACTER

### ASSOCIATE PROFESSORS

BITNER, BLASKO, GOURLEY, SINHA,  
STEPHENS, WALKER, WARD

### Research Activity

The Department of Marketing has a significant research orientation that spans a broad scope of topics, including strategic marketing management, consumer behavior, selling and sales management, advertising, channels management, international marketing, business to business marketing, and services marketing. Many research projects involve faculty and doctoral student collaboration. Some specific projects published recently have focused on evaluation of service encounters, advertising creativity, relationship quality in selling, channel responsiveness, salesperson motivation, influence patterns in strategic decision making, consumption symbolism, marketing competencies and organizational performance, social network influences on consumer behavior, innovation in industrial markets, and the effects of relationship marketing.

### MARKETING

#### **MKT 411 Sales Management.** (3) A

Application of management concepts to the administration of the sales operation. Prerequisite: MKT 302.

#### **412 Promotion Management.** (3) A

Integration of the promotional activities of the firm including advertising, personal selling, public relations, and sales promotion. Prerequisite: MKT 302.

#### **424 Retail Management.** (3) A

Role of retailing in marketing. Problems and functions of retail managers within various retail institutions. Prerequisite: MKT 300.

#### **434 Industrial Marketing.** (3) A

Strategies for marketing products and services to industrial, commercial, and governmental markets. Changing industry and market structures. Prerequisite: MKT 302 or instructor approval.

#### **435 International Marketing.** (3) N

Analysis of marketing strategies developed by international firms to enter foreign markets and to adapt to changing international environments. Prerequisites: MKT 302 or instructor approval; professional program business student.

#### **451 Marketing Research.** (3) F, S, SS

Integrated treatment of methods of market research and analysis of market factors affecting decisions in the organization. Prerequisites: MKT 302 and QBA 221 (with grades of "C" or higher).

#### **460 Strategic Marketing.** (3) F, S, SS

Policy formulation and decision making by the marketing executive. Integration of marketing programs and consideration of contemporary marketing issues. Prerequisites: MKT 302, 304, 451 (with grades of "C" or higher); professional program business student.

#### **502 Marketing Management.** (3) F, S

Managing the marketing function; market and environmental analysis; marketing planning, strategy, and control concepts. Development and management of marketing programs. Prerequisite: ECN 502.

#### **520 Strategic Perspectives of Buyer Behavior.** (3) N

Concepts and theories from the behavioral sciences as they relate to marketing strategy formulation. Prerequisite: MKT 502 or equivalent or instructor approval.

#### **522 Marketing Information.** (3) A

Marketing research, marketing information systems, and modern statistical techniques in marketing decision making. Prerequisite: MKT 502.

#### **524 Services Marketing.** (3) F, S

Strategies for marketing services emphasizing the distinctive challenges and approaches that make marketing of services different from marketing manufactured goods. Prerequisite: MKT 502 or equivalent.

#### **563 Marketing Strategy.** (3) A

Planning and control concepts and methods for developing and evaluating strategic policy from a marketing perspective. Prerequisite: MKT 502.

#### **591 Seminar.** (3) A

Topics such as the following will be offered:

- (a) Product Strategy
- (b) Channel Strategy
- (c) Promotion Strategy
- (d) Marketing in International Operations
- (e) Advertising Strategy

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Chemical Engineering

**Eric J. Guilbeau**

*Chair*

(EC G202) 602/965-3313

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### REGENTS' PROFESSORS

MAYER, WAGNER

### PROFESSORS

BERMAN, CALE, CARPENTER,  
GUILBEAU, JACOBSON, KRAUSE,  
KUESTER, RAUPP, SATER, ZWIEBEL

### ASSOCIATE PROFESSORS

BECKMAN, BELLAMY, BURROWS,  
DEY, GARCIA, RIVERA, TORREST

### ASSISTANT PROFESSORS

ALFORD, BEAUDOIN

### PROFESSORS EMERITI

DORSON, HENDRICKSON, REISER,  
SHAW, STANLEY

The faculty in the Department of Chemical, Bio and Materials Engineering offer graduate programs leading to the Master of Science in Engineering, the Master of Science, and the Doctor of Philosophy degrees. Within the Chemical Engineering major, areas of concentrations are available in biomedical and clinical engineering, chemical process engineering, chemical reactor engineering, energy and materials conversion, environmental control, solid state processing, and transport phenomena. For students interested in the Bioengineering major, see pages 130-132 for program description. Within the Engineering Science major, students may select materials science and engineering as the area of study (see page 185 for program description). The faculty also participate in offering the interdisciplinary program leading to the Doctor of Philosophy degree with a major in the Science and Engineering of Materials (see pages 261-262 for program description). A *Graduate Student Handbook*, detailing information on graduate studies in Chemical Engineering, is available to admitted students. Students should contact the department.

### Graduate Record Examination.

Graduate Record Examination (GRE) scores are required from all students.

### MASTER OF SCIENCE IN ENGINEERING DEGREE

For information concerning the Master of Science in Engineering degree, refer to pages 69-70.

### MASTER OF SCIENCE DEGREE

For information concerning the Master of Science degree, refer to pages 53-55.

**Transition Program.** Students applying for the program leading to a master's degree with a major in Chemical Engineering, or area of study materials science under the Engineering Science major, may have an undergraduate B.S. degree in a major field other than chemical engineering or materials science. The qualifications of transition students are reviewed by the department graduate committee, and a special program is designed for successful applicants. In general applicants should have had, or should be prepared to take, calculus through differential equations and physics. Transition students are expected to complete the essential courses in their area of study from the undergraduate program in order to be prepared for the graduate courses. Other course work from the undergraduate program may be required depending upon the area of study selected by the student.

Transition students should contact the graduate coordinator for an evaluation of the undergraduate transcript.

**Program of Study.** All candidates for the Master of Science in Engineering or Master of Science degree with a major in Chemical Engineering, or area of study materials science and engineering under the Engineering Science major, are required to complete an approved program of study consisting of the minimum required semester hours, including research report (M.S.E.) or thesis (M.S.). Special course requirements for the different areas of study are established by the faculty and are available from the departmental graduate coordinator. In addition to the course/thesis requirements, all full-time graduate students must successfully complete the seminar course during each semester of attendance; part-time students must enroll in the seminar course at least three times during the course of study. Candidates whose undergraduate degree was in a field other than

chemical engineering or materials science may be required to complete more than 30 semester hours.

**Thesis Requirements.** A thesis or equivalent is required.

**Final Examinations.** A final oral examination is required in defense of the thesis or equivalent.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

The Doctor of Philosophy degree with a major in Chemical Engineering, or area of study materials science and engineering under the Engineering Science major, is conferred upon evidence of excellence in research resulting in a scholarly dissertation that is a contribution to knowledge.

**Doctoral Program.** Upon successful completion of the qualifying examination, a research supervisory committee is formed and the doctoral student is required to submit a research proposal. Following the acceptance of the research proposal, the student is given a comprehensive examination to determine initiative, originality, breadth, and high level of professional commitment to the problem selected for investigation. Upon successful completion of the comprehensive examination, the student applies for admission to candidacy.

**Master's Degree in Passing.** Students who are enrolled in the Ph.D. degree program in Chemical Engineering, *but who do not hold a previously earned master's degree in chemical engineering*, can obtain the M.S.E. degree (the "Master's in Passing") upon completion of course requirements, the Ph.D. Qualifying Examination, the Dissertation, Prospectus, and the Comprehensive Examination.

As this degree is only available to students who are enrolled as regular students in the Ph.D. program in Chemical Engineering, all of the above requirements (including course work) can be applied toward the Ph.D. requirements.

**Foreign Language Requirements.** Candidates in the program leading to the Ph.D. degree with a major in Chemical Engineering, or area of study

materials science and engineering under the Engineering Science major, normally are not required to pass an examination showing reading competency of a foreign language. However, the supervisory committee may establish such a requirement in special cases depending upon the research interests of the candidate. If the foreign language is required, the student must successfully fulfill the requirement before taking the comprehensive examination.

**Dissertation Requirements.** A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required.

**Final Examinations.** A final oral examination in defense of the dissertation is required.

### Research Activity

**Biochemical Engineering.** Biochemical separations, biomaterials engineering, scanning probe microscopy, and affinity chromatography.

**Biomedical Engineering.** Body processes, wearable artificial kidneys, improved blood oxygenators, noninvasive techniques, biophysical property correlations, cardiovascular prosthesis and biomaterials, computer analysis of clinical data, optimization of health delivery systems, biomechanics, biocontrol, analysis of human motion, bioelectronics, medical imaging, and development of physiological sensors.

**Chemical Process Control.** Advanced process identification and control, continuous process diagnostics, batch supervisory control, statistical process control, expert systems, neural networks, and artificial intelligence. Applications to industrial processes.

**Chemical Process Engineering.** Chemical process design fundamentals, chemical instrumentation for process control, optimization techniques and applications, process modeling, simulation, dynamics and control, and applied statistics.

**Chemical Reactor Engineering.** Reactor analysis and design, high temperature reaction kinetics, atmospheric reactions, catalysis, biochemical processes, and semiconductor materials processing.

*Energy and Materials Conversion and Conservation.* Materials and resource recovery from urban, forest and agricultural wastes, biomass conversion to transportable and conveniently useful fuels, energy storage, coal gasification, and separation and purification system.

*Environmental Analysis and Control.* Energy and environmental design considerations, purification of exhaust streams, reduction of emissions from storage tanks, analysis of air and water pollution, modeling of pollution systems, and recycling for pollution control.

*Materials Science and Engineering.* Semiconductor processing and characterization, polymeric and ceramic composites, materials for high critical temperature superconductor applications, ferritic thin films for capacitor and memory applications, high temperature materials for space applications, mechanical behavior of high strength Al-Li alloys, environmentally influenced mechanical effects, and microbiologically influenced corrosion reactions.

*Solid State Processing.* Adsorption, catalysis, solid state materials processing for control of properties, semiconductor materials processing, chemical vapor deposition, surface reactions, electrochemical reactions, optimization of electroplating processing, and surface analyses.

*Transport Processes.* Fluid mechanics of small particles, applications of laser Doppler velocimeter, interfacial transport and membrane separations, phase equilibria, and incorporation in process design.

#### CHEMICAL ENGINEERING

**CHE 411 Biomedical Engineering I.** (3) F Review of diagnostic and prosthetic methods using engineering methodology. Introduction to transport, metabolic, and autoregulatory processes in the human body. Cross-listed as BME 411. Prerequisite: instructor approval.

**413 Biomedical Instrumentation I.** (3) F Principles of medical instrumentation. Studies of medical diagnostic instruments and techniques for the measurement of physiologic variables in living systems. Prerequisites: A/G/B/BME 435 (grade of "C" or higher); ECE 333 or 334.

**458 Semiconductor Material Processing.** (3) N Introduction to the processing and characterization of electronic materials for semiconductor applications. Prerequisites: CHE 333, 342.

**475 Biochemical Engineering.** (3) N Application of chemical engineering methods, mass transfer, thermodynamics, and transport phenomena to industrial biotechnology. Prerequisite: instructor approval.

**476 Bioreaction Engineering.** (3) N Principles of analysis and design of reactors for processing with cells and other biologically active materials; applications of reaction engineering in biotechnology. Prerequisite: instructor approval.

**477 Bioreaction Processes.** (3) N Principles of separation of biologically active chemicals; the application, scaleup, and design of separation processes in biotechnology. Prerequisite: instructor approval.

**501 Introduction to Transport Phenomena.** (3) F, S Transport phenomena, with emphasis on fluid systems. Prerequisite: transition student with instructor approval.

**502 Introduction to Energy Transport.** (3) F, S Continuation of transport principles, with emphasis on energy transport in stationary and fluid systems. Prerequisite: transition student with instructor approval.

**503 Introduction to Mass Transport.** (3) F, S The application of transport phenomena to mass transfer. The design of mass transfer equipment, including staged processes. Prerequisite: transition student with instructor approval.

**504 Introduction to Chemical Thermodynamics.** (3) F, S Energy relations and equilibrium conversions based on chemical potentials and phase equilibria. Prerequisite: transition student with instructor approval.

**505 Introduction to Chemical Reactor Design.** (3) F, S Application of kinetics to chemical reactor design. Prerequisite: transition student with instructor approval.

**518 Introduction to Biomaterials.** (3) F Topics include structure property relationships for synthetic and natural biomaterials, biocompatibility, and uses of materials to replace body parts. Cross-listed as BME 518. Prerequisite: ECE 313 or instructor approval.

**527 Advanced Applied Mathematical Analysis in Chemical Engineering.** (3) F Formulation and solution of complex mathematical relationships resulting from the description of physical problems in mass, energy, and momentum transfer and chemical kinetics.

**528 Process Optimization Techniques.** (3) S Method for optimizing engineering processes. Experimental design and analysis; linear and nonlinear regression methods; classical, search, and dynamic programming algorithms.

**533 Transport Processes I.** (3) F Unified treatment of momentum, heat, and mass transfer from molecular theory, and continuum points of view. Continuum equations of microscopic and macroscopic systems and multicomponent and multiphase systems. Cross-listed as BME 533.

**534 Transport Processes II.** (3) S Continuation of CHE/BME 533, emphasizing mass transfer. Cross-listed as BME 534. Prerequisite: BME/CHE 533.

**536 Convective Mass Transfer.** (3) N Turbulent flow for multicomponent systems, including chemical reactions with applications in separations and air pollution. Prerequisite: CHE 533 or MAE 571.

**543 Thermodynamics of Chemical Systems.** (3) F Classical and statistical thermodynamics of nonideal physicochemical systems and processes; prediction of optimum operating conditions. Cross-listed as BME 543.

**544 Chemical Reactor Engineering.** (3) S Reaction rates, thermodynamics, and transport principles applied to the design and operation of chemical reactors. Cross-listed as BME 544. Prerequisite: BME/CHE 543.

**548 Topics in Catalysis.** (3) N Engineering catalysis, emphasizing adsorption, kinetics, characterization, diffusional considerations, and reactor design. Other topics include mechanisms, surface analyses, and electronic structure.

**552 Industrial Water Quality Engineering.** (3) N Water pollutants, quality criteria and control, chemical treatment processing, and system design. Case studies. Prerequisite: CHE 331 or equivalent.

**553 Air Quality Control.** (3) N Air pollutant origins, effects, and control. Physical and chemical processes, including dispersion, combustion, sampling, control equipment design, and special topics. Prerequisite: CHE 331 or equivalent.

**554 New Energy Technology.** (3) N Gasification, liquefaction pyrolysis, and combustion processes for coal, wastes, and other raw materials. In-situ processes for coal, oil, shale, and geothermal energy. Environmental quality issues.

**556 Separation Processes.** (3) N Topics in binary/multicomponent separation, rate governed and equilibration processes, mass transfer criteria, energy requirements, separating agents and devices, and staged operations.

**558 Electronic Materials.** (3) N Processing and characterization of electronic materials for semiconductor type uses. Thermodynamics and transport phenomena, phase equilibria and structure, mass transfer, and diffusion and thermal properties.

**561 Advanced Process Control.** (3) S Dynamic process representation, linear optimal control, optimal state reconstruction, and parameter and state estimation techniques for continuous and discrete time systems.

**563 Chemical Engineering Design.** (3) N Computational methods; the design of chemical plants and processes.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

#### MATERIALS SCIENCE AND ENGINEERING

**MSE 421 Physical Metallurgy Laboratory.** (1) S Focuses on analysis of microstructure of metals and alloys and includes correlation with mechanical properties to some extent. Lab. Pre- or corequisite: MSE 420.

**453 Experiments in Materials Synthesis and Processing II.** (2) F A continuation of MSE 354, with emphasis on characterization. Small groups complete three experiments supervised by selected faculty members. Lab. Cross-listed as EEE 453. Prerequisites: EEE/MSE 353 and 354 or equivalents.

**454 Advanced Materials Processing and Synthesis.** (3) S

Case studies from published literature of current techniques in materials processing and synthesis. Student participation in classroom presentations. Lecture, recitation. Cross-listed as EEE 454. Prerequisites: EEE/MSE 353 and 354 or equivalents.

**510 X-Ray and Electron Diffraction.** (3) F Fundamentals of X-ray diffraction, transmission electron microscopy, and scanning electron microscopy. Techniques for studying surfaces, internal microstructures, and fluorescence. Lecture, demonstrations. Prerequisite: transition student with instructor approval.

**511 Corrosion and Corrosion Control.** (3) S Introduction to corrosion mechanisms and methods of preventing corrosion. Topics include the following: electrochemistry, polarization, corrosion rates, oxidation, coatings, and cathodic protection. Prerequisite: transition student with instructor approval.

**512 Analysis of Material Failures.** (3) S Identification of types of failures. Analytical techniques. Fractography, SEM, nondestructive inspection, and metallography. Mechanical and electronic components. Prerequisite: transition student with instructor approval.

**513 Polymers and Composites.** (3) F Relationship between chemistry, structure, and properties of engineering polymers. Design, properties, and behavior of fiber composite systems.

**514 Physical Metallurgy.** (4) F Crystal structure and defects. Phase diagrams, metallography, solidification and casting, and deformation and annealing. Lecture, lab. Prerequisite: transition student with instructor approval.

**515 Thermodynamics of Materials.** (3) N Principles of statistical mechanics, statistical thermodynamics of single crystals, solutions, phase equilibrium, free energy of reactions, free electron theory, and thermodynamics of defects. Prerequisite: transition student with instructor approval.

**516 Mechanical Properties of Solids.** (3) S Effects of environmental and microstructural variables of mechanical properties, including

plastic deformation, fatigue, creep, brittle fracture, and internal friction. Prerequisite: transition student with instructor approval.

**517 Introduction to Ceramics.** (3) F Principles of structure, property relations in ceramic materials. Processing techniques. Applications in mechanical, electronic, and superconducting systems. Prerequisite: transition student with instructor approval.

**518 Integrated Circuits Materials Science.** (3) N Principles of materials science applied to semiconductor processing and fabrication in metals, ceramics, polymers, and semiconductors. Prerequisite: transition student with instructor approval.

**520 Theory of Crystalline Solids.** (3) F Anisotropic properties of crystals; tensor treatment of elastic, magnetic, electric and thermal properties, and crystallography of Martensitic transformations.

**521 Defects in Crystalline Solids.** (3) S Introduction to the geometry, interaction, and equilibrium between dislocations and point defects. Relations between defects and properties will be discussed. Prerequisite: ECE 350 or instructor approval.

**530 Materials Thermodynamics and Kinetics.** (3) S Thermodynamics of alloy systems, diffusion in solids, kinetics of precipitation, and phase transformations in solids. Prerequisites: CHE 312 or ECE 340; ECE 350.

**531 Statistical Thermodynamics.** (3) N Kinetic and quantum theory. Statistical mechanics; ensemble theory. Structure and thermodynamics of non-interacting and interacting particles. Boltzmann integro-differential equation. Cross-listed as MAE 582. Prerequisite: MAE 581.

**533 Direct Energy Conversion.** (3) N Advanced selected topics in direct energy conversion, theory, design, and applications. Cross-listed as MAE 537. Prerequisite: MAE 581.

**540 Fracture, Fatigue, and Creep.** (3) F Relationship between microstructure and fracture; fatigue and creep properties of materials.

Environmental effects and recent developments. Current theories and experimental results. Prerequisite: MSE 440 or equivalent.

**550 Advanced Materials Characterization.** (3) N Analytical instrumentation for characterization of materials; SEM, SIMS, Auger, analytical TEM, and other advanced research techniques.

**556 Electron Microscopy Laboratory.** (3) F Lab support for MSE 558. Cross-listed as SEM 556. Pre- or corequisite: MSE/SEM 558.

**557 Electron Microscopy Laboratory.** (3) S Lab support for MSE 559. Cross-listed as SEM 557. Pre- or corequisite: MSE/SEM 559.

**558 Electron Microscopy I.** (3) F Microanalysis of the structure and composition of materials using images, diffraction and X-ray, and energy loss spectroscopy. Knowledge of elementary crystallography, reciprocal lattice, stereographic projections, and complex variables is required. Cross-listed as SEM 558. Prerequisite: instructor approval.

**559 Electron Microscopy II.** (3) S Microanalysis of the structure and composition of materials using images, diffraction and X-ray, and energy loss spectroscopy. Knowledge of elementary crystallography, reciprocal lattice, stereographic projections, and complex variables is required. Cross-listed as SEM 559. Prerequisite: instructor approval.

**560 Strengthening Mechanisms.** (3) S Deformation of crystalline materials. Properties of dislocations. Theories of strain hardening, solid solution, precipitation, and transformation strengthening. Prerequisite: ECE 350 or equivalent.

**561 Phase Transformation in Solids.** (3) N Heterogeneous and homogeneous precipitation reactions, shear displacive reactions, and order-disorder transformation.

**562 Ion Implantation.** (3) S Includes defect production and annealing. Generalized treatment, including ion implantation, neutron irradiation damage, and the interaction of other incident beams. Prerequisite: MSE 450.

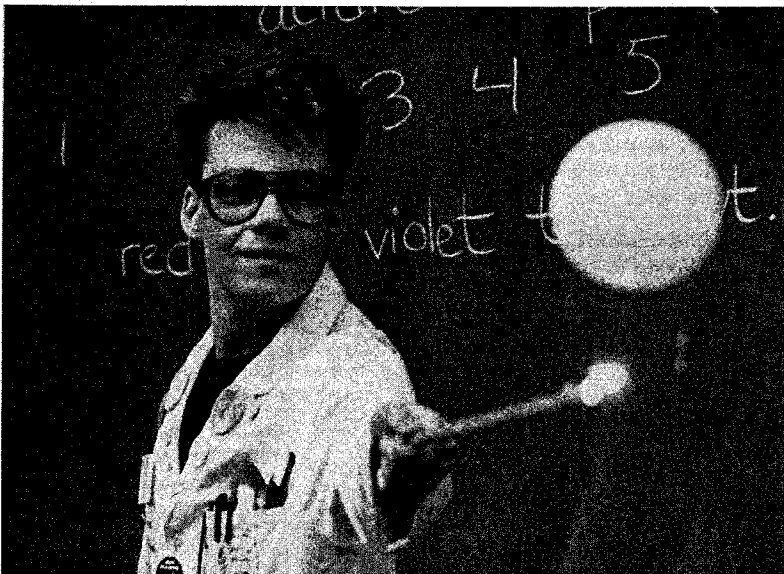
**570 Polymer Structure and Properties.** (3) F Relationships between structure and properties of synthetic polymers, including glass transition, molecular relaxations, crystalline state viscoelasticity, morphological characterization, and processing.

**571 Ceramics.** (3) A Includes ceramic processing, casting, molding, firing, sintering, crystal defects, and mechanical, electronic, and physical properties. Prerequisites: MSE 521, 561.

**572 Semiconductor Phase Diagrams.** (3) A Analysis of binary and ternary phase diagrams and application to semiconductor growth and vapor and liquid phase epitaxy. Prerequisite: MSE 521.

**573 Magnetic Materials.** (3) A Emphasis on ferromagnetic and ferrimagnetic phenomena. Domains, magnetic anisotropy, and magnetostriction. Study of commercial magnetic materials. Prerequisite: MSE 520 or equivalent.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.





## Chemistry

Ana L. Moore  
*Assistant Chair for  
 Graduate Studies*  
 (PS D102A) 602/965-4664

### REGENTS' PROFESSORS

BUSECK, C. MOORE,  
 O'KEEFE, PETTIT

### PROFESSORS

ANGELL, BALASUBRAMANIAN,  
 BIEBER, BIRK, BLANKENSHIP,  
 T. BROWN, CRONIN, FUCHS,  
 GLAUNSINGER, GUST,  
 HOLLOWAY, LOHR, McMILLAN,  
 T. MOORE, MUNK,  
 ROSE, SKIBO, WILLIAMS

### ASSOCIATE PROFESSORS

ALLEN, A. MOORE,  
 PETUSKEY, STEIMLE, WOLF,  
 WOODBURY, ZIURYS

### ASSISTANT PROFESSORS

BLOOM, GROTHJAHN,  
 KOUVETAKIS, PENA, YAGHI

### REGENTS' PROFESSORS EMERITI

EYRING, WAGNER

### PROFESSORS EMERITI

D. BROWN, BURGOYNE, HARRIS,  
 JUVET, LIU, LUCHSINGER,  
 MOELLER, STUTSMAN, THOMSON,  
 WHITEHURST, ZASLOW

The faculty in the Department of Chemistry and Biochemistry offer programs leading to the Master of Science and the Doctor of Philosophy degrees, with a major in Chemistry. Areas of concentration include analytical, inorganic, organic, physical, and solid state chemistry, biochemistry, and geochemistry. The faculty also participate in offering programs leading to the Master of Natural Science degree when one of the concentrations is chemistry (see page 67), and the interdisciplinary programs, leading to the Doctor of Philosophy degrees with majors in Exercise Science and the Science and Engineering of Materials (see pages 196-197 and 261-263). Students admitted to the Master of Education degree program with a major in Secondary Education may also elect chemistry as the subject matter field.

The graduate programs offered by the faculty in the Department of Chem-

istry and Biochemistry prepare students for professional careers in chemistry and related fields in industry, government, and educational institutions. All students applying for admission to one of these programs must submit scores for the Graduate Record Examination.

### MASTER OF SCIENCE DEGREE

See pages 53-55 for general requirements.

**Program of Study.** A minimum of 30 semester hours of credit is required, including three core courses. A thesis carrying six hours of credit is also included in the total. The remaining courses are selected by the student in consultation with the supervisory committee.

**Thesis Requirements.** A thesis is required.

**Final Examinations.** A general oral examination is required of all candidates for the master's degree. A written examination may also be required.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

**Program of Study.** A minimum of 84 semester hours of credit, including dissertation, is required. Approximately 20-30 hours of this total is formal course work, including three core courses. The remaining courses, including research and dissertation, are selected by the student in consultation with the supervisory committee.

**Cumulative Examinations.** Written examinations are required. In addition, an oral examination is required which includes material of a general nature, and the presentation and defense of current research and an original research proposal prepared by the student.

### Foreign Language Requirements.

There is no departmental foreign language requirement, but the student's supervisory committee may specify a reading proficiency in one or more foreign languages.

**Dissertation Requirements.** A dissertation based on original work of high quality and demonstrating proficiency

in the student's special field is required. (See dissertation requirements, pages 73-74.)

**Final Examinations.** The final oral examination is a defense of the dissertation, during which the candidate presents a summary of the dissertation research. Evidence of a publishable contribution of original research must be presented.

### Research Activity

Current research in the department is reflected in the following list of subjects: chemical bonding; atomic spectroscopy; transition elements; organometallic chemistry; meteorite chemistry; electrical properties of titanium oxides; X-ray and neutron crystallography; X-ray crystallography of membrane proteins; photobiology; electronic structure and mechanisms involved in pigment systems; artificial photosynthesis; bacterial photosynthesis; chemical applications of nuclear magnetic resonance spectroscopy; organic mass spectrometry including field ionization kinetics; biochemical pharmacology; structure of biopolymers; metalloproteins; molecular biology; site-directed mutagenesis; quantitative analysis with electron beam instruments; enzymes of purine metabolism; toxic proteins from Mojave rattlesnake venom; purine and pyrimidine chemistry; design of potential antitumor agents; design and synthesis of imaging agents of malignant tissues; redox chemistry of quinones; rate processes and molecular spectroscopy; nature and origin of organic compounds in carbonaceous meteorites; computer-assisted structure elucidation; cycloaddition and cycloreversion reactions; magnetic, chemisorption, and catalytic behavior of small metallic particles; structure and properties of metal-ammonia systems; solid state geochemistry; nucleic acid chemistry and electron microscopy; separations and chromatographic detectors; electron microprobe analysis of air-pollutants; metal complexes of macrocyclic chelating agents; structure analysis of metal complexes having a high coordination number; molecular orbital calculations; infrared and Raman spectroscopy; ceramics; laser spectroscopy; ultrafast kinetics; microwave spectroscopy.

In addition, interdisciplinary research is actively pursued in several areas,

e.g., biochemistry, geochemistry, solid state science, and materials science. Magnetic and magnetic resonance studies involve faculty and students from both the Department of Physics and Astronomy and the Department of Chemistry and Biochemistry in a well-equipped magnetism facility. Approximately 35 faculty members from the Departments of Chemistry and Biochemistry, Physics and Astronomy, Geology and the College of Engineering and Applied Sciences are associated with the Center for Solid State Science. The center includes a number of specialized facilities such as electron microscopy and crystal-growing laboratories. Eleven faculty members from the Department of Chemistry and Biochemistry and the Department of Botany are associated with the Center for the Study of Early Events in Photosynthesis. This center has unique instrumentation for studying the earliest energy storing reactions of photosynthesis. The Center for Meteorite Studies and the Cancer Research Institute also foster interdisciplinary research efforts. Faculty in the Department of Chemistry and Biochemistry also participate in collaborative programs in the science and engineering of materials and in molecular and cellular biology.

### CHEMISTRY

- CHM 421 Instrumental Analysis.** (3) S Principles of instrumental methods in chemical analysis. Electroanalytical and optical techniques. Prerequisites: CHM 325, 326. Pre- or corequisite: CHM 442.
- 424 Separation Methods and Quantitative Organic Analysis.** (3) N Theory and practice of gas, liquid, ion-exchange, and gel permeation chromatography, countercurrent distribution, electrophoresis, and distillation; qualitative and quantitative interpretation of IR, mass, and NMR spectroscopy; quantitative methods of organic analysis via functional groups. 2 hours lecture, 4 hours lab. Prerequisites: CHM 318 or 332 or 442 or instructor approval.
- 431 Qualitative Organic Analysis.** (3) S Systematic identification of organic compounds. 1 hour lecture, 6 hours lab. Prerequisites: CHM 118 (or 326) and 320 (or 336) or instructor approval.
- 441 General Physical Chemistry.** (3) F Laws of thermodynamics and their applications, properties of gases, solids, liquids and solutions, reaction kinetics, wave mechanics, molecular spectroscopy, and statistical thermodynamics. Credit is allowed for *only* CHM 341 or 441. Prerequisites: MAT 272 or 291; PHY 241. Corequisite: MAT 274.
- 442 General Physical Chemistry.** (3) S Continuation of CHM 441. Prerequisite: CHM 441; MAT 274.
- 452 Inorganic Chemistry Laboratory.** (1-2) S Preparation and characterization of typical inorganic substances, emphasizing methods and techniques. 1 conference, 5 hours lab. Prerequisite: instructor approval. *General Studies: L2 (if credit also earned in CHM 444).*
- 453 Inorganic Chemistry.** (3) S Principles and applications of inorganic chemistry. Prerequisite: CHM 341 or 441.
- 461 General Biochemistry.** (3) F Structure, chemistry, and metabolism of biomolecules and their role in the biochemical processes of living organisms. Credit is allowed only for CHM 361 or 461. Prerequisites: CHM 318 (or 332) and 341 (or 441) or instructor approval.
- 462 General Biochemistry.** (3) S Continuation of CHM 461. Prerequisite: CHM 461 or instructor approval.
- 463 Biophysical Chemistry.** (3) S Principles of physical chemistry as applied to biological systems. Prerequisite: CHM 341 or 441.
- 467 General Biochemistry Laboratory.** (2) S The application of modern chemical and physical methods to biochemical problems; purification and characterization of biological macromolecules; quantitative measurement of enzyme activity and properties; evaluation of metabolic processes. 1 conference, 5 hours lab. Prerequisite: CHM 461. *General Studies: L2 (if credit also earned in CHM 464).*
- 471 Solid State Chemistry.** (3) F Crystal chemistry, thermodynamics and electrochemistry of solids, nonstoichiometric compounds, diffusion and solid state reactions, crystal growth, and selected topics. Pre- or corequisite: CHM 441 or instructor approval.
- 480 Methods of Teaching Chemistry.** (3) S Organization and presentation of appropriate content of chemistry; preparation of reagents, experiments, and demonstrations; organization of stock rooms and laboratories; experience in problem solving. Prerequisite: instructor approval.
- 481 Geochemistry.** (3) F Origin and distribution of the chemical elements. Geochemical cycles operating in the earth's atmosphere, hydrosphere, and lithosphere. Cross-listed as GLG 481. Prerequisite: CHM 341 or 441 or GLG 321.
- 485 Meteorites and Cosmochemistry.** (3) N Chemistry of meteorites and their relationship to the origin of the earth, solar system, and universe. Cross-listed as GLG 485.
- 501 Current Topics in Chemistry.** (1) F, S May be repeated for credit. Prerequisite: instructor approval.
- 521 Computer Interfacing to Chemical Instrumentation.** (3) N Assembly and machine language programming of laboratory-size computers for data acquisition and online, real-time control of chemical instrumentation. Digital logic and timing considerations in hardware interfacing of computers. No prior knowledge of computers or electronics assumed. Sound knowledge of chemical instrumentation desirable. 2 hours lecture, 4 hours lab.
- 523 Advanced Analytical Chemistry.** (3) A Theoretical principles of analytical chemistry. Prerequisites: CHM 325 and 442 or equivalents.
- 525 Spectrochemical Methods of Analysis.** (4) N Theoretical and practical considerations involving the use of optical instruments for chemical analysis, emphasizing emission and absorption spectroscopy. 3 hours lecture, 3 hours lab. Prerequisite: CHM 442.
- 526 X-Ray Methods of Analysis.** (4) N Theoretical and practical considerations involving the use of X-ray diffraction and spectroscopy for chemical and structural analyses. 3 hours lecture, 3 hours lab. Prerequisite: CHM 442.
- 527 Electrical Methods of Chemical Analysis.** (4) N Theoretical and practical considerations of polarography, potentiometric, amperometric, and conductometric titrations. 2 hours lecture, 6 hours lab. Prerequisite: CHM 442.
- 531 Advanced Organic Chemistry I.** (3) F Reaction mechanisms, reaction kinetics, linear free energy relationships, transition state theory, molecular orbital theory, and Woodward-Hoffmann rules. Prerequisites: CHM 318 (or 332), 442.
- 532 Advanced Organic Chemistry II.** (2) S Continuation of CHM 531. Prerequisite: CHM 531.
- 537 Organic Reactions.** (3) S Important synthetic reactions of organic chemistry emphasizing recently discovered reactions of preparative value. Prerequisite: CHM 531.
- 541 Advanced Thermodynamics.** (3) F Equilibrium thermodynamics, chemical reactions, and phase equilibria. Introduction to statistical thermodynamics, critical phenomena, and kinetics. Prerequisite: CHM 442.
- 545 Quantum Chemistry I.** (3) F Basic quantum theory, chemical bonding, and molecular structure. Prerequisite: CHM 442.
- 546 Quantum Chemistry II.** (3) S Quantum theory of rate processes. Principles of spectroscopy and nonlinear optics. Prerequisite: CHM 545.
- 548 Chemical Kinetics.** (2) N Kinetic theory and rate processes. Prerequisite: CHM 545.
- 553 Advanced Inorganic Chemistry.** (3) S Principles of modern inorganic chemistry and their applications over the entire periodic system. Prerequisites: CHM 442 and 453 or equivalents.
- 556 Topics in Inorganic Chemistry.** (3) N May be repeated for credit. Prerequisites: CHM 553; instructor approval.
- 563 Biophysical Chemistry.** (3) N Physical chemistry of macromolecules, especially proteins, nucleic acids, and polysaccharides. Thermodynamics, hydrodynamics, and spectroscopy of and their relation to structure. Prerequisites: CHM 442, 462.

**568 Molecular Mechanisms of Photosynthesis.** (3) N

Structure and function of photosynthetic complexes; mechanism of energy conversion in plants, bacteria, and model systems. Cross-listed as BOT 568. Prerequisite: instructor approval.

**579 Topics in Solid State Chemistry.** (3) N

May be repeated for credit. Prerequisite: instructor approval.

**582 Topics in Geochemistry and Cosmochemistry.** (3) N

Topics of current interest for students in chemistry and other fields. Sampling of data and thought concerning phase equilibria, element distribution, meteorites, the Earth, and other planets. May be repeated for credit. Prerequisite: instructor approval.

**583 Phase Equilibria and Geochemical Systems.** (3) N

Natural reactions at high temperatures and pressures; silicate, sulfide, and oxide equilibria. Cross-listed as GLG 583.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.



## Civil Engineering

Larry W. Mays  
Chair  
(EC G252) 602/965-3589

### PROFESSORS

S. HOUSTON, W. HOUSTON,  
MAMLOUK, MATTHIAS,  
MAYS, O'BANNON,  
SINGHAL, UPCHURCH

### ASSOCIATE PROFESSORS

DUFFY, FAFITIS, HINKS, JOHNSON,  
RAJAN, ZANIEWSKI

### ASSISTANT PROFESSORS

BAKER, FOX,  
MOBASHER, WESTERHOFF

### PROFESSORS EMERITI

BETZ, BLACKBURN, BORGO, KLOCK,  
LUNDGREN, PIAN, RUFF

The faculty in the Department of Civil and Environmental Engineering offer graduate programs leading to the Master of Science in Engineering, the Master of Science, and the Doctor of Philosophy degrees with a major in Civil Engineering. Areas of concentration include environmental/sanitary, geotechnical/soil mechanics, structures, transportation (an area of study may be in materials), and water resources/hydraulics.

**Graduate Record Examination.** Submission of scores on the Graduate Record Examination is required for Ph.D. applicants and is recommended for M.S. and M.S.E. applicants. Students whose undergraduate degree is not based on an ABET-accredited program must submit scores on the GRE.

**TOEFL Examination.** International students are required to have passed the TOEFL examination with a minimum score of 550.

### MASTER OF SCIENCE DEGREE

For information concerning the Master of Science degree, refer to pages 53-55. ♦

### MASTER OF SCIENCE IN ENGINEERING DEGREE

For information concerning the Master of Science in Engineering degree, refer to pages 69-70. Applicants may have a baccalaureate degree in a major

other than civil engineering. The student's qualifications are reviewed, and deficiency courses are specified.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

The Doctor of Philosophy degree is conferred upon students based on evidence of excellence in research leading to a scholarly dissertation that is a contribution to knowledge in the field of civil engineering.

**Letters of Recommendation.** Submission of three letters of recommendation is required for those applying for admission to the Ph.D. degree program. One letter must be from the chair or advisor of the applicant's previous degree program.

**Program of Study.** The program of study must be prepared soon after the student has been admitted to the program, the supervisory committee has been formed, and a preliminary examination (if required by the supervisory committee) has been taken.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Written and oral comprehensive examinations are required. The examinations are administered by the supervisory committee. Students should request permission from the Graduate College to take the comprehensive examinations when they have essentially completed the course work in their approved program of study.

**Dissertation Requirements.** A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required.

**Final Examinations.** A final oral examination in defense of the dissertation is required.

### Research Activity

A broad range of theoretical and experimental research programs have been established in civil and environmental engineering to prepare graduate students for careers in professional practice and research. The faculty pursue research topics related to the advancement of knowledge in civil and environmental engineering.

Experimental and theoretical investigations by civil and environmental engineering faculty and students are carried out in the specialized areas of structures, geotechnical, hydraulics and water resource systems, environmental engineering, transportation, and materials.

### CIVIL ENGINEERING

**CEE 423 Structural Design.** (3) F  
Analysis and design of reinforced concrete steel, masonry, and timber structures. Lecture, lab. Prerequisite: CEE 323. Corequisite: CEE 322.

**440 Engineering Hydrology.** (3) F  
Descriptive hydrology; hydrologic cycle, systems, and models. Rain-runoff models. Hydrologic design. Concepts, properties, and basic equations of groundwater flow. Prerequisites: CEE 341; ECE 394.

**486 Integrated Civil Engineering Design.** (3) S  
Students are required to complete a civil engineering design in a simulated practicing engineering environment. Lecture, team learning. Limited to undergraduates in their final semester. Prerequisites: CEE 321, 341, 351, 361, 372. *General Studies: L2.*

**512 Pavement Performance and Management.** (3) S  
Pavement management systems, including data collection, evaluation, optimization, economic analysis, and computer applications for highway and airport design. Prerequisite: CEE 412.

**514 Bituminous Materials and Mixture.** (3) F  
Types of bituminous materials used in pavement mixtures. Chemical composition and physical properties, desirable aggregate characteristics, and optimum asphalt contents. Lecture, lab. Prerequisite: ECE 351.

**515 Properties of Concrete.** (3) S  
Materials science of concrete. Cement chemistry, mechanisms of hydration, interrelationships among micro and macro properties of cement-based materials. Mechanical properties, failure theories, fracture mechanics of concrete materials. Cement-based composite materials and the durability aspects. Lecture, lab. Prerequisite: ECE 350 or 351.

**521 Stress Analysis.** (3) F  
Advanced topics in the analytical determination of stress and strain. Prerequisite: CEE 321.

**524 Advanced Steel Structures.** (3) F  
Strength properties of steel and their effects on structural behavior. Elastic design of steel structures. Plastic analysis and design of beams, frames, and bents. Plastic deflections. Plastic design requirements. Multistory buildings. Prerequisite: CEE 322.

**526 Finite Element Methods in Civil Engineering.** (3) F  
Finite element formulation for solutions of structural, geotechnical, and hydraulic problems. Prerequisite: CEE 432.

**527 Advanced Concrete Structures.** (3) S '98  
Ultimate strength design. Combined shear and torsion. Serviceability. Plastic analysis. Special systems. Prerequisite: CEE 323.

- 528 Stability of Structures.** (3) N  
Elastic and inelastic buckling of rolled and cold-formed columns and beams. Stability of plates, rigid frames, and trusses. Prerequisites: CEE 322; instructor approval.
- 529 Complex Structures.** (3) N  
Classical and numerical investigations of linear and nonlinear structures composed of flat and curved surfaces and linear or curvilinear elements. Prerequisite: instructor approval.
- 530 Prestressed Concrete.** (3) S '97  
Materials and methods of prestressing. Analysis and design for flexure, shear, and torsion. Prestress losses due to friction, creep, shrinkage, and anchorage set. Statically indeterminate structures. Design of flat slabs, bridges, and composite beams. Prerequisite: CEE 323.
- 531 Theory of Structures.** (3) N  
General theorems relating to elastic systems; deflection of trusses and beams; statically indeterminate trusses, beams, rings, arches, and frames by consistent deformation, least work, and elastic center; horizontally curved members in bending and torsion. Prerequisite: CEE 321.
- 533 Applied Optimal Design.** (3) S '97  
Linear and nonlinear programming. Problem formulation. Design sensitivity analysis. FEM-based optimal design of structural and mechanical systems. Prerequisite: instructor approval.
- 536 Structural Dynamics.** (3) F '97  
Structures and structural members subjected to dynamic loadings, response spectra theory applications to bridges and power plants, investigations of the responses of multidegree of freedom structures, and matrix and numerical methods of analysis. Lecture, recitation. Prerequisites: CEE 321; instructor approval.
- 537 Topics in Structural Engineering.** (1-3) F, S  
Advanced topics, including, wind engineering, earthquake engineering, probabilistic concepts, and bridge and building engineering. Prerequisite: instructor approval.
- 540 Groundwater Hydrology.** (3) F  
Physical properties of aquifers, well pumping, subsurface flow modeling, unsaturated flow, numerical methods, land subsidence, and groundwater pollution. Prerequisite: CEE 440 or instructor approval.
- 541 Surface Water Hydrology.** (3) F '96  
Hydrologic cycle and mechanisms, including precipitation, evaporation, and transpiration; hydrograph analysis; flood routing; statistical methods in hydrology and hydrologic design. Prerequisite: CEE 440 or instructor approval.
- 542 Water Resources Systems Planning.** (3) A  
Philosophy of water resources planning; economic, social, and engineering interaction; introduction to the theory and application of quantitative planning methodologies in water resources planning. Guest lecturers, case studies. Prerequisite: instructor approval.
- 543 Water Resources Systems I.** (3) A  
Theory and application of quantitative planning methodologies for the design and operation of water resources systems; class projects using a computer; case studies. Pre- or corequisite: CEE 542 or instructor approval.
- 545 Foundations of Hydraulic Engineering.** (3) S '97  
Review of incompressible fluid dynamics. Flow in pipes and channels; unsteady and varied flows; wave motion. Prerequisite: CEE 341.
- 546 Free Surface Hydraulics.** (3) F '97  
Derivation of 1-dimensional equations used in open channel flow analysis; computations for uniform and nonuniform flows, unsteady flow, and flood routing. Mathematical and physical models. Prerequisite: CEE 341.
- 547 Principles of River Engineering.** (3) N  
Uses of rivers, study of watershed, and channel processes. Sediment sources, yield, and control; hydrologic analysis. Case studies. Prerequisite: CEE 341 or instructor approval.
- 548 Sedimentation Engineering.** (3) F '96  
Introduction to the transportation of granular sedimentary materials by moving fluids. Degradation, aggregation, and local scour in alluvial channels. Mathematical and physical models. Prerequisite: CEE 547 or instructor approval.
- 550 Soil Behavior.** (3) S  
Physicochemical aspects of soil behavior, stabilization of soils, and engineering properties of soils. Prerequisite: CEE 351.
- 551 Advanced Geotechnical Testing.** (3) S  
Odometer, triaxial (static and cyclic) back pressure saturated and unsaturated samples, pore pressure measurements, closed-loop computer-controlled testing, in-situ testing, and sampling. Lecture, lab. Prerequisite: CEE 351.
- 552 Geological Engineering.** (3) S  
Geological investigations for engineering purposes, case histories, geologic structure, weathering, remote sensing, geophysics, and air photo interpretation for engineering site locations. Lecture, field trips. Prerequisite: CEE 351.
- 553 Advanced Soil Mechanics.** (3) S  
Application of theories of elasticity and plasticity to soils, theories of consolidation, failure theories, and response to static and dynamic loading. Prerequisite: CEE 351.
- 554 Shear Strength and Slope Stability.** (3) F  
Shear strength of saturated and unsaturated soils strength-deformation relationships, time-dependent strength parameters, effects of sampling, and advanced slope stability. Prerequisite: CEE 351.
- 555 Advanced Foundations.** (3) S  
Deep foundations, braced excavations, anchored bulkheads, reinforced earth, and underpinning. Prerequisite: CEE 351.
- 556 Seepage and Earth Dams.** (3) F  
Transient and steady state fluid flow through soil, confined and unconfined flow, pore water pressures, and application to earth dams. Prerequisite: CEE 351.
- 557 Hazardous Waste: Site Assessment and Mitigation Measures.** (3) F  
Techniques for hazardous waste site assessment and mitigation. Case histories presented by instructor and guest speakers. Prerequisites: graduate standing; instructor approval.
- 559 Earthquake Engineering.** (3) F '97  
Characteristics of earthquake motions, selection of design earthquakes, site response analyses, seismic slope stability, and liquefaction. Prerequisite: CEE 351.
- 560 Soil and Groundwater Remediation.** (3) F  
Techniques for remediation of contaminated soils and groundwaters are presented with basic engineering principles. Prerequisite: instructor approval.
- 561 Physical-Chemical Treatment of Water and Waste.** (3) S  
Theory and design of physical and chemical processes for the treatment of water and waste waters. Prerequisite: CEE 361.
- 562 Environmental Biochemistry and Waste Treatment.** (3) S  
Theory and design of biological waste treatment systems. Pollution and environmental assimilation of wastes. Prerequisite: CEE 362.
- 563 Environmental Chemistry Laboratory.** (3) F  
Analysis of water, domestic and industrial wastes, laboratory procedures for pollution evaluation, and the control of water and waste treatment processes. Lecture, lab. Prerequisite: CEE 361.
- 566 Industrial/Hazardous Waste Treatment.** (3) N  
Emphasis on treatment of local industrial/hazardous waste problems, including solvent recovery and metals. Lecture, project. Prerequisites: CEE 561, 563.
- 573 Traffic Engineering.** (3) F  
Driver, vehicle, and roadway characteristics, laws and ordinances, traffic control devices, traffic engineering studies, and Transportation System Management measures. Prerequisite: CEE 372.
- 574 Highway Capacity.** (3) S  
Highway capacity for all functional classes of highways. Traffic signalization, including traffic studies, warrants, cycle length, timing, phasing, and coordination. Prerequisite: CEE 372.
- 575 Traffic Flow Theory and Safety Analysis.** (3) F '96, S '98  
Traffic flow theory; distributions, queuing, delay models, and car-following. Highway safety; accident records systems, accident analysis, identifying problem locations, and accident countermeasures. Prerequisite: CEE 573 or 574.
- 576 Airport Engineering.** (3) S '97  
Planning and design of airport facilities. Effect of aircraft characteristics, air traffic control procedures and aircraft demand for runway and passenger handling facilities, on-site selection, runway configuration, and terminal design. Prerequisite: CEE 372.
- 577 Urban Transportation Planning.** (3) F '97  
Application of land use parameters traffic generation theory, traffic distribution and assignment models, transit analysis, and economic factors to the solution of the urban transportation problem. Prerequisite: CEE 372.
- Students enrolled in CEE 580, 590, 592, 599, 792, and 799 are required to attend graduate student seminars at the times shown in the Schedule of Classes. Each semester, every graduate student enrolled for more than eight semester hours is to enroll for at least one semester hour of CEE 592, 599, 792, or 799.*
- Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.



## Communication

### Master's Program

A. Cheree Carlson  
*Director of Graduate Studies*  
 (STAUF A412) 602/965-5096

#### PROFESSORS

ARNOLD, BANTZ, HECHT,  
 JAIN, KASTENBAUM,  
 PETRONIO, K. VALENTINE

#### ASSOCIATE PROFESSORS

ALBERTS, BULEY, CARLSON,  
 COREY, CORMAN, CRAWFORD,  
 DAVEY, MARTIN, MAYER,  
 NAKAYAMA, C. VALENTINE

#### ASSISTANT PROFESSORS

FLORES, HASIAN, TROST

#### ASSOCIATE INSTRUCTIONAL PROFESSIONAL

OLSON

#### PROFESSORS EMERITI

GOYER, PERRILL

The Department of Communication strives to advance the understanding of message-related human behavior, for the purpose of improving communicative interactions. Teaching, research, and service are directed to the continued development of knowledge and application of the principles of communication. Courses of study are designed to provide students with relevant programs adapted to individual academic and professional goals.

### MASTER OF ARTS DEGREE

Faculty in the Department of Communication offer a program leading to the Master of Arts degree, with a major in Communication. Current areas of study within the major are intercultural communication, interpersonal communication, performance studies, organizational communication, and rhetoric/public address.

**Admission Requirements.** Admission is competitive, based upon evidence of the applicant's undergraduate scholarly and research abilities. A completed application for admission and two transcripts of all undergraduate and graduate work must be submitted to the Graduate Admissions Office. See pages 44-46 for Graduate College general requirements. All applicants must submit the following:

1. a completed Graduate College application and official undergraduate and graduate transcripts;
  2. a statement of professional goals (approximately 300 words);
  3. Graduate Record Examination (GRE) scores (verbal, quantitative, analytical) taken within the past five years, plus other relevant test data provided by the applicant;
  4. three letters of recommendation prepared within the preceding 12 months;
  5. an optional writing sample; and
  6. a minimum score of 600 on the Test of English as a Foreign Language (TOEFL) and a minimum score of 230 on the Test of Spoken English (TSE) for all applicants whose native language is not English.
- All application materials must be received by February 1.
- Program of Study.** The program consists of a minimum of 30 semester hours of graduate course work, which includes six semester hours of thesis credit. All students must successfully complete the following:
1. COM 501 Research Methods in Communication with a minimum grade of "B";
  2. COM 504 Theories and Models of Communication with a minimum grade of "B";
  3. at least one of the following three courses: COM 508 Quantitative Research Methods in Communication, COM 509 Qualitative Research Methods in Communication, or COM 521 Rhetorical Criticism of Public Discourse with a minimum grade of "B";
  4. at least two of the following seminars: COM 510 Interpersonal Communication Theory and Research, COM 529 Theories of Persuasion, COM 531 Theories of Small Group Communication, COM 541 Research in Performance Studies, COM 555 Communicative Processes in Organizations, COM 563 Intercultural Communication, and COM 575 Language and Message Systems;
  5. a noncredit COM 596 Pro-Seminar in Communication during the first semester in residence;
  6. a written comprehensive examination on theory and methodology, and an area of study (an oral examination may be required); and
  7. a thesis, which is an account of original research, and an oral examination in defense of the thesis.
- Applicants with undergraduate deficiencies must remove such deficiencies, and these courses do not count toward the master's degree. The student's program of study is the mutual responsibility of the student and the supervisory committee. A foreign language is not required, but is encouraged as appropriate. Descriptions of current program options and requirements are available from the Department of Communication, 412 Stauffer Hall.
- ### Research Activity
- Faculty members in the Department of Communication are dedicated to conducting and reporting quality research. The Communication Research Consortium assists faculty and graduate students in planning and conducting independent and interdisciplinary research. Typical research topics studied by members of the faculty include the following: communication and culture, messages as organizational products, privacy rules in interpersonal communication, the role of attitude and cultural similarity in the development of interpersonal relationships, the role of communication in love relationships, message selection and criticism in rhetoric and interpretation, the development of communication networks, intercultural cultural communication competence, communication in small groups, communication with aging populations, discourse in organizational settings, and the influence of rhetorical discourse upon social issues.
- ### COMMUNICATION
- COM 404 Research Apprenticeship.** (3) F, S Direct research experience on faculty projects. Student/faculty match based on interests. Lecture, apprenticeship. Prerequisite: COM 308 or instructor approval.
- 407 Advanced Critical Methods in Communication.** (3) S Examination of critical approaches relevant to communication, including textuality, social theory, cultural studies, and ethnography. Lecture, discussion. Prerequisite: COM 308.



**408 Quantitative Research Methods in Communication.** (3) F, S  
Advanced designs, measurement techniques, and methods of data analysis of communication research. Prerequisites: COM 308 and POS 401 (or PSY 230 or QBA 221 or SOC 395 or STP 226) or instructor approval.

**410 Interpersonal Communication Theory and Research.** (3) F, S, SS  
Survey and analysis of major research topics, paradigms, and theories dealing with message exchanges between and among social peers. Prerequisites: COM 110 and 308 or instructor approval. *General studies:* SB.

**411 Communication in the Family.** (3) A  
A broad overview of communication issues found in marriage and family life, focusing on current topics concerning communication in the family. Prerequisites: COM 110 and 207 or instructor approval. *General studies:* SB.

**414 Crisis Communication.** (3) N  
Role of communication in crisis development and intervention. Prerequisite: instructor approval.

**417 Communication and Aging.** (3) N  
Critical study of changes in human communicative patterns through the later adult years, with attention on intergenerational relationships and self-concept functions. Prerequisite: instructor approval.

**421 Rhetoric of Social Issues.** (3) F, S  
Critical rhetorical study of significant speakers and speeches on social issues of the past and present. Prerequisite: COM 308, 321 or instructor approval. *General studies:* HU.

**422 Advanced Argumentation.** (3) N  
Advanced study of argumentation theories and research as applied to public forum, adversary, scholarly, and legal settings. Prerequisite: COM 222 or instructor approval.

**426 Political Communication.** (3) F  
Theories and criticism of political communication, including campaigns, mass persuasion, propaganda, and speeches. Emphasis on rhetorical approaches. Prerequisite: COM 207 or instructor approval. *General studies:* SB.

**430 Leadership in Group Communication.** (3) N  
Theory and process of leadership in group communication, emphasizing philosophical foundations, contemporary research, and applications to group situations. Prerequisite: COM 230 or instructor approval.

**441 Performance Studies.** (3) F, S, SS  
Theory, practice, and criticism of texts in performance. Emphasis on the interaction between performer, text, audience, and context. Prerequisite: COM 241, 308 or instructor approval. *General studies:* HU.

**442 Interpretation and the Mass Media.** (3) N  
The relationship of modern media (radio, TV, and film) to oral interpretation and literature.

**445 Narrative Performance.** (3) N  
Theory and practice of performing narrative texts (e.g., prose fiction, oral histories, diaries, essays, letters). Includes scripting, directing, and the rhetorical analysis of story telling. Prerequisite: COM 241 or instructor approval. *General studies:* HU.

**446 Interpretation of Literature Written by Women.** (3) N  
Students explore, through performance and critical writing, literature written by women. *General studies:* HU, C.

**450 Theory and Research in Organizational Communication.** (3) F, S, SS  
Critical review and analysis of the dominant theories of organizational communication and their corollary research strategies. Prerequisites: COM 250 and 308 or instructor approval. *General studies:* SB.

**451 Employee Participation Processes in Organizations.** (3) N  
Principles, concepts, and leadership for implementation of "Quality Circles" and similar employee involvement processes. Prerequisites: COM 230 and 250 or instructor approval.

**453 Communication Training and Development.** (3) A  
Examination of the procedures and types of communication training and development in business, industry, and government. Prerequisites: COM 250 and 308 or instructor approval.

**463 Intercultural Communication Theory and Research.** (3) F, S, SS  
Survey and analysis of major theories and research dealing with communication between people of different cultural backgrounds, primarily in international settings. Lecture, discussion, small group work. Prerequisites: COM 263 and 308 or instructor approval. *General studies:* SB, G.

**465 Intercultural Communication Workshop.** (3) N  
Experientially based study of communication between members of different cultures designed to help students improve their intercultural communication skills. Prerequisite: instructor approval.

**472 Development of Language as Communicative Behavior.** (3) N  
Development of language and interpersonal communicative behaviors of children through adolescence, including expressive and receptive competencies and interactions with others. Prerequisite: instructor approval. *General studies:* SB.

**480 Methods of Teaching Communication.** (3) N  
Analysis, organization, and presentation of textual and other classroom materials. Prerequisite: instructor approval.

**494 Special Topics.** (1-3) F, S, SS  
Prerequisite: instructor approval.

**501 Research Methods in Communication.** (3) F  
Critical analysis of systems of inquiry in communication, focusing on the identification of variables and approaches to conducting research in communication. Prerequisite: instructor approval.

**504 Theories and Models in Communication.** (3) F  
Theory construction, metatheoretical concerns, models, construct definition, and comparative analysis of current theories in communication. Prerequisite: instructor approval.

**508 Quantitative Research Methods in Communication.** (3) F  
Empirical research designs, measurements, and statistical strategies and techniques in analyzing and evaluating experimental and de-

scriptive research in communication. Prerequisites: COM 501 and 504 or instructor approval.

**509 Qualitative Research Methods in Communication.** (3) S  
Qualitative research methods, including interviewing, field methods, and other nonquantitative techniques for analyzing communication. Prerequisites: COM 501 and 504 or instructor approval.

**510 Interpersonal Communication Theory and Research.** (3) A  
Contemporary theories and research in interpersonal communication. Prerequisites: COM 501 and 504 or instructor approval.

**512 Death, Society, and Human Experience.** (3) N  
Examines dying, death, bereavement, and suicide from both individual and sociocultural perspectives in terms of options for communication and action in death-related situations. Prerequisite: instructor approval.

**521 Rhetorical Criticism of Public Discourse.** (3) N  
History and significance of rhetorical theory and criticism in the analysis of public discourse. Prerequisites: COM 501 and 504 or instructor approval.

**529 Theories of Persuasion.** (3) A  
Analysis of representative theories and models of persuasive processes and their implications for communicative behavior. Prerequisites: COM 501 and 504 or instructor approval.

**531 Theories of Small Group Communication.** (3) N  
Theory and research in small group interaction and decision making, focusing on communicational variables which affect small group output. Prerequisites: COM 501 and 504 or instructor approval.

**541 Research in Performance Studies.** (3) N  
Supervised research in the historical and contemporary relationships between the performer, the text, and the audience. Prerequisites: COM 501 and 504 or instructor approval.

**555 Communicative Processes in Organizations.** (3) N  
Systematic analysis of communicative interactions between organizational structure, information flow, and human behaviors in the organizational setting. Prerequisites: COM 501 and 504 or instructor approval.

**563 Intercultural Communication.** (3) A  
Analysis of contemporary theory and research concerning the effects of a variety of cultural variables on communication between people. Prerequisites: COM 501 and 504 or instructor approval.

**575 Language and Message Systems.** (3) N  
Sign/symbol systems; personal, functional, and contextual aspects of message systems; measurement of "meaning." Prerequisites: COM 501 and 504 or instructor approval.

**584 Communication Internship.** (1-12) F, S, SS

**596 Pro-Seminar in Communication.** (0) F  
Discussion of research projects with the faculty. Prerequisite: admission to the graduate program.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Communication

### Doctoral Program Interdisciplinary Faculty

Judith N. Martin  
Director  
(STAUF A412) 602/965-5096

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#### BUSINESS ADMINISTRATION

Professors: Metcalf, Smeltzer

**COMMUNICATION**  
Professors: Arnold, Bantz, Hecht, Jain, Kastenbaum, Petronio, K. Valentine;  
Associate Professors: Alberts, Buley, Carlson, Corey, Corman, Davey, Martin, Mayer, Nakayama, C. Valentine;  
Assistant Professor: Trost

#### EDUCATIONAL LEADERSHIP

Associate Professor: Noley

#### ELEMENTARY EDUCATION

Professor: Edelsky

**ENGLISH**  
Associate Professor: Miller

**FAMILY RESOURCES  
AND HUMAN DEVELOPMENT**  
Associate Professor: Christopher

**JOURNALISM AND  
TELECOMMUNICATIONS**  
Professors: Anderson, Godfrey

**JUSTICE STUDIES**  
Regents' Professor: Altheide;  
Professors: Johnson, Kelly

**PUBLIC AFFAIRS**  
Professor: Perry

**RECREATION MANAGEMENT  
AND TOURISM**  
Professor: Allison

**SOCIOLOGY**  
Professors: Nagasawa, Snow

**SPEECH AND HEARING SCIENCE**  
Professor: LaPointe

The Committee of Faculty offers an interdisciplinary graduate program leading to the Doctor of Philosophy degree in Communication. Concentrations are available in communicative development, intercultural communication, and organizational communication. The program is designed to prepare scholars for research-oriented careers in universities and in the public or private sectors. Students are provided training in communication theory, research methodology, and a specialization in one or more areas of concentra-

tion. The goal of the program is to meet the needs of students whose interests transcend traditional disciplinary boundaries.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

**Admission Requirements.** Admission to the program is competitive. Applications are considered once a year for fall admission. Applicants must have earned either a bachelor's or master's degree and must present evidence of scholarly writing (e.g., an undergraduate honors thesis, a master's thesis, or their equivalent). All applicants should be knowledgeable in the basic principles of both qualitative and quantitative methods of research, social statistics, and communication theory. If course work in these areas has not been completed, admitted students are required to successfully complete COM 501 Research Methods in Communication, COM 504 Theories and Models in Communication, and a relevant graduate-level statistics course (plus any other courses stipulated by the admissions committee) before enrolling in the required theory and methodology sequence. In addition to meeting the minimum Graduate College admission requirements, the applicant's scholastic and professional record must indicate special interest in and aptitude for systematic research in communication. All applicants must submit the following:

1. a completed Graduate College application and official undergraduate and graduate transcripts;
2. a formal *curriculum vitae*, including a statement of career goals and the relevance of this degree program to those goals;
3. Graduate Record Examination (GRE) scores (verbal, quantitative, analytical) taken within the past five years, plus other relevant test data volunteered by the applicant;
4. three letters of recommendation prepared within the preceding 12 months;
5. a sample of writing (e.g., master's thesis, course paper); and

6. A minimum score of 600 on the Test of English as a Foreign Language (TOEFL) and a minimum score of 230 on the Test of Spoken English (TSE) for all applicants whose native language is not English.

All application materials must be in the program office by February 1 to be considered. Late applications are not processed.

**Supervisory/Dissertation Committee.** This committee consists of a chair and at least two other members appointed by the dean of the Graduate College based upon the director's recommendation. The chair of the committee, who serves as the student's advisor, must be knowledgeable in the student's area of concentration, have an active research agenda, publish regularly in appropriate refereed academic journals, and be experienced in graduate education. Members of the committee must represent more than one academic discipline. The purpose of the committee is to guide the student through the completion of the program of study, the comprehensive examinations, and the dissertation research.

**Areas of Concentration.** Students admitted to the program select a formal area of concentration in any of the three broad areas of communicative development, intercultural communication, and organizational communication. However, the interdisciplinary nature of the program and breadth of its faculty allow students to design individual programs of study geared toward more specialized topics in human communication. As a rule, these cut across the formal areas of concentration and closely follow the areas of expertise of program faculty. Program graduates study areas such as: interpersonal communication, organizational communication, performance studies, rhetoric, critical/cultural studies, relational communication, and information technology. Contact the director for an up-to-date list of program faculty and their areas of interest.

**Communicative Development.** This area of concentration includes the study of human communicative behaviors and functions as they evolve and

change over time. Students in this area study the role of communication in developmental processes such as the development of communicative and linguistic competence in children, the role of communication in the development of interpersonal relationships, the role of communication in national development, the role of communication in the aging process, and the role of communication in death and dying. Students in this concentration would find relevant course work in communication, social and developmental psychology, family studies, and educational psychology, among others.

*Intercultural Communication.* The focus of the intercultural communication area of concentration is on the theoretical relationship between culture and communication. Students in this area study cross-cultural variability in communication, as well as the effect of cultural/ethnic similarities and dissimilarities on communication between members of different cultural/ethnic groups. Students in this concentration would find relevant course work in communication, cultural anthropology, intergroup relations, cross-cultural psychology, comparative sociology, and linguistics, among others.

*Organizational Communication.* This area of concentration focuses on the role of communicative processes and systems in public and private organizations. The emphasis in this area is on theoretical and methodological analyses of the interaction between human participants and organizational structures, information channels, and message forms. The student choosing this area of concentration is expected to be thoroughly familiar with communicative tasks, goals, and patterns in organizational settings and theories of organization and to have an understanding of organizational structure and networks and systems analysis procedures. Students in the concentration would find relevant course work in communication, industrial psychology and sociology, organization theory, management, and public administration, among others.

**Program of Study.** If the student has completed an appropriate master's degree, the Ph.D. requires a minimum of

60 hours beyond the master's degree. Course work for a typical program of study is distributed as follows: required core courses (12 semester hours), area of concentration (24 semester hours), dissertation (COM 799) and research (COM 792) (24 semester hours) for a total of 60 hours (minimum). A sequence of four interdisciplinary theory and methodology courses are required of all students entering the program. The required theory and methodology courses are COM 601 Multidisciplinary Perspectives in Research in Communication, COM 604 Theory Construction in Communication, COM 608 Multivariate Statistical Analysis of Data in Communication, and COM 609 Advanced Qualitative Research Methods in Communication.

In addition to successfully completing the required courses, each student is required to participate in a research colloquium during each semester of residence.

The student also is required to demonstrate proficiency in research methods (statistics, computer languages, content analysis methods, foreign language, participant observation, etc.) which, in the judgment of the supervisory committee, is needed for the student's dissertation research. Evidence of required proficiency may be demonstrated by established university examination procedures or by successful completion of a sequence of courses designated by the student's program committee.

For students who have completed only the bachelor's degree before admission to the Ph.D. program, a minimum of 84 hours of interdisciplinary graduate work is required for the program, with the same 60-hour requirement for students with the master's degree. The initial course work for students admitted with only a bachelor's degree is similar to the M.A. degree requirements in Communication, except that no thesis is required. These requirements include a general overview of research in communication (COM 501), an overview of theories and models of communication (COM 504), a statistics course (COM 508), and electives from communication or other disciplines to total 24 hours of course work. The methods, theory, and statis-

tics courses must be completed before beginning the required theory and methodology sequence for the Ph.D. (i.e., they are prerequisites for the required courses).

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Upon completion of course work and before the formal approval of the dissertation proposal, the student is examined in the relevant area of concentration and research methods. The examination consists of both written and oral components designed to test the student's interdisciplinary knowledge in the field and chosen area of concentration and the student's readiness to undertake interdisciplinary dissertation research. The examination is conducted by the student's supervisory committee.

**Admission to Candidacy.** After the student has passed both the written and oral portions of the comprehensive examination and the student's dissertation topic has been approved, the student may apply to the Graduate College for admission to candidacy. No dissertation hours (COM 799) may be taken before admission to candidacy, but six hours of research (COM 792) may be taken before admission to candidacy. Students must enroll for 12 hours of research (COM 792)/dissertation (COM 799) credit following the semester in which they are advanced to candidacy.

**Dissertation Proposal.** Before conducting the research for the dissertation, each student must submit a dissertation proposal that is defended orally and approved by the student's dissertation committee.

**Research and Dissertation.** The dissertation consists of a fully documented written analysis of a problem that extends the knowledge and/or theoretical framework of the field and reflects the student's creativity and competence in independent, interdisciplinary research using an appropriate research methodology.

**Final Examinations.** An oral examination in defense of the dissertation, conducted by the dissertation committee, is required.

### Research Activity

Members of the Committee of Faculty are engaged in a variety of research activities. Among others, the following represent research interests of the faculty approved to direct dissertations: the role of communication in creating organizational cultures, the process of social influence, explaining communication in interpersonal and intergroup encounters, the development of interpersonal relationships, the role of subjective culture in the attribution of meaning, the development of communication competencies, privacy regulation, cross-cultural variations in interpersonal communication, identity-validation in intergroup encounters, communication networks, the impact of newer information technologies in organizations, the role of communication in response to disasters, and communication in multinational corporations.

### COMMUNICATION

**COM 601 Multidisciplinary Perspectives in Research in Communication.** (3) F  
Critical review of approaches, aspects, concepts, and issues associated with research in communication. Prerequisite: instructor approval.

**604 Theory Construction in Communication.** (3) F  
Review and analysis of philosophical problems inherent in communicative research and of meta-theories designed to deal with these problems. Prerequisite: COM 504 or instructor approval.

**608 Multivariate Statistical Analysis of Data In Communication.** (3) S  
Statistical analysis of communication research data. Multivariate procedures used in communication research and methods of causal analysis. Prerequisites: COM 501, 508 or equivalents.

**609 Advanced Qualitative Research Methods in Communication.** (3) F  
Analysis of issues in the practice of qualitative communication research, including data gathering, fieldwork issues, analysis strategies, and reporting results. Prerequisite: COM 509 or instructor approval.

**780 Practicum: Research in Communication.** (3) N  
Guided practice in the conduct of communication research. Topic identification; procedures, formats, and ethics of publishing. Prerequisites: COM 601, 604.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Communication Disorders

M. Jeanne Wilcox  
*Chair*  
(LL A145) 602/965-2374

### PROFESSORS

BACON, CASE, DORMAN, LaPOINTE,  
MOWRER, WILCOX

**ASSOCIATE PROFESSOR**  
SINEX

**ASSISTANT PROFESSORS**  
HADLEY, LISS, RISPOLI, SHARMA  
**CLINICAL ASSISTANT PROFESSOR**  
COOK

**DIRECTOR OF CLINICAL SERVICES**  
CASE

**PROFESSORS EMERITI**  
CHUBRICH, CLUFF, PRATHER

The faculty in the Department of Speech and Hearing Science offer a program leading to the Master of Science degree with a major in Communication Disorders. Both a thesis and nonthesis degree option is available, and students may study either speech-language pathology or audiology. The program is accredited by the Educational Standards Board of the American Speech-Language-Hearing Association.

**Admission Requirements.** Students applying for admission to this program should have their undergraduate transcripts mailed to the Graduate Admissions Office. In addition, candidates should have their Graduate Record Examination scores, a statement of professional and academic goals not to exceed 200 words, and three letters of recommendation sent to the Department of Speech and Hearing Science. All materials must be received in the department by January 15 for fall admission which is the only term in which students may begin their program of study. Candidates who have undergraduate deficiencies may need to take required prerequisite courses.

**Academic Requirements.** A student must complete a minimum of 30 semester hours of graduate course work, exclusive of credit for practicum, approved by the supervisory committee.

### Statistical Proficiency Requirements.

A student pursuing the M.S. degree must provide satisfactory evidence of competency in statistical methods appropriate to the behavioral sciences.

**Clinical Requirements.** A student in the M.S. program must complete at least 375 clock hours of supervised clinical practicum experience, of which a minimum of 250 clock hours must be obtained at the graduate level.

**Thesis Option.** Students wishing to pursue the thesis option will complete 30 semester hours of course work, six hours of which must be thesis credit, excluding practicum and internship hours. The thesis must meet requirements established by the Graduate College.

**Nonthesis Option.** Students choosing the nonthesis option will complete 33 semester hours of course work, excluding practicum and internship hours.

**Final Examinations.** For a candidate for the degree Master of Science (thesis option), two final examinations are required: (1) the National Teacher Examination in speech pathology, or the National Teacher Examination in audiology, administered by Educational Testing Service and available at ASU through the University Testing Service, and (2) an oral defense of the thesis. For a candidate for the degree of Master of Science (nonthesis option), two final examinations are required: (1) the National Teacher Examination in speech pathology, or the National Teacher Examination in audiology, administered as described above, and (2) a four-hour comprehensive written examination administered by the supervisory committee.

Students should expect to spend two years completing the academic, practicum and research requirements for either degree option.

### Research Activity

The faculty and students in the Department of Speech and Hearing Science maintain active research programs. Students are encouraged to conduct research during their entire graduate program.

The department maintains the equipment and facilities for a full range of research in both speech pathology and

audiology. Areas in which active research programs are under way include: oral sensory physiology, aphasia and neurogenic communication disorders, speech perception in normal and hearing-impaired populations, speech synthesis, pediatric and adult aural rehabilitation, voice disorders, phonological development and disorders, childhood language acquisition, stuttering, central auditory dysfunction, electrophysiological assessment of auditory function in infants and neurologically impaired individuals, psychoacoustics, and language disorders in infant, pre-school and school-age children.

#### COMMUNICATION DISORDERS

##### **SHS 401 Introduction to Audiologic Evaluation.** (4) F

Measurement of the basic audiologic test battery, including audiograms, masking, speech recognition, and immittance. 3 hours lecture, 3 hours lab. Prerequisites: SHS 311, 376, 384 or equivalents.

##### **402 Modifying Communicative Behavior.** (3) S

Principles and techniques of modifying speech and language behavior. Prerequisite: SHS 250 or equivalent.

##### **465 Speech and Language Acquisition.** (3) S, SS

Speech and language development in the normal child. Cross-listed as SHS 565. Prerequisite: SHS 367 or equivalent.

##### **485 Acquired Speech and Language Disorders.** (3) S

Introduction to acquired speech and language disorders across the lifespan. Prerequisites: SHS 250, 310.

##### **496 Aural Rehabilitation.** (3) S

Approaches to aural rehabilitation of children and adults. Introduction to educational audiology and assistive listening devices. Prerequisites: SHS 375, 401.

##### **501 Introduction to Audiologic Evaluation.** (4) F

Measurement of the basic audiologic test battery, including audiograms, masking, speech recognition, and immittance. 3 hours lecture, 3 hours lab. Prerequisite: SHS 311 and 376 and 384 or equivalents.

##### **502 Advanced Audiologic Evaluation I.** (4) F

Differential diagnosis of cochlear and retro-cochlear disorders, including measurement of auditory evoked responses. 3 hours lecture, 2 hours lab. Prerequisite: SHS 401 or 501 or equivalent.

##### **504 Hearing Aids.** (4) S

Operation, application and fitting of amplification devices for the hearing impaired. 3 hours lecture, 2 hours lab. Prerequisite: SHS 401 or 501 or equivalent.

##### **505 Computers and Current Technology in Audiology and Speech-Language Pathology.** (3) F

Computer applications and current technology as applied to service administration and delivery in the fields of audiology and speech-language pathology. Lecture, lab.

##### **508 Pediatric Audiology.** (3) F

Audiologic assessment, screening, and development considerations for infants and young children. Prerequisite: SHS 401 or 501 or equivalent.

##### **510 Advanced Hearing Science.** (3) N

Anatomical, physiological, and psychophysical aspects of audition. Prerequisite: SHS 376 or instructor approval.

##### **511 Auditory Perception by the Hearing Impaired.** (3) F '96

A study of how and why sensorineural hearing loss alters the perception of sound. Prerequisite: SHS 376 or instructor approval.

##### **512 Medical Aspects of Speech and Hearing.** (3) F

Correlation of history and physical findings with pathologic physiology and test results in speech and hearing abnormalities.

##### **515 Audiologic Instrumentation and Calibration.** (3) S

Electronic instruments used to produce, modify, and measure characteristics of sound. Measurement standards and methods for calibration of audiologic equipment. Lecture, lab. Prerequisite: SHS 401 or 501 or equivalent.

##### **516 Advanced Audiologic Evaluation II.** (3) S

Continuation of SHS 502, including behavioral and physiological measures of the central auditory nervous system, and vestibular assessment. Lecture, lab. Prerequisite: SHS 502.

##### **535 Hearing Conservation.** (3) S

The causes and prevention of noise-induced hearing loss and approaches to industrial audiology programs. Prerequisite: SHS 401 or 501 or equivalent.

##### **545 Speech Perception and Production.** (3) F

Current knowledge regarding the production and perception of speech. Introduces speech perceptual problems of the hearing impaired, and cochlear implants. Prerequisite: SHS 375 or instructor approval.

##### **552 Otoacoustic Emissions as a Diagnostic Tool.** (3) F '96

Study of the types of otoacoustic emissions, their theoretical implications and application to clinical diagnostics. Lecture, discussion, lab. Prerequisite: SHS 376 or instructor approval.

##### **555 Cochlear Implants.** (3) S

Current status of cochlear implant research and development. Prerequisites: SHS 504 and 545 or instructor approval.

##### **565 Speech and Language Acquisition.** (3) S

Speech and language development in the normal child. Cross-listed as SHS 465. Prerequisite: SHS 367 or equivalent.

##### **566 Psychology of Language.** (3) S

The psycholinguistic study of the production and comprehension of language across the lifespan.

##### **567 Neural Bases of Communication Disorders.** (3) F

Neuroscience and its application to matters of normal and disordered communication. Pre- or corequisite: SHS 310 or equivalent.

##### **571 Augmentative Communication and Language Programming.** (3) S

Focus on individuals across the age span who are or who are at risk for being unable to communicate with spoken language. Lecture, lab.

##### **572 Language Assessment and Intervention in Early Childhood.** (3) F

Focus on the birth to 5-year-old population who are at risk for or have communication and language disabilities. Prerequisite: SHS 470 or 570 or equivalent.

##### **573 Language Assessment and Intervention with School-Age Populations.** (3) S

Focus on later language development, linguistic demands of academic settings, assessment and intervention strategies for older children and adolescents. Prerequisite: SHS 565 or equivalent.

##### **574 Fluency Disorders and Treatment.** (3) F

Phenomena, etiology, assessment, and theories of stuttering are presented, followed by various treatment procedures for children and adults who stutter. Prerequisite: SHS 431 or equivalent.

##### **575 Aphasia and Related Neurogenic Language Disorders.** (3) S

Assessment and treatment of acquired neuro-linguistic impairment. Prerequisite: SHS 567.

##### **576 Neuromotor Speech Disorders.** (3) S

Evaluation and treatment of the dysarthrias and apraxia of speech. Emphasis on acquired adult disorders.

##### **577 Craniofacial Disorders of Communication.** (3) S, SS

Communication disorders related to anomalies of the craniofacial structures, including orofacial clefting of the lip and palate. Prerequisite: SHS 310 or equivalent.

##### **578 Disorders of Voice.** (3) S

Communication disorders related to dysfunction of the phonatory and resonance systems of voice production, assessment, and treatment. Prerequisite: SHS 310 or instructor approval.

##### **580 Clinical Practicum.** (1-6) F, S, SS

Supervised practicum in audiology or speech-language pathology. 1 hour staffing and 3 hours of client contact per week per hour of credit. May be repeated for credit. Prerequisites: instructor approval; student must not have provisional admission status.

##### **582 Differential Diagnosis of Communication Disorders.** (3) S

Procedures for assessing speech/language disorders in children and adults. 3 hours lecture, 2 hours lab. Prerequisite: instructor approval.

##### **584 Internship.** (1-6) F, S, SS

Off-campus directed experiences in audiology or speech-language pathology. May be repeated for credit. Prerequisites: SHS 580; student must consult with coordinator before registration.

##### **585 Articulation and Phonology: Assessment and Intervention.** (3) S

Assessment and treatment of developmental articulation and phonological disorders. Prerequisites: SHS 250 and 310 or equivalents.

##### **591 Seminar.** (3) F, S, SS

Selected topics regularly offered:

- (a) Autism and Pervasive Language Disorders
- (b) Multiply Handicapped Child

##### **596 Aural Rehabilitation.** (3) S

Approaches to aural rehabilitation in children and adults. Introduction to educational audiology and assistive listening devices. Prerequisite: SHS 375 or 400 or 501 or equivalent.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Computer Science

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### PROFESSORS

ASHCROFT, BARNHILL,  
BLACKLEDGE, COLLOFELLO, FARIN,  
FINDLER, FOLEY, GOLSHANI, LEWIS,  
NIELSON, J. URBAN, WOODFILL, YAU

### ASSOCIATE PROFESSORS

BHATTACHARYA, DASGUPTA,  
DIETRICH, FALTZ, FAUSTINI, GHOSH,  
HUEY, LINDQUIST, MILLER,  
O'GRADY, PHEANIS, ROCKWOOD,  
SEN, S. URBAN

### ASSISTANT PROFESSORS

ELGOT-DRAPKIN, KAMBHAMPATI

Information about the Department of Computer Science and Engineering may also be obtained via the World Wide Web at <http://www.eas.asu.edu/~csedept>.

The faculty in the Department of Computer Science and Engineering offer graduate programs leading to the Master of Science and the Doctor of Philosophy degrees with a major in Computer Science. The faculty also offer a professional graduate program leading to the Master of Computer Science degree.

Areas of study include computer architecture, digital system design, computer-aided geometric design (CAGD), graphics, artificial intelligence (AI), database concepts, software engineering, language processing, operating systems, parallel-distributed systems, and computer-science theory.

### MASTER OF COMPUTER SCIENCE DEGREE

For information concerning the Master of Computer Science degree, refer to page 59.

### MASTER OF SCIENCE DEGREE

The Master of Science degree program with a major in Computer Science stresses formal course work to provide breadth of material, and it culminates with a thesis that demonstrates depth in a particular research area.

**Admission.** See the general requirements for admission to the Graduate College on pages 44-46. An applicant

for the M.S. program should normally have a baccalaureate degree in computer science, computer engineering, or a closely related area. The applicant's undergraduate GPA and depth of preparation in computer science and engineering are the primary factors affecting admission. Every applicant must submit scores for the Graduate Record Examination (verbal, quantitative, and analytical required; the subject test in computer science is optional). An international student must also submit TOEFL scores. The application deadline for admission in the fall semester is March 15, and the deadline for admission in the spring semester is October 15.

**Program of Study.** Each student defines a potentially unique program of study in conjunction with an advisor, subject to approval of the department and the Graduate College. The program of study must include three areas of interest, and it must contain a minimum of 30 semester hours of approved graduate-level course work (including a thesis). At least 21 hours must be formal course work, and at least 18 hours must be CSE 500-level credits (excluding CSE 598). The department may prescribe additional courses based on the background of the candidate. No foreign language is required.

**Final Examinations.** The student must pass a final oral examination in defense of the thesis and over the course work taken for the degree and the appropriate undergraduate prerequisites.

### DOCTOR OF PHILOSOPHY DEGREE

The Doctor of Philosophy degree with a major in Computer Science is available for students of high ability who show promise for independent research.

**Admission.** See pages 76-77 for general requirements. An applicant for the Ph.D. program should have the equivalent of a baccalaureate major in computer science, computer engineering, or a closely related area. Most applicants should have earned the master's degree, but applicants with exceptional attainments in their baccalaureate are admitted directly into the Ph.D. program. The applicant's GPA and depth of preparation in computer science and engineering are primary factors affect-

ing admission. Every applicant must submit scores for the Graduate Record Examination (verbal, quantitative, analytical, and computer science) and three letters of recommendation. An international student must submit TOEFL scores. The application deadline for admission in the fall semester is March 15, and the deadline for admission in the spring semester is October 15.

**Residency.** In addition to the Graduate College's requirement for one year of full-time residency, the Department of Computer Science and Engineering stipulates one additional year of full-time residency for dissertation research.

**Program of Study.** After passing the qualifying examination, each student must file a program of study for approval by the supervisory committee, the department, and the Graduate College.

**Foreign Language Requirements.** None. The program committee, however, may establish a requirement depending upon the research interests of the candidate.

**Comprehensive Examinations.** A student must pass a comprehensive examination, which has a mandatory written component, before being admitted to candidacy. The exam may have both the oral and written components, testing the student's general knowledge in the dissertation area as well as closely related areas.

**Dissertation Requirements.** A student must complete a dissertation based on original work to demonstrate creativity in research and scholarly proficiency in the subject area.

**Final Examinations.** The student must pass a final oral examination in defense of the dissertation.

### Research Activity

The faculty of the Computer Science and Engineering Department participate in a wide variety of both theoretical and applied research projects involving many aspects of both software and hardware. Current research topics include software engineering, graphics, computer-aided geometric design, microprocessor applications, digital system design, real-time embedded systems, declarative languages, computational linguistics, compilers, operating



systems, distributed operating systems, database concepts, distributed architectures, parallel architectures, data structures, artificial intelligence, strategic decision systems, and algorithms.

The Department of Computer Science and Engineering maintains various instructional laboratories with UNIX workstations (Sun, Silicon Graphics, DEC, etc.), Pentium PCs, and Macintosh computers. These laboratories support special applications required for various computer science courses not available elsewhere on the ASU campus. The department has a VLSI design laboratory and two microprocessor laboratories for both Intel and Motorola processors. The department has various research laboratories with equipment directed to specific applications in addition to regular computer facilities. All computers in the department are networked, with some of the research laboratories having the high-speed 100BASE-T protocol. The College of Engineering and Applied Sciences provides various servers to support client/server applications and development in the department. All computers in the department are connected through networking to Information Technology (IT) at ASU. See "Computing Facilities and Services" on page 28 for more information concerning equipment and services provided by IT.

#### COMPUTER SCIENCE AND ENGINEERING

##### **CSE 408 Multimedia Information Systems.** (3) F

Design, use, and applications of multimedia systems. An introduction to acquisition, compression, storage, retrieval, and presentation of data from different media such as images, text, voice, and alphanumeric. Prerequisite: CSE 310.

**410 Information Processing.** (3) A  
Primary and secondary file access organizations. Multi-attribute indexing. File processing. Introduction to database management and document retrieval. Social and ethical implications. Prerequisite: CSE 310.

**412 Database Management.** (3) F, S  
Introduction to DBMS concepts. Data models and languages. Relational database theory. Database security/integrity and concurrency. Prerequisite: CSE 310.

**420 Computer Architecture I.** (3) S  
Computer architecture. Performance versus cost trade-offs. Instruction set design. Basic processor implementation and pipelining. Prerequisite: CSE 330.

##### **421 Microprocessor System Design I.** (4) F, S

Assembly-language programming and logical hardware design of systems using 8-bit microprocessors and microcontrollers. Fundamental concepts of digital system design. Reliability and social, legal implications. Lecture, lab. Prerequisite: CSE/EEE 225 or 226.

##### **422 Microprocessor System Design II.** (4) F, S

Design of microcomputer systems using contemporary logic and microcomputer system components. Requires assembly language programming. Prerequisite: CSE 421.

##### **423 Microcomputer System Hardware.** (3) S

Information and techniques presented in CSE 422 are used to develop the hardware design of a multiprocessor, multiprogramming, microprocessor-based system. Prerequisite: CSE 422.

##### **428 Computer-Aided Processes.** (3) A

Hardware and software considerations for computerized manufacturing systems. Specific concentration on automatic inspection, numerical control, robotics, and integrated manufacturing systems. Prerequisite: CSE 330.

##### **430 Operating Systems.** (3) F, S

Operating system structure and services, processor scheduling, concurrent processes, synchronization techniques, memory management, virtual memory, input/output, storage management, and file systems. Prerequisites: CSE 330, 340.

##### **434 Computer Networks.** (3) A

Computer network protocols, hardware elements, and software algorithms. Error handling, routing, flow control, host-to-host communication, and local area networks. Prerequisite: CSE 330.

##### **438 Systems Programming.** (3) A

Design and implementation of systems programs, including text editors, file utilities, monitors, assemblers, relocating linking loaders, I/O handlers, and schedulers. Prerequisite: CSE 421 or instructor approval.

##### **440 Compiler Construction I.** (3) F

Introduction to programming language implementation. Implementation strategies such as compilation, interpretation, and translation. Major compilation phases such as lexical analysis, semantic analysis, optimization, and code generation. Prerequisites: CSE 340, 355.

##### **450 Design and Analysis of Algorithms.** (3) F

Design and analysis of computer algorithms using analytical and empirical methods; complexity measures, design methodologies, and survey of important algorithms. Prerequisite: CSE 310.

##### **451 Switching Theory.** (3) N

Combinational logic, functional decomposition, NAND (NOR) circuit analysis and synthesis, logic arrays, iterative networks, fault diagnosis, sequential circuit representation, and memory devices. Prerequisites: CSE 120; MAT 243.

##### **457 Theory of Formal Languages.** (3) A

Theory of grammar, methods of syntactic analysis and specification, types of artificial languages, relationship between formal languages, and automata. Cross-listed as MAT 401. Prerequisite: CSE 355.

##### **459 Logic for Computing Scientists I.** (3) F

Propositional logic, syntax and semantics, proof theory versus model theory, soundness,

consistency and completeness, first order logic, logical theories, automated theorem proving, ground resolution, pattern matching unification and resolution, Dijkstras logic, proof obligations, and program proving. Prerequisite: CSE 355.

##### **461 Software Engineering Senior Project I.** (3) F

First of two-course software design sequence. Development planning, management; process modeling; incremental and team development using CASE tools. Lecture, lab. Prerequisites: CSE 360; ECE 400.

##### **462 Software Engineering Senior Project II.** (3) S

Second of two-course software design sequence. Process, product assessment and improvement; incremental and team development using CASE tools. Lecture, lab. Prerequisite: CSE 461.

##### **470 Computer Graphics.** (3) F, S

Display devices, data structures, transformations, interactive graphics, 3-dimensional graphics, and hidden line problem. Prerequisites: CSE 310; MAT 342.

##### **471 Introduction to Artificial Intelligence.** (3) F, S

State space search, heuristic search, games, knowledge representation techniques, expert systems, and automated reasoning. Prerequisites: CSE 240, 310.

##### **473 Nonprocedural Programming Languages.** (3) S

Functional and logic programming using languages like Lucid and Prolog. Typical applications would be a Screen Editor and an Expert System. Prerequisite: CSE 355.

##### **476 Introduction to Natural Language Processing.** (3) F

Principles of computational linguistics, formal syntax, and semantics, as applied to the design of software with natural (human) language I/O. Prerequisite: CSE 310 or instructor approval.

##### **477 Introduction to Computer-Aided Geometric Design.** (3) F, S

Introduction to parametric curves and surfaces, Bezier and B-spline interpolation, and approximation techniques. Prerequisites: CSE 210, 470; MAT 342.

##### **510 Advanced Database Management.** (3) F, S

Advanced data modeling, deductive databases, object-oriented databases, distributed and multidatabase systems; emerging database technologies. Prerequisite: CSE 412.

##### **512 Distributed Databases.** (3) A

Fragmentation design. Query optimization. Distributed joins. Concurrency control. Distributed deadlock detection. Prerequisite: CSE 510.

##### **513 Deductive Databases.** (3) F

Logic as a data model. Query optimization emphasizing the top-down and bottom-up evaluation of declarative rules. Prerequisite: CSE 510.

##### **514 Object-Oriented Database Systems.** (3) A

Object-oriented data modeling, database and language integration, object algebras, extensibility, transactions, object managers, versioning/configuration, active data, nonstandard applications. Research seminar. Prerequisite: CSE 510.

- 516 Digital Testing and Reliability.** (3) N Fault modeling, test generation, and simulation for combinational and sequential circuits; memory testing, self-checking logic, fault-tolerant logic, and reliability analysis. Prerequisite: CSE 423 or EEE 425 or instructor approval.
- 517 Hardware Design Languages.** (3) N Introduction to hardware design languages using VHDL. Modeling concepts for specification, simulation, and synthesis. Prerequisite: CSE 423 or EEE 425 or instructor approval.
- 518 Synthesis with Hardware Design Languages.** (3) N Modeling VLSI design in hardware design languages for synthesis. Transformation of language-based designs to physical layout. Application of synthesis tools. Prerequisite: CSE 517.
- 520 Computer Architecture II.** (3) F Computer architecture description languages, computer arithmetic, memory-hierarchy design, parallel, vector, and multiprocessors, and input/output. Prerequisites: CSE 420, 430.
- 521 Microprocessor Applications.** (4) S Microprocessor technology and its application to the design of practical digital systems. Hardware, assembly language programming, and interfacing of microprocessor-based systems. Lecture, lab. Prerequisite: CSE 421.
- 523 Microcomputer Systems Software.** (3) F Developing system software for a multiprocessor, multiprogramming, microprocessor-based system using information and techniques presented in CSE 421, 422. Prerequisite: CSE 422.
- 526 Parallel Processing.** (3) N Real and apparent concurrency. Hardware organization of multiprocessors, multiple computer systems, scientific attached processors, and other parallel systems. Prerequisite: CSE 330 or 423.
- 529 RISC Design Methodology.** (3) N Optimal computer architecture design methodology based on the symbiotic relationship of hardware and software disciplines. Prerequisite: CSE 330 or 423.
- 530 Operating System Internals.** (3) F Implementation of process management and synchronization, system call and interrupt handling, memory management, device drivers and file systems in UNIX. Prerequisites: CSE 430; knowledge of C language.
- 531 Distributed and Multiprocessor Operating Systems.** (3) N Distributed systems architecture, remote file access, message-based systems, object-based systems, client/server paradigms, distributed algorithms, replication and consistency, and multiprocessor operating systems. Prerequisite: CSE 530 or instructor approval.
- 532 Advanced Operating System Internals.** (3) F Memory, processor, process and communication management, and concurrency control in the Mach multiprocessor and distributed operating system kernels and servers. Prerequisite: CSE 530 or instructor approval.
- 535 Performance Evaluation.** (3) S Topics in computer system measurement and evaluation, including hardware/software monitors, workload characterization, program behavior, adaptive scheduling, simulation models, and measurement interpretation. Prerequisite: CSE 430.
- 536 Theory of Operating Systems.** (3) S Protection. Communication and synchronization in distributed systems, distributed file systems, deadlock theory, virtual memory theory, and uniprocessor and multiprocessor thread management. Prerequisite: CSE 430.
- 540 Compiler Construction II.** (3) S Formal parsing strategies, optimization techniques, code generation, extensibility and transportability considerations, and recent developments. Prerequisite: CSE 440.
- 545 Programming Language Design.** (3) N Language constructs, extensibility and abstractions, and runtime support. Language design process. Prerequisite: CSE 440.
- 550 Combinatorial Algorithms and Intractability.** (3) N Combinatorial algorithms, nondeterministic algorithms, classes P and NP, NP-hard and NP-complete problems, and intractability. Design techniques for fast combinatorial algorithms. Prerequisite: CSE 450.
- 554 Advanced Switching Theory.** (3) S Lattices, Boolean algebras, post algebras, Boolean differential calculus, multivalued logic, fuzzy logic, and finite state machines. Prerequisite: CSE 451.
- 555 Automata Theory.** (3) N Finite state machines, pushdown automata, linear bounded automata, Turing machines, register machines, rams, and rasps; relationships to computability and formal languages. Prerequisite: CSE 355.
- 556 Expert Systems.** (3) S Knowledge acquisition and representation, rule-based systems, frame-based systems, validation of knowledge bases, inexact reasoning, and expert database systems. Prerequisite: CSE 471.
- 560 Software Engineering.** (3) F, S Software engineering foundations, formal representations in the software process; use of formalisms in creating a measured and structured working environment. Lecture, lab. Prerequisite: CSE 360.
- 562 Parallel and Distributed Software Engineering.** (3) A Software engineering characteristics particular to parallel and distributed systems. Tools and techniques to support software engineering involving parallel processing and distributed systems. Prerequisite: CSE 560.
- 563 Software Requirements and Specification.** (3) A Examination of the definitional stage of software development; analysis of specification representations, formal methods, and techniques emphasizing important application issues. Prerequisite: CSE 560.
- 564 Software Design.** (3) A Examination of software design issues and techniques. Includes a survey of design representations and a comparison of design methods. Prerequisite: CSE 560.
- 565 Software Verification, Validation, and Testing.** (3) A Test planning, requirements-based and code-based testing techniques, tools, reliability models, and statistical testing. Prerequisite: CSE 560.
- 566 Software Project, Process, and Quality Management.** (3) A Project management, risk management, configuration management, quality management, and simulated project management experiences. Prerequisite: CSE 560.
- 570 Advanced Computer Graphics I.** (3) F Hidden surface algorithms, lighting models, and shading techniques. User interface design. Animation techniques. Fractals and stochastic models. Raster algorithms. Prerequisite: CSE 470.
- 571 Artificial Intelligence.** (3) S Definitions of intelligence, computer problem solving, game playing, pattern recognition, theorem proving, and semantic information processing; evolutionary systems; heuristic programming. Prerequisite: CSE 471.
- 573 Advanced Computer Graphics II.** (3) S Modelling of natural phenomena: terrain, clouds, fire, water, and trees. Particle systems, deformation of solids, antialiasing, and volume visualization. Lecture, lab. Prerequisite: CSE 470.
- 574 Planning and Learning Methods in AI.** (3) F '97 Reasoning about time and action, plan synthesis and execution, improving planning performance, applications to manufacturing intelligent agents. Prerequisite: CSE 471 or equivalent.
- 575 Decision-Making Strategies in AI.** (3) S Automatic knowledge acquisition, automatic analysis/synthesis of strategies, distributed planning/problem solving, causal modeling, predictive human-machine environments. Prerequisite: CSE 471 or 571 or equivalent.
- 576 Topics in Natural Language Processing.** (3) S Comparative parsing strategies, scoping and reference problems, non-first-order logical semantic representations, and discourse structure. Prerequisite: CSE 476 or instructor approval.
- 577 Advanced Computer-Aided Geometric Design I.** (3) F General interpolation; review of curve interpolation and approximation; spline curves; visual smoothness of curves; parameterization of curves; introduction to surface interpolation and approximation. Prerequisites: CSE 470, 477; or instructor approval.
- 578 Advanced Computer-Aided Geometric Design II.** (3) S Coons patches and Bezier patches; triangular patches; arbitrarily located data methods; geometry processing of surfaces; higher dimensional surfaces. Prerequisites: CSE 470, 477; or instructor approval.
- 579 NURBs: Non-Uniform Rational B-Splines.** (3) S Projective geometry, NURBs-based modeling, basic theory of conics and rational Bezier curves, rational B-splines, surfaces, rational surfaces, stereographic maps, quadrics, IGES data specification. Prerequisites: CSE 470, 477.
- Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Construction

W.W. Badger  
*Director*  
 (COB A268) 602/965-3615

**PROFESSORS**  
 BADGER, MULLIGAN

**ASSOCIATE PROFESSORS**  
 MAYO, WEBER

**ASSISTANT PROFESSORS**  
 CHASEY, HAMILTON, KASHIWAGI,  
 WALSH, WIEZEL

**VISITING EMINENT SCHOLAR**  
 SCHEXNAYDER

**PROFESSORS EMERITI**  
 BURTON, HASTINGS, PETERMAN,  
 WARD, WOODING

The faculty in the Del E. Webb School of Construction offer a graduate program leading to the Master of Science degree with a major in Construction. The areas of concentration are construction science, facilities, and management. The interdisciplinary nature of the program allows a candidate's program of study to reflect both individual interests and career goals.

The primary objective of the program is to allow students with a baccalaureate degree in construction or a related field such as architecture, business, or engineering to broaden and improve their professional capabilities in construction. The program is designed to meet the growing need for professionals with advanced technical, management, and applied research skills in the construction industry.

The *construction science* concentration allows students with interest in field engineering or supervision of heavy and industrial construction projects to pursue a more technically oriented course of study. The *facilities* concentration (emphasizing facilities management) supports the needs of the student desiring a career in the maintenance, operation, renovation, or decommissioning of existing facilities. The *management* concentration (emphasizing construction management) allows students seeking upper-level management positions in various sectors of the

construction industry to improve their competency in project, program, and company management areas.

**Admission Requirements.** Applicants are expected to satisfy all requirements for admission to the Graduate College. In addition, applicants are expected to be competent in basic construction topics. Admission is based upon an evaluation of the student's academic background and industrial experience. Applicants with deficiencies may be required to complete course work beyond that required for the program of study. Industrial experience beyond completion of a baccalaureate degree is strongly recommended and may be accepted as a demonstration of competency in a deficient area. Students whose native language is not English must also submit a TOEFL score of at least 550.

**Program of Study.** As soon as possible after selecting the student's supervisory committee, a program of study must be filed with the Graduate College. The program may include course work from the colleges of Architecture and Environmental Design, Business, Engineering and Applied Sciences, and Public Programs.

The program of study consists of the following: thesis option—30 semester hours of graduate study culminating in a thesis and an oral defense; or non-thesis option—36 semester hours of graduate study culminating in an oral and written comprehensive examination.

Each program is tailored to meet individual needs based on the student's experience, strengths, and goals. Typically a thesis-based program of study includes 12 semester hours of core requirements, 12 semester hours of electives selected to reinforce an area of interest, and six semester hours of thesis/research. In the thesis option, an oral examination in defense of the thesis is required.

The nonthesis program of study includes 12 semester hours of core requirements, 12 semester hours of electives selected to reinforce an area of interest, nine semester hours of concentration development electives, and three semester hours of research. In the nonthesis option, the comprehensive

exam content is developed from selected course work and includes both the oral and written components.

### Research Activity

Applied research is an integral part of the Master of Science degree with a major in Construction. School faculty and current facilities are adequate for a wide range of research activities related to the construction industry. Students select, in conjunction with the supervisory committee members, research topics matching their expertise and interests. Research projects may then be completed through library research, industry studies, or laboratory work as appropriate.

Ongoing research projects include green building, the use of waste and recycled materials, water supply services in Mexico, international construction alliances, and the excavation and deep foundations in cemented soils. Some of the funded projects have included roof performance studies, sponsored by Motorola Inc., the requirements for the demolition and removal of chimneys at the Navajo Generating Station, sponsored by the Salt River Project, and a Salt River Project/Mexico Energy Trade Study, also sponsored by the Salt River Project.

### CONSTRUCTION

**CON 424 Structural Design.** (3) F, S  
 Economic use of steel, reinforced concrete, and wood in building and engineered structures. Design of beams, columns, and connections. Elastic and ultimate strength design. Student design projects. Field trips. Prerequisite: CON 323.

**453 Construction Labor Management.** (3) F, S  
 Labor and management history, union, and open shop organization of building and construction workers; applicable laws and government regulations; goals, economic power, jurisdictional disputes, and grievance procedures. Lecture, lab. Prerequisites: CON 371; ECN 112.

**455 Construction Office Methods.** (3) F, S  
 Administrative systems and procedures for the construction company office, including methods improvement and work simplification, policy and procedures. Prerequisite: CON 389.

**463 Foundations and Concrete Structures.** (3) F, S  
 Subsurface construction theory and practice for foundations of buildings, engineered facilities, shallow and deep foundations, pavements, and excavations. Concrete form design. Lecture, recitation, field trips. Prerequisites: CEE 450; CON 424.

**468 Conceptual and Electrical Estimating.**

(3) F  
System of estimating construction costs before design has been initiated. Cost estimating for large projects. Analysis and organization of electrical estimate. Prerequisite: CON 383.

**472 Development Feasibility Reports.** (3) S  
Integration of economic location theory, development cost data, market research data, and financial analysis into a feasibility report. Computer orientation. Prerequisites: CON 389; REA 394 ST: Real Estate Fundamentals. *General Studies: L2.*

**477 Residential Construction Business Practices.** (3) S

Topics addressed will include development, marketing, financing, legal issues, and sales. Prerequisite: CON 377 or instructor approval.

**483 Advanced Building Estimating.** (3) F, S  
Concepts of pricing and markup, development of historic costs, life cycle costing, change order and conceptual estimating, and emphasizing microcomputer methods. Prerequisite: CON 383.

**486 Heavy Construction Estimating.** (3) F, S

Methods analysis and cost estimation for construction of highways, bridges, tunnels, dams, and other engineering works. Field trips. Prerequisite: CON 383. Pre- or corequisite: CON 344.

**495 Construction Planning and Scheduling.** (3) F, S

Various network methods of project scheduling, such as AOA, AON Pert, bar-charting, line-of-balance, and VPM techniques. Microcomputers used for scheduling, resource allocation, and time/cost analysis. Lecture, lab. *General Studies: N3.*

**496 Construction Contract Administration.** (3) F, S

Survey administrative procedures of the general and subcontractors. Study documentation, claims, arbitration, litigation, bonding, insurance, and indemnification. Discuss ethical practices. Lecture, field trips. Prerequisites: CON 371; ETC 400; senior standing.

**512 Advanced Construction Contract Administration.** (3) F, S

Advanced studies in construction contract administration. Survey the administrative procedures of the general and subcontractor. Study documentation, claims, arbitration, litigation, bonding, insurance, indemnification, legal practice, licensing, codes. Lecture, guest speakers, field trips.

**531 Economics of the Construction Industries.** (3) F

The economic environment of construction, with emphasis on unique aspects; critical review of economic literature dealing with the construction industries. Prerequisite: CON 496 or instructor approval.

**533 Strategies of Estimating and Bidding.** (3) F

Course will explore advanced concepts of the estimating process, such as modeling and statistical analysis, to improve bid accuracies. Prerequisite: CON 483 or 486 or instructor approval.

**540 Construction Productivity.** (3) F

Productivity concepts. Data collection. Analysis of productivity data and factors affecting productivity. Means for improving production and study of productivity improvement programs. Pre- or corequisite: CON 495.

**543 Construction Equipment Engineering.** (3) 3

Analysis of heavy construction equipment productivity using case studies. Applies engineering fundamentals to the planning, selection, and utilization of equipment. Lecture, case studies.

**545 Construction Project Management.** (3) S

Theory and practice of construction project management. Roles of designer, owner, general contractor, and construction manager. Lecture, field trips. Pre- or corequisite: CON 495.

**547 Strategic Planning.** (3) S

The business planning process of the construction enterprise. Differences between publicly held and closely held businesses and their exposure.

**548 Managing the Construction Enterprise for Survival.** (3) F

Provides a thorough understanding of the business risks in the construction industry, and processes for avoiding them.

**551 Facilities Management.** (3) S

Analysis of the facilities management organization and implementation of human resources, business management, building design and construction, work management, and physical plant operations.

**577 Construction Systems Engineering.** (3) F

Systems theory as applied to the construction process. Alternates for structuring information flows and the control of projects. Prerequisite: IEE 476 or equivalent.

**561 International Construction.** (3) S

An investigation of the cultural, social, economic, political, and management issues related to construction in foreign countries and remote regions.

**589 Construction Company Financial Control.** (3) F

Financial accounting and cost control at the company level in construction companies. Accounting systems. Construction project profit calculations. Financial analysis. Lecture, case studies.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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**Counseling Psychology**

Gail Hackett

Director

(EDB 301) 602/965-3384

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**PROFESSORS**BERNSTEIN, CLAIBORN,  
HACKETT, HORAN, KERR,  
KURPIUS, McWHIRTER**ASSOCIATE PROFESSORS**

KINNIER, METHA

The faculty in the Division of Psychology in Education offer a graduate program leading to the Doctor of Philosophy degree with a major in Counseling Psychology. The Ph.D. program in Counseling Psychology is accredited by the American Psychological Association. The Ph.D. program adheres closely to the scientist-practitioner model in preparing graduates for positions in academic and psychological service settings. Although faculty interests are diverse, there is a strong emphasis on empirical data as the basis for professional decision-making. All applicants must submit scores of the Graduate Record Examination (GRE) and submit all application materials by January 15 to be considered for admission for the following academic year.

Curriculum requirements of the Counseling Psychology program include course work from several domains (general psychology core, empirical foundations, and counseling theory and methods) as well as practicum and internship experiences. Comprehensive examinations cover the psychology core, empirical foundations, and counseling theory and practice. Moreover, candidates for the doctorate must complete a College of Education core course, COE 501 Introduction to Research and Evaluation in Education (3). See page 176 under "Education Core Courses" for the listing. Applicants should contact the Division of Psychology in Education and request the *Counseling Psychology Program* brochure for a complete description of admissions and curricular requirements.

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**Counseling**

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See "Master of Counseling" on pages 59-60. For faculty, research activity, and courses, refer to "Counselor Education," pages 162-163.

### Research Activity

In addition to conducting research in career development and self-efficacy, faculty and students are involved in a variety of other projects, including school-based drug abuse prevention, adolescent suicide prevention, problem-solving and decision making, interpersonal and counselor skill development, professional ethics, small group process, consultation, the counseling process, counseling the gifted and talented, health psychology, and specialized problems of women and minorities. Behavioral health topics, including smoking, eating disorders, cancer, arthritis, pain control, cognitive, and stress and burnout are also studied.

### COUNSELING PSYCHOLOGY

#### CPY 613 Child Counseling. (3) N

Applications of counseling theory in working with children in clinics and elementary schools. Integrated practicum available with permission of instructor. Prerequisite: CED 577 or equivalent.

#### 622 Group Counseling. (3) F, S

Theories and methodologies used in group counseling. Prerequisites: CED 567 and 577 or equivalents.

#### 634 Organizational Development and Planned Change. (3) N

Organizational/individual dynamics, including theory, analysis, techniques, and consultation/intervention strategies used in organizational development. Field consultation projects. Prerequisites: CED 567 and 577 or equivalents.

#### 644 Psychology of Careers. (3) S

Advanced career counseling, including theory, research, and practice. Prerequisite: CED 577 or equivalent.

#### 645 Professional Issues and Ethics. (3) F, S

Ethical, legal, and professional issues of concern to practitioners and researchers functioning in a variety of settings. Prerequisites: CED 512 and 523 or equivalents.

**667 Patterns of Behavior Disorders. (3) A**  
Etiology and treatment of a variety of psychological problems, particularly those represented in DSM III-R. Prerequisite: CED 577 or equivalent.

#### 672 Human Diversity: Social Psychological Perspectives. (3) A

Implications for psychological practice of social, psychological, and biological factors in the development of behavioral differences.

#### 674 Counseling Women. (3) F

Explores women's development and its implications for counseling. Sexism in mental health, sex differences in diagnosis and psychopathology, and women's particular treatment needs.

#### 675 Counseling Interventions in Stress Management. (3) N

Theory, procedures, and application of stress management techniques, including biofeedback, meditation, relaxation, autogenic therapy, visualization, and imagery. Prerequisites: CED 577 or equivalent; instructor approval.

#### 677 Advanced Counseling. (3) N

Advanced topics in counseling theory, research, and practice. Prerequisite: CED 577 or equivalent.

#### 679 History and Systems of Psychology. (3) A

Examination of the development and differentiation of the discipline of psychology from its origins in philosophy to the present.

#### 701 Science and Practice of Counseling Psychology. (3) F

Directed experiences involving the integration of theory, research, and practice in counseling psychology. Prerequisite: instructor approval.

#### 702 Research Methods in Counseling Psychology. (3) A

The application of experimental and/or quasi-experimental methods to theory construction and treatment evaluation in counseling psychology. Prerequisite: COE 502 or equivalent.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Counselor Education

Gail Hackett

Director

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### PROFESSORS

BERNSTEIN, CABIANCA, CLAIBORN,  
GROSS, HACKETT, HORAN, KERR,  
KURPIUS, McWHIRTER

### ASSOCIATE PROFESSORS

ARCINIEGA, BROWN, KINNIER,  
METHA, SHELL

### ASSISTANT PROFESSORS

FISHER, HOOD

The faculty in the Division of Psychology in Education offer graduate programs with a major in Counselor Education leading to the Master of Education, Master of Counseling, and Doctor of Education degrees. Applications are not currently being accepted for the Doctor of Education degree program in Counselor Education. For information regarding these degrees, see pages 59 and 74-75. The Master of Counseling degree is a two-year, 60-semester-hour professional degree that prepares counselors for a number of settings, including schools, colleges, and universities, organizational settings, and a variety of mental health agencies. The M.C. program, which focuses on community counseling, is accredited by CACREP (Council for the Accreditation of Counseling and Related Educational Programs). The M.Ed. program in Counselor Education

is designed for teachers seeking a greater understanding of student behavior and information regarding pupil personnel services. This program requires 30 semester hours of graduate course work. Candidates for the M.Ed. degree must complete the College of Education core for master's students, which amounts to nine semester hours. The core courses are COE 501, 504, and 505. Candidates for the M.C. degree must complete COE 501. See page 176 under "Education Core Courses" for the listing. All applicants must submit scores of the Graduate Record Examination (GRE) or the Miller Analogies Test (MAT). Applicants to the M.C. degree must submit all application materials by February 15 to be considered for admission for the following academic year. Applicants to the M.Ed. degree must submit all application materials by October 15 or April 15 to be considered for the following semester. Students who complete the M.Ed. program in Counselor Education and who wish to be certified as school counselors may apply to the program area for admission to an additional sequence of 18 semester hours.

### Research Activity

Counselor Education faculty are engaged in the study of various topics, including counselor training, student development, gerontological counseling, ethics and professional issues, marriage and family counseling, the counseling process, counseling the gifted and talented, career development, and at-risk youth.

### COUNSELOR EDUCATION

#### CE 512 Introduction to Helping Relationships and Community Counseling. (3) F, S, SS

Introduction to the skills used in the helping professions and an examination of the settings in which they occur.

**522 Personality Development. (3) F, S, SS**  
Interaction of affective and cognitive factors in personality development at different age levels. Various personality theories examined.

**523 Psychological Tests. (3) F, S, SS**  
Standardized tests in the study of the individual, with emphasis on test score interpretation in counseling.

**534 Occupations and Careers. (3) F, S, SS**  
The world of work, career development, education, and training for occupational entry and mobility.

**545 Analysis of the Individual. (3) F, S, SS**  
Theory and methods commonly used in studying the individual. Observational methods, diagnostic interviews, structured, and semi-

structured methods for assessing personality. Pre- or corequisite: CED 523.

**567 Group Procedures.** (3) F, S, SS  
Social psychological factors determining interaction, effectiveness, and morale in small groups. Techniques of observation, assessment, and leadership.

**577 Counseling.** (3) F, S, SS  
Principles and application of counseling with particular emphasis on counseling theories. Prerequisites: CED 512, 534, 545; admission to M.C. or school counselor certification program.

**655 Student Development Programs in Higher Education.** (3) A  
Emerging conceptual models of student development. Overview of student personnel and student affairs programs in community colleges, four-year colleges, and universities. Observation on campuses.

**656 The American College Student.** (3) A  
Selected theories of human development with application to academic/sociopsychological learning tasks of postsecondary environmental influences, including faculty expectations and campus subcultures.

**672 Marriage and Family Counseling I.** (3) F  
Introduction to marriage and family counseling theories. Emphasis is on a systems-communication model utilizing cocounseling.

**681 Supervised Practice.** (3) F, S  
Supervised experiences in schools or community agencies. Prerequisite: instructor approval.

**684 Internship in Community Counseling.** (3-6) F, S, SS

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Creative Writing

### Interdisciplinary Faculty

Jewell Parker Rhodes  
*Director, Executive Committee*  
(LL C346) 602/965-7454

#### ENGLISH

Regents' Professors: Dubie, Rios;  
Professors: Boyer, Carlson, Harris,  
Rhodes; Assistant Professors:  
Goldberg, Pritchard

#### THEATRE

Professors: Bedard, Mason;  
Assistant Professors: Edwards, Engel

Faculty of the Creative Writing Committee offer an interdisciplinary Master of Fine Arts degree with a major in Creative Writing. The program is offered jointly by the Department of English in the College of Liberal Arts and Sciences and the Department of Theatre in the College of Fine Arts. Refer also to pages 62-63.

## MASTER OF FINE ARTS DEGREE

One of the unique features of this interdisciplinary program is that, because it utilizes faculty research, creative activity, and teaching interests of two academic units, a student may tailor a course of study to fit individual needs, talents, and goals. The Department of English administers the program and reviews the applications for admission. The 48-hour studio/academic program is designed to provide students of demonstrated intelligence, motivation, and creative talent with the opportunity to work under the direction of faculty who are practicing, published writers. Committed to the relevance of the study of literature as well as to the art and craft of creative literature, the program includes equal components in literature and writing.

### Research and Scholarly Activity

Research and scholarly endeavors inform the creative work of the faculty, which includes publication of poetry, fiction, drama, creative nonfiction, and literary translation; collaborative production with musicians, fine printers, and visual artists. Special research course offerings have emphasized Magical Realism, cross-genre approaches to creative writing, and intensive study of the form and theory of verse, and fiction.

Research and creative activity is enhanced by vigorous faculty and student involvement in producing a national literary magazine, *Hayden's Ferry Review*, an ASU student publication. Creative writing faculty and graduate students participate in public outreach programs, including workshops at ASU for adults and high school students in rural and metropolitan areas of the region. Public lectures and readings by faculty members, original play productions and reader's theatre, and a regular series of public readings, lectures and conferences featuring writers of national renown provide a forum for exchange among artist, audience, scholar, and student. Recent conferences, with support from the National Endowment for the Arts and other agencies, have brought together writers, editors, and publishers, focusing attention on issues in publishing creative work.

## Curriculum and Instruction

Sheryl L. Santos  
*Director*

Larry A. Faas  
*Assistant Director*  
(ED 409) 602/965-1644

### PROFESSORS

BARONE, BITTER, CHRISTIE,  
EDELSKY, EDWARDS, FAAS, FALTIS,  
GRYDER, HUDELSON, McISAAC,  
MOYER, SEARFOSS, STAHL,  
STALEY, WALLEN, ZIMILES

### ASSOCIATE PROFESSORS

ANDERSON, ARIAS, BAKER,  
BENAVIDES, BLANCHARD, COHEN,  
EEDS, FLORES, GOMEZ, GUZZETTI,  
HATFIELD, KNAUPP, McCOY,  
McGOWAN, PETERSON, PIBURN,  
RADER, ROBERTS, SANTOS,  
SURBECK, SWISHER,  
VALLEJO, WILSON

### ASSISTANT PROFESSORS

BLUMENFELD-JONES, FLEMISTER,  
KINARD, MIDDLETON, TRUJILLO

### PROFESSOR EMERITUS

RAY

The faculty of the Division of Curriculum and Instruction offer the Master of Arts (M.A.), Master of Education (M.Ed.), and Doctor of Education (Ed.D.) degree programs with a major in Curriculum and Instruction. The Doctor of Philosophy (Ph.D.) degree in Curriculum and Instruction is offered by the Interdisciplinary Committee on Curriculum and Instruction. See pages 167-169 for more information about the Ph.D. in Curriculum and Instruction.

Graduate-level endorsement programs in bilingual education, English as a second language, reading, and early childhood education are available and may be completed in conjunction with a M.Ed. or the Postbaccalaureate Program for Teacher Certification.

M.A., M.Ed., and Ed.D. students majoring in Curriculum and Instruction



complete requirements by choosing one of the following concentrations: bilingual education, communication arts, early childhood education, elementary education, English as a second language, Indian education, mathematics education, multicultural education, reading education, science education, secondary education, and social studies education. An additional concentration in curriculum studies is available in the Ed.D. program.

### Options

M.Ed. students in the bilingual education concentration may select a K-8 or secondary school-level option.

M.Ed. students in early childhood education and elementary education who are certified teachers select the general option. Those who are seeking a master's degree and initial certification by the State of Arizona are admitted concurrently to the respective M.Ed. degree and corresponding Postbaccalaureate Program for Teacher Certification option.

M.Ed. students in the secondary education concentration who are certified teachers may select a general or academic specialization option. Those selecting the academic specialization option complete 15 semester hours of core and secondary education course work and 15 hours in their academic specialization. The 15 hours of course work in the academic area must be selected in consultation with a member of the academic area faculty. This person serves as cochair of the student's supervisory committee.

Ed.D. students with a concentration in secondary education may select a general program of study or an option which emphasizes art education, business education, music education, or physical education. A faculty member from the option selected serves as co-chair of the student's supervisory committee.

**Admission.** Applicants for admission to the M.Ed. degree are required to

1. meet minimum Graduate College requirements for admission;
2. provide Graduate Record Examination (GRE) verbal and quantitative scores or Miller Analogies Test (MAT) scores; and
3. three letters of recommendation.

Applicants for admission to the M.A. degree are required to

1. meet minimum Graduate College requirements for admission;
2. provide Graduate Record Examination (GRE) verbal and quantitative scores; and
3. three letters of recommendation.

Applicants for admission to the Ed.D. degree should contact the Division of Curriculum and Instruction graduate admissions secretary for information regarding specific test scores and materials that need to be submitted with their applications.

Applicants should note that meeting minimal admissions requirements does not guarantee admission. In addition, international students are required to submit Test of English as a Foreign Language (TOEFL) scores.

**Programs of Study.** The M.Ed. degree requires 30 semester hours of graduate course work and a written comprehensive examination.

The M.A. degree requires a minimum of 30 semester hours of graduate course work, including a thesis. An oral examination in defense of the thesis is required.

Candidates for the Ed.D. degree are required to complete at least 90 hours of graduate course work and research and dissertation credit.

**Endorsements.** The Arizona Reading endorsement requires 30 graduate semester hours, including 15 semester hours in reading education. The teaching endorsements in bilingual education and English as a second language require 21 semester hours and the middle school endorsement requires 18 semester hours. A valid Arizona teaching certificate is required to secure each of the above endorsements. Those interested in qualifying for one of these endorsements should seek advisement from a faculty member in the program area.

### Postbaccalaureate Program for

**Teacher Certification.** The postbaccalaureate initial teacher certification program offers, to those who have completed bachelor's degree majors outside the College of Education, course work needed to qualify for Arizona teacher certification. Postbaccalaureate programs are offered in bilingual education, early childhood education, elementary education, secondary education, and special education. Concurrent postbaccalaureate teacher certification

and admission to the M.Ed. program in special education is required for those seeking certification by the State of Arizona. This requirement is waived for postbaccalaureate program for teacher certification applicants in special education who have already completed a master's degree.

Two options are provided for postbaccalaureate program for teacher certification students in bilingual education, English as a second language, early childhood education, elementary education, and secondary education: (1) a nondegree option leading to teacher certification only and (2) a joint certification/master's degree option leading to completion of certification requirements and an M.Ed. degree.

A maximum of nine semester hours completed after receiving a bachelor's degree and before formal admission to a graduate program may be applied to an M.Ed. or M.A. degree. The maximum time limit for the program of study is six years.

Prospective postbaccalaureate program for teacher certification students should contact the Office of Student Affairs (EDB 7) for information about specific admission requirements.

Those interested in combining preparation for initial teacher certification with pursuing a master's degree should also contact an advisor in the program area that offers the preparation in the selected teaching area.

### Research Activity

The research activity of faculty and graduate students emphasize the following areas of study.

### Bilingual/Multicultural Education.

Assessment and evaluation of minority language populations; Native American education; parent and community involvement; second language acquisition; sociolinguistics; development and education of children and youth from diverse cultural, linguistic, and racial/ethnic populations; professional preparation in bilingual and English as a second language.

### Early Childhood Education.

Cross-cultural differences in child-rearing expectations and parent-child relations; professional preparation of early childhood education personnel; teacher preparation practices; infant and toddler development; constructivist approaches to content area learning.

**Elementary Education.** Pedagogical practices in elementary education; policy and sociological concerns; mathematics discourse and instructional methods; outdoor education; school, technology, and society education (STS); science education methods and materials; whole language education; social studies pedagogy; middle school teaching practices.

**Reading Education.** Development of literacy; children and adolescent literature; discourse analysis; psycholinguistic and sociolinguistic aspects of reading; content area reading; developmental reading; assessment and remediation of reading problems; children's play and literacy development.

**Secondary Education.** Critical theory; curriculum development; equity and diversity; pedagogical practices in the sciences; social studies education; learning theory; issues and trends in secondary education; business education; essential elements of effective instruction; teacher-student interactions; collaborative instructional techniques.

#### BILINGUAL EDUCATION

**BLE 511 Introduction to Language Minority Education.** (3) A  
Historical, philosophical, theoretical, and pedagogical foundations of language minority education in the United States.

**514 Bilingual/Multicultural Aspects of Special Education.** (3) S  
Theories and issues related to the education of bilingual and culturally diverse exceptional children.

**515 Instructional Methods for Bilingual Students.** (3) F, S  
An introduction to general dual language teaching approaches. Focuses on the effective teaching of limited English proficient populations. Prerequisite: BLE 511.

**520 ESL For Children.** (3) S  
Examines approaches to second language development for children congruent with recent research in second language acquisition in children. Prerequisite: BLE 511.

**521 Primary/Elementary Communication Arts in Bilingual Education.** (3) S  
Examination of bilingual/biliterate development of elementary school children, bringing together native and second language, oral language, and literacy development findings with educational practices. Cross-listed as ECD 521. Prerequisite: BLE 511.

**522 Literacy/Biliteracy Development.** (3) S  
Examines approaches to first and second language reading and writing for bilingual/second language learners from a whole language perspective (Spanish-English emphasis). Prerequisite: BLE 511.

**528 Social Studies for Bilingual/ESL Teachers.** (3) S

Provides language and instructional methodologies relevant to bilingual/multicultural students in social studies content delivered in Spanish and English. Prerequisite: BLE 511.

**533 Reading-Teaching Bilingual Students.** (3) F, S

Acquaints teachers with a sociopsycholinguistic perspective on first and second language reading and with strategies for reading development (Spanish-English emphasis). Prerequisite: BLE 511.

**535 Sociolinguistic Issues in Bilingual Education.** (3) F

Survey of major theoretical issues (e.g., language situations, communicative competence, language attitudes) interrelating language, social processes, and bilingual education. Prerequisite: BLE 511.

**541 Nature of Bilingualism/Second Language Acquisition.** (3) A

Bilingual and second language acquisition, with emphasis on children and adolescents. Cognitive, social, and cultural aspects are stressed. Prerequisite: BLE 511.

**543 Bilingual Education Models.** (3) A

Bilingual education programs in other countries; analysis of political, social, economic, and educational implications; practice in planning bilingual education curricula. See also offerings under MCE, SED, SPE, and SPF. Prerequisite: BLE 511.

**561 Parent Involvement in Language Minority Education Programs.** (3) F, S

Examines issues, approaches, and strategies for improving parental and community involvement in the schooling of language minority children and youth. Prerequisite: BLE 511.

**580 Practicum.** (1-6) F, S

Provides for practical application in school settings of principles of bilingual education or English as a Second Language. Special permission required.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

#### CURRICULUM AND INSTRUCTION

**DCI 701 Curriculum Theory and Practice.** (3) F, S

Curriculum theory and practice as a field of study. Its current orientations and applications, modes of inquiry, and community of scholars and practitioners. Seminar. Corequisite: master's-level curriculum course.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

#### EARLY CHILDHOOD EDUCATION

**ECD 522 Developmental Social Experiences in Early Childhood Education.** (3) F  
Materials, techniques, aesthetic expression, creative activities, and values in the integrated curriculum. Prerequisite: ECD 311 or equivalent.

**525 Communication Arts in Early Childhood Education.** (3) S  
Problems and trends of current programs and oral language development. Effort to bring to-

gether language acquisition findings with educational practices. Opportunity for self-directed learning/study. Prerequisite: ECD 322 or equivalent.

**527 Mathematics in Early Childhood Education.** (3) F

Theory and practice in the use of manipulative materials for teaching mathematics to preschool and primary grade children. Prerequisite: ECD 402 or EED 380 or 402 or equivalent.

**544 Play Education.** (3) S, SS

Theories of play and the educational implications of each. Practical applications at the early childhood level.

**555 Modern Practices in Early Childhood Education.** (3) F, SS

Trends and practices, instructional and resource materials, and methods and techniques in early childhood education.

**733 Social and Emotional Development.** (3) A

Inquiry into the social and emotional development dynamics in children, such as peer relationships, self-concept, and parenting processes, with implications for teachers.

**744 Evaluative Procedures: Young Children.** (3) S

A critical examination and use of developmentally appropriate evaluative procedures for children from birth through age eight.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

#### ELEMENTARY EDUCATION

**EED 511 Principles of Curriculum Development.** (3) F, S, SS

Contemporary curriculum theories. Curriculum as an interrelated entity. Principles of conceiving and effecting change.

**526 Communication Arts in the Elementary School.** (3) S, SS

A critical examination of school language arts teaching, focusing on theoretical assumptions regarding oral- and written-language development.

**528 Social Studies in the Elementary School.** (3) F, SS

Problems and trends of current programs. Development of a balanced and articulated program of social studies. Prerequisite: EED 355 or equivalent.

**529 Science in the Elementary School.** (3) S

Problems and trends of current programs. Development of a balanced and articulated science program. Prerequisite: EED 320 or equivalent.

**530 Outdoor/Environmental Education.** (3) SS

Use of various outdoor settings as laboratories for classroom-related experience, study, observation, inquiry, research, and recreation. Includes strategies and materials for developing environmental literacy.

**537 Mathematics in the Elementary School.** (3) F, SS

Contemporary mathematics teaching. Content, materials, and approaches to instruction. Prerequisite: EED 380 or 402 or equivalent.

**578 Student Teaching in the Elementary School.** (9-15) F, S  
Supervised teaching for postbaccalaureate students, synthesized experience in curriculum, instruction, and classroom management. Prerequisites: completion of 21 hours of identified course work from an approved program of study; a GPA of 2.50 (postbaccalaureate nondegree) or 3.00 (postbaccalaureate degree); approval of Professional Field Experiences.

**581 Diagnostic Practices in Mathematics.** (3) F, S  
Specific skills in diagnosing/treating children's learning difficulties in mathematics. Includes practicum experiences, both on and off campus, in identifying strengths/weaknesses and initial remediation. Prerequisite: EED 380 or 402 or instructor approval.

**720 Language in Education.** (3) A  
Sociolinguistic seminar on language issues in education, including language acquisition, classroom interaction, language attitudes, relation language, and class-gender ethnicity.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### INDIAN EDUCATION

**IED 411 Foundations of Indian Education.** (3) F, S  
Historical development of Indian affairs and Indian education, including contemporary educational issues, traditional Indian concepts of education, and Indian cultures.

**422 Methods of Teaching Indian Students.** (3) F  
Philosophies, methodologies, and materials used in Indian education. Examination of local and tribal classroom materials. Experimentation with new teaching concepts. Prerequisite: IED 411.

**433 Counseling the Indian Student.** (3) A  
Techniques and methods used in counseling, with emphasis on understanding Indian cultures and values. Experimentation with new counseling concepts. Prerequisite: IED 411.

**500 PS: Administration and Management of Indian Education Programs.** (3) A  
Examination of administrative and programmatic practices related to the schooling of American Indian populations.

**594 Workshop in Indian Education.** (6) SS  
Practical approaches to teaching Indian students. Curriculum and materials development, community involvement, current issues, and research examined.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### READING EDUCATION

**RDG 481 Practicum: Elementary Reading.** (3) F, S, SS  
Practicum experience through supervised tutoring of K-8 public school students experiencing reading difficulty. Conducted in public school setting. Limited to students admitted to postbaccalaureate program. May be taken concurrently with RDG 315. Prerequisite: RDG 314.

**505 Developmental Reading.** (3) F, S, SS  
For classroom and special reading teachers. Specific professional skills in decoding, comprehension, and evaluation. Required for Special Reading Endorsement. Prerequisite: teaching certificate.

**507 Content Area Literacy.** (3) F, S, SS  
Theory, teaching strategies, and practical application concerning learning from text across subject matter disciplines.

**533 Reading-Teaching Bilingual Students.** (3) F, S  
Acquaints teachers with theory and practice in second language acquisition and with strategies for developing word recognition and comprehension in native language and second language reading (Spanish-English emphasis).

**544 Secondary Reading Programs.** (3) S  
Examines rationale for secondary reading programs (grades 7-12), teaching strategies, research, and program assessment. Prerequisite: RDG 507.

**550 Practicum Experiences in Reading.** (3) F, S, SS  
Practicum experience utilizing assessment and instructional techniques for classroom settings. (See RDG 557 for State of Arizona reading endorsement.) Prerequisite: RDG 505 or equivalent.

**556 Assessment Procedures in Reading.** (3) F, S  
Techniques for classroom and clinical reading assessment and instruction. Emphasis on continuous assessment. May be taken concurrently with RDG 557. Recommended for State of Arizona reading endorsement. Prerequisite: RDG 505.

**557 Advanced Reading Practicum.** (3) F, S  
Advanced practicum experience utilizing specialized reading and other assessment and instruction techniques for classroom and clinic settings. Lab sections. Recommended for State of Arizona reading endorsement. May be taken concurrently with RDG 556. Prerequisites: RDG 505; instructor approval.

**563 Children's Literature.** (3) F, S, SS  
Selecting and using children's literature and related nonprint media to support the elementary school curriculum. Cross-listed as LIS 563.

**581 Literature-Based Reading Programs.** (3) F, S, SS  
For classroom and special reading teachers. The role of literature in the acquisition and development of literacy. Specific suggestions for helping students learn to read and/or expand their reading ability with literature. Introduction to literature studies. Prerequisite: teaching certificate.

**582 Practicum: Literature Studies.** (3) S  
Practical application of literature study group principles in field sites or through on-campus simulations. Lecture, supervised practice. Prerequisite: RDG 581 or instructor approval.

**629 Seminar: History of Reading Instruction and Research.** (3) S  
Recurrent themes, prominent authorities, and significant research and publications in the history of reading education and related curricula. Prerequisite: instructor approval.

**630 Research in Reading.** (3) F  
For advanced graduate students interested in applied research problems, literature of reading instruction, and major issues related to reading research. Prerequisite: instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### SECONDARY EDUCATION

**SED 400 Principles of Effective Instruction in Secondary Education.** (3) F, S, SS  
Different models of education are examined. Appropriate teaching practices for each model are developed and applied to secondary school classrooms. Lecture, discussion. Prerequisite: PTPP admission.

**480 Special Methods of Teaching Social Studies.** (3) F, S  
Interdisciplinary approaches; production and collection of materials.

**501 Introduction to Effective Instruction.** (6) F, S, SS  
Introductory course for postbaccalaureate certification program in secondary education. Emphasis upon developing basic classroom management, instruction, and evaluation. Includes a field assignment of at least 120 hours. Prerequisite: admission to postbaccalaureate certification program.

**522 Secondary School Curriculum Development.** (3) F, S, SS  
Social processes, issues, principles, patterns, and procedures in curriculum development.

**533 Improving Instruction in Secondary Schools.** (3) F, S, SS  
Analyses of procedures, methods, techniques, and experiments in teaching in secondary schools. Prerequisites: SED 478, 578.

**577 Issues and Trends in Secondary Education.** (3) N  
Analyses of lay and professional reports; problems and issues in American secondary education. Prerequisites: SED 478, 578.

**578 Student Teaching in the Secondary Schools.** (3-12) F, S  
The practice of teaching. The relationship of theory and practice in teaching. Post Baccalaureate students only. Prerequisites: completion of approved post baccalaureate program; a minimum 2.50 GPA; approval of Office of Professional Field Experiences.

**588 Human Relations in the Secondary Schools.** (3) A  
Problems in human relations inherent in the interaction of pupils, teachers, administrators, nonprofessional staff, and laymen. Prerequisites: SED 478, 578.

**711 Secondary Curriculum Development.** (3) S, SS  
Theories and processes of developing curriculum; evaluation of research. Prerequisites: SED 478, 522 (or equivalent), 578.

**722 Improvement of Instruction in the Secondary School.** (3) F  
Evaluation of the research; issues and theories related to the improvement of instruction. Prerequisite: SED 533.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Curriculum and Instruction

### Doctoral Program Interdisciplinary Committee

Sanford J. Cohn  
Program Director  
(ED 305) 602/965-1448

#### CHEMISTRY AND BIOCHEMISTRY

Professor: Birk

#### EARLY CHILDHOOD EDUCATION

Professor: Zimiles;  
Associate Professor: Gomez

#### EDUCATIONAL MEDIA AND COMPUTERS

Professors: Bitter, Hudelson,  
McIssac, Staley

#### ELEMENTARY EDUCATION

Professor: Edelsky; Associate  
Professors: Arias, Cohen, Flores,  
Hatfield, McGowan

#### ENGLISH

Professors: Donelson, Ney, Nilsen

#### EXERCISE SCIENCE AND PHYSICAL EDUCATION

Professors: Burkett, Corbin, Darst,  
Pangrazi, Stone, Wells

#### FAMILY RESOURCES AND HUMAN DEVELOPMENT

Associate Professors: Manore, Vaughan

#### MULTICULTURAL EDUCATION

Professor: Faltis

#### MUSIC EDUCATION

Professors: Boswell, Humphreys;  
Associate Professor: Stauffer

#### READING AND LIBRARY SCIENCE

Professors: Christie, Searfoss;  
Associate Professors: Blanchard,  
Eeds, Guzzetti

#### SECONDARY EDUCATION

Professor: Barone;  
Associate Professors: Baker, Piburn;  
Assistant Professor: Blumenfeld-Jones

#### SPECIAL EDUCATION

Professors: Prieto, Rutherford,  
Zucker; Associate Professors: Cohn,  
Di Gangi, McCoy

#### ZOOLOGY

Professor: Lawson

The Interdisciplinary Committee on Curriculum and Instruction offers an interdisciplinary graduate program leading to the Doctor of Philosophy degree in Curriculum and Instruction. The interdisciplinary committee sets guidelines and supervises programs of study.

Areas of concentration, with some subspecializations, follow:

Curriculum studies  
Early childhood education  
Educational media and computers  
Elementary education  
Language education  
Science education  
English education  
Exercise and wellness education  
Music education  
Physical education  
Reading education  
Science education  
Special education  
Gifted  
Mildly handicapped  
Multiculturally exceptional  
Severely/multiply handicapped

One of the unique features of this interdisciplinary program is that, because it utilizes faculty research and teaching interests from a number of academic units, a student may work in concert with the program committee to tailor a course of study to fit individual needs and goals.

The interdisciplinary committee sets guidelines and supervises programs of study, while an executive committee, appointed by the dean of the College of Education and the dean of the Graduate College, has primary responsibility for the operation of the program. It is composed of faculty representing the various concentrations.

#### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

The Doctor of Philosophy degree with a major in Curriculum and Instruction is an individualized interdisciplinary degree that integrates graduate courses from a variety of academic units. This course work provides a substantive knowledge base in the concentration area and a sound foundation for research leading to a dissertation.

**Admission.** In addition to meeting minimum Graduate College admission requirements, each applicant must provide the following:

1. a letter of career goals and statement of reasons for seeking the interdisciplinary Ph.D. in Curriculum and Instruction;
2. Graduate Record Examination (GRE), verbal and quantitative test scores;

3. a sample of written work; and
4. three academic letters of recommendation.

One year of full-time teaching experience at the appropriate level, or its equivalent, is strongly recommended. In the absence of prior teaching experience, a teaching internship is required but may not be counted toward the Ph.D. degree.

Admission decisions are based upon the compatibility of the applicant's career goals with the purpose of the degree program, previous academic training and performance, GRE scores, letters of recommendation, and the availability of a potential mentor in the candidate's concentration area. It should be noted that, because of enrollment limits, applicants who meet minimum requirements are not automatically admitted.

**Program Committee.** The program committee, consisting of a chair and at least two other members, oversees the preparation of the initial program of study and the preparation and evaluation of the comprehensive examination. Although the program committee may consist of only three members for early advisement, it must have *at least five members* for the administration and evaluation of the comprehensive examination, three of whom must be members of the interdisciplinary committee and two of whom must be experts in the student's area of concentration. At least one member of the program committee must be a faculty member of the Division of Curriculum and Instruction. The committee must be approved by the dean of the Graduate College.

The program committee and the student must decide on the area of concentration and cognate area to be included in the student's comprehensive examination. They also must develop a program of study to establish a professional knowledge base and methods of inquiry and analytical tools for research.

**Dissertation Committee.** After passing the comprehensive examination, a dissertation committee is formed, upon the approval of the dean of the Graduate College. The basic functions of the dissertation committee are as follows:

1. overseeing the development and approval of a dissertation proposal;

2. providing guidance while the candidate conducts the dissertation study/analysis;
3. reviewing the dissertation manuscript; and
4. conducting an oral defense of the dissertation.

Members of the program committee may also serve as members of the dissertation committee; however, the committees may have different memberships. At least one member of the dissertation committee must be a faculty member of the Division of Curriculum and Instruction. The dissertation committee chair must be a faculty member designated eligible to serve in this capacity by the interdisciplinary committee and the dean of the Graduate College.

**Program of Study.** The program requires at least 93 semester hours, or the equivalent of four academic years of full-time study, beyond the bachelor's degree. Students with a master's degree directly related to the anticipated course of study must complete a minimum of 54 semester hours beyond the master's degree. At least 30 semester hours in the approved program of study, exclusive of research and dissertation, must be taken at ASU. Each candidate must also register for a minimum of 24 semester hours of research and dissertation credit, with the dissertation directed by a dissertation chair approved by the interdisciplinary committee and the dean of the Graduate College. The program of study is divided into four general areas:

1. Ph.D. core course requirements;
2. professional focus;
3. cognate study; and
4. independent research and dissertation.

**Core Course Requirements.** All doctoral students in the College of Education are required to complete designated core courses. In addition, Curriculum and Instruction doctoral students are required to take a core course, DCI 701 Curriculum Theory and Practice.

**Professional Focus.** With the advice and approval of the student's program committee, a student must select a sequence of courses and experiences designed to focus subsequent efforts on a particular aspect of curriculum and instruction, culminating in a dissertation.

The professional focus is divided into three areas:

1. methods of inquiry and analytical tools associated with empirical study of curriculum and instruction;
2. a substantive knowledge base in the area of concentration; and
3. internships in research and college teaching.

Semester hours counted under one category may not be counted under another. Courses (42 semester hours) are drawn from program courses in the student's area of concentration.

**Cognate Study.** Students are expected to choose interrelated courses (12 semester hours minimum) outside their declared area of concentration that have a clear link to their dissertation efforts. Cognate studies can be drawn from a broad range of offerings, both within and outside the College of Education.

**Foreign Language Requirements.** None.

**Core Course Analysis.** A core course analysis is required of all students before the completion of 24 semester hours of graduate study.

This written analysis is to be in the form of a paper in which the student describes key concepts and ideas learned in the Ph.D. core courses as they relate to the student's area of concentration. The purpose of this activity is to allow the student to demonstrate awareness of the key concepts from the core courses and to demonstrate clear and effective writing skills.

**Annual Report for Ph.D. Candidates.** At the end of each school year (before the last day of final exams), the Ph.D. advisor of each student prepares a report to be reviewed by the director of the executive committee. Copies of the report are distributed to the members of the student's program or dissertation committee. The report from the mentor, which is accompanied by the student's transcript and an up-to-date *curriculum vitae*, includes the following:

1. a statement concerning the status of the student's program of study (with a copy);
2. a statement of the status of preparation toward the student's comprehensive examination (including a projected date for completion);

3. a statement about the student's performance in course work; and
4. a statement about the student's accomplishments during the academic year (and summer, if appropriate), including research activity, writings, presentations, and professional accomplishments.

**Comprehensive Examinations.** Upon completion of course work in the Ph.D. program of study and before admission to candidacy and the start of the dissertation research, the student is examined in the areas of concentration, cognate study, and methods of inquiry and analytical tools. The examination is designed to test the student's accumulation of interdisciplinary knowledge and ability to communicate across disciplines. The comprehensive examination is developed and administered by the student's five-member program committee.

**Dissertation Precis and Proposal.**

The precis is a 15-page sketch of the dissertation research proposed by the student. Upon approval of the precis by the dissertation committee, the student must develop a dissertation proposal. The proposal typically constitutes a draft of the first three chapters of the dissertation, but may vary with the dissertation committee's approval. Following approval of the proposal by the dissertation committee chair, a proposal meeting is scheduled. Approval of the proposal at that meeting indicates that the faculty agree that the rationale, review of the literature, method, and proposed analyses are appropriate and that the study may proceed as planned. If problems are identified in the proposal meeting, the dissertation committee may meet again to hear a revised proposal or arrange a more relevant way to re-examine the proposal.

**Research and Dissertation.** Twenty-four semester hours of research and dissertation credit are required. Twelve dissertation credits must be reserved for post-candidacy registration. The dissertation is designed to be the student's culminating experience. The dissertation must consist of a fully documented written study demonstrating a high level of expertise in research and scholarship in the student's area of concentration. The dissertation should make an original contribution to inquiry in the area of curriculum and instruction and be worthy of publication by an es-



tablished press as a book or monograph or as one or more articles in a refereed, scholarly journal. The dissertation should not only demonstrate that the student is able to conduct quality research, but also should be conceived and carried out in such a way that it should make a contribution to advancing scholarship in the field of curriculum and instruction.

**Final Examinations.** The final oral examination in defense of the dissertation is scheduled and conducted by the student's dissertation committee. A candidate must pass the final examina-

tion within five years after completing the comprehensive examination.

**Residency Requirement.** All students are required to fulfill a one-academic-year in full-time program residence.

#### Research Activity

Faculty in the interdisciplinary Ph.D. program committee in Curriculum and Instruction are engaged in a variety of research activities. Representative examples may be found under the program descriptions that correspond to the areas of concentration of this degree program.

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## Dance

**Pamela H. Matt**  
*Acting Chair*  
(PEBE 107A) 602/965-5029

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**PROFESSORS**  
JONES, KEUTER,  
LESSARD, LUDWIG

**ASSOCIATE PROFESSORS**  
KAPLAN, MATT, MOONEY

**ASSISTANT PROFESSORS**  
JACKSON, PARK, VISSICARO

**PROFESSORS EMERITI**  
CHLISTOWA, GISOLO, NAGRIN

**LECTURER EMERITUS**  
DesJARDIN

**INSTRUCTIONAL PROFESSIONAL  
EMERITUS**  
ROSEN

The faculty in the Department of Dance offer a graduate program leading to the Master of Fine Arts degree with a major in Dance. See page 63 for information concerning this degree program.

#### Research and Creative Activity

Research and creative activities in the Department of Dance include the following: the creation and performance of new works of dance and music; collaboration with other artists; theory and teaching of improvisation, choreography, and performance; kinesiology and ideokinesis; labanotation theory, practice, and reconstruction of dances from notated scores. This work is fostered by the availability of a new state-of-the-art experimental theatre and sound and media labs.

#### DANCE HISTORY

**DAH 501 Philosophy of Dance.** (3) S  
Analytical and critical study of the implications of traditional and contemporary philosophies of dance regarding meaning, identity, form, content, genre, and style.

**502 Cultural Concepts of Dance.** (3) S  
Cultural concepts; trends, economic, political, and geographical forces in major eras of dance history.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.





## DANCE

**DAN 434 Technique and Theory of Modern Dance.** (2) F, S

Preparation in the performance and comprehension of professional level modern dance technique. 6 hours weekly. May be repeated for credit. Placement audition required.

**435 Technique and Theory of Ballet.** (2) F, S

The study of professional advanced ballet technique with emphasis on preparation for performance. 4 hours weekly. May be repeated for credit. Placement audition required.

**437 Partnering.** (2) S

Fundamental technique, theory, and practice of partnering applicable to all dance forms. Variations from ballet (on pointe and off). May be repeated for credit. Prerequisite: instructor approval.

**464 Choreography and Accompaniment.** (2) F

Function of accompaniment for dance; experience in the use of percussion, voice, records, piano, and selected instruments in relation to their use in choreography. Studio. Prerequisites: DAN 264 and 265 or equivalent.

**465 Advanced Choreography.** (2) S

Investigation and practice of contemporary styles of choreography. Studio. Prerequisites: DAN 264 and 265 or equivalent.

**480 Senior Performance in Dance.** (2) F

Original choreography for group performance with analysis and critique of problems encountered in production. Must be repeated for a total of 4 credits. Prerequisites: DAN 464, 465.

**510 Dance Stagecraft and Production.** (3) N

Theory of lighting, costuming, makeup, scenery, and sound as related to dance performance. May be repeated once for credit. Lecture, studio. Prerequisite: DAN 211 or equivalent.

**521 Sound Lab I.** (1) F

Introduction to tape recording, sound mixing, audio tape editing for dance choreographers. Lecture, lab. Prerequisite: instructor approval.

**522 Sound Lab II.** (1) S

Continuation of DAN 521. Emphasis on development of tape compositions. Lecture, lab. Prerequisite: DAN 521.

**528 Dance Notation III.** (3) N

Advanced study of labanotation. Experiences in notating and reconstruction of labanotation dance scores. Lecture, studio. Prerequisite: DAN 328 or equivalent.

**534 Technique and Theory of Modern Dance.** (2) F, S

Preparation in the performance and comprehension of professional-level modern dance for first-year graduate students. 6 hours weekly. May be repeated for credit. Placement audition required.

**535 Technique and Theory of Ballet.** (1) F, S

Graduate-level study of professional advanced ballet technique with emphasis on preparation for performance. 4 hours weekly. May be repeated for credit. Placement audition required.

**537 Partnering.** (2) S

Fundamental technique, theory, and practice of partnering, applicable to all dance forms. Variations from ballet (on pointe and off). May be repeated for credit. Prerequisite: instructor approval.

**542 Ideokinesis.** (2) F

A theoretical examination of ideokinetic methods of facilitating postural change and movement efficiency.

**550 Graduate Dance Pedagogy: Modern.** (3) S

Advanced analysis of teaching techniques for modern dance.

**551 Graduate Dance Pedagogy: Ballet.** (3) F

Advanced analysis of teaching techniques for ballet. Prerequisite: instructor approval.

**561 Choreographer/Composer Workshop.** (3) N

Analysis of, experimentation with, and practice in working with composers of music for choreography. Open to experienced choreographers and composers. Lecture, studio. Prerequisite: instructor approval.

**564 Solo and Group Choreography I.** (2) F

Original choreography created for solo and group performance. Studio. Prerequisites: DAN 464 and 465 or equivalent.

**565 Solo and Group Choreography II.** (2) S

Continuation of DAN 564. Studio. Prerequisite: DAN 564.

**571 Dance Theatre.** (1-3) F, S

Performance in specially choreographed dance productions. 3 hours a week. May be repeated for credit. Prerequisite: instructor approval.

**591 Seminar.** (0-3) F, S

Seminar focusing on enrichment topics, production aspects of thesis projects, teaching concerns, special lectures, films, or critiques.

**634 Technique and Theory of Modern Dance.** (2) F, S

Preparation in the performance and comprehension of professional-level modern dance for second-year graduate students. 6 hours weekly. May be repeated for credit. Placement audition required.

**640 Advanced Problems in Analysis of Dance Technique.** (3) S

Theories and principles of human anatomy, kinesiology, and the psychology of learning applied to analysis of dance movement. Prerequisites: DAN 340 and 342 or instructor approval.

**664 Choreography Workshop.** (2) F

Choreographic study in a seminar context with faculty and guest artists. Studio. May be repeated for credit. Prerequisites: DAN 564 and 565.

**693 AP: MFA Performance.** (1-9) F, S

Studio work in preparation for required M.F.A. concert. Public performance to be approved by the student's supervisory committee and to be followed by a final oral examination. A written bound document as well as video documentation must be left with the department. Prerequisite: instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Decision and Information Systems

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(BAC 554) 602/965-6350

## PROFESSORS

BURDICK, ECK, HERSHAUER, KAZMIER, KIRKWOOD, MAYER, PHILIPPAKIS, RUCH, WOOD

## ASSOCIATE PROFESSORS

BROOKS, CALLARMAN, CARROLL, GOUL, KEEFER, KEIM, REISER, ROY, D. SMITH-DANIELS, V. SMITH-DANIELS, ST. LOUIS, VERDINI, WILSON

## ASSISTANT PROFESSORS

AMUNDSON, CHING, KIANG, KULKARNI, SIFERD

## PROFESSORS EMERITI

HUSTON, McCREADY

The faculty in the College of Business offers a program leading to the Master of Science degree with a major in Decision and Information Systems. The faculty also participate in the programs leading to the Master of Business Administration, Master of Science in Statistics, and Doctor of Philosophy in Business Administration degrees. For information concerning these degree programs, refer to pages 58-59, 137-138, and 271-272.

## MASTER OF SCIENCE DEGREE

The program leading to the Master of Science degree with a major in Decision and Information Systems educates specialists to develop and apply quantitative and computer methods to support business decision making. Areas of study within the program include applied statistics, computer information systems, management science, or operations management.

**Admission.** Applicants should have received their undergraduate education in a computer or quantitative field such as computer information systems, computer science, engineering, mathematics, science, or quantitative business analysis. All applicants must have completed at least one semester or quarter of course work in each of the following areas: calculus, computer programming, and statistics or probability. Applicants must satisfy all re-

requirements for admission to the Graduate College (see pages 44-46) and must submit scores received on either the Graduate Management Admission Test or the Graduate Record Examination (verbal, quantitative, and analytical). In addition, applicants must demonstrate currency and competency in subject matter relevant to the area of study they intend to pursue. International applicants whose native language is not English must submit scores from the TOEFL and TSE exams. Specific admission requirements for each area of study may be obtained from the Graduate Decision and Information Systems Admissions Committee, College of Business, Arizona State University, Tempe, Arizona 85287-3606.

**Program of Study.** The program of study normally consists of a minimum of 30 semester hours, including the following:

CIS 505	Technical Foundations of Data Management .....	3
	or QBA 510 Managerial Statistics (3)	
CIS 593	Applied Project .....	3
	or QBA 593 Applied Project (3)	

Each candidate for the Master of Science degree with a major in Decision and Information Systems must receive approval for a specific program of study from the Decision and Information Systems graduate advisor before completing nine semester hours of study within the degree program. No more than six semester hours of course work may be taken at the 400 level. Examples of specific programs for the various areas of study may be obtained from the Decision and Information Systems graduate advisor.

**Foreign Language Requirements.** None.

**Thesis Requirements.** A thesis is optional.

**Final Examinations.** A final written examination is required of all candidates. In addition, an oral examination in defense of the thesis is required of candidates who elect to write a thesis.

#### Research Activity

Research activities of Decision and Information Systems faculty encompass theory and applications in computer information systems, manage-

ment science, operations management, and statistics. The faculty are actively engaged in research in the following areas: database systems, artificial intelligence, management information systems, decision support systems, model management systems, mathematical optimization, decision analysis, linear statistical models, panel models, categorical data analysis, experimental design, forecasting, operations strategy, productivity and quality management, production scheduling, project management, health care operations, and service operations.

Students and faculty have access to excellent computing facilities, including mainframes, minicomputers, computer workstations, and specialized equipment and software for research in graphics, distributed database systems, group decision support systems, model management systems, management science, operations simulation, and statistics.

### COMPUTER INFORMATION SYSTEMS

#### CIS 420 Business Database Concepts. (3) F, S

Database theory, design, and application, including the entity-relationship model, the relational, hierarchical, and network database models, and query languages. Prerequisites: CIS 330; professional program business student majoring in Computer Information Systems or Accountancy. Pre- or corequisite: CIS 335.

#### 430 Advanced Topics in Information Systems. (3) A

Advanced topics such as data communications, distributed systems, decision support systems, and artificial intelligence. Prerequisites: professional program business student majoring in Computer Information Systems or Accountancy; instructor approval.

**440 Systems Analysis and Design. (3) F, S** Development of business application systems using structured and object-oriented analysis and design. Use and evaluation of CASE or other tools. Prerequisites: CIS 420; professional program business student majoring in Computer Information Systems or Accountancy.

#### 502 Management Information and Decision Support Systems. (3) F, S

Fundamentals of computer-based management information and decision support systems. Prerequisites: completion of all first-year MBA courses; QBA 502.

#### 505 Technical Foundations of Data Management. (3) A

Data and file structures for business data management; information processing using techniques supported by languages such as C. Prerequisites: CIS 335 and a computational programming language or instructor approval.

**506 Business Database Systems. (3) A** Hierarchical, network, relational, and other recent data models for database systems. Processing issues such as concurrency control, query optimization, and distributed processing. Prerequisites: CIS 505 or equivalent; MAT 210.

**510 Systems Models and Simulation. (3) N** Design of computer-based decision systems. Simulation as a research and decision-making tool. Prerequisites: MAT 210; QBA 502; a computational programming language.

**512 Decision Support Systems. (3) A** Definition, description, construction, and evaluation of computer-based decision systems. Prerequisites: CIS 502 or 505 or QBA 505; MAT 210.

#### 515 Management Information Systems. (3) A

Systems theory concepts applied to the collection, retention, and dissemination of information for management decision making. Prerequisite: CIS 335 or 502.

**520 Systems Design and Evaluation. (3) A** Methodologies of systems analysis and design. Issues include project management, interface, organizational requirements, constraints, documentation, implementation, control, and performance evaluation. Prerequisite: CIS 505 or equivalent.

**525 Artificial Intelligence in Business. (3) N** Development and application of artificial intelligence approaches to business problem solving. Prerequisite: CIS 505 or equivalent.

#### 530 Information Systems Development. (3) A

Object-oriented and interprocess communication and control concepts for information systems; applications based on languages such as C++ and platforms such as networked UNIX. Prerequisite: CIS 505.

**535 Distributed Information Systems. (3) A** Introduction to distributed systems and their impact on information systems in business. Prerequisite: ACC 587 or CIS 505.

#### 591 Seminar in Selected CIS Topics. (3) A

Topics such as the following will be offered:

- Advanced Data and Knowledge Base Systems
- Distributed Artificial Intelligence
- Integrated Modeling Environments
- Organizational Support Systems

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### OPERATIONS AND PRODUCTION MANAGEMENT

#### OPM 502 Operations and Logistics Management. (3) F, S

Conceptual foundations for the total operations and logistics functions for all types of organizations. Application of analytical methods to production problems. Prerequisites: ECN 502; QBA 502.

#### 540 Quality and Productivity Management. (3) A

Organizational factors influencing quality and productivity in the production of goods and services. Quality and productivity strategies, improvement programs, and measurement systems. Prerequisite: OPM 502 or instructor approval.

**581 Production and Inventory Management.** (3) A

Planning and control of production and inventories in manufacturing and service systems. Includes strategic implications, decision-making models, and applications. Prerequisite: OPM 502 or instructor approval.

**582 Capacity Management and Scheduling.** (3) A

Capacity and scheduling decisions entailing the acquisition and allocation of a firm's resources, including work force, equipment, and facilities. Prerequisites: OPM 581; QBA 561.

**585 Facilities Design and Management of Technology.** (3) A

Decisions regarding management of facilities and technology for manufacturing and service firms. Facilities location, layout, process design, and selection. Prerequisites: OPM 581; QBA 561.

**587 Project Management.** (3) A

Planning, scheduling and controlling of projects in R & D, manufacturing, construction and services. Project selection, financial considerations, and resource management. Prerequisite: QBA 502.

**791 Seminar.** (3) N

Topics such as the following are offered:

- (a) Doctoral Seminar in Production/Operations Management
- (b) Doctoral Seminar in Logistics Systems

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### QUANTITATIVE BUSINESS ANALYSIS

**QBA 410 Applied Business Forecasting.** (3) N

Application of forecasting techniques in business and institutional environments. Prerequisite: QBA 321.

**421 Applied Quality Analysis II.** (3) A

Applications of statistical tools employed in manufacturing and experimental research. Applications focus on design and improvement of processes. Prerequisite: QBA 321.

**450 Operations and Process Analysis.** (3) A  
Implementation of quantitative techniques for the analysis of quality problems related to operations and process analysis. Prerequisites: OPM 301; QBA 221.

**502 Managerial Decision Analysis.** (3) F, S  
Fundamentals of quantitative analysis to aid management decision making under uncertainty. Prerequisites: MAT 210; computer literacy; graduate degree program student.

**505 Management Science.** (3) N  
Quantitative approaches to decision making, including linear programming and simulation, with an emphasis on business applications. Prerequisites: MAT 210; QBA 502.

**510 Managerial Statistics.** (3) A  
Statistical methods used in decision making, including analysis of variance and simple and multiple linear regression. Prerequisites: MAT 210; QBA 502 or an introductory statistics course.

**511 Sampling Techniques in Business.** (3) N

Planning, execution and analysis of surveys in business research. Prerequisite: QBA 502.

**525 Applied Regression Models.** (3) A

Simple linear regression, multiple regression, indicator variables, and logistic regression. Emphasis on business and economic applications. Prerequisites: MAT 210; QBA 510.

**527 Categorical Data Analysis.** (3) N

Discrete data analysis in business research. Multidimensional contingency tables and other discrete models. Prerequisite: QBA 525.

**528 Exploratory Data Analysis.** (3) N

Introduces student to principles and methods of exploratory data analysis. Prerequisite: QBA 502.

**530 Experimental Design.** (3) A

Experimental designs used in business research. Balanced and unbalanced factorial designs, repeated measures designs, and multivariate analysis of variance. Prerequisite: QBA 525 or equivalent.

**535 Multivariate Methods.** (3) A

Advanced statistical methods used in business research. Multivariate analysis of association and interdependence. Prerequisite: QBA 525.

**540 Forecasting.** (3) N

Foundation of statistical forecasts and forecast intervals; application of classical and computer-assisted forecasting methods to business forecasting problems. Prerequisites: MAT 210; QBA 502.

**550 Intermediate Decision Analysis.** (3) N

Quantitative decision analysis methods for business decision making under uncertainty, including decision diagrams, subjective probabilities, and preference assessment. Prerequisites: MAT 210; QBA 502.

**552 Statistical Decision Theory.** (3) N

Statistical decision methods for business decision making under uncertainty, including Bayesian inference, optimal statistical decisions, and value of information assessment. Prerequisites: MAT 210; QBA 510 or 550.

**560 Probabilistic Models.** (3) N

Development and application of probabilistic models for quantitative business analysis. Prerequisites: MAT 210; QBA 502.

**561 Mathematical Programming.** (3) N

Techniques for solving mathematical programming models of business problems. Prerequisites: MAT 210, 242.

**562 Network Flow Models.** (3) N

Introduction to network structure, applications, and algorithms; development of data structures for network algorithms applied to business problems. Prerequisites: QBA 561 or MAT 242 and QBA 505.

**564 Nonlinear Optimization.** (3) N

Basic properties of solutions and algorithms for constrained and unconstrained minimization, basic descent methods, and barrier methods. Prerequisites: QBA 561 or MAT 242 and QBA 505.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Design

**Robert Lee Wolf**

*Director*

(AED 154) 602/965-4135

Fax: 602/965-9717

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### PROFESSORS

BUSH, KROELINGER,  
REZNIKOFF, WOLF

### ASSOCIATE PROFESSORS

BRANDT, DORSA, JOHNSON,  
NIELSEN, RATNER, WITT

### ASSISTANT PROFESSORS

BERNARDI, CUTLER,  
HARMON-VAUGHAN,  
McDERMOTT, SADLER

### PROFESSORS EMERITI

BENZINGER, KNIGHT,  
QUESADA, STREUFERT

The faculty in the School of Design, College of Architecture and Environmental Design, offer a postprofessional research degree program leading to the Master of Science in Design degree with majors in Industrial Design and Interior Design. The program prepares industrial designers and interior designers for leadership positions in teaching and research. For information concerning this degree program, refer to pages 68-69.

The faculty in the school also participate in offering the new Ph.D. in Environmental Design and Planning program. For information about the Ph.D. degree program, see pages 190-192.

### E-mail and Web Addresses

E-mail inquiries or requests should be addressed to robert.lee.wolf@asu.edu. Information about the program in Design, and the College of Architecture and Environmental Design in general, may be found on the World Wide Web at [aspin.asu.edu/provider/caed/caedhome.html](http://aspin.asu.edu/provider/caed/caedhome.html).

### Research Activity

Faculty in industrial design and interior design are involved in the following areas of research: human factors, material design, computer-assisted design, lighting and acoustical design, facilities planning and management, design history, methodology, theory, and criticism. The College of Architecture

and Environmental Design maintains a high-bay research facility, a lighting laboratory, a human factors laboratory, an extensive shop facility, as well as a state-of-the-art material resource center. The college's Research and Service Foundation provides facilities for basic research and community service activities in energy technology, design, and planning.

## DESIGN

### DSC 412 History of Decorative Arts in Interiors. (3) F

The design of decorative arts as an expression of cultural influences and as an extension of interior spaces. Prerequisite: DSC 311 or instructor approval. *General studies: HU.*

### 413 History of Textiles in Interior Design. (3) S

Cultural and historical expression of textiles as related to interiors. May include field trips. Prerequisite: DSC 412 or instructor approval.

### 422 Facilities Planning and Management I. (3) F

The facility management process in large-scale organizations. Planning, long-range forecasting, and productivity. Project management methodologies using micro-based software programs. Prerequisite: senior standing.

### 423 Facilities Planning and Management II. (3) S

The formation of facilities policies, procedures, and standards. The facilities database, space allocations, and management process. Evaluation of programming criteria. Prerequisites: DSC 422; senior standing.

### 442 Specifications and Documents for Interiors. (3) F

Contract specifications, documents, schedules, and bidding procedures for interior design. Prerequisites: DSC 341, 365. *General studies: L2.*

**457 Acoustics for Interior Design.** (3) F Physical properties of sound. Studies pertaining to sound-absorbing materials, constructions, and room acoustics. Prerequisites: MAT 118; PHY 111, 113; senior standing.

**458 Lighting for Interior Design.** (3) S Light as an aspect of interior design. Evaluation of light sources for distribution, color, and cost. Prerequisite: senior standing.

### 460 Design Project I. (5) F

Complete analysis of the product unit as an element of mass production, featuring marketing, technology, human factors, and visual design. Emphasis on professional standards. 10 hours studio. Prerequisites: DSC 361, 484.

### 461 Design Project II. (5) S

Product design, with emphasis in systems interaction. Culmination of design process and technique. Individual project direction is encouraged. 10 hours studio. Prerequisite: DSC 361.

### 466 Interior Design Studio V. (5) F

Advanced interior design problem solving, design theory, and criticism. Thesis project development based upon the major's concentration. 10 hours studio. Prerequisite: department approval.

### 467 Interior Design Studio VI. (5) S

Advanced series of specialized projects or continuation of thesis project based upon the major's concentration. 10 hours studio. Prerequisite: department approval.

### 474 Design Seminar. (3) S

Manufacturer's liability, statutes, regulations, and common law rules; role of expert witnesses; insurance and product safety programs. Seminar. Prerequisites: senior standing.

### 520 Contemporary Design Issues. (3) F, S

Projected applications in design production, planning, and decision-making processes. Lecture, seminar. Prerequisites: DSC 310 and 311 or equivalents.

### 524 Illumination and Acoustics. (3) N

Research and laboratory investigation of advanced illumination and acoustics issues of facility design. Emphasis on human factors and performance aspects. Prerequisites: DSC 457 and 458 or equivalents.

### 525 Design Methodologies. (3) F

Practical exercises and studies in problem-solving strategies; problem definition and supporting theory for the designer. Lectures, seminars, lab. Prerequisite: senior or graduate standing.

### 527 Modern Design Theory. (3) S

Aesthetic, political, economic, and social theories that have shaped modern design; theory as the basis for design philosophies. Lectures, seminars. Prerequisite: DSC 525 or equivalent.

### 529 Design Criticism. (3) F

Critical methods applied to design as material culture and human expression; evaluation of achievement versus intention. Lecture, seminar. Prerequisite: DSC 527 or equivalent.

### 544 Human Factors Systems and Documentation. (3) F

Advanced topics associated with theory and methods of human factors in design. Individual projects stressing problem organization, evaluation, and documentation. Lectures, seminars, lab. Prerequisite: DSC 344 or equivalent.

### 552 Computer Simulation in Design. (3) F

The use of computer graphics as a medium to develop and present images of the environment for analysis and perception. Lecture, lab. Prerequisite: senior or graduate standing.

### 553 Computer Imaging and Visual Perception. (3) S

Issues and applications of computer simulation as a tool for describing and testing human interface with the environment. Lecture, lab. Prerequisite: senior or graduate standing.

### 558 Daylighting. (3) N

Daylighting as a design determinant; concepts, techniques, methodology, experiments, and case studies. Lecture, studio. Prerequisite: senior or graduate standing.

### 580 Practicum: Methods of Teaching Design. (3) F

Background and development of design education theories. Concepts of studio teaching methods. Comprehensive student project development and evaluation methods. Prerequisite: graduate standing.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Economics

Arthur E. Blakemore

Chair

(BAC 659) 602/965-3531

### PROFESSORS

BLAKEMORE, BOYES, BRADA, BURGESS, DeSERPA, FAITH, GOODING, HOFFMAN, HOGAN, KINGSTON, KNOX, LOW, McDOWELL, McPETERS, MELVIN, MÉNDEZ, ORMISTON, SCHLAGENHAUF, SMITH

**ASSOCIATE PROFESSORS**  
REFFETT, SCHLEE, WINKELMAN

**ASSISTANT PROFESSORS**

AHN, DATTA

**LECTURER**

ROBERTS

**PROFESSORS EMERITI**

COCHRAN, JACKSON, LOWE, PLANTZ

The faculty in the Department of Economics, College of Business, offer programs leading to the Master of Science and the Doctor of Philosophy degrees with a major in Economics. The faculty also participate in offering the professional program leading to the Master of Business Administration and the program leading to the Doctor of Philosophy degree with a major in Business Administration. For information concerning these degrees, refer to pages 58-59 and 137-138. Further information concerning the degree programs in economics can be obtained from the Director of Graduate Programs, Department of Economics.

**Admission.** See the general requirements for admission to the Graduate College on pages 44-46. In addition, each applicant to either graduate program must submit three letters of recommendation from academic sources and test scores for the general aptitude portion of the Graduate Record Examination (GRE). Submission of scores from the GRE advanced test in economics is recommended. Applications should be received at the Department of Economics by March 1 if the student is seeking a graduate assistantship.

Students are expected to have demonstrated competency in economics at a minimum level through ECN 313 and 314 and in mathematics through MAT 271. Passing grades in the equivalents of these courses taken at other colleges are accepted as a demonstration of competency. Additional courses in calculus, linear algebra, and statistics are recommended before the first semester in the program.

Students with inadequate undergraduate preparation in economics or mathematics may be required to remove deficiencies before enrolling in graduate courses.

### FIELDS OF STUDY

Graduate students may choose from among eight fields of study: comparative economic systems, econometrics, health economics, industrial organization, international economics, labor economics, macroeconomics, and public economics. The comparative economic systems field examines the philosophical and economic foundations of a variety of major economic systems in terms of theory and policy. Course work focuses on comparison of alternative institutions and system components of contemporary economies and their patterns of evolution. The goal of the econometrics field is to provide students with the tools needed to empirically assess economic models using data obtained from observation of real world phenomena. Course work emphasizes applications as well as theory. The intent of the health economics field is to provide students with the tools needed to assess and critique the concepts, structures, functions and values that characterize contemporary health care systems. Course work focuses on the economics of production and distribution of health care services, with special emphasis on the impact of regulation, competition, and economic incentives. The field of industrial organization is concerned with the theory and empirical evidence concerning the organization of firms and industries. Topics include the "law and economics" of monopoly, collusion, business pricing and marketing practices, corporate control, mergers and acquisitions. The international economics field examines both the theoretical and empirical literature associated with the determinants of comparative advantage, trade patterns and commercial policy effects on such patterns, the determi-

nants of exchange rates and international financial flows, and effects of international linkages on the domestic economy. The labor economics field includes the study of labor force participation, unemployment, the role and effect of education and other personal variables on earnings, geographical and inter-firm earning differentials, the demand for labor, discrimination, the role and economic effects of unions, personnel practices and policies, and similar topics. The intent of the macroeconomic field is to provide the student with tools needed to assess both theoretically and empirically modern macroeconomic models. Public economics is concerned with the positive and normative study of government's effect on the economy. Course work focuses on evaluating the economic consequences of government policies and on the application of economics to political science. See the Department of Economics Graduate Student Handbook for specific field requirements.

### MASTER OF SCIENCE DEGREE

The master of science degree program is designed to provide broad training in economics. The purpose is to equip the student with sufficient knowledge of economic analysis and techniques to undertake supervised research positions, to teach in two-year colleges, to assume business or government positions, or to undertake the more intensive and specialized work leading to the Ph.D. or J.D. degree.

**Program of Study.** See pages 53-55 for general requirements. See the Department of Economics Graduate Student Handbook for specific requirements.

**Course Load.** Students are limited to 15 semester hours per semester.

**Foreign Language Requirements.** None.

**Thesis Requirements.** Students have the option of a nonthesis or thesis track. For the nonthesis track, students are required to conduct an applied research project under the supervision of a faculty member. The applied research project often is conducted in conjunction with an internship, and three hours of credit is granted for the project. For the thesis option, six semester hours of credit is granted for completion of the thesis.

**Final Examinations.** A final oral examination in defense of the thesis or applied research project is required.

### DOCTOR OF PHILOSOPHY DEGREE

The Ph.D. degree program is designed to provide the student with a more fundamental command of basic economic analysis and of the subject matter in several specialized fields. It is designed to qualify students for teaching at four-year institutions of higher education and for research positions in public agencies and private business organizations.

**Program of Study.** See pages 76-77 for general requirements. In addition to completing 60 hours of credit beyond the bachelor's degree (30 hours beyond the master's degree) and 24 hours research dissertation credit, the Ph.D. student must accomplish five tasks:

1. meet qualification requirement;
2. present at least two fields of study;
3. pass the comprehensive examination;
4. pass the dissertation proposal defense; and
5. complete a dissertation with an oral defense.

See the department of Economics Graduate Student Handbook for details concerning these tasks.

**Qualifying Examinations.** The student must demonstrate proficiency in economic theory and application by passing both the microeconomic and macroeconomic qualifying examinations. These examinations are given at the beginning of the fall semester of the second year of graduate study. The student must demonstrate proficiency in statistical and econometric analysis by passing ECN 525 and ECN 526.

**Fields of Study.** Students are required to present at least one primary field and one secondary field for the Ph.D. The primary field must be the one in which the comprehensive examination is taken; usually this is the field in which dissertation work is contemplated.

**Comprehensive Examination.** The comprehensive examination consists of a written research paper, a written examination, and an oral examination. The research paper consists of both a general and detailed literature review of the dissertation area as well as a de-



scription of the proposed dissertation topic. The written examination consists of questions designed to test the student's knowledge of the proposed research area. Examination questions are designed to cause the student to examine the research topic in considerable depth and breadth. The oral examination consists of questions designed to test the student's knowledge of the proposed research area. Examination questions are designed to expand on the written examination as well as to provide guidance on the dissertation research.

**Dissertation Proposal Defense.** Students prepare a preliminary draft of the dissertation proposal before taking the comprehensive examination. Upon passing the comprehensive examination, students submit a revised dissertation proposal to their supervisory committee that formalizes the research agenda and incorporates the supervisory committee's suggestions. The dissertation proposal must be defended orally.

**Admission to Candidacy.** The student should apply promptly for admission to candidacy after passing the comprehensive field examination, oral examination, and the dissertation proposal defense.

**Dissertation Requirements.** A dissertation representing original research work of high quality, demonstrating the student's proficiency in the field, is required.

**Foreign Language Requirements.** None.

**Final Examinations.** An oral examination in defense of the dissertation is required.

### Research Activity

There is a strong commitment to professional research in the Department of Economics. Faculty are actively engaged in both applied and theoretical research in a variety of areas. Topics of recently published research include: optimal labor contracts and involuntary unemployment; efficient estimation with dynamic panel data; the effects of restructuring and privatization in Central and Eastern Europe; unemployment insurance programs; the economics of mob goods; the stability of long-run money demand; an empirical methodology for cointegrated systems; job

search; labor market consequences of U.S. immigration; volatility in foreign exchange markets; equity control of multinational firms by less developed countries; optimal portfolios; the demand for insurance and insurable assets; wage uncertainty and competitive equilibrium in labor markets; exchange rate dynamics; real business cycle analysis; strategic information manipulation in duopolies; non-expected utility theory; comparative statics under uncertainty; the value of information in alternative economic environments; and an empirical examination of organization structure.

Research tools at ASU are excellent. The Hayden Library holds an extensive collection of works in economics and related areas. The Noble Science and Engineering Library is a designated U.S. Patent Depository. ASU has computer facilities that provide exceptional support for processing empirical research. A remote site terminal for both batch processing and time sharing is located in the College of Business.

## ECONOMICS

**ECN 436 International Trade Theory.** (3) A The comparative-advantage doctrine, including practices under varying commercial policy approaches. The economic impact of international disequilibrium. Prerequisite: ECN 314 or instructor approval. *General Studies: SB, G.*

**438 International Monetary Economics.** (3) A History, theory, and policy of international monetary economics. Balance of payments and exchange rates. International financial markets including Eurocurrency markets. Prerequisite: ECN 313 or instructor approval. *General Studies: SB, G.*

**441 Public Finance.** (3) A Public goods, externalities, voting models, public expenditures, taxation, and budget formation with emphasis on the federal government. Prerequisite: ECN 314 or instructor approval. *General Studies: L2/SB.*

**453 Government and Business.** (3) A Development of public policies toward business. Antitrust activity. Economic effects of government policies. Prerequisite: ECN 314 or instructor approval.

**480 Introduction to Econometrics.** (3) A Elements of regression analysis: estimation, hypothesis tests, prediction. Emphasis is on use of econometric results in assessment of economic theories. Prerequisite: instructor approval. *General Studies: N2.*

**498 Pro-Seminar.** (3) A Topic chosen from current area of interest. Prerequisites: ECN 313 and 314 or instructor approval.

**502 Managerial Economics.** (3) F, S Application of microeconomic analysis to managerial decision-making in areas of demand, production, cost, and pricing. Evaluation of competitive strategies. Prerequisite: MBA degree program student.

**504 History of Economic Thought.** (3) S Historical development of economic theory. Emphasis on the development of economic analysis from preclassical economics through Keynes. Prerequisite: ECN 510 or instructor approval.

**509 Macroeconomic Theory and Applications.** (3) F Theory of income, output, employment, and price level. Influence on business and economic environment. Prerequisites: ECN 111 and calculus or instructor approval.

**510 Microeconomic Theory and Applications.** (3) F, S Application of economic theory to production, consumer demand, exchange, and pricing in a market economy. Prerequisites: ECN 112 and calculus or instructor approval.

**511 Macroeconomic Analysis I.** (3) F Current theories of output, employment, inflation, and asset prices as well as major aggregates. Introduction to dynamic optimization techniques. Prerequisites: ECN 313 and calculus or instructor approval.

**512 Microeconomic Analysis I.** (3) F Theory of production, consumer demand, resource use, and pricing in a market economy. Prerequisites: ECN 314 and calculus or instructor approval.

**513 Macroeconomic Analysis II.** (3) F Focus on growth theory, dynamic general equilibrium models, monetary theory, open-economy issues. Prerequisite: ECN 511 or instructor approval.

**514 Microeconomic Analysis II.** (3) S General equilibrium, welfare economics, production, and capital theory. Prerequisite: ECN 512 or instructor approval.

**515 Advanced Macroeconomic Analysis.** (3) F Focus on current research areas in macroeconomics and monetary theory with emphasis on methods in economic dynamics and numerical techniques. Prerequisite: ECN 511 or instructor approval.

**516 Economics of Uncertainty, Information, and Strategic Behavior.** (3) F Economic behavior under uncertainty; markets and contracts under asymmetric information; the theory of games with incomplete information and applications. Prerequisite: ECN 512 or instructor approval.

**517 Monetary Theory.** (3) F Traditional and post-Keynesian monetary theory, interest rate determination, the demand and supply of money. Prerequisite: ECN 511 or instructor approval.

**521 Labor Economics I.** (3) F Development of basic theoretical models for analyzing labor market issues. Prerequisite: ECN 510 or instructor approval.

**522 Labor Economics II.** (3) N Extensions/criticisms of labor market theories. Applications to a variety of policy issues. Prerequisite: ECN 521.

**525 Econometrics I.** (3) S Problems in the formulation of econometric models. Emphasis on estimation, hypothesis testing, and forecast of general linear models. Prerequisite: 6 hours of statistics or instructor approval.

**526 Econometrics II.** (3) F Estimation and inference of qualitative and limited dependent variable models as well as general multiple equation models. Prerequisite: ECN 525 or instructor approval.



**527 Econometrics III. (3) S**

Generalized method of moment estimation, estimation with censored and truncated samples, nonlinear models, panel-data models, econometrics of nonstationarities. Prerequisite: ECN 526 or instructor approval.

**531 Comparative Economic Systems. (3) F**

Philosophical foundations of major economic systems and of properties of principal system models. Comparison of alternative institutions and system components of contemporary economies. Prerequisites: ECN 509, 510 or instructor approval.

**536 International Trade Theory. (3) S**

Theories of comparative advantage and their empirical verification. Theory and political economy of commercial policy. Resource transfers and the role of the multinational corporation. Prerequisites: ECN 509, 510 or instructor approval.

**538 International Monetary Theory and Policy. (3) F**

The foreign exchange market, balance of payments, and international financial institutions and arrangements; theory and applications. Prerequisites: ECN 509, 510 or instructor approval.

**541 Public Economics. (3) S**

Economics of collective action, public spending, taxation, and politics. Impact of central governmental activity on resource allocation and income distribution. Prerequisite: ECN 510 or instructor approval.

**553 Industrial Organization. (3) S**

Analysis of structure, conduct, and performance in industrial markets; the economics of organizations. Prerequisite: ECN 510 or instructor approval.

**560 Economics of Growth and Development. (3) F**

Economic problems, issues, and policy decisions facing the developing nations of the world. Prerequisites: ECN 509, 510 or instructor approval.

**584 Economics Internship. (1-3) SS**

Academic credit for professional work organized through the Internship Program. Prerequisites: ECN 510, 511 or instructor approval.

**585 Mathematics for Economists. (3) F**

Survey of mathematical ideas encountered in economics and econometrics: nonlinear programming, the Kuhn-Tucker theorem, concave programming, optimization over time. Prerequisite: calculus or instructor approval.

**591 Economics Seminar. (1-3) F, S, SS**

Presentations by outside speakers, department faculty, and graduate students of work in progress. Prerequisite: instructor approval.

**593 Applied Projects. (3) F**

Preparation of a supervised applied project typically in conjunction with an internship. Prerequisites: ECN 510, 511.

**594 Conference and Workshop in Economics. (1-2) F, S, SS**

Topics such as the following are offered:

- (a) **Mathematical Statistics Workshop. (1) S**  
Introduction to statistic principles of estimation and hypothesis testing. Prerequisite: ECN 485 or instructor approval.
- (b) **Econometrics Time-Series Workshop. (1) S**  
Extension of the analysis of cointegrated systems to include issues of identification and inference in structural VAR models. Corequisite: ECN 527 or instructor approval.

**(c) Econometrics Cross-Section Workshop. (1) S**

Issues in the analysis of specific models such as double-selection and panel-data models. Corequisite: ECN 527 or instructor approval.

**(d) Microeconomic Topics Workshop. (1-3) SS**

Issues in microeconomic theory. Prerequisite: ECN 514 or instructor approval.

**(e) Macroeconomic Topics Workshop. (1-3) SS**

Issues in macroeconomic theory. Prerequisite: ECN 513 or instructor approval.

**598 Special Topics. (3) N**

Advanced topics in economics. Consult *Schedule of Classes* for offerings. Prerequisite: instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Education Core Courses

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The core courses for the College of Education graduate programs carry the prefix "COE." These courses are no longer required for all graduate majors in the College of Education. Contact the appropriate division to obtain specific core requirements.

### COLLEGE OF EDUCATION

**COE 501 Introduction to Research and Evaluation in Education. (3) F, S, SS**

Overview of educational inquiry from controlled, quantitative to qualitative, naturalistic. Emphasis on locating and critically interpreting published research.

**502 Introduction to Quantitative Methods. (3) F, S, SS**

Topics in statistical analysis, measurement, and research design. Exploratory data analysis, estimation theory, and statistical inference. Use of computers for data analysis. Cross-listed as EDP 502.

**503 Introduction to Qualitative Research. (3) F, S, SS**

Terminology, historical development, approaches (including ethnography, ethnomethodology, critical theory, grounded theory, and hermeneutics), and qualitative versus quantitative social sciences; methods of inquiry. Cross-listed as EDP 503.

**504 Learning and Instruction. (3) F, S, SS**

Introduction to psychology of learning and instruction. Includes the foundations of learning theories and their application to educational practice. Cross-listed as EDP 504.

**505 American Education System. (3) F, S, SS**

Political, social, historical, and philosophical analyses of American education at all levels. Examination of primary sources, legal findings, and case studies.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Educational Administration and Supervision

**Thomas H. Metos**  
*Program Coordinator*  
(ED 107D) 602/965-4673

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**PROFESSORS**

APPLETON, GLASS, METOS,  
NORTON, SMITH, STOUT,  
TIPPECONNIC, WEBB

**ASSOCIATE PROFESSORS**

CASANOVA, HARTWELL-HUNNICUTT,  
LEVAN, NOLEY

**ASSISTANT PROFESSORS**

MARGOLIS, PENA

The faculty in the Division of Educational Leadership and Policy Studies offer graduate programs leading to the Master of Arts, Master of Education, and Doctor of Education degrees with a major in Educational Administration and Supervision. Students interested in the Doctor of Philosophy degree with a field of study encompassing educational administration should refer to the major Educational Leadership and Policy Studies, described on pages 177-178.

Applicants for admission to the M.A. or doctoral degree programs must submit scores on the Graduate Record Examination. Applicants for admission to the M.Ed. degree program must submit scores on either the Graduate Record Examination or the Miller Analogies Test; scores on the Graduate Record Examination are preferred. A minimum of 36 hours is required for the M.Ed. degree.

Candidates for all degrees must pass a written comprehensive examination. An oral comprehensive examination is also required for M.A. candidates. An oral examination over the written portion of the comprehensive examination may be required of Ed.D. candidates at the discretion of the student's program committee. In addition, candidates for the Ed.D. must pass a final oral examination in defense of the dissertation. Candidates for the M.A., M.Ed., and Ed.D. programs may be required to take certain College of Education core courses depending upon previous experience and education. Pre-approval by an advisor is required. The core courses are COE 501, 502, 503, 504, and 505.

See page 176 under the "Education Core Courses" for listing. A set of research courses is required for the Ed.D. degree.

**Research Activity**

Faculty research includes the study of: economics and financing of education, competency performance, administrator preparation, roles and characteristics of school administrators, educational demographics, equity in leadership, administrative decision processes, evaluation of teaching performance, evaluation of administrative performance, community education, effects of legislative budget limitations, personnel administration communications, alternative school programs, policy formation, and planning and school board problems. Students have the opportunity to work on research projects in the College of Education and in school districts and educational agencies throughout the state. The division is a member of the University Council for Educational Administration.

**EDUCATIONAL ADMINISTRATION AND SUPERVISION**

**EDA 501 Competency/Performance in Educational Administration.** (3) F, SS  
The nature of educational administration and the concept of competency as it applies to educational administration.

**507 Computers in Educational Administration.** (3) F, S  
Survey of computer use and applications in educational administration. Lecture, lab. Cross-listed as EMC 507.

**510 Introduction to Organization and Administration of American Public Schools.** (3) F, S  
Organizational structure and administration of public education are explored through the application of legal and ethical concepts and relevant information of the social sciences. Cross-listed as SPF 510.

**511 School Law.** (3) S  
Constitutional, statutory, and case law that relates to all school personnel, pupils, the school district, and other governmental units. Contracts, dismissals, tenure, retirement, pupil injuries, liability of personnel and district, school district boundary changes, and bonding.

**521 Evaluation of Teaching Performance.** (3) F  
In-depth analysis of legal basis of teacher appraisal, teacher competency, measurement of teacher performance, and application of performance appraisal systems. Prerequisite: COE 504.

**524 Theory and Application of Educational Administration.** (3) F, SS  
History and development of public school administration in the United States; current organizational patterns for public education at lo-

cal, intermediate, state, and national levels; current theoretical positions in educational administration.

**525 Human Relations and Societal Factors in Education.** (3) N  
Interrelations between problems of educational administration and interdisciplinary social sciences. Communications skills, morale, authority, and perception. Concepts from political science, economics, and social-psychology useful to the administrator.

**526 Instructional Supervision.** (3) F, S, SS  
Administering curriculum improvement, in-service education, evaluating, and improving teaching competence; administrative instructional responsibilities.

**527 Managerial Functions in School Administration.** (3) N  
Relates to the work of the central district office staff and the school principal. Use of human resources, educational planning, and organization and management of time.

**538 Administration of the Community School.** (3) N  
Philosophy, history, organization, and operation of the community-centered school. Introduction of the community education concept into a school system and making it operational.

**544 Public School Finance.** (3) F  
Measures of ability, efforts, and educational need; capital outlay funding; tax revenues; federal, state, and local financing alternatives; major issues and trends in the financing of public education.

**548 Community Relations in Education.** (3) N  
Administrative factors of primary importance in developing community involvement in public schools. Emphasis on theory and skill of school system and individual communication.

**555 Educational Facility Planning.** (3) N  
School building needs, educational planning for facilities, responsibilities of architects, duties of contractors, and equipping and furnishing of school buildings.

**571 School Business Management.** (3) F, S, SS  
Purchasing, budgeting, accounting, payroll management, auditing, financial reporting, insurance, and administration of nonteaching personnel and services.

**573 School Personnel Administration.** (3) S  
Organization for personnel services; development of policy to govern selection, orientation, placement, remuneration, transfers, separations, and development of morale among instructional and noninstructional personnel.

**576 The School Principalship.** (3) F  
Problem and laboratory approaches used to provide application of administrative activities of elementary and secondary schools. Prerequisites: EDA 501, 526.

**634 Instructional Leadership.** (3) N  
Curricular practices and processes used by instructional leaders who plan, organize, and coordinate the professional activities in elementary and secondary schools. Prerequisite: EDA 526.

**675 Politics of Education.** (3) S  
Social science theory and research are used to consider the political context of educational policy making. Prerequisite: COE 505.

**676 The School Superintendency.** (3) S  
Critical examination of the school superintendency and the primary functions of this educational position. The duties, responsibilities, activities, and problems of the school superintendent are included. The unique leadership role of the school superintendent is examined. Prerequisite: instructor approval.

**679 Administration of Special Programs in Education.** (1-3) N  
For personnel administering special educational services; responsibilities of superintendents, principals, supervisors, and directors for special education, student personnel, audiovisual, library science, and others.

**711 Administrative Leadership.** (3) F  
Emphasis on research in leadership; application of research findings to administrative and supervisory functions in educational endeavors. Prerequisites: EDA 524; 30 semester hours in educational administration; admission to doctoral program.

**722 Administration of Instructional Improvement.** (3) S  
Recent research relating to administrative and supervisory responsibilities for the improvement of the educational program. Effective processes by administrators, supervisors, consultants, and coordinators. Prerequisites: 30 semester hours in educational administration; admission to doctoral program.

**733 Administrative Management.** (3) S  
Recent research relating to school management. School finance, law, buildings, transportation, food services, and supply management. Prerequisites: EDA 527, 544, 571; 30 semester hours in educational administration; admission to doctoral program.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**Educational Leadership and Policy Studies**

Mary Lee Smith  
Program Coordinator  
(ED 104) 602/965-6357

**REGENTS' PROFESSOR  
BERLINER**

**PROFESSORS**

APPLETON, FENSKE, GLASS,  
METOS, NORTON, PADILLA, RENDÓN,  
RICHARDSON, SMITH, STOUT, WEBB

**ASSOCIATE PROFESSORS**

CASANOVA, HARTWELL-HUNNICUTT,  
LEVAN, NOLEY

The faculty in the Division of Educational Leadership and Policy Studies offer a Doctor of Philosophy degree with an interdisciplinary approach to complex problems of educational policy and leadership. It brings together scholarly interests found in educational administration, higher education, and social and

philosophical foundations of education. Emphasis is placed upon critical thought, theories and practice within political, demographic, historical, sociocultural, and intellectual contexts in the United States and other nations. The purpose of the program is to develop educational researchers, policy analysts, and leaders for careers in schools, colleges, universities, and government and private agencies.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

**Admission.** In addition to meeting Graduate College minimum requirements, applicants must submit scores on the Graduate Record Examination, a statement of intent, a résumé, and three letters of recommendation. The admission committee meets in early April. All required materials must be in the division office in early March to assure review. Students entering the program must have a bachelor's or master's degree in either education or an appropriate subject field (e.g., anthropology, economics, history, philosophy, and sociology), or additional courses are required in the areas of deficiency before admission to the program.

**Program Committee.** The program committee (chair and at least two other members) advises in the preparation of the program of study and administers the comprehensive examinations. The committee must be approved by the dean of the Graduate College.

**Dissertation Committee.** After passing the comprehensive examination, a dissertation committee is formed upon the approval of the dean of the Graduate College. The dissertation committee approves the subject and title of the dissertation. Members of the program committee may also serve as members of the dissertation committee; however, the committees may have different memberships. The dissertation chair must be a faculty member designated eligible to serve in this capacity by the dean of the Graduate College.

**Program of Study.** Students entering the Ph.D. program are expected to meet the requirement of an 84-semester-hour program of study (including the semester hours transferred from the master's degree in a related discipline). A typical program of study is as follows.

**College of Education Core.** Candidates for the Ph.D. program may be required to take certain College of Education core courses depending upon previous experience and education. Pre-approval by an advisor is required.

**Policy Studies Foundation.** At the heart of the Ph.D. program are 12 semester hours of course work in education policy. During the students' first year in the program, they must take a two-semester sequence, SPF 791 Pro-Seminars I and II in educational policy studies. They must take a three-semester hour course in SPF 691 S: Evaluation Theory some time early in their program. The three-semester hour course EDA 675 Politics of Education is required.

**Advanced Research Methods.** Students must complete a minimum of nine semester hours of research methods, including three hours of SPF 691 Seminar: Economics of Education beyond the core courses. Courses satisfying this requirement can be taken outside the College of Education curricula with the committee chair's approval. The courses taken deepen the student's research emphasis, whether it be qualitative or quantitative.

**Specialty Studies.** Each student completes 12 semester hours of course work in an area of special interest. This course work represents added depth in the specialty in which the student plans to practice as a scholar, administrator, or policy analyst. These courses are normally selected from those offered within the division.

**Practicum.** Students must earn three semester hours of credit for a supervised practicum. This work is planned in conjunction with the student's committee chair and involves applied work in a practical setting relating to the student's intended postdoctoral position.

**Research and Dissertation.** Each Ph.D. candidate is required to complete a minimum of 24 semester hours of research and dissertation.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** The examination centers on the professional focus and the cognate study and must be passed before admission to candidacy. A written examination is required; an oral examination over the written portion may be required at the discretion of the student's program committee.

**Dissertation Precis and Proposal.** The precis is a 15-page summary of the dissertation research proposed by the student. Upon approval of the precis by the dissertation committee, the student proceeds with developing a dissertation proposal.

**Research and Dissertation.** Twenty-four semester hours of research and dissertation credit are required. The dissertation must consist of a fully documented written study demonstrating a high level of research competence and scholarship in the student's area of professional focus. The dissertation should make an original contribution to knowledge in the area of educational leadership and policy studies and be worthy of publication by an established press as a book or monograph or as one or more articles in a refereed, scholarly journal.

**Final Examinations.** A final oral examination in defense of the dissertation is required.

### Research Activity

Faculty research focuses on issues in education from preschool to higher education, such as: culture, language, and the schools; access to education by women and ethnic minorities; financing public education; the role of educational leaders; the schools' use of technology. The approach is interdisciplinary since problems in education are illuminated by all of the social and behavioral sciences as well as the humanities. Research techniques include both quantitative and qualitative methods.

## Educational Media and Computers

Gary G. Bitter  
Program Coordinator  
(EDB 146) 602/965-7192

**PROFESSORS**  
BITTER, McISAAC

**ASSOCIATE PROFESSORS**  
RADER, WILSON

**ASSISTANT PROFESSORS**  
FLEMISTER, KINARD

**PROFESSOR EMERITUS**  
SATTERTHWAITE

The faculty in the Division of Curriculum and Instruction offer a graduate program in Educational Media and Computers leading to the Master of Education degree. This program emphasizes the use of media and computers in education. Students study the design, production, selection, utilization, and evaluation of instructional programs. Students may also select an area of concentration in business education.

A concentration in educational media and computers is offered through the interdisciplinary Doctor of Philosophy degree program in Curriculum and Instruction. See pages 167-169 for more information about the Ph.D. in Curriculum and Instruction.

The graduate program prepares students to work with a wide range of media and computers in schools and in business training programs. Potential employment opportunities for graduates include positions as media specialists, computer coordinators, and computer education instructors in schools and universities. Graduates are also prepared to design multimedia training materials and computer-based training programs for business and industry.

In addition to meeting minimum Graduate College requirements for master's degree admission, each applicant must provide (1) Graduate Record Examination (GRE) verbal test scores, Miller Analogies Test (MAT) scores, or Test of English as a Foreign Language

(TOEFL) scores (for international students) and (2) a statement of professional goals.

A minimum of 33 hours is required in the master's degree program. Each master's degree candidate in Educational Media and Computers produces and orally defends an instructional unit.

For information on course work pertaining to media and computers, contact the program coordinator (EDB 146).

### Research Activity

The faculty in educational media and computers maintain an active program of research and development that has been supported by funds from federal agencies, private corporations, and the university. General research areas include (1) the design of effective multimedia and computer-based instruction and (2) the effective utilization of multimedia and computers in schools. Students participate in research and development activities as an integral part of their degree programs.

### BUSINESS EDUCATION

**BUE 480 Teaching Business Subjects.** (3) S

Organization and presentation of appropriate content for business subjects in the secondary school.

**501 Principles of Business Education.** (3) F  
History, philosophy, principles, and objectives of business and distributive education.

**502 Organization and Management of Co-operative Programs.** (3) F  
Work-study programs for business occupations in high schools and community colleges.

**503 Competency-Based Business and Vocational Education.** (3) S  
Development and administration of competency-based individualized programs in business and vocational education.

**505 Current Literature in Business and Vocational Education.** (3) S  
Critical analyses, generalizations, and trends in business and vocational education.

**506 Information Processing for Business and Vocational Teachers.** (3) SS  
Development of curriculum and strategies for teaching information processing; hardware/software evaluation and equipment acquisition techniques in business and vocational education.

**512 Technology in Business and Vocational Education.** (3) SS  
Emerging curricula and instructional technology in business and vocational education.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### EDUCATIONAL MEDIA AND COMPUTERS

**EMC 405 Presentation Technology for Multimedia.** (3) F

An exploration of multimedia hardware and software used in creating presentations for educational, corporate, and commercial applications.

**406 Computer Graphics and Animation.** (3) S

The study and application of design and animation techniques for use in video or computer-based presentations.

**455 Animation and Special Effects.** (3) F  
An examination of the art, science, and impact of animation and other special effects used in film.

**503 Current Issues and Problems in Media/Computer Education.** (3) F, S

Introduction to current theory and practice in instructional media and computers. Overview of production areas.

**505 Presentation Techniques for Multimedia.** (3) F

An exploration of multimedia hardware and software used in creating presentations for educational, corporate, and commercial applications. Lecture, lab.

**506 Computer Graphics and Animation.** (3) S

The study and application of design and animation techniques for use in video or computer-based presentations. Lecture, lab.

**507 Computers in Educational Administration.** (3) F, S

Survey of computer use and applications in educational administration. Lecture, lab. Cross-listed as EDA 507.

**511 Computer Applications in Education.** (3) F, SS

Use and evaluation of computers for word processing, information management, graphics, and authoring instruction in educational settings.

**513 Introduction to Multimedia.** (3) F  
Introduction to multimedia, emphasizing applications for business, industry, and public and higher education.

**521 Instructional Media Design.** (3) F, S  
Preparing specifications for instructional television, film, slide/tape programs, and computer-based instruction. CD-ROM. Prerequisite: EMC 511 or instructor approval.

**522 Evaluating Computer Materials.** (3) S, SS

Selection, utilization, design, and evaluation of instructional computer material. Focus on learning theory, criteria for evaluating educational software. Prerequisite: EMC 521 or instructor approval.

**523 Telecommunication for Instruction.** (3) F

Introduction to Internet resources for educators. Instructional applications of distance-learning technologies.

**524 Imaging Technology.** (3) F

Use of optical scanning and digital data manipulation of photographs for use in educational presentations and publications.

**525 Presentation Graphics.** (3) S

Design, production, and display of computer graphics for group presentations. Prerequisite: EMC 521 or instructor approval.

**527 Instructional Television.** (3) F

Design and production of instructional programs for television. Lecture, lab. Prerequisite: EMC 521 or instructor approval.

**528 Photomedia Production.** (3) S

Design and production of multimedia programs. Emphasis on slide/tape format. Prerequisites: EMC 521 and 524 and 525 or instructor approval.

**530 Development of Computer-Based Instruction.** (3) S

The systematic design, development, and formative evaluation of computer-based instruction. Prerequisite: EMC 511 or instructor approval.

**531 Hypermedia.** (3) F

The application of HyperCard and other support software in the design and production of instructional computer-based material for business, industry, and public and higher education. Lecture, lab.

**532 Desktop Publishing.** (3) F, SS

Design and production of educational materials using computer-based word processing, graphics, and page layout programs. Lecture, lab.

**535 Interactive Video.** (3) S

The use of various authoring systems and support programs to assist in the design and production of regular and repurposed interactive video. Lecture, lab.

**584 Educational Media Internship.** (1-6) F, S, SS

Prerequisites: EMC 521; LNT 502; instructor approval.

**637 Computers in Elementary School Curriculum.** (3) SS

Experiences with educational uses of computers; computer awareness, family/societal impact, classroom applications/software, and curriculum development.

**701 Advanced Technologies in Education.** (3) S

Examining the role and impact of artificial intelligence, expert systems, and related advanced technologies in education.

**702 Research in Technology-Based Education.** (3) F

Critical exposure to theories, research, and methods in technology-based education.

**703 Research in Educational Telecommunications.** (3) S

Seminar with emphasis on research in telecommunications and distance education. Prerequisite: EMC 523 or instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Educational Psychology

Gail Hackett

Director

(EDB 301) 602/965-3384

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**REGENTS' PROFESSORS**

BERLINER, KULHAVY

**PROFESSORS**

BARONA, GLASS, GRINDER, HARRIS,  
KERR, KRUS, NELSEN,  
SMITH, STROM

**ASSOCIATE PROFESSORS**

BETZ, MOORE, SANTOS DE BARONA

**ASSISTANT PROFESSORS**

BEHRENS, ROBERTS, STAFFORD

The faculty in the Division of Psychology in Education offer graduate programs leading to the Master of Arts, Master of Education, and Doctor of Philosophy degrees with a major in Educational Psychology. In the Ph.D. program, concentrations are available in: school psychology; measurement, statistics, and methodological studies; and lifespan developmental psychology. The Ph.D. in Educational Psychology with a concentration in school psychology is accredited by the American Psychological Association and the National Association of School Psychologists.

Students applying for admission to any of these programs are required to submit scores on the Graduate Record Examination.

The Master of Education degree program requires 36 semester hours of graduate course work. The Master of Arts degree program requires 30 semester hours of graduate course work, which includes a thesis. All applicants must submit scores of the Graduate Record Examination (GRE). All programs except school psychology (see below) have deadlines of October 15 for receiving all application materials, including test scores, to be considered for admission for the following semester. All degree programs require written comprehensive examinations; doctoral degree programs require a final oral examination as well. Additional information on these degree programs may be obtained from the Division of Psychology in Education.

**School Psychology.** The faculty specializing in school psychology offer a scientist-practitioner program leading to the Doctor of Philosophy degree.

The program provides preparation in academic and professional areas through course work, research, practica, and internship. Graduates are employed in school districts, behavioral health settings serving children and adolescents, and universities. All application materials, including test scores, must be received by January 15 to be considered for admission the following academic year. For more information on the faculty, the programs of study, and admission requirements, applicants should contact the Division of Psychology in Education and request the *School Psychology Program* brochure.

**Research Activity**

Research in methodology includes the development and assessment of theory and techniques of design, statistics, psychometrics, and evaluation. Specific topics include multivariate analysis, personnel and program evaluation, qualitative methodology, and use of computers in instruction and testing.

Research in human development includes studies of critical thinking, moral development and honesty, prejudice, belief systems, authority, social environments of schools, and cultural influences on development.

School psychology research involves assessment of cognitive and academic skills, classroom processes and school cultures, and assessment of minority individuals. Additional research topics in school psychology include cognitive-emotional processes in achievement motivation, cognitive behavioral interventions, and social-cognitive development.

**EDUCATIONAL PSYCHOLOGY****EDP 502 Introduction to Quantitative Methods.** (3) F, S, SS

Topics in statistical analysis, measurement, and research design. Exploratory data analysis, estimation theory, and statistical inference. Use of computers for data analysis. Cross-listed as COE 502.

**503 Introduction to Qualitative Research.** (3) F, S, SS

Terminology, historical development, approaches (including ethnography, ethnomethodology, critical theory, grounded theory, and hermeneutics), and qualitative versus quantitative social sciences; methods of inquiry. Cross-listed as COE 503.

**504 Learning and Instruction.** (3) F, S, SS  
Introduction to psychology of learning and instruction. Includes the foundations of learning theories and their application to educational practice. Cross-listed as COE 504.

**510 Essentials of Classroom Learning.** (3) F, S, SS  
Theoretical and empirical foundations of learning in the classroom milieu. Critical exposure to research and method in instructional psychology. Cross-listed as LNT 510.

**513 Child Development.** (3) F, S, SS  
Examination of problems and achievements experienced by children growing up in a technological society. Emphasis on discovering the child's perspective.

**514 Psychology of the Adolescent.** (3) F, S, SS  
Cognitive, physical, and social development of adolescents in contemporary society. Impact of family, school, and work place on adolescent development. Prerequisite: EDP 310 or PGS 100 or equivalent.

**530 Theoretical Issues and Research in Human Development.** (3) F  
Psychological theories, research, and methods relevant to human development, emphasizing the relations between early development and later performance.

**532 Psychology of Exceptionality.** (3) S  
General psychological theory and experimental research relevant to exceptionality, emphasizing implications for educational programs that recognize unique learner characteristics. Field work.

**534 Principles of Behavior Modification.** (3) F  
Principles of conditioning as applied to behavior modification; current research on the experimental analysis of behavior in educational psychology.

**540 Theoretical Views of Learning.** (3) F, S  
Classical and cognitive theories of learning, plus recent orientations. Illustrative experimental and rational foundations; implications for educational practice. Cross-listed as LNT 540.

**542 The Psychology of Learning and Instruction.** (3) S  
Critical review and evaluation of research on learning variables relevant to acquisition and retention of instructional materials. Lab. Cross-listed as LNT 542.

**543 Psychological Research on Life-Span Development.** (3) S  
Critical review and evaluation of contemporary research on cognitive and affective development across the life span. Prerequisite: EDP 530 or equivalent.

**550 Introduction to Measurement in Education.** (3) F, S  
Nature and types of educational measures. Critiquing and selecting appropriate measuring devices. Constructing measuring devices. Social controversies about tests.

**551 Expository Writing and Research Heuristics.** (3) F  
Weekly writing practice making use of heuristic concepts and expository principles. The construction of rationales for research problems. Logic and coherence in rhetoric. Writing style appropriate to exposition.

**552 Basic Statistical Analysis in Education.** (3) F, S, SS  
Nature of educational data and statistical analysis. Frequency distributions and descriptive indexes. Introduction to hypothesis testing, ANOVA and regression.

**554 Intermediate Statistical Data Analysis in Education.** (3) F, S, SS  
Multiple regression, ANOVA by multiple regression, repeated measures and other designs, covariance analysis, and introduction to MANOVA. Prerequisite: COE 502 or EDP 552 or passing grade on a qualifying exam.

**556 Data Processing Techniques in Measurement and Research.** (3) S  
Advancement of statistical design and measurement skills through development of data-processing techniques and usage of special programs and data-processing programs. Prerequisite: EDP 554.

**560 Individual Intellectual Assessment.** (1-6) F, S  
Experience in administering and interpreting individual tests. Theoretical basis for ability testing, ethical considerations, and diagnostic use of test results. Initial enrollment, 3-hour minimum. Lab experience. Prerequisites: EDP 454 and admission to a program in professional psychology or instructor approval.

**562 School Psychology: Theory and Practice.** (3) F  
Development and present status of school psychology, including an overview of assessment and intervention strategies and professional issues.

**563 Interventions in School Psychology.** (3) F  
Examination of case-based consultation and consultation research relevant to school psychology practice. Field experience. Prerequisite: school psychology program or instructor approval.

**566 Diagnosis of Learning Difficulties.** (3) S  
Clinical diagnosis of learning difficulties, emphasizing specific academic problems. Use and interpretation of diagnostic instruments in practical school situations. Prerequisites: EDP 560 and 562 or equivalents; instructor approval.

**567 School Psychological Services to Minority Students.** (3) S  
Historical perspectives and major issues in psychological and academic assessment and interventions with minority school children.

**568 Organizational Development: School Psychological Perspectives.** (3) F  
Applications of organization development strategies and techniques in facilitating the positive impact of schools on students' learning and social functioning.

**651 Methods and Practices of Qualitative Research.** (3) S  
Advanced course for students familiar with theory and extant work. Topics include data collection, analysis, reporting, and an extensive fieldwork project. Prerequisite: COE 503.

**652 Multivariate Procedures in Data Analysis I.** (3) F  
Multivariate analysis of variance and covariance, multivariate multiple comparison procedures, power analysis and effect size, discriminant analysis, and repeated measures analysis. Prerequisite: EDP 554 or passing score on qualifying exam.

**654 Multivariate Procedures in Data Analysis II.** (3) S  
Multivariate multiple regression, canonical correlation, factor analysis, categorical data analysis, log linear models, and structural equation models. Prerequisite: EDP 554 or passing score on qualifying exam.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Electrical Engineering

Joseph C. Palais  
*Director of Graduate Studies*  
(ENGR 555) 602/965-3590

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### REGENTS' PROFESSORS BALANIS, FERRY

#### PROFESSORS

AKERS, BACKUS, CROUCH,  
DeMASSA, HIGGINS, KARADY,  
KELLY, PALAIS, PAN, ROEDEL,  
SCHRODER, WANG

#### ASSOCIATE PROFESSORS

ABERLE, COCHRAN, DAVIS,  
EL-GHAZALY, EL-SHARAWY, GORUR,  
GREENEICH, GRONDIN, HOLBERT,  
KOZICKI, MORRELL, SADOWSKY,  
SHEN, SKROMME, SPANIAS,  
TSAKALIS, TYLAVSKY

#### ASSISTANT PROFESSORS

ALLEE, CHAKRABARTI, KARAM,  
RODRIGUEZ, SI, SPECTOR,

#### PROFESSORS EMERITI

AX, BARKSON, DONNELLY,  
KAUFMAN, LUDERER, RUSSELL,  
SCHWUTTKE, SIRKIS, TICE,  
WELCH, ZIMMER

The faculty in the Department of Electrical Engineering offer graduate programs leading to the Master of Science in Engineering, the Master of Science, and the Doctor of Philosophy degrees, with a major in Electrical Engineering. The faculty also participate in offering the interdisciplinary program leading to the Doctor of Philosophy degree with a major in the Science and Engineering of Materials. See pages 261-262 for program description.

**Admission.** See the general requirements for admission to the Graduate College on pages 44-46. In addition, a student whose undergraduate degree is



not based on an ABET-accredited program must submit scores on the Graduate Record Exam and must have earned the equivalent of a 3.50 GPA in the last two years of study. All applicants must submit a short statement of purpose to the department. This statement must include the desired area of study within electrical engineering.

#### MASTER OF SCIENCE DEGREE

For information concerning the Master of Science degree, refer to pages 53-55.

#### MASTER OF SCIENCE IN ENGINEERING DEGREE

For information concerning the Master of Science in Engineering degree, refer to pages 69-70. A final written comprehensive exam is required for option 2 in this program. Most master's degree students are admitted to the M.S.E. program, option 2. Only those who are offered financial support or who are outstanding students showing research potential are admitted to the M.S. program.

#### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

The Doctor of Philosophy degree with a major in Electrical Engineering is awarded based upon evidence of excellence in research leading to a scholarly dissertation that is a contribution to knowledge.

**Program of Study.** The program of study should be filed soon after the student has been admitted to the program and the supervisory committee has been formed.

**Foreign Language Requirements.** None.

**Qualifying Examinations.** Every student must pass a qualifying examination consisting of a short research paper and an oral presentation of the research. The exam must take place before the end of the second semester in attendance at ASU.

**Comprehensive Examinations.** Written and oral comprehensive examinations are required before the student is admitted to candidacy. The examinations are administered by the supervisory committee.

**Dissertation Requirements.** A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required.

**Final Examinations.** A final oral examination in defense of the dissertation is required.

#### Research Activity

Opportunities at the level of the master's or doctoral degree are offered to students whose goals are research, development, design, manufacturing, systems, engineering management, teaching, or other professional activities in electrical engineering or related disciplines.

Research opportunities in the Department of Electrical Engineering are available in a broad spectrum of subjects encompassing traditional as well as new specialties. Significant research activity exists in solid state electronics, power systems, electromagnetic, communications, signal processing, control systems, and coherent optics, reflecting the continuing strong interest and cooperation of local industry in these disciplines. Solid state electronics, telecommunications, and power systems have been selected for support by industry as part of a program establishing excellence centers for engineering at ASU.

The list that follows provides an indication of the breadth of subjects available for research in the department. A research project may embrace more than one of the topics listed and may involve cooperative activity with local industry. The list is not meant to be exhaustive; topics other than those shown may also be suitable.

**Solid State Electronics.** Semiconductor crystal growth: Czochralski bulk, epitaxial, (LPE, VPE, MOCVD, and MBE) and thin films. Processing: oxidation, diffusion, ion-implantation, rapid thermal processing, low pressure CVD, reactive ion etching, evaporation, and optical and electron beam lithography. Devices: quantum functional devices, neural network circuits, discrete and integrated circuits, thin film devices, solar cells, lasers, microwave devices, and integrated optical circuits. Characterization: electrical, optical, physical, and chemical measurements, SEM, STM/AFM, Auger surface analysis, nondestructive evaluation. Modeling: heterojunction device modeling,

MOSFET and bipolar transistor modeling, charge carrier ballistics, Monte Carlo simulations, quantum device modeling, quantum transport, theory of optical processes and effects, and VLSI circuit design and novel architectures.

**Power Engineering.** Power systems: operation analysis, transient stability and reliability analysis, generation and transmission planning, system protection, and application of expert system. Transmission and distribution: distribution system design, load management, and automation. Power electronics: rectifiers and inverters, high power switching devices, power supplies for fusion devices, accelerators, etc. High voltage DC (HVDC): multi-terminal system control and operation analysis. High voltage techniques: electrical strength of dielectric, insulation coordination, aging of non-ceramic insulators, electric field distribution, and high altitude corona studies. Computer applications: software development for analysis and control, real-time computer control, large network analytical techniques, and neural networks. Solar energy: photovoltaic system design, analysis of dispersed generation, harmonics effect, and system interface. Nuclear plant diagnostics. Power generation: power plant dynamics, modeling, and diagnostics. Advanced instrumentation.

**Control Systems.** Nonlinear systems analysis and control; adaptive control; robust control; sampled-data and real-time digital control, virtual instrumentation in control; neural networks; system identification and model validation; control of distributed parameter systems; modeling, simulation, and graphical visualization of dynamical systems. Applications to aerospace, robotics, semiconductor process, manufacturing systems, and power systems. **Communications and Signal Processing.** Digital communications; coding; coherent communication systems; signal detection, estimation, and prediction; signal processing architectures; nonlinear signal analysis; spectral estimation; system identification, parameter estimation; filtering and filter synthesis; signal modeling and deconvolution; image processing, adaptive signal processing, data compression, and pattern recognition; speech compression, coding, and recognition.

*Antennas, Microwaves, Computational Electromagnetic, and Radar.* Antennas: antenna analysis, design, and measurements; electromagnetic wave radiation, propagation, scattering, and reception; slotted waveguides; patch antennas; antenna broadbanding techniques. Microwaves: microwave circuits, devices, and systems; microwave, millimeter wave, and optical integrated circuits and transmission lines; transient analysis of striplines and microstrips; printed lines on anisotropy substrates; microwave solid state circuits and devices and measurement techniques. Packaging of microwave integrated circuits. Computational electromagnetics: Geometrical and physical theories of diffraction; moment method; finite-difference time-domain; finite element. Radar: wideband radar techniques, radar cross section, radar multipath, and tracking.

*Lasers and Coherent Optics.* Fiber optics: communications, active and passive components, networks, sensors, and system analysis; lasers, optical processing, and holography.

In addition, students are encouraged to undertake interdisciplinary research projects encompassing several technical areas in electrical engineering, as well as other areas of engineering, science and mathematics.

## ELECTRICAL ENGINEERING

**EEE 437 Optoelectronics.** (3) N  
Basic operating principles of various types of optoelectronic devices which play important roles in commercial and communication electronics; light emitting diodes, injection lasers and photodetectors. Prerequisites: ECE 352; EEE 436.

**440 Electromagnetic Engineering II.** (4) F, S  
Second half of an introductory course in electromagnetic theory and its application in electrical engineering. Analytical and numerical solution of boundary value problems. Advanced transmission lines; waveguides; antennas; radiation and scattering. Lecture, lab. Prerequisite: EEE 340 or equivalent.

**453 Experiments in Materials Synthesis and Processing II.** (2) F  
A continuation of EEE 354, with emphasis on characterization. Small groups complete 3 experiments supervised by selected faculty members. Lab. Cross-listed as MSE 453. Prerequisites: EEE/MSE 353 and 354 or equivalents.

**454 Advanced Materials Processing and Synthesis.** (3) S  
Case studies from published literature of current techniques in materials processing and synthesis. Student participation in classroom presentations. Lecture, recitation. Cross-listed as MSE 454. Prerequisites: EEE/MSE 353 and 354 or equivalents.

**506 Digital Spectral Analysis.** (3) S  
Principles and applications of digital spectral analysis, least squares, random sequences, parametric, and non-parametric methods for spectral estimation. Prerequisites: EEE 407, 554.

**511 Artificial Neural Computation Systems.** (3) F  
Networks for computation, learning function representations from data, learning algorithms and analysis, function approximation and information representation by networks, applications in control systems and signal analysis. Prerequisite: instructor approval.

**523 Advanced Analog Integrated Circuits.** (3) F  
Analysis and design of analog integrated circuits: analog circuit blocks, reference circuits, operational-amplifier circuits, feedback, and nonlinear circuits. Prerequisite: EEE 433 or equivalent.

**525 VLSI Design.** (3) F, S  
Analysis and design of Very Large Scale Integrated (VLSI) Circuits. Physics of small devices, fabrication, regular structures, and system timing. Open only to graduate students.

**526 VLSI Architectures.** (3) F  
Special-purpose architectures for signal processing. Design of array processor systems at the system level and processor level. High-level synthesis. Prerequisite: CSE 330 or EEE 407 or instructor approval.

**530 Advanced Silicon Processing.** (3) S  
Thin films, CVD, oxidation, diffusion, ion-implantation for VLSI, metallization, silicides, advanced lithography, dry etching, rapid thermal processing. Pre- or corequisite: EEE 435.

**531 Semiconductor Device Theory I.** (3) F  
Transport and recombination theory, pn and Schottky barrier diodes, bipolar and junction field-effect transistors, and MOS capacitors and transistors. Prerequisite: EEE 436 or equivalent.

**532 Semiconductor Device Theory II.** (3) S  
Advanced MOSFETs, charge-coupled devices, solar cells, photodetectors, light-emitting diodes, microwave devices, and modulation-doped structures. Prerequisite: EEE 531.

**533 Semiconductor Modeling.** (3) S  
Process and device modeling, device parameter extraction, process integration, and exposure to current modeling software. Prerequisite: EEE 436 or equivalent.

**534 Semiconductor Transport.** (3) S  
Carrier transport in semiconductors. Hall effect, high electric field, Boltzmann equation, correlation functions, and carrier-carrier interactions. Prerequisites: EEE 434, 436 (or 531).

**535 Solar Cells.** (3) N  
Photovoltaic devices, including homojunctions and heterojunctions. Photogeneration of carriers, spectral response, electrical characteristics, and efficiency. Prerequisite: EEE 436 or equivalent.

**536 Semiconductor Characterization.** (3) S  
Measurement techniques for semiconductor materials and devices. Electrical, optical, physical, and chemical characterization methods. Prerequisite: EEE 436 or equivalent.

**537 Semiconductor Optoelectronics I.** (3) N  
Electronic states in semiconductors, quantum theory of radiation, absorption processes, radiative processes, nonradiative processes, photoluminescence, and photonic devices. Prerequisites: EEE 434, 436 (or 531).

**538 Semiconductor Optoelectronics II.** (3) N  
Material and device physics of semiconductor lasers, light-emitting diodes, and photodetectors. Emerging material and device technology in III-V semiconductors. Prerequisite: EEE 537.

**539 Introduction to Solid State Electronics.** (3) F  
Crystal lattices, reciprocal lattices, quantum statistics, lattice dynamics, equilibrium, and nonequilibrium processes in semiconductors. Prerequisite: EEE 434.

**541 Electromagnetic Fields and Guided Waves.** (3) F  
Polarization and magnetization; dielectric, conducting, anisotropic, and semiconducting media; duality, uniqueness, and image theory; plane wave functions, waveguides, resonators, and surface guided waves. Prerequisite: EEE 440 or equivalent.

**542 Selected Microwave Devices.** (3) N  
Use of ferrite, semiconductor, and piezoelectric materials in microwave systems. Prerequisites: ECE 352; EEE 445 or equivalents.

**543 Antenna Analysis and Design.** (3) F  
Impedances, broadband antennas, frequency independent antennas, miniaturization, aperture antennas, horns, reflectors, lens antennas, and continuous sources design techniques. Prerequisite: EEE 443 or equivalent.

**544 High Resolution Radar.** (3) N  
Fundamentals; wideband coherent design, waveforms, and processing; stepped frequency; synthetic aperture radar (SAR); inverse synthetic aperture radar (ISAR); imaging. Prerequisites: EEE 303, 340 or equivalents.

**545 Microwave Circuit Design.** (3) S  
Analysis and design of microwave attenuators, in-phase and quadrature-phase power dividers, magic tee's, directional couplers, phase shifters, DC blocks, and equalizers. Prerequisite: EEE 445 or instructor approval.

**546 Advanced Fiber-Optics.** (3) S  
Theory of propagation in fibers, couplers and connectors, distribution networks, modulation, noise and detection, system design, and fiber sensors. Prerequisite: EEE 448 or instructor approval.

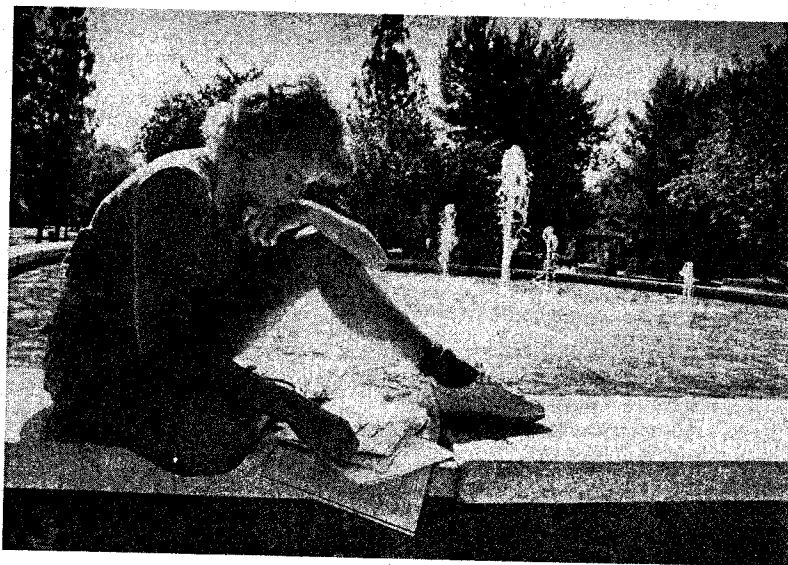
**547 Microwave Solid State Circuit Design I.** (3) N  
Application of semiconductor characteristics to practical design of microwave mixers, detectors, limiters, switches, attenuators, multipliers, phase shifters, and amplifiers. Prerequisite: EEE 545 or instructor approval.

**548 Coherent Optics.** (3) N  
Diffraction, lenses, optical processing, holography, electro-optics, and lasers. Prerequisite: EEE 440 or equivalent.

**549 Lasers.** (3) N  
Theory and design of gas, solid, and semiconductor lasers. Prerequisite: EEE 448 or instructor approval.

**550 Transform Theory and Applications.** (3) N  
Introduction to abstract integration, function spaces, and complex analysis in the context of integral transform theory. Applications to signal analysis, communication theory, and system theory. Prerequisite: EEE 303.

- 551 Information and Coding Theory.** (3) N Fundamental theorems of information theory for sources and channels; convolutional and burst codes. Prerequisites: EEE 451, 554.
- 552 Coherent Communications.** (3) N Systems analysis and design of telecommunication systems using phase-locked loops. Prerequisite: EEE 554.
- 554 Random Signal Theory I.** (3) F Application of statistical techniques to the representation and analysis of electrical signals and to communications systems analysis. Prerequisite: EEE 303, 350 or instructor approval.
- 555 Random Signal Theory II.** (3) S Processing of signals in the presence of noise. Random signals, correlation, frequency spectra, estimation, filtering, noise, prediction, and transients. Prerequisite: EEE 554.
- 556 Detection and Estimation Theory.** (3) N Combination of the classical techniques of statistical inference and the random process characterization of communication, radar, and other modern data processing systems. Prerequisites: EEE 455, 554.
- 558 Modulation Theory.** (3) N Noise performance of analog and digital modulation systems. Emphasis on modern digital techniques in terrestrial and satellite communications systems. Prerequisites: EEE 455, 554.
- 571 Power System Transients.** (3) N Simple switching transients. Transient analysis by deduction. Damping of transients. Capacitor and reactor switching. Transient recovery voltage. Travelling waves on transmission lines. Lightning. Protection of equipment against transient overvoltages. Introduction to computer analysis of transients. Prerequisite: EEE 471.
- 572 Advanced Power Electronics.** (3) N Analysis of device operation, including thyristors, gate-turn-off thyristors, and transistors. Design of rectifier and inverter circuits. Applications such as variable speed drives, HVDC, motor control, and uninterruptible power supplies. Prerequisite: EEE 470.
- 573 Power System Control.** (3) N Concepts of economic and secure operation of power systems; load frequency control, economic dispatch, unit commitment; state estimation, contingency analysis, optimal power flow; power system control centers. Prerequisites: EEE 471.
- 574 Computer Solution of Power Systems.** (3) S Algorithms for digital computation for power flow, fault, and stability analysis. Sparse matrix and vector programming methods, numerical integration techniques, stochastic methods, solution of the least squares problem. Prerequisite: EEE 471.
- 577 Power System Planning.** (3) F Load forecasting, reliability assessment, unit commitment, economic dispatching, hydro-thermal coordination. Generation and bulk transmission planning, synchronous machine dynamic simulation, and system stability assessment and simulation. Prerequisite: EEE 471.
- 579 Power Transmission and Distribution.** (3) S High voltage transmission line electric design; conductors, corona, RI and TV noise, insulators, clearances. DC characteristic, feeders voltage drop, and capacitors. Prerequisite: EEE 470.
- 581 Filtering of Stochastic Processes.** (3) N Modeling, estimation, and filtering of stochastic processes, with emphasis on the Kalman filter and its applications in signal processing and control. Prerequisites: EEE 482, 550, 554.
- 582 Linear System Theory.** (3) S Controllability, observability, and realization theory for multivariable continuous time systems. Stabilization and asymptotic state estimation. Disturbance decoupling, noninteracting control. Prerequisite: EEE 482.
- 585 Digital Control Systems.** (3) F Analysis and design of digital and sampled data control systems, including sampling theory, z-transforms, the state transition method, stability, design, and synthesis. Prerequisites: EEE 482, 550.
- 586 Nonlinear Control Systems.** (3) N Stability theory, including phase-plane, describing function, Liapunov's method, and frequency domain criteria for continuous and discrete, nonlinear, and time-varying systems. Prerequisite: EEE 482.
- 587 Optimal Control Systems.** (3) N Application of calculus of variations, Pontryagin's principle, and dynamic programming to control problems. Computational techniques for solving optimal control problems. Prerequisite: EEE 482.
- 606 Adaptive Signal Processing.** (3) F Principles/applications of adaptive signal processing, adaptive linear combiner, Wiener least-squares solution, gradient search, performance surfaces, LMS/RLS algorithms, block time/frequency domain LMS. Prerequisites: EEE 506, 554.
- 631 Heterojunctions and Superlattices.** (3) F Principles of heterojunctions and quantum well structures, band line-ups, optical, and electrical properties. Introduction to heterojunction devices. Prerequisites: EEE 436, 531.
- 632 Heterojunction Devices.** (3) N Principles of semiconductor heterojunctions and quantum wells are applied to the analysis of advanced electronic and optical devices. Devices studied are modulation doped field effect transistors (MODFETs), pseudomorphic MODFETs, heterojunction bipolar transistors, quantum well and superlattice optical detectors, modulators, and lasers. Prerequisites: EEE 434, 436, 531, 631.
- 641 Advanced Electromagnetic Field Theory.** (3) N Cylindrical wave functions, waveguides, and resonators; spherical wave functions and resonators; scattering from planar, cylindrical, and spherical surfaces; Green's functions. Prerequisite: EEE 541 or equivalent.
- 643 Advanced Topics in Electromagnetic Radiation.** (3) N High-frequency asymptotic techniques, geometrical and physical theories of diffraction (GTD and PTD), moment method (MM), radar cross section (RCS) prediction, Fourier transforms in radiation, and synthesis methods. Prerequisite: EEE 543.
- 645 Microwave Filter Design.** (3) N Analysis and design of microwave low-pass, high-pass, band-pass, and band-stop filters and microwave diplexers/multiplexers. Prerequisite: EEE 545 or instructor approval.
- 647 Microwave Solid State Circuit Design II.** (3) F Practical design of microwave free-running and voltage-controlled oscillators using Gunn and Impatt diodes and transistors; analysis of noise characteristics of the oscillator. Prerequisites: EEE 545, 547.
- 731 Advanced MOS Devices.** (3) S Threshold voltage, subthreshold current, scaling, small geometry effects, hot electrons, and alternative structures. Prerequisite: EEE 531.
- 732 Advanced Bipolar Devices and Circuits.** (3) N Critical examination of new bipolar device and circuit technologies. Performance trade-offs, scaling effects, and modeling techniques. Prerequisite: EEE 531.
- 770 Advanced Topics in Power Systems.** (3) N Power system problems of current interest, approached at an advanced technical level, for mature students. Prerequisites: EEE 577, 579 or equivalents; instructor approval.
- Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.



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## Engineering Courses

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Graduate courses offered by the College of Engineering and Applied Sciences that apply to degree requirements, when appearing on an approved program of study, are listed elsewhere in this catalog. Basic courses that may be required, or taken as electives, are shown below.

### ANALYSIS AND SYSTEMS

**ASE 485 Engineering Statistics.** (3) F, S, SS  
Designing statistical studies for solutions to engineering problems. Methods include regression, design and analysis of experiments, and other statistical topics. Prerequisite: ECE 380. *General Studies: N2.*

**496 Professional Seminar.** (0) F, S  
Topics of interest to students in the engineering special and interdisciplinary studies.

**500 Research Methods: Engineering Statistics.** (3) F, S, SS  
Designing statistical studies for solutions to engineering problems. Methods include regression, design and analysis of experiments, and other statistical topics. Prerequisite: ECE 380.

**582 Linear Algebra in Engineering.** (3) F  
Development and solution of systems of linear algebraic equations. Applications from mechanical, structural, and electrical fields of engineering. Prerequisite: MAT 242 or equivalent.

**586 Partial Differential Equations in Engineering.** (3) S  
Development and solution of partial differential equations in engineering. Applications in solid mechanics, vibrations, and heat transfer. Prerequisites: ECE 386; MAT 242, 274.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Engineering Science

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The faculty of the School of Engineering offer graduate programs leading to the Master of Science in Engineering, the Master of Science, and the Doctor of Philosophy degrees with a major in Engineering Science. Several areas of study are available as identified under research activity options below. Programs are coordinated through the departments of Electrical Engineering; Mechanical and Aerospace Engineering; and Chemical, Bio, and Materials Engineering.

**Graduate Record Examination.** A student whose undergraduate degree program is not ABET accredited must submit scores on the Graduate Record Examination (GRE) General Test as part of the admission process. The Mechanical Engineering program requires the GRE of all students. Certain disciplines also require GRE scores for application to the M.S., M.S.E., and Ph.D. programs in Engineering Science.

### Research Activity

#### Engineering Mechanics

Dusan Krajcinovic  
*Professor*  
(EC G346) 602/965-3291

#### FACULTY

BICKFORD, BOYER, CHEN,  
FERNANDO, JANKOWSKI, KOURIS,  
KRAJCINOVIC, LIU, MIGNOLET,  
RANKIN, REED, SIERADZKI

Research activities include mechanics of solids and structures, structural dynamics, structural stability, fluid structure and ground structure interaction, random and deterministic vibrations, nonlinear mechanics, fluid dynamics, and control and estimation of dynamical systems.

#### Engineering Science

Faculty of the School of Engineering offer programs of a special and interdisciplinary nature.

#### Materials Science and Engineering

Stephen J. Krause  
*Professor*  
(EC G202) 602/965-3313

#### FACULTY

ALFORD, DEY, JACOBSON, KRAUSE

Faculty members who advise students in this area of study are located within the Department of Chemical, Bio and Materials Engineering. Courses offered carry the MSE prefix and are listed on pages 144-145, following the list of courses offered in Chemical Engineering.

Requirements for the Master of Science degree are described on pages 53-55; those for the Master of Science in Engineering, on pages 69-70; and those for the Doctor of Philosophy, on pages 76-77.

Each student admitted as a regular degree candidate is required to complete an approved program of study. Students who have an undergraduate degree in an area other than Materials Science, or a similarly named program, may qualify for admission to a transition program and may be required to take one or more undergraduate courses in preparation for enrollment in graduate courses in Materials Science and Engineering. The program of study of transition students is determined by the student's supervisory committee after review of the student's academic record.

Research activities in Materials Science and Engineering include programs in semiconductor processing and characterization, polymeric and ceramic composites, cuprates for high critical temperature superconductor applications, ferritic thin films for capacitor and memory applications, high temperature materials for space applications, mechanical behavior of high strength Al-Li alloys, environmentally influenced mechanical effects, and microbiologically influenced corrosion reactions.

#### Systems Science and Engineering

Frank Hoppensteadt  
*Director*  
(GWC 606) 602/965-8382

#### FACULTY

HIGGINS, RODRIGUEZ, SI, TSAKALIS

The program integrates modern tools and techniques of systems science, applied mathematics, and computation with application area throughout the School of Engineering. Areas include linear and nonlinear control for systems governed by ordinary differential equations, such as aircraft, spacecraft, advanced ground transportation and robots, and for systems governed by partial differential equations, such as fluid dynamics systems and process control systems; adaptive systems, such as adaptive control, neural networks, cognitive science, artificial intelligence; large-scale systems, such as power systems, V.L.S.I. design, networks; scientific computing and simulation, such as scientific computing, symbolic computation, visualization, and computer-aided geometric design.

## English

Nancy A. Gutierrez  
*Chair*  
 (LL B504) 602/965-3168

### REGENTS' PROFESSORS N. DUBIE, RIOS

#### PROFESSORS

BENDER, BJORK, BOYER, BRACK,  
 D. BRINK, J. BRINK, BUCKINGHAM,  
 CANDELARIA, CARLSON,  
 DONELSON, EVANS, M. HARRIS,  
 HELMS, KEHL, LIGHTFOOT, NEY,  
 A. NILSEN, D. NILSEN, RHODES,  
 ROEN, SANDS, SHINN

#### ASSOCIATE PROFESSORS

ADAMS, BATES, CORSE, GREEN,  
 GUTIERREZ, HORAN, JANSSEN,  
 JOHNSON, MAHONEY, MAJOR,  
 MILLER, MORGAN, OJALA, RAMAGE,  
 SCHWALM, SENSIBAR,  
 VANDEN HEUVEL, WILKINS

#### ASSISTANT PROFESSORS

CASTLE, COLBY, J. DUBIE, GOGGIN,  
 GOLDBERG, K. HARRIS, LUSSIER,  
 McCABE, G. NELSON,  
 PERRY, PRITCHARD,  
 STEVENS, VAN GELDEREN

#### LECTURERS

COOK, DUGAN, DWYER,  
 OBERMEIER, WHEELER

The faculty in the Department of English offer the Master of Arts degree in English, the Master of Teaching English as a Second Language degree, and the Doctor of Philosophy degree in English. Students may also pursue an interdisciplinary program leading to the Master of Fine Arts degree in Creative Writing, offered by the faculties in the Departments of English and Theater. (For information concerning this degree program, refer to pages 62-63 and 163.) Students admitted to the Master of Education degree program with a major in Secondary Education may also elect English as the subject matter field (see page 60).

### MASTER OF ARTS DEGREE

This degree is designed to provide further cultural and professional advancement for students of English.

**Admission Requirements.** The department requires that applicants have an undergraduate major in English and

a 3.00 GPA in courses taken in the major field. Those who do not have a major in English are encouraged to register as nondegree students while they take courses in areas of deficiency as identified by the advisor.

Deadline for admission applications and requests for financial assistance, including teaching assistantships, is February 1. Incomplete files are not considered.

Applicants for the M.A. program in English with concentrations in literature and language and rhetoric and composition are required to submit GRE General Test scores, three letters of recommendation, a personal statement of aims and purposes, and an academic writing sample.

Applicants for the M.A. program with a concentration in English linguistics must show completion of one upper-division course in a linguistics-related field, and must submit a personal statement of aims and purposes and three letters of recommendation. GRE scores are not required.

Applicants for the M.A. program in English with a concentration in comparative literature must prove fluency in a foreign language to a level sufficient for graduate study.

**Program of Study.** A student may pursue a concentration in comparative literature, English linguistics, literature and language, or rhetoric and composition.

For the concentration in comparative literature, a candidate must complete 36 semester hours of graduate courses, with a minimum of 12 hours being taken in the Department of Languages and Literature's. Included in the 36 hours must be ENG 500 Research Methods, ENG 501 Introduction to Comparative Literature, and ENG 599 Thesis.

For the concentration in English linguistics, a candidate must complete a minimum of 33 semester hours of graduate courses. The 33 semester hours must include LIN 500 Research Methods, 511, 514, one LIN 591 Seminar, or their equivalents chosen in consultation with the advisor, and ENG 599 Thesis. Electives are chosen in consultation with the advisor.

For the concentration in literature and language, a candidate must complete a minimum of 33 semester hours. The 33 semester hours must include ENG 500 Research Methods, ENG 599

Thesis, an 18-hour distribution requirement selected from six available areas, and six hours of other electives. Two courses selected must carry ENG 591 Seminar credit.

For the concentration in rhetoric and composition, a candidate must complete a minimum of 36 hours of graduate courses, including a 12-hour core, a six-hour thesis, and 18 elective hours that must include six hours of ENG 591 Seminar and may include nine hours of appropriate graduate courses outside the English department.

**Foreign Language Requirements.** A reading knowledge of French, German, Spanish, or other suitable language is required. The choice of language must be approved by the student's supervisory committee.

**Comprehensive Examinations.** A comprehensive examination is required for students in the comparative literature concentration. (A detailed description of its scope is available in the Department of English.)

**Thesis Requirements.** A thesis is required.

**Final Examinations.** A final oral examination in defense of the thesis is required.

### M.TESL

The Master of Teaching English as a Second Language degree is designed for students who seek a professionally oriented graduate education. For information, see page 72.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

**Admission Requirements.** Applicants for the Ph.D. program in English are required to submit scores on the Graduate Record Examination (verbal and advanced literature sections), three letters of recommendation, a personal statement of aims and purposes, and an academic writing sample. Deadline for admission applications and requests for financial aid, including teaching assistantships, is February 1. Incomplete files are not considered.

**Program of Study.** A minimum of 60 hours of graduate courses (exclusive of dissertation) beyond the bachelor's degree constitutes the formal course



preparation. Specifically required are three hours in history of the English language (for example, LIN 505 American English, ENG 507 Old English, ENG 508 Old English Literature, ENG 509 Middle English, and LIN 548 Studies in English Language); six hours in theory courses; and the following distribution requirement: English literature before 1660 (including one course in each of the following: Chaucer, Shakespeare, and Milton); English literature 1660–1900; British literature since 1900; American literature before 1900; and American literature since 1900. Students must take a minimum of five graduate seminars en route to the Ph.D. degree, at least three of which must be taken in the doctoral program at ASU. Up to twelve hours of course work taken outside the department may be counted toward the degree.

**Foreign Language Requirements.** A competent reading knowledge of a language other than modern English is required. The requirement can be met by

1. earning a grade of "B" or better in a 400- or 500- level course in an appropriate language;
2. demonstrating proficiency by taking a language examination approved by the supervisory committee; and
3. showing native speaker proficiency in a language approved by the supervisory committee.

**Ph.D. Examinations.** The Ph.D. examination consists of three parts. Part I is a portfolio of three essays, representing different historical periods or fields of concentration and employing more than one critical approach. After successful completion of Part I, the student may advance to Part II, a three-hour written exam in the student's area of specialization based on a bibliography compiled by the student and approved by the student's supervisory committee. Part III is a colloquy, based on a written prospectus, defining the topic, scope, and significance of the dissertation.

**Dissertation Requirements.** (See dissertation requirements on pages 73–74.) The subject of the dissertation is decided in consultation with the chair of the student's supervisory committee, subject to approval of the director of the Ph.D. program.

**Final Examinations.** A final examination in defense of the dissertation, arguing for its method and conclusions, is required.

### Research Activity

Recent and current research by the Department of English faculty includes the following titles and areas: Old English poetry; Arthurian romance; Renaissance literature; iconography of death in the English Renaissance; the Elizabethan masque; Shakespeare's plays in performance; Spenser biography; witchcraft and women in the Renaissance; wordplay in Milton; literature of the age of discovery and encounter; heroism in Euro-American literary tradition; literature of the Restoration; textual edition of Smollett (nine volumes) and Johnson (three volumes); letters of William Michael Rossetti; Victorian poetry; Victorian sages; gothic fiction, especially Bram Stoker; American sea fiction; Melville; reception of Dickinson's poetry, bibliography of Dickinson criticism; 19th-century American literary periodicals; American writers' responses to Darwin (from Howells to Hemingway); Kate Chopin; *Sehnsucht* in 20th-century American literature; Faulkner; biblical backgrounds for literature; Chicana/o literature; the Bible as literature; Vietnam War fiction; film history; film director, Sidney Lumet; film making in Arizona; science fiction and fantasy; literature and aging; ethnopoetics; gender studies; contemporary literary theory; translation theory; censorship in American schools; young adult literature; classical, 18th-century and modern rhetoric; stylistics; Latin American literature; composition theory; history of the English curriculum; literary language and the type-token ratio; sociolinguistics; pragmatics and discourse analysis; language and politics; language and gender; iconicity in syntax, connectionism and language teaching; phonology; natural language processing; language typology; language acquisition; English morphological structure; avant-garde theater; performance and contemporary theater; literature's of the Americas; gender studies in comparative contexts; science and literature; history of secondary English teaching; Irish literature; gay and lesbian studies; post colonialism; Native American literature.

Among recent books published by the faculty are *Gospel Fictions*; *As Far*

*Away as China; Perspectives on Official English; On the Rim of the Mandala; Body Betrayal; Snow Water Cove; Writing Arguments; Our Town: An American Play; Continuities: Essays and Ideas in American Literature; G. B. Shaw: An Annotated Bibliography of Writings about Him; Groom Falconer; The Lime Orchard Woman; News of the World; The Old English Verse Saints' Lives; The Origins of Faulkner's Art; Richard Brautigan; Sea Brothers: The Tradition of American Sea Fiction from Moby Dick to the Present; Screenwriting: A Method; Thematic Relations; Truants; Venus and Adonis: A Facsimile Edition; Worlds Within Women: Myth and Mythmaking in Fantastic Literature by Women; Faulkner's Poetry; Emily Dickinson's Critical Reception in the 1890s: A Documentary History; Studies in American Indian Literature; American Indian Women: A Guide to Research; Sacrificial Smoke (trans.); Expedition of Humphry Clinker (ed.); Playing With Gender: A Renaissance Pursuit (ed.); Dryden's Aeneid: The English Virgil; A Brief Discourse of the Christian Life of Mistress Katherine Brettergh (facsimile edition); Radio Sky; Body Betrayal; Speed; Victorian Sages and Cultural Discourse: Renegotiating Gender and Power (ed.); Teodoro Luna's Two Kisses; Teaching and Learning English Worldwide (ed.); Performing Drama/Dramatizing Performance: Alternative Theater and the Dramatic Text; Only a Mother (trans.); The Adventures of Ferdinand Count Fathom (ed.); The History and Adventures of an Atom (ed.); The Clouds of Magellan; Voice of Deliverance: The Language of Martin Luther King, Jr., and Its Sources; Rumors From the Cauldron: Selected Essays, Reviews and Reportage; American College Life in English Communication; Your Reading; Humor in American Literature: A Selected Annotated Bibliography; Writing Arguments; Baseball Fiction; Voodoo Dreams; The Instinct for Bliss; Diamond; Inspiring Literacy: Literature for Children and Young Adults (ed.); Men Writing the Feminine: Literature, Theory, and the Question of Genders; The Tale Maker; Lushootseed Dictionary (ed.); Writing and Being; Sea Brothers: The Tradition of American Sea Fiction from Moby Dick to Present; Elizabeth Bishop: Her Poetics of Loss; "Rooted Sorrow": Dying in Early Modern England; Ismael Reed;*



*Sidney Lumet; Charrería Mexicana An Equestrian Folk Tradition; Gabriela Mistral: An Artist and Her People.*

English faculty currently serve as editors of *Explorations in Ethnic Studies; Modern Scandinavian Literature in Translation; Rocky Mountain Review of Language and Literature; Centennial Review; Manoa: New Chicano Writing*. Other faculty serve on the editorial boards of *Age of Johnson, English Literature in Transition, MELUS, Metaphor and Symbolic Activity: An Interdisciplinary Journal of Empirical Inquiry, Modern Language Journal, Revista Argentina de Linguistic, Rhetoric Review, Resources for American Literary Study, Dickinson Studies, and 18th Century: A Current Bibliography; Victorian Poetry; WPA: Writing Program Administration; Studies in American Indian Literature; English Journal; English Education.*

### ENGLISH

- ENG 400 History of Literary Criticism.** (3) S Major critics and critical traditions in the western world. Prerequisite: 6 hours of literature or instructor approval. *General Studies: HU.*
- 405 Style and Stylistics.** (3) N Linguistic, rhetorical, and literary approaches to the analysis of style in poetry, fiction, and other forms of written discourse.
- 408 Advanced Screenwriting I.** (3) F A study of the principles of dramaturgy or dramatic structure, with particular emphasis on character as the creator of events.
- 409 Advanced Screenwriting II.** (3) S Application of the principles taught in a complete feature-length screenplay. Prerequisite: ENG 408.
- 411 Advanced Creative Writing.** (3) F, S Separate poetry and fiction workshops for experienced writers, emphasizing individual style. May be taken once for poetry, once for fiction. Prerequisite: ENG 310 or instructor approval.
- 412 Professional Writing.** (3) N Lectures and conferences concerning techniques of writing for publication. Prerequisite: ENG 310 or instructor approval.
- 413 History of the English Language.** (3) F, S Development of English from the earliest times to the modern period. Prerequisite: junior standing or instructor approval. *General Studies: HU.*
- 415 Medieval Literature.** (3) F Medieval English literature in translation, from *Beowulf* to Malory (excluding Chaucer), emphasizing cultural and intellectual backgrounds; includes continental works. Prerequisite: ENG 221 or instructor approval. *General Studies: HU.*
- 416 Chaucer: Canterbury Tales.** (3) F Chaucer's language, his last work, and its relationship to continental and insular traditions. Prerequisite: ENG 221 or instructor approval. *General Studies: HU.*
- 417 Chaucer: Troilus and Criseyde and the Minor Works.** (3) S Chaucer's language, his major poem, and his early works in their medieval context. Prerequisite: ENG 221 or instructor approval. *General Studies: HU.*
- 418 Renaissance Literature.** (3) F Poetry and prose, 1485–1603, excluding the drama. Humanism and major genres; More, Sidney, Spenser, and other representative writers. Prerequisite: ENG 221 or instructor approval. *General Studies: HU.*
- 419 English Literature in the Early 17th Century.** (3) S Prose and poetry, exclusive of Milton and the drama. Metaphysical, Cavalier, and neoclassical verse; Donne, Jonson, Bacon, and other representative writers. Prerequisite: ENG 221 or instructor approval. *General Studies: L2/HU.*
- 422 Studies in Shakespeare.** (3) F, S
- 423 Renaissance Drama.** (3) S Drama of the Tudor and early Stuart periods (exclusive of Shakespeare). Includes Kyd, Marlowe, Jonson, and Webster. Prerequisite: ENG 221 or instructor approval. *General Studies: L2/HU.*
- 424 Milton.** (3) F, S Selected prose and poetry, emphasizing *Paradise Lost, Paradise Regained,* and *Samson Agonistes*. Prerequisite: ENG 221 or instructor approval. *General Studies: HU.*
- 425 Romantic Poetry.** (3) F Poetry of Wordsworth, Coleridge, Shelley, Keats, and Byron. *General Studies: HU.*
- 426 Victorian Poetry.** (3) F Poetry of the second half of the 19th century. Special study of Tennyson, Browning, and Arnold. Prerequisite: ENG 222 or instructor approval. *General Studies: L2/HU.*
- 427 Restoration and Early 18th Century.** (3) F Writers and movements in the nondramatic literature of the Restoration and early 18th century. Prerequisite: ENG 221 or instructor approval. *General Studies: HU.*
- 428 The Later 18th Century.** (3) S Writers, movements, and books during the second half of the 18th century. Prerequisite: ENG 221 or instructor approval. *General Studies: L2/HU.*
- 430 Victorian Cultural Backgrounds.** (3) N Social, religious, and other cultural issues in prose by such writers as Carlyle, Ruskin, Darwin, Arnold, Pater, and Morris. Prerequisite: ENG 222 or instructor approval. *General Studies: L2/HU.*
- 435 19th-Century American Poetry.** (3) S Themes and developments in American poetry to 1900, including Poe, Whitman, and Dickinson. *General Studies: HU.*
- 439 Restoration and 18th-Century Drama.** (3) S '97 English drama 1600–1800. Prerequisite: ENG 221 or instructor approval. *General Studies: HU.*
- 440 American Literature to 1815.** (3) N Thought and expression from the time of the first English-speaking colonies to 1815. Prerequisite: ENG 341 or instructor approval. *General Studies: HU.*
- 441 20th-Century American Drama.** (3) N American drama since World War I, especially experimental techniques. Prerequisite: ENG 341 or 342 or instructor approval. *General Studies: HU.*
- 442 20th-Century British and Irish Poetry.** (3) F Theory and practice of poetry since 1900. Prerequisite: ENG 222 or instructor approval.
- 443 American Poetry, 1900–1945.** (3) F Developments in theory and practice of major poets. Prerequisite: ENG 341 or 342 or instructor approval. *General Studies: HU.*
- 444 Studies In American Romanticism, 1830–1860.** (3) F Cultural expression in works of representative writers. Prerequisite: ENG 341 or instructor approval. *General Studies: HU.*
- 445 American Realism, 1870–1900.** (3) S Writers and influences that shaped the development of literary realism. *General Studies: L2/HU.*
- 448 20th-Century British and Irish Novel.** (3) S Theory and practice of the novel since 1900. Prerequisite: ENG 222 or instructor approval. *General Studies: HU.*
- 451 The Novel to Jane Austen.** (3) F From origins of prose fiction through the 18th century. *General Studies: HU, H.*
- 452 The 19th-Century Novel.** (3) S From Scott to Conrad. *General Studies: HU.*
- 453 The American Novel to 1900.** (3) F The rise and development of the novel to Dreiser. Prerequisite: ENG 341 or instructor approval. *General Studies: HU.*
- 454 The American Novel, 1900–1945.** (3) F Developments in theory and practice of major novelists. Prerequisite: ENG 341 or 342 or instructor approval. *General Studies: HU.*
- 455 The Form of Verse: Theory and Practice.** (3) N Types, history, criticism, and schools of theory of metrical form. Analysis of lyric, narrative, and dramatic poetry.
- 457 American Poetry Since 1945.** (3) S Major American poets of the period. Developments in theory and practice. Prerequisite: ENG 341 or instructor approval. *General Studies: HU.*
- 458 American Novel Since 1945.** (3) S Major novelists of the period. Developments in theory and practice. Prerequisite: ENG 342 or instructor approval. *General Studies: L2/HU.*
- 460 Western American Literature.** (3) S Critical examination of ideas and traditions of the literature of the western United States, including the novel. *General Studies: HU.*
- 461 Women and Literature.** (3) N Selected topics in literature by or about women. May be repeated for credit when topics vary. *General Studies: HU.*
- 462 20th-Century Women Authors.** (3) F Critical examination of literature by 20th-century women writers. May be repeated for credit when topics vary. *General Studies: HU.*
- 463 European Drama from Ibsen to 1914.** (3) N Chief continental and British dramatists of the period, emphasizing the beginnings and development of realism. *General Studies: HU.*
- 464 European Drama from 1914 to the Present.** (3) N Chief continental and British dramatists of the period, emphasizing experimental techniques. *General Studies: HU.*

**471 Literature for Adolescents.** (3) F, S  
Prose and poetry that meet the interests and capabilities of junior high and high school students. Recent literature stressed. A passing grade of at least "C" required before students are permitted to student teach in English.  
*General Studies: HU.*

**480 Methods of Teaching English.** (3) F, S  
Methods of instruction, organization, and presentation of appropriate content in English. A passing grade of at least "C" required before students are permitted to student teach in English. Prerequisite: ENG 312 or 314 or 413.

**500 Research Methods.** (3) F  
Methodology and resource materials for research. Analysis of criticism and scholarship, including evaluation of sources.

**501 Introduction to Comparative Literature.** (3) N  
Problems, methods, and principles, illustrated by selected critical essays and literary texts.

**502 Contemporary Critical Theory.** (3) F  
An advanced survey of major schools of 20th-century literary and critical theory. Lecture, discussion. Cross-listed as HUM 549.

**507 Old English.** (3) F  
Elements of Old English grammar with selected readings.

**508 Old English Literature.** (3) N  
Intensive literary, linguistic, and cultural study of Old English literature. May be repeated for credit when topics vary. Prerequisite: ENG 507.

**509 Middle English.** (3) S  
A study of the principal dialects of the language with selected readings. Prerequisite: graduate standing.

**512 The Teaching of Composition.** (3) N  
The theory and practice of teaching writing at all levels. Emphasis on current research. Prerequisites: teaching experience; instructor approval.

**515 Middle English Literature.** (3) N  
English literature from the 12th through the 15th centuries, exclusive of Chaucer. Prerequisite: ENG 509 or instructor approval.

**517 Contemporary Rhetorical Theory.** (3) F  
Investigation of the work of such important rhetorical theorists as Burke, Toulmin, Perelman, Gates, and Cixous.

**520 Renaissance Literature.** (3) S  
Poetry and prose of the English Renaissance, excluding drama.

**521 Shakespeare.** (3) F, S  
A selection of comedies, histories, and tragedies presented in the context of literary history and critical theories, with an emphasis on classical and medieval backgrounds.

**525 American Literary Criticism.** (3) N  
Analysis and discussion of leading historical and critical interpretations of American literature from the beginnings to the present.

**530 Classical Rhetoric and Written Composition.** (3) F '97  
Relationship of major texts in classical rhetoric to developments in composition theory, literary theory, and practice through the 19th century.

**531 Rhetorical Theory and Literary Criticism.** (3) S '97  
Intensive study of major rhetorical theorists of the 20th century in such areas as literary criticism, discourse theory, and composition theory.

**532 Composition Theory.** (3) N  
Intensive study in the rhetorical categories of invention, arrangement, style, aims, modes, and forms of written discourse.

**545 Studies in English Literature.** (3) N  
This course offers selected authors or issues and may be repeated for credit.

**547 Studies in American Literature.** (3) N  
This course offers selected authors or issues and may be repeated for credit.

**549 Studies in Comparative Literature.** (3) N  
This course offers selected authors or issues and may be repeated for credit.

**550 Contemporary Comparative Literature.** (3) F  
Comparative studies in modern literature in English and other literatures in translation. May be repeated for credit when content varies.

**560 Studies in Dramatic Forms.** (3) F, S  
Selected topics in dramatic and cinematic literature, history, criticism, theory, and cross-disciplinary study. May be repeated for credit when topic varies. Lecture, studio.

**571 Advanced Study in Literature for Adolescents.** (3) N  
History and criticism of adolescent literature. Prerequisite: ENG 471 or instructor approval.

**573 Censorship and Literature.** (3) N  
The history of censorship, primarily in the United States, and significant court decisions that affected writers and books.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## LINGUISTICS

**LIN 500 Research Methods.** (3) F  
Methodology and resource materials for research. Analysis of criticism and scholarship, including evaluation of sources.

**505 American English.** (3) F  
Development of the English language in America, including a survey of geographical and social dialects.

**510 English Linguistics.** (3) F  
Current approaches to the study of the English language.

**511 Phonetics and Phonology.** (3) S  
Current trends in phonological theory and its basis in acoustic and articulatory phonetics. Prerequisite: LIN 510 or equivalent or instructor approval.

**513 Semantics.** (3) F '96  
Current approaches to linguistic meaning with particular attention to English. Prerequisite: LIN 510 or equivalent or instructor approval.

**514 Syntax.** (3) S  
The analysis of syntactic structure by contemporary theoretical models with a focus on English. Prerequisite: LIN 510 or equivalent or instructor approval.

**516 Pragmatics and Discourse Theory.** (3) F '97  
The study of language use in context and of language structures in conversation and written text. Lecture, discussion. Prerequisite: LIN 510 or equivalent or instructor approval.

**548 Studies in English Language.** (3) N  
This course offers selected authors or issues and may be repeated for credit.

**572 Theories Underlying the Acquisition of English as a Second Language.** (3) F  
Theories of 2nd language acquisition including the linguistic, cognitive, affective, and socio-cultural aspects.

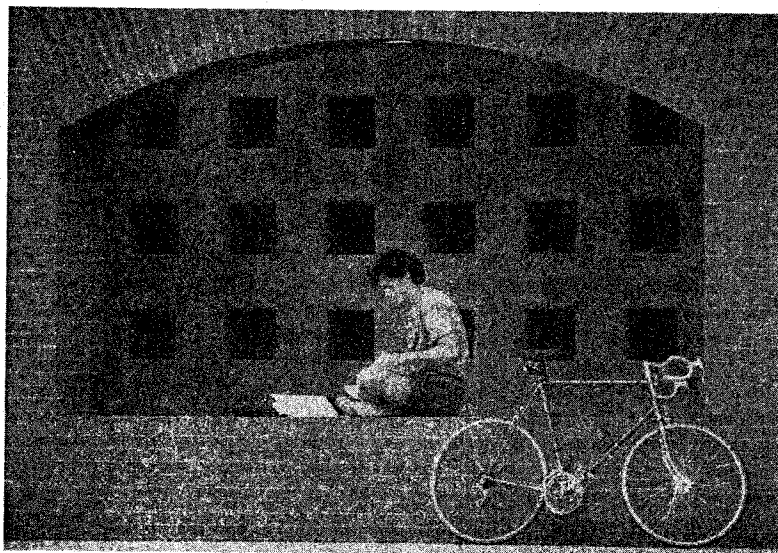
**574 The Teaching of English as a Second Language.** (3) S  
Methods of teaching English as a 2nd language, language teaching trends, practical applications, and the teaching of different skills. Prerequisite: LIN 572 or instructor approval.

**575 Advanced Studies in the Teaching of English as a Second Language.** (3) F  
Current research issues in the teaching and learning of English as a 2nd language. Prerequisite: LIN 572 or instructor approval.

**576 Sociolinguistic Aspects of Second Language Acquisition.** (3) N  
A survey of studies in 2nd language acquisition in the context of recent sociolinguistic theory.

**577 Grammar for TESL.** (3) N  
A survey of major grammatical structures in English and how they can be taught to ESL speakers. Lecture, discussion. Prerequisite: LIN 510.

**593 Applied Project.** (3) F, S  
Preparation of a supervised applied project that is a graduation requirement in the TESL professional major. Independent study with consultation.



## Environmental Design and Planning

Michael D. Kroelinger  
 Director, Executive Committee  
 (AED 154D) 602/965-4620

### SCHOOL OF ARCHITECTURE

Regents' Professor: J. Cook;  
 Professors: Boyle, El Diasty, Scheatzle;  
 Associate Professors: McIntosh, Ozel,  
 Zygus; Assistant Professor: Biln

### SCHOOL OF DESIGN

Professors: Kroelinger, Resnikoff;  
 Associate Professors: Brandt, Witt;  
 Assistant Professor: Sadler

### SCHOOL OF PLANNING AND LANDSCAPE ARCHITECTURE

Professors: Brady, Brock, Kihl, Pijawka,  
 Steiner; Associate Professors:  
 E. Cook, Kim, Miller, Whyson;  
 Assistant Professors:  
 Guhathakurta, Yabes

The Committee on Environmental Design and Planning offers a college-wide interdisciplinary program leading to the Doctor of Philosophy degree with a major in Environmental Design and Planning. Three areas of concentration are available: design; history, theory, and criticism; and planning. The faculty of the Schools of Architecture, Design, and Planning and Landscape Architecture participate in offering the degree. Faculty from disciplines outside of the College of Architecture and Environmental Design may participate in offering the program if appropriate to the interdisciplinary nature of the student's research interest.

### DOCTOR OF PHILOSOPHY DEGREE

The Doctor of Philosophy degree in Environmental Design and Planning is an individualized collegewide interdisciplinary degree that integrates graduate courses and faculty research expertise from a variety of academic areas: architecture, building design, environmental planning, environmental resources, industrial design, and interior design. The program is at the cutting edge of creating new knowledge in environmental design and planning. It complements interdisciplinary research relating to energy systems, environmental science and ecology, history and development of culture, materials science and engineering, and urban and

regional studies. Broad in scope, the program involves multidisciplinary research interests at both micro- and macro-scale levels of design and planning. The program provides research experience for students wishing to pursue careers in academe and in industry as members of interdisciplinary design and planning teams on environmental and energy issues, as well as for those wishing to teach in the architecture, design, or planning fields.

### Areas of Concentration

The Ph.D. in Environmental Design and Planning offers concentrations in the following areas based on the research and teaching expertise of participating faculty.

**Design.** Design—micro-scale issues in the designed environment—includes the study of architecture, building science, industrial design, interior design, and landscape architecture. Research fields include acoustics, affordable housing, climate-responsive building, computer-aided design, energy modeling, human factors in design, facilities planning and management, fire protection, industrialized housing, landscape architecture, lighting, passive solar energy and conservation, and site planning.

**History, Theory, and Criticism.** History, theory, and criticism—cultural and theoretical issues in the history of the environment—includes the study of architecture, environmental planning, industrial design, interior design, landscape architecture, and urbanism. Research fields include study of the arts and crafts movement, contemporary criticism and analysis, design theories and methods, history of building science, history of city planning, landscape theory and criticism, and the study of the history of architecture and design.

**Planning.** Planning—macro-scale issues in the planned environment—includes the study of environmental resource management, landscape architecture, planning, and urban design. Research fields include contemporary urban design, economic development, environmental assessment, environmental planning, ethics in planning, housing and urban development, international development planning, landscape ecology, legal aspects of planning, planning for ethnically diverse populations, the

protection of environmentally sensitive areas, public participation, social dimensions of planning, urban design policy, urban planning, and urban and regional development.

**Admission.** Students are admitted to the Ph.D. program only upon completion of a master's degree in architecture, industrial design, interior design, landscape architecture, or planning or upon the demonstration of equivalent standing.

In addition to meeting Graduate College admission requirements, applicants must submit

1. a minimum of three letters of reference;
2. a sample of written work and any other evidence relevant to admission to the program;
3. a statement of purpose (summarizing career objectives and reasons for pursuing doctoral education, and indicating proposed area of concentration and a potential mentor in the College of Architecture and Environmental Design); and
4. Graduate Record Examination (GRE) scores.

A Test of English as a Foreign Language (TOEFL) score of at least 600 is required of all applicants whose native language is not English.

**Program of Study.** The Ph.D. in Environmental Design and Planning is structured as a 54-semester-hour post-master's program, not as an 84-semester-hour postbaccalaureate program. Students must be thoroughly familiar with design and planning and are expected to demonstrate a high level of academic maturity before being admitted to the program.

Each student entering the Ph.D. program is required to submit a program of study during the first year. The director of the Ph.D. program appoints a program committee composed of a minimum of three faculty from the areas of concentration. This committee includes a prospective mentor and is responsible for approving the student's program of study and monitoring the student's progress in the program. The program of study consists of a minimum of 54 semester hours of graduate work beyond the master's degree. Of the 54 semester hours, 24 must be research and dissertation credit. At least 30 semester hours of the remainder, ex-

clusive of dissertation and research hours, must be completed after admission to the Ph.D. program at ASU.

The student is required to take 15 semester hours in the area of concentration and a minimum of nine semester hours of specialized course work outside the area of concentration; an additional six semester hours in current research and research methods is required.

#### **Preliminary Candidate Evaluation.**

Before the end of the first academic semester of course work, the student's program committee conducts a preliminary evaluation of the student. The evaluation is based on a written and oral examination, and is directed at one of the following three areas of concentration:

1. design;
2. history, theory, and criticism; and
3. planning.

Performance on the preliminary candidate evaluation examination serves as a guide to the student's program committee as the committee members counsel the student and formulate a program of study.

#### **Foreign Language Requirements.**

None.

**Comprehensive Examinations.** Upon completion of course work in the Ph.D. program of study and before admission to candidacy and the start of dissertation research, the student must take a written examination on his or her knowledge of the chosen area of concentration and interdisciplinary knowledge, including the ability to communicate across disciplines. An oral examination follows the written examination.

**Dissertation Requirements.** The dissertation must consist of a fully documented written analysis of a problem that is original in nature and extends the knowledge and/or theoretical framework of the field. The research must demonstrate the student's creativity and competence in independent research.

**Final Examinations.** A final oral examination in defense of the dissertation is required. A candidate must pass the final examination within five years after completing the comprehensive examination.

#### **Research Activity**

The College of Architecture and Environmental Design maintains a rooftop testing laboratory for solar research, a high-bay research facility, a lighting simulation laboratory, a human factors laboratory, an urban design laboratory, an extensive shop facility, computing resources and laboratories, material resource center, a general rangeland ecology laboratory, a soils and riparian research laboratory, GIS laboratory, and a range-wildlife nutrition ecology laboratory. These facilities are augmented by the CAED library, media center, and the Gallery of Design.

Facilities for basic research activities and community service oriented programs in energy technology, design, real estate development, and planning are also provided by the college through the Herberger Center for Design Excellence and the joint urban design program.

Faculty from the three schools participate in research in the following broadly defined areas.

**School of Architecture.** Architectural design methodology, solar architecture design, energy performance in buildings, architectural computing and graphics, facilities development and management, environments for aging, housing, urban design, building technology, environmental analysis and programming, passive cooling and heating, ecotechniques, arid region building and systems design, and architectural history.

**School of Design.** Problem solving strategies; problem definition; aesthetic, political, economic, and social theories; design history, methodology, theory, and criticism; methods as applied to materials culture and human expression; theories and methods of human factors and ergonomics; design production, planning, and marketing; acoustics and lighting design; perception and visual performance; computer imaging, visualization, analysis, and perception; human-machine interface design; product semantics, appropriate technology, and environmental issues; environmental graphics; environmental psychology; corporate, institutional, and healthcare design; post-occupancy evaluation; aging and design; public welfare and safety; rehabilitation, restoration, and preservation design; facility management methodology; design edu-

cation theory; design forecasting; and collaborative learning and design journalism.

**School of Planning and Landscape Architecture—Environmental Planning.** Research is primarily conducted in the four areas described below.

#### *Urban and Regional Development.*

Housing, economic and community development, citizen participation, policy analysis, transportation, and the politics of planning.

*Urban Design.* Urban landscape design, planning and land-use law, urban design theory, development controls, and design guidelines.

*Landscape Ecological Planning.* Public land management, the conservation of renewable and nonrenewable resources, the management of solid and hazardous wastes, environmental impact assessment, environmental law, riparian and wetlands protection, and land-use planning.

*International Planning.* Housing, economic and community development, urban design, landscape ecology, and agroforestry.

**School of Planning and Landscape Architecture—Environmental Resources.** Research programs include applications of geographic information systems to resource management, monitoring of ecological change, wildlife habitat ecology, vegetation dynamics, fire ecology, soil ecology and ecosystem restoration.

Range ecology studies investigate various problems, from shrub control and hydrologic research in Arizona chaparral to the use of microcomputers in field data acquisition and the effects of power plant emission on vegetation. Other research has considered the relationships between both livestock and wildlife and their environments.

#### **Environmental Design and Planning**

In addition to the PED 700-level courses, refer to the course listing under the following majors for courses that are available to support the collegewide interdisciplinary degree program in Environmental Design and Planning: architecture, building design, environmental planning, environmental resources, industrial design, interior design, and landscape architecture.

## PLANNING AND ENVIRONMENTAL DESIGN

### EPD 700 Interdisciplinary Research Methods. (3) F

Introduction to the philosophy and methodology of interdisciplinary research in environmental design and planning. Seminar.

### 710 Current Research in Design. (3) S

Review and critical evaluation of contemporary literature and method in architecture, building science, interior design, industrial design, and landscape architecture. Seminar.

### 712 Current Research in Planning. (3) S

Review and critical evaluation of contemporary literature and method in environmental planning, landscape ecology, urban design, and urban and regional planning. Seminar.

### 714 Current Research in History, Theory, and Criticism. (3) S

Review and critical evaluation of contemporary literature and method in the theory and history of architecture, design, and planning. Seminar.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Environmental Planning

Frederick Steiner

Director

(AED 158) 602/965-7167

### PROFESSORS

KIHL, PIJAWKA, STEINER

### ASSOCIATE PROFESSORS

COOK, KIM, SAN MARTIN

### ASSISTANT PROFESSORS

FISH, GUHATHAKURTA, McSHERRY, WASSERMAN, YABES

### PROFESSOR EMERITUS

ELMORE

The faculty in the School of Planning and Landscape Architecture offer a graduate program leading to the professional Master of Environmental Planning degree with a major in Environmental Planning (concentration in urban planning). Three areas of specialty are offered urban and regional development, urban design, and landscape ecological planning. For information concerning this degree program, refer to pages 60-61. The faculty in the school also participate in offering the new Ph.D. in Environmental Design and Planning program. For information about the Ph.D. program, see pages 73-74.

## Research Activity

Faculty and students in this graduate program are involved in the following areas of research:

### *Urban and Regional Development.*

Housing, economic and community development, citizen participation, policy analysis, transportation, and the politics of planning.

*Urban Design.* Urban landscape design, planning and land-use law, urban design theory, development controls, and design guidelines.

*Landscape Ecological Planning.* Public land management, the conservation of renewable and nonrenewable resources, the management of solid and hazardous wastes, environmental impact assessment, environmental law, riparian and wetlands protection, and land-use planning.

*International Planning.* Housing, economic and community development, urban design, landscape ecology, and agroforestry.

## URBAN AND ENVIRONMENTAL PLANNING

### PUP 412 History of the City. (3) F

The city from its ancient origins to the present day. Emphasis on European and American cities during the last five centuries. Cross-listed as APH 414. *General studies: H.*

### 420 Theory of Urban Design. (3) S

Analysis of the visual and cultural aspects of urban design. Theories and techniques applied to selected study models. Cross-listed as PLA 420. Prerequisite: junior standing. *General studies: HU.*

### 433 Zoning Ordinances, Subdivision Regulations, and Building Codes. (3) F, S

Analysis of zoning ordinances, subdivision regulations, building codes, and other planning implementation techniques relative to local development.

### 442 Environmental Planning. (3) F

Environmental planning problems, including flood plains, water quality and quantity, solid and hazardous waste, air quality, landslides, and noise. Field trips. Prerequisite: PUP 301 or instructor approval.

### 444 Preservation Planning. (3) S

History, theory, and principles of historic preservation. Emphasis on legal framework and methods practiced. Lecture, off-campus field study. Prerequisite: instructor approval.

### 445 Women and Environments. (3) F

Examines the role women play in shaping the built environment; ways built/natural forms affect women's lives. Focus on contemporary U.S. examples. Prerequisite: upper division or graduate status. *General studies: C.*

### 452 Ethics and Professional Practice. (3) S

Ethical problems and issues in planning, professional practice, and decision making. Prerequisite: department major or instructor approval. *General studies: L2.*

### 485 International Field Studies in Planning and Landscape Architecture. (1-12) F, S, SS

Organized field study of planning and landscape architecture in specified international locations. May be repeated for credit with department approval. Study abroad. Cross-listed as PLA 485.

### 510 Citizen Participation. (3) S

Theory and practice of citizen participation in planning. Examines and critiques participation techniques and roles of planners. Prerequisite: instructor approval.

### 520 Planning Theories and Processes. (3) F

Review of past and current theoretical developments (related to social change perspectives, the role and ethics of planners. Prerequisite: instructor approval.

### 524 Planning Methods I: Planning Research Methods. (3) F

Tools useful for urban planning research; emphasis on research design and survey methods. Prerequisite: PUP 301 or instructor approval.

### 525 Urban Housing Analysis. (3) F

Nature, dimensions, and problems of urban housing, government policy environment, and underlying economics of the housing market.

### 531 Planning and Development Control Law. (3) S

Case studies on police power, eminent domain, zoning, subdivision controls, exclusion, preservation, urban redevelopment, and aesthetic and design regulation.

### 532 Advanced Urban Planning Law. (3) S

Advanced study on selected issues in planning law, such as urban design controls, exclusionary practices, compensable regulation, and tax policy. Prerequisite: PUP 432 or instructor approval.

### 544 Urban Land Use Planning. (3) F

Theory and methods of urban land use planning, including the rational planning process, comprehensive, functional, and neighborhood plans. Prerequisite: PUP 301 or instructor approval.

### 546 Urban Design Policy. (3) N

Advanced study of local, state, and federal urban design policy. Cross-listed as PLA 546. Prerequisite: PLA/PUP 420.

### 561 Urban Design Studio. (4) N

Current urban form and urban landscape design problems within the Phoenix-centered region. Studio. Prerequisite: PLA/PUP 420 or instructor approval.

### 572 Planning Studio I: Data Inventory and Analysis. (4) F

Comprehensive planning workshop dealing with real community problems. Focus on the data gathering and analysis steps of the planning process. Prerequisite: Master of Environmental Planning student or instructor approval.

### 574 Planning Studio II: Options and Implementation. (4) S

Comprehensive planning workshop dealing with real community problems. Focus on the development of options, plan making, and plan implementation. Studio. Prerequisite: PUP 572 or instructor approval.



**575 Environmental Impact Assessment.** (3) S

Criteria and methods for compliance with environmental laws; development of skills and techniques needed to prepare environmental impact statements/assessments.

**584 Internship.** (3) F, S, SS (SS1 only)  
Internship under the supervision of practitioners in the Phoenix area or other locales. Credit/no credit.

**622 Planning Methods II: Quantitative Planning Analysis.** (3) S

Methods and models used as the basic quantitative techniques of urban, regional, and environmental planning and policy analysis. Prerequisites: PUP 424; statistics; instructor approval.

**642 Land Economics.** (3) F

Land use and locational impact of economic activity and the urban real property market. Prerequisite: instructor approval.

**644 Public Sector Planning.** (3) N

Urban fiscal problems and public goods provision in state and local governments. Prerequisites: instructor approval; 1 course in microeconomics.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**LANDSCAPE ARCHITECTURE****PLA 442 Landscape Construction I.** (3) F

Landscape constructions focusing on landform transformations. Topics include landform analysis, grading, and earthwork. Studio. Prerequisite: admission to department's professional level or instructor approval.

**443 Landscape Architecture Theory and Criticism.** (3) S

Landscape architecture theories and projects are critically analyzed to evaluate validity of design and contribution to society. Prerequisites: PLA 310, 361, 420; PUP 412.

**444 Landscape Construction II.** (3) S

Characteristics of materials and methods used in landscape architectural construction. Studio. Prerequisite: PLA 442 or instructor approval.

**461 Landscape Architecture V.** (5) F

Landscape ecological planning: collection and application of ecological data relevant to planning and design at landscape scale. Studio. Prerequisite: PLA/PUP 362 or instructor approval.

**485 International Field Studies in Planning and Landscape Architecture.** (1-12) F, S, SS

Organized field study of planning and landscape architecture in specified international locations. May be repeated for credit with department approval. Study abroad. Cross-listed as PUP 485.

**546 Urban Design Policy.** (3) N

Advanced study of local, state, and federal urban design policy. Cross-listed as PUP 546. Prerequisite: PLA/PUP 420.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**Environmental Resources**

Frederick Steiner

Director

(AED 158) 602/965-7167

**PROFESSORS**

BRADY, BROCK

**ASSOCIATE PROFESSORS**

MILLER, WHYSONG

**ASSISTANT PROFESSOR**

GREEN

The faculty in the School of Planning and Landscape Architecture offer a program leading to the Master of Science degree in Environmental Resources. Areas of study are offered in natural resource management and range ecology.

The faculty in the school also participate in offering the new Ph.D. in Environmental Design and Planning program. For information about the Ph.D. degree program, see pages 190-192.

**Admission.** Applicants to the program are expected to meet the minimum requirements for admission to the Graduate College. In addition, scores from the Graduate Record Examination (GRE) or Miller Analogies Test (MAT) are required. Applicants are expected to have completed 18 semester hours in environmental sciences or closely related courses. Applicants not meeting these requirements may be considered for admission with deficiencies.

Submit the following separate application materials to:

**ENVIRONMENTAL RESOURCES****PROGRAM****SCHOOL OF PLANNING AND****LANDSCAPE ARCHITECTURE****ARIZONA STATE UNIVERSITY**

PO Box 872005

TEMPE AZ 85287-2005

1. a statement of intent (maximum 600 words) explaining (a) the applicant's interest in environmental resources; (b) the applicant's academic background; and (c) the applicant's educational objectives;

2. three letters of recommendation from references who are qualified to comment on the applicant's potential in the selected area of study; and
3. a résumé.

**Application Deadlines.** For fall enrollment, application materials are due in the School of Planning and Landscape Architecture and the Graduate College on March 15.

For spring enrollment, application materials are due in the School of Planning and Landscape Architecture and the Graduate College on October 15.

**Selection Procedures and Notifications.** School faculty evaluate the applications and supporting materials and recommend to the Graduate College whether the applicant should be granted regular or provisional admission or if admission should be denied. If admission is provisional, the Graduate College specifies in its letter of admission the provisions to be met to gain regular status. The school informs successful applicants of the procedures for enrollment.

**Program of Study.** A minimum of 30 semester hours of approved graduate course work is required. All students are required to complete a 13 semester hour core curriculum. First year students are expected to complete ERS 550 Vegetation Dynamics, ERS 591 Environmental Resources Seminar, and ERS 594 CW: Environmental Resources Statistics. Second year students are required to complete ERS 591 in the fall semester. Students can complete ERS 485 GIS in Natural Resources or ERS 486 Remote Sensing in Environmental Resources (or an approved substitute if the student has previously taken both ERS 485 and 486) at any time during their residence. All students are also expected to complete a minimum of three semester hours of research and three semester hours of thesis. The remaining hours (11 semester hours) are chosen to support the student's educational objectives.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** None.



**Thesis Requirements.** A thesis is required.

**Final Examinations.** A final oral examination covering the thesis and related subject matter is required.

### Research Activity

Faculty and graduate students in Environmental Resources are active in a number of research programs, including applications of geographic information systems to resource management, monitoring of ecological change, wild-life habitat ecology, vegetation dynamics, fire ecology, soil ecology, and ecosystem restoration. Range ecology studies investigate various problems, from shrub control and hydrologic research in Arizona chaparral to the use of microcomputers in field data acquisition and the effects of power plant emission on vegetation. Other research has considered the relationships between both livestock and wildlife and their environments.

### ENVIRONMENTAL RESOURCES

**ERS 402 Range Habitat Inventory.** (4) S Vegetation sampling and inventory as related to animal-habitat relations. Lecture, lab, 1 weekend field trip. Prerequisites: CSE 180, ERS 350, 360, department major, or instructor approval.

**407 Range Plants and Habitats.** (4) F The distribution, ecological characteristics, identification of key plants, and values of habitats on western rangelands. Laboratory emphasis on grass identification. Lecture, lab. Prerequisite: BOT 370 or equivalent.

**410 Wildlife Habitat Relations.** (3) N Interactions among animal populations and their habitat. Systems simulation of population dynamics as influenced by competition and management strategies. Lecture, 1 weekend field trip. Prerequisite: ERS 360.

**420 Range Habitat Improvements.** (3) S Techniques of restoration ecology applied for the improvement of arid and semiarid rangelands with associated riparian habitats. Weekend field trips. Prerequisite: ERS 360.

**425 Soil Classification and Management.** (3) N Principles of soil genesis, morphology, and classification. Management and conservation practices will be presented. Prerequisite: ERS 325.

**433 Riparian Ecosystem Management.** (3) N Examination of the functions and components that make up riparian ecosystems and the management of these ecosystems. Lecture, field trip. Prerequisite: ERS 325 or instructor approval.

**446 Soil Fertility.** (3) S Ability of soils to retain and supply plant nutrients. Reactions of fertilizers in soils. Prerequisites: ERS 325, 326.

**448 Soil Ecology.** (3) N Soils viewed in an ecosystem context, soil-plant relationships, nutrient budgets, and abiotic factors that influence soil processes. Prerequisites: BIO 320 and ERS 325 and 326 or instructor approval.

**452 Soil, Water, and Irrigation.** (3) N Water measurement, conveyance, and conservation, with emphasis on crop production and soil-plant water relations. Prerequisite: ERS 325.

**460 Applied Systems Ecology.** (3) N The systems approach applied to analysis and management of natural resource ecosystems. Use of simulation models. Prerequisites: ERS 350 or equivalent; 1 course in ecology.

**470 Land Reclamation.** (3) N Problems of reestablishing vegetation on disturbed sites. Special revegetation techniques, surface modifications, and government regulations. 1 weekend field trip. Prerequisites: ERS 407 and 420 and 446 and 448 or instructor approval.

**475 Wildlife and Range Animal Management.** (3) S Principles and techniques for management of domestic and nondomestic animals using rangeland ecosystems. Emphasis on practical applications of management. Weekend field trips. Prerequisite: instructor approval.

**480 Natural Resource Planning.** (3) S Planning for management and conservation of wildland ecosystems. Ecological, economic, and social constraints on long-term sustainable resource development. Computer tools for resource planning. Lecture, 1 weekend field trip. Prerequisites: ERS 402 or equivalent; senior standing.

**485 GIS in Natural Resources.** (3) F Principles of Geographic Information Systems (GIS) utilized in natural resource management. Use of computers for spatial analysis of natural resources. Lecture, lab. Prerequisite: CSE 180 or equivalent.

**486 Remote Sensing in Environmental Resources.** (4) S Principles and application of remote sensing technologies in natural resource management. Integration of computerized data from aerial photography and Landsat imagery in resource management. Lecture, lab. Prerequisite: ERS 485 or equivalent.

**490 Recent Advances in Environmental Resources.** (1) N Current literature and significant developments involving environmental resources. May be repeated for credit.

**540 Plant Responses to Environmental Stresses.** (3) N Reaction of plants to environmental stresses; herbivores, fire, pesticides, mechanical treatments, aerial pollutants, and soil amendments. 1 weekend field trip. Prerequisites: BOT 360 and ERS 420 or instructor approval.

**548 Plants, Soils, and Environmental Quality.** (3) N Effects of air quality on plants and soils, and their role in removing contaminants from the atmosphere. Prerequisite: ERS 325.

**550 Vegetation Dynamics.** (4) F Dynamics of vegetation emphasizing concepts of ecological succession, applications of landscape ecology, and impacts of herbivory. Field trips required. Lecture, lab.

**553 Advanced Animal Nutrition.** (4) F Metabolic and physiological interactions of nutrients in wild and domesticated animals consuming natural feeds. Lecture, lab.

**560 Systems Ecology.** (3) N Quantitative description and mathematical modeling of ecosystem structure and function. Techniques for model construction and simulation. Lecture, lab. Prerequisites: ERS 350 or equivalent; computer programming; 6 hours in ecological studies.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Exercise Science

### Doctoral Program Interdisciplinary Faculty

Daniel M. Landers  
*Director, Executive Committee*  
(PEBE 112) 602/965-7664

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#### ANTHROPOLOGY

Associate Professor: Marzke

#### CHEMICAL, BIO AND MATERIALS ENGINEERING

Associate Professor: Yamaguchi;  
Assistant Professor: Sweeney

#### CHEMISTRY AND BIOCHEMISTRY

Professor Emeritus: Harris

#### EXERCISE SCIENCE AND PHYSICAL EDUCATION

Regents' Professor: Landers;  
Professors: Burkett, Krahenbuhl,  
Stelmach, Stock, J. Thomas, Wells;  
Associate Professors: Hinrichs,  
Martin, Willis; Assistant Professors:  
Matt, K. Thomas

#### FAMILY RESOURCES AND HUMAN DEVELOPMENT

Associate Professor: Manore

#### PSYCHOLOGY

Professors: Karoly, Linder

#### PSYCHOLOGY IN EDUCATION

Regents' Professor: Kulhavy;  
Professor: Glass

#### ZOOLOGY

Professors: Hazel, Satterlie;  
Assistant Professor: J. Harrison

The Committee on Exercise Science offers an interdisciplinary graduate program leading to the Doctor of Philosophy degree in Exercise Science. The committee functions in setting guidelines and supervising programs of study. One of the unique features of this interdisciplinary program is that, because it utilizes faculty research and teaching interests from a number of

academic units, a student may tailor a course of study to fit individual needs and goals. The present committee is composed of members from the following academic units: Anthropology; Chemical, Bio and Materials Engineering; Chemistry and Biochemistry; Exercise Science and Physical Education; Family Resources and Human Development; Psychology; Psychology in Education; and Zoology. Courses, however, are not limited to these academic units. Concentrations are available in biomechanics, physiology of exercise, and motor behavior/sport psychology.

### DOCTOR OF PHILOSOPHY DEGREE

The Doctor of Philosophy degree in Exercise Science is an individualized interdisciplinary degree that integrates graduate courses from a variety of academic units to provide a sound foundation for research leading to a dissertation in Exercise Science. Topics for these dissertations come from one of three research areas: biomechanics, physiology of exercise, and motor behavior/sport psychology.

**Admission.** In addition to meeting Graduate College requirements, students must submit a letter designating a potential area of interest, the name of a potential mentor (from the list of faculty above), and a statement of career goals to the director of the Committee on Exercise Science. Graduate Record Examination scores (verbal and quantitative), a professional résumé, and three letters of recommendation must also be submitted. All applicants whose native language is not English must submit a TOEFL score. Preference is given to applicants already holding a master's degree, although exceptional students possessing only a baccalaureate degree may apply. Admission decisions are based on the compatibility of the applicant's career goals with the purpose of the degree program, previous academic training and performance, GRE scores, recommendations, and the ability of the potential mentor to devote time to an additional student. To be considered for research or teaching assistantships, all application materials should be received before February 1.

**Program of Study.** The program of study consists of a minimum of 54 semester hours of graduate work beyond

the master's degree (84 hours of graduate credit for applicants holding only the baccalaureate degree). Of the 54 hours, 24 are research and dissertation credit to be completed at ASU. The student should expect to devote at least one to two years to completing the dissertation. At least 30 hours of the approved Ph.D. program in which the student is enrolled, exclusive of dissertation and research hours, must be completed at ASU. An individual program of study is selected in consultation with the student's supervisory committee. The program of study reflects the interdisciplinary nature of the degree program. Students are expected to have fulfilled a majority of the foundational course work before admission. Prerequisites that have not been completed must be taken as remedial work in addition to the program of study.

**First-Year Evaluation.** The student must pass an examination, given during the third week of the first semester. The examination covers the area of concentration as well as statistics/research design and allied areas. The examination is both diagnostic and qualifying in the concentration area. If the student passes the written examination in the concentration area, the results in the allied areas serve as a guide to the supervisory committee in formulating a program of study. If the student's performance on the written examination in the area of concentration is marginal or unsatisfactory, the student must take an oral examination or another written examination within one semester. Failure to qualify on the second examination results in a recommendation to the Graduate College for dismissal.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Upon completion of course work and before commencing dissertation research, the student is given written and oral examinations. After the student has passed the comprehensive examinations, a dissertation committee is appointed by the dean of the Graduate College. After the dissertation committee has approved the dissertation prospectus, the student is eligible to apply for admission to candidacy.

**Dissertation Requirements.** The dissertation must consist of a fully documented written analysis of a problem

that extends the knowledge and/or theoretical framework of the field. The research should demonstrate the student's creativity and competence for independent research.

**Final Examinations.** A final oral examination in defense of the dissertation is required. The candidate must take the final oral examination in defense of the dissertation within five years after passing the comprehensive examinations. Any exception must be approved by the supervisory committee, the director of the Committee on Exercise Science, and the dean of the Graduate College and ordinarily involves repetition of the comprehensive examinations.

### Research Activity

Faculty composing the Committee on Exercise Science are engaged in a variety of research activities. The following list includes some of the most recent research interests.

*Biomechanics.* Mechanical determinants of economical gait; upper extremity contributions during walking and running; evaluation of methods for estimating segment inertial properties; and the mechanics of swimming techniques and archery shooting technique.

*Physiology of Exercise.* Exercise and cardiovascular disease; CHD risk factors; thermal adaptation; exercise prescription; oxygen consumption; body composition; endocrine responses to exercise; cell membrane lipid metabolism; epithelial transport of ions; cellular enzyme activity; mitochondrial and cellular bioenergetics; muscle physiology; hepatic exercise metabolism; free radical production during exercise; neuromuscular fatigue; exercise and aging; physiological, biochemical, and hormonal aspects of stress; physiological aspects of the exercising female; cardiovascular and metabolic aspects of wheelchair training; and optimization of physical training programs.

*Motor Behavior/Sport Psychology.* Autonomic and central nervous system mediators of behavior; exercise and mental health; psychophysiological/cognitive/motor processes; attention; feedback; coordination; force production; neuromotor impairments; control and coordination of movement; arousal and attention in skilled performance; mental preparation strategies; coping and adaptation; aging and motor coordination; cognitive factors and sport

skill performance; and development of gender differences in sport and motor performance.

**Exercise Science.** For courses which are available to support the interdisciplinary degree program in exercise science, refer to the course listings under the following majors: Anthropology, Bioengineering, Chemical Engineering, Chemistry, Educational Psychology, Family Resources and Human Development, Exercise Science/Physical Education, Psychology, and Zoology. A limited number of applicable courses are also available through other departments.

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### Exercise Science/ Physical Education

William J. Stone  
Chair  
(PEBW M201) 602/965-3591

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#### REGENTS' PROFESSOR LANDERS

**PROFESSORS**  
BURKETT, CORBIN, CORDER,  
DARST, KRAHENBUHL,  
OSTERHOUDT, PANGRAZI,  
STELMACH, STOCK, STONE,  
J. THOMAS, WELLS

**ASSOCIATE PROFESSORS**  
DEZELSKY, HINRICHS,  
MARTIN, WILLIS

**ASSISTANT PROFESSORS**  
KELLEY, MATT, K. THOMAS, SWAN

The faculty in the Department of Exercise Science and Physical Education offer a graduate program leading to the Master of Science degree in Exercise Science/Physical Education. Faculty also participate in two interdisciplinary Ph.D. programs: (1) Exercise Science with concentrations in biomechanics, physiology of exercise, and motor behavior/sport psychology and (2) Curriculum and Instruction with concentrations in exercise and wellness and physical education.

Students admitted to the Master of Education degree program in Secondary Education may elect exercise science/physical education as the subject matter field. The M.Ed. is offered and administered through the College of Education. See page 60 for the program description.

### MASTER OF SCIENCE DEGREE

Applicants for the Master of Science degree program in Exercise Science/Physical Education may choose from five areas of study: biomechanics, exercise physiology, exercise and wellness, physical education (elementary, secondary, and adapted), and motor behavior/sport psychology (motor learning and control, motor development, and sport psychology). All applicants are required to submit scores from the Graduate Record Examination. Admission decisions are based upon previous academic training and performance, GRE scores, recommendations, and the ability of potential mentors to devote time to an additional student. International applicants whose native language is not English must also submit a TOEFL score. Applications are reviewed by department faculty only once a year. To be considered for admission in the fall semester, all application materials must be received by the department by February 1. The program requires a minimum of 30 semester hours, at least 21 of which must be EPE courses. Required courses with corresponding semester hours include EPE 500 (3), EPE 501 (3), and EPE 599 (6). Remaining course work is selected by the student in consultation with an advisor and supervisory committee.

**Deficiencies.** All applicants recommended for admission are evaluated for deficiencies in their academic preparation. Deficiencies are divided into two areas (1) those associated with the discipline of exercise science and physical education (human anatomy and physiology, biomechanics, exercise physiology, motor learning and development, psychosocial aspects of physical activity, and history and philosophy of sport) and (2) those associated with the area of study (a maximum of six deficiency semester hours pertinent to study in the area may be specified).

**Foreign Language Requirements.**  
None.

**Thesis Requirements.** A thesis is required.

**Final Examinations.** A final oral examination in defense of the thesis is required.

### DOCTOR OF PHILOSOPHY DEGREE IN EXERCISE SCIENCE

The Committee on Exercise Science offers an interdisciplinary graduate program leading to the Doctor of Philosophy degree in Exercise Science. The present committee is composed of members from several academic units. Information about this program is located under the description of the Exercise Science major, pages 194-196.

### DOCTOR OF PHILOSOPHY DEGREE IN CURRICULUM AND INSTRUCTION

The Committee on Curriculum and Instruction offers an interdisciplinary graduate program leading to the Doctor of Philosophy degree in Curriculum and Instruction. Information about this program is located under the description of the Curriculum and Instruction major, pages 167-169.

#### Research Activity

Laboratory research has been enhanced by the development of a 13,500-square-foot laboratory, the Exercise and Sport Research Institute, which is considered internationally as one of the finest facilities of its kind. The institute includes laboratories dedicated to exercise physiology, biomechanics, sport psychology, motor learning and control, and motor development. Another well-equipped facility is the Physical Education Research Laboratory. This 1,114-square-foot laboratory is dedicated to research on teaching and coaching as well as physical fitness education and programming.

The nature and scope of research activities in the various areas of study are listed below.

**Biomechanics.** Mechanical determinants of economical gait, gait impairments and postural control of the aged, repetitive strain syndrome in computer keyboard operators, upper extremity contributions during walking and running, estimation of segment inertial properties, mechanics of swimming techniques, and mechanics of overhand throwing.

**Exercise Physiology.** Exercise and cardiovascular disease, thermal adaptation, exercise prescription, oxygen consumption, body composition, endocrine responses to exercise, cell membrane lipid metabolism, epithelial transport of ions, cellular enzyme activity, exercise and aging, physiological and biochemi-

cal aspects of stress, physiological aspects of the exercising female, cardiovascular and metabolic aspects of wheelchair training, and optimization of physical training programs.

*Exercise and Wellness.* Methods of effective exercise and health promotion, effectiveness of fitness programs, fitness testing, exercise adherence, motivation and fitness, physical self-perception, and fitness/exercise knowledge and attitudes.

*Motor Behavior/Sport Psychology.*

Autonomic and central nervous system mediators of behavior, psychophysiological and cognitive correlates of information processing, arousal and attention in skilled performance, competitive anxiety, mental preparation strategies, interpersonal attraction and conflict, coping and adaptation, motor programming, spatial orientation, aging and motor coordination, cognitive factors and sport skill performance, and development of gender differences in sport and motor performance.

*Physical Education.* Analysis and measurement of teaching in the environments of elementary schools, secondary schools, and athletic coaching; attitudes and values of children and youth; curriculum models for secondary schools; effectiveness of adapted programs; pre-school physical education programs; and analysis of motor patterns in young children.

### EXERCISE SCIENCE/ PHYSICAL EDUCATION

**EPE 442 Physical Activity in Health and Disease.** (3) F

The role of physical activity and physical fitness in the development of morbidity and mortality throughout the human life span. Prerequisites: EPE 340; ZOL 201, 202. *General Studies: L2.*

**500 Research Methods.** (3) F

An introduction to the basic aspects of research, including problem selection, literature review, instrumentation, data handling, methodology, and the writing of research reports and articles.

**501 Research Statistics.** (3) S

Statistical procedures; sampling techniques; exercise testing, exercise prescription, hypothesis testing, and experimental designs as they relate to research publications.

**505 Applied Exercise Physiology Techniques.** (3) F '97

Investigative techniques used in the applied exercise physiology laboratory. Emphasis on pulmonary function, body composition, and cardiorespiratory assessment. Lecture, lab. Prerequisite: EPE 340.

**510 Introduction to Biomechanics Research Methods.** (3) F

Application of mechanics to human movement analysis. Includes consideration of two-dimensional imaging techniques, force measurement, electromyography, and data processing methods. Lecture, discussion, some labs. Prerequisite: EPE 335 or instructor approval.

**520 Sport Psychology.** (4) F

Current research in sport psychology. Includes questionnaire, psychophysiological, and behavioral research techniques. Lecture, discussion. Prerequisites: EPE 448, 500.

**521 Motor Development, Control, and Learning.** (4) S '97

Theory and research on motor skill acquisition, including learning/control and development (i.e., growth, children and exercise, and development learning). Lecture, discussion, some labs. Prerequisites: EPE 345, 500, 501.

**522 Exercise Psychology.** (3) S

Contemporary research and theory as related to human behavior and health in an exercise setting. Lecture, discussion. Prerequisite: EPE 500.

**530 Exercise Physiology.** (3) F

Immediate and long-term adaptations to exercise with special reference to training and the role of exercise in cardiovascular health. Prerequisite: EPE 340.

**531 Physiology of Women in Sport.** (3) S

Physiological aspects of women engaging in physical activity. Factors affecting performance and health throughout life are emphasized. Prerequisite: EPE 340.

**532 Environmental Aspects of Human Performance.** (3) N

Physiological response mechanisms to desert, arctic, mountain, and undersea environments with emphasis on exercise performance. Prerequisite: EPE 530.

**534 Sports Conditioning.** (3) F

Bases of sports conditioning, including aerobic and anaerobic power, strength, flexibility, and analysis of conditioning components for sports.

**535 Factors Influencing Exercise Performance.** (3) S

Physiological factors that can affect the ability to exercise, and the body's response to exercise. Lecture, seminar. Prerequisite: EPE 530.

**544 Fitness/Wellness Management.** (3) F

Development of the fitness/wellness industry. Planning, organizing, promoting, and managing fitness/wellness programs.

**550 Historical Bases of Physical Education.** (3) N

Golden Age of Greece, Renaissance, and modern Europe. Cultural, economic, and educational forces that influenced the development of physical education, dance, and athletics in the United States.

**555 Sport and the American Society.** (3) F

Impact of sports upon the American culture, with focus on competition, economics, myths, minorities, and the Olympic syndrome.

**560 Theory of Administration.** (3) N

Administrative philosophies, development of concepts related to processes of administration, types of administrative behavior, tasks and responsibilities of the administrator, and the evaluation of the effectiveness of administration.

**561 Administration of Athletics.** (3) N

Managing an athletic program, including financing, budget policies, staging, and promotion of athletic contests, schedules, travel insurance, and current athletic trends.

**570 Programs and Special Topics in Adapted Physical Education.** (3) F

Contemporary adapted, developmental, remedial, and corrective physical education programs; understanding of principles, problems, and recent developments in this area.

**571 Improving Sport Skills.** (3) SS

Factors in successful motor performance in skills used in individual, dual, and team sports.

**572 Trends and Issues in Physical Education.** (3) S

Literature, research, and practices in contemporary physical education, including finances, Title IX, teaching and coaching philosophies, school organization, and nonteaching physical education programs.

**573 Curriculum and Instruction in Secondary Physical Education.** (3) F

Current curriculum and instruction practices and research in secondary school physical education. Prerequisite: ESPE major or teaching experience.

**574 Analysis of Teaching Behavior in Sport and Physical Education.** (3) N

Use of systematic, direct observation techniques in analyzing and evaluating instruction in sport and physical education. Lecture, lab.

**575 Teaching Lifetime Fitness.** (3) S

Organizing and implementing physical fitness programs in the schools with emphasis on individual problem solving.

**576 Physical Education for Elementary School Children.** (3) F

Current practices and research pertaining to elementary school physical education programs.

**610 Advanced Topics in Biomechanics.** (3) S

Three-dimensional imaging techniques, data analysis theory, and integration of biomechanics research tools; includes original research project. Lecture, discussion, some labs. Prerequisite: EPE 510 or instructor approval.

**620 Developmental Motor Skill Acquisition.** (3) S '97

Cognitive-motor theories of learning/performance applied to children's motor skill acquisition. Study of knowledge development and research analysis/techniques. Lecture, discussion. Prerequisite: EPE 521.

**621 Motor Learning/Control.** (3) F '97

Discussion of contemporary research issues in motor learning and control. Includes behavioral and neurophysiological issues. Lecture, discussion. Prerequisite: EPE 521.

**630 Current Topics in Exercise Physiology.** (3) F

Discussion of contemporary research issues in exercise physiology. Lecture, seminar. Prerequisites: EPE 505, 530, 531.

**642 Exercise Epidemiology.** (3) S '96

Physical activity, exercise, and physical fitness and the development of chronic disease. Not open to students who have taken EPE 442. Prerequisites: EPE 340, 500, 501.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Family Resources and Human Development

William L. Mermis  
Chair  
(HEC 106) 602/965-6978

### PROFESSORS

FABES, HOOVER, MERMIS,  
MORGAN, PETERSON, ROOSA

### ASSOCIATE PROFESSORS

BALCAZAR, BOULIN-JOHNSON,  
CHRISTOPHER, GRIFFIN,  
HUGHSTON, JOHNSTON, MANORE,  
C. MARTIN, MONTE,  
VAUGHAN, WILSON

### ASSISTANT PROFESSORS

DUMKA, MADDEN-DERDICH, PETERS

### LECTURERS

R. MARTIN, WEIGAND

The faculty in the Department of Family Resources and Human Development offer a graduate program leading to the Master of Science degree in Family Resources and Human Development. Two concentrations are available (1) general family resources and human development with an area of study in human nutrition and foods and (2) family studies with areas of study in child development or family relationships. Within the family relationships area, students may take courses in marriage and family therapy (MFT) sufficient to meet MFT certification requirements for the state of Arizona.

Students applying to this program are required to submit scores on the Graduate Record Examination (verbal and quantitative sections).

### MASTER OF SCIENCE DEGREE

**Admission.** Applications for admission, teaching assistantships, and Cowden Fellowships are accepted until January 15 preceding the fall semester to which the applicant is seeking admission.

**Program of Study.** Courses are selected by the student along guidelines of the specific areas, after consultation with the supervisory committee. The program of study should be completed and approved by the supervisory committee by the end of the second semester of full-time graduate study upon

completion of 12 semester hours. A program of study may include more than 30 semester hours, and the exact number will be determined by program requirements and the student's supervisory committee. Acceptance of the proposed program of study must be verified by signature of the student and committee members. After approval within the department, the program of study is submitted to the Graduate College for final approval. The following requirements must be met for the two concentrations.

**General Family Resources and Human Development.** As part of the program of study, 20-23 semester hours of approved graduate course work emphasizing human nutrition and foods are required. Required courses are FRD 500, a 500-level statistics (3-6 semester hours) course approved by an advisor, six semester hours of thesis/research credit, and two graduate seminars selected from the following: FON 531, 532, 533, 538, and/or 598. The student may select courses from the following upon consultation with an advisor: FON 540, 541, 542, 544, 545, 546, 548, 550, 551, and 580. Other courses may be selected upon consultation with the advisor. The prerequisites for graduate work in this area are as follows: anatomy and physiology and laboratory, biochemistry and laboratory, general chemistry and laboratory, introductory statistics, microbiology and laboratory, organic chemistry and laboratory, and general nutrition.

**Family Studies.** The required courses are CDE 531, FAS 531, FRD 500; two statistics courses, one basic and one advanced, selected with the approval of the student's advisor; and six semester hours of thesis/research. A minimum of 34 semester hours is required for this degree program; however, 37 hours are recommended.

Additional requirements must be fulfilled in the chosen area of study.

**Child Development.** The required courses are CDE 533, six hours of CDE electives, and one FAS course selected in consultation with the advisor.

**Family Relationships.** The required courses are FAS 539, six hours of FAS electives, and one CDE course selected in consultation with the advisor.

Within the family relationships area of study, students may take courses in

marriage and family therapy to meet certification requirements for the state of Arizona. A separate application and acceptance is required for admission to the MFT specialization which includes clinical practice and supervision. Typically, the MFT specialization is a three-year program.

**Thesis Requirements.** A thesis is required.

**Final Examinations.** A final oral examination in defense of the thesis is required.

### Research Activity

Recent faculty and student research include the following subjects: nutrition and public health problems of Hispanics, ethnic families; police family-work stress; gender issues, social support; premarital sexual influence strategies, sexual expression, and relationship development; prevention programs for families, process in MFT, client expectancies, sexual enhancement; social-emotional development, peer relationships, temperament; behavioral observation of marital and family interaction; women's role as caregivers to elderly mothers; cross-cultural perspectives; family relations of mid-life and later life; physician counseling; vitamin C metabolism; vegetarian nutrition; lactation/infant formula research; postdivorce relationships between former spouses; coparental relationships after divorce; nutrition and exercise, energy balance and obesity; nutrition assessment (especially vitamin B6), women's health issues (amenorrhea, subclinical eating disorders, chronic dieting, female athlete triad), development of stereotypes, gender roles; employee assistance and wellness programs, work and the family; community mental health and consultation; development of nutritionally sound food products, food additive safety; parent-adolescent relationships, adolescent social competence, adolescent autonomy and connectedness, adolescent risk-taking, family theory; adolescent sexuality, pregnancy, parenting; parental influences; child development and mental health; prevention program development and evaluation; nutrition assessment of geriatric populations, and adolescent sexuality; adolescent educational aspirations.

## CHILD DEVELOPMENT

**CDE 430 Infant/Toddler Development in the Family.** (3) F

An examination of the development of infants/toddlers, the socialization processes of families, and the interactions of these processes. Prerequisite: CDE 232 or equivalent. *General Studies: SB.*

**437 Observational and Naturalistic Methods of Studying Children.** (3) S

In-depth examination of implementing observational and naturalistic studies of children in a variety of settings. 2 hours lecture, 3 hours lab. Prerequisites: CDE 430; 6 hours of psychology. *General Studies: L2/SB.*

**531 Theoretical Issues in Child Development.** (3) S

Major developmental theories, related research, and their application to family interaction. Prerequisites: CDE 430 and 437 (or equivalent) or instructor approval.

**533 Research Issues in Child Development.** (3) S

An in-depth exploration and critique of research focusing on child development in a family setting. Prerequisites: CDE 531; FRD 500.

**534 Applied Child Development.** (3) S

Integration of child development research and theory to understand developmental problems and their relevance to intervention strategies. Prerequisites: CDE 531; FRD 500.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## FAMILY STUDIES

**FAS 431 Parent-Adolescent Relationships.** (3) F

Dynamics of the relationships between parents and adolescents. Developmental characteristics of adolescence and the corresponding adult stage. Prerequisites: CDE 232; FAS 331.

**432 Family Development.** (3) N

Normative changes in families over time from formation until dissolution. Emphasis on the marital subsystem in middle and later years. Prerequisites: CDE 232 and FAS 331 or instructor approval.

**435 Advanced Marriage and Family Relationships.** (3) F

Recent research, issues, and trends relating to marriage and family interaction. Influence of family composition, physical environment, family patterns, and values on family dynamics. Prerequisites: FAS 331, 361. *General Studies: SB.*

**436 Conceptual Frameworks in Family Studies.** (3) S

Approaches to study families focusing on systems, interactional, exchange, conflict, and developmental frameworks. Applications to diverse individual and family situations. Prerequisites: CDE 232; FAS 331, 361.

**440 Fundamentals of Marriage and Family Therapy.** (3) S

Introduction to the fundamental orientations of marriage and family therapy.

**457 Third-World Women.** (3) F

Economic, sociopolitical, and demographic context for understanding the roles of third-world women in health, family, work, education, and community. Prerequisite: 6 hours of social science credit or instructor approval.

**530 Introduction to Marriage and Family Therapy.** (3) F

Introduction of major marriage and family therapy orientations. Review history, theory, application, and outcome research for each orientation. Prerequisite: admission to M.S. program in FRHD with a concentration in family studies or instructor approval.

**531 Family Theory Development.** (3) S

Historical and current approaches to theory development, evaluation, and application in family studies. Prerequisite: FAS 435 or instructor approval.

**535 Family Relationships in the Middle and Later Years.** (3) N

Developmental processes and generational relationships of the family in the middle and later stages of the family life cycle. Prerequisites: CDE 232 and FAS 331 or instructor approval.

**536 Dysfunctional Marriage and Family Relationships.** (3) N

A critical review of current theory and empirical evidence connecting marital and family interaction patterns with aberrant behavior. Prerequisite: PGS 466 or PSY 573 or equivalent or instructor approval.

**537 Interpersonal Relationships.** (3) F

Critical examination of current theoretical and research developments in the area of interpersonal relationships. Applications for research and intervention emphasized. Prerequisite: FAS 435 or equivalent or instructor approval.

**538 Advanced Techniques in Marriage and Family Therapy.** (3) N

An in-depth review of assumptions and advanced techniques associated with contemporary marriage and family therapy approaches. Prerequisite: a graduate-level course in marriage and family therapy or instructor approval.

**539 Research Issues in Family Interaction.** (3) F

Critical review of current and past research in the area of family dynamics. Emphasizes interactional processes within the family. Prerequisite: FAS 435 or equivalent or instructor approval.

**540 Assessment in Marriage and Family Therapy.** (3) S

Instruction in the assessment and outcome evaluation of couples and families involved in marital and family therapy. Lecture, lab. Prerequisites: FRD 500 or equivalent; PSY 530; instructor approval.

**580 Marriage and Family Therapy Practicum.** (3) F, S

Supervised clinical experience in marriage and family therapy; includes development of assessment and outcome evaluation skills. Lecture, lab. Prerequisite: instructor approval.

- (a) First semester (3)
- (b) Second semester (3)
- (c) Third semester (3)

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## FOOD AND NUTRITION

**FON 440 Advanced Human Nutrition I.** (3) F  
Metabolic reactions and interrelationships of vitamins, minerals, and water. CHM 332 recommended. Prerequisites: CHM 361; FON 241 or equivalent; ZOL 202.

**441 Advanced Human Nutrition II.** (3) S  
Metabolic reactions and interrelationships of carbohydrate, lipid, and protein. CHM 331, 332 recommended. Prerequisites: CHM 361; FON 241 or equivalent; ZOL 202.

**442 Experimental Foods.** (4) F  
Food product development techniques, food evaluation and testing, and investigation of current research into food composition. 2 hours lecture, 6 hours lab. Prerequisites: CHM 231; FON 142.

**444 Diet Therapy.** (3) S  
Principles of nutritional support for prevention and treatment of disease. Prerequisites: FON 241 or equivalent; ZOL 202.

**445 Quantity Food Production.** (3) S  
Standard methods of food preparation in quantity; operation of institutional equipment and menu planning for institutions. Experience in quantity food service. 1 hour lecture, 6 hours lab. May require field trips. Prerequisites: FON 241 (or equivalent) and 343 and 344 or instructor approval.

**446 Human Nutrition Assessment Lecture/Laboratory.** (3) S  
Clinical and biochemical evaluation of nutritional status. 2 hours lecture, 3 hours lab. Prerequisites: CHM 367; FON 440 or 441.

**448 Community Nutrition.** (3) F  
Food-related behaviors; community organization and delivery of nutrition services; program design, implementation, and evaluation strategies; nutritional assessment of population groups. PGS 100 and SOC 101 are recommended. Prerequisite: FON 241 or equivalent.

**450 Nutrition in the Life Cycle I.** (3) F  
Emphasis on nutritional needs and problems during pregnancy, lactation, infancy, and childhood. Prerequisite: FON 241 or equivalent.

**451 Nutrition in the Life Cycle II.** (3) S  
The nutritional requirements and nutrition-related disorders of adolescence, middle adulthood, and later life. Prerequisite: FON 241 or equivalent.

**531 Recent Developments in Nutrition.** (3) N  
Survey of research. Prerequisites: 1 course each in advanced nutrition and biochemistry.

**532 Current Research in Nutrition I.** (3) S  
Vitamins and minerals. Prerequisites: 1 course each in advanced nutrition and biochemistry.

**533 Current Research in Nutrition II.** (3) F  
Carbohydrates, lipids, and proteins. Prerequisites: 1 course each in advanced nutrition and biochemistry.

**538 Recent Developments in Foods.** (3) N  
Discussion and critique of current research. Prerequisite: FON 142.

**540 Advanced Micronutrient Metabolism.** (3) F

The metabolism of vitamins and minerals, primarily as applied to humans, with research literature emphasized. Prerequisites: 1 course each in basic nutrition and biochemistry.



**541 Advanced Macronutrient Metabolism.**

(3) S

The metabolism of protein, fat, and carbohydrate, primarily as applied to humans, with research literature emphasized. Prerequisites: 1 course each in basic nutrition and biochemistry.

**542 Advanced Food Product Development.**

(4) F

Principles of food product development and testing, including current government regulations. 2 hours lecture, 6 hours lab. Prerequisites: FON 142; inorganic chemistry.

**544 Therapeutic Nutrition.**

(3) S

Current theories of the nutritional prevention or treatment of various diseases. Prerequisites: 1 course each in basic nutrition and physiology.

**545 Recent Developments in Institutional Feeding.**

(3) S

Current practices in institutional feeding, including supervised practicum with local quantity food operation. 1 hour lecture, 6 hours lab. Prerequisites: FON 142 and 343 and 344 or instructor approval.

**546 Assessment Techniques in Nutrition Research.**

(2) S

Current techniques in human nutrition research. Research literature is reviewed and critiqued. Lecture, lab. Prerequisites: CHM 361, 367; FON 440 or 441.

**546L Laboratory Techniques in Nutrition Research.**

(1) S

Laboratory techniques required in nutrition research, including spectroscopy, chromatography, and RIA. Lab. Prerequisites: CHM 361, 367; FON 440 or 441.

**548 Nutrition Program Development.**

(3) F

The planning, development, implementation, and evaluation of community nutrition programs, including the process of grant applications. Prerequisites: 1 course each in basic nutrition and sociology.

**550 Advanced Maternal and Child Nutrition.**

(3) F

Metabolic characteristics and nutritional needs of the pregnant woman, lactating woman, infant, and child are reviewed in-depth. Prerequisites: 1 course each in basic nutrition, physiology, and biochemistry.

**551 Advanced Geriatric Nutrition.**

(3) S

Metabolic characteristics and nutritional requirements of the elderly are reviewed in depth. Prerequisites: 1 course each in basic nutrition, physiology, and biochemistry or instructor approval.

**580 Dietetics Practicum.**

(3-9) F, S, SS

Structured practical experience in the Preprofessional Practice Program (AP4), supervised by practitioners with whom the student works closely. Practicum. Prerequisite: acceptance into the AP4 program.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**FAMILY RESOURCES AND HUMAN DEVELOPMENT****FRD 451 Field Experience.**

(1-12) N

Supervised field placement in the area of student's concentration with a community business or agency. Students must make arrangements with instructor 1 semester in advance of enrollment. Prerequisites: completion of 60 hours; instructor approval.

**500 Research Methods.**

(4) F

Purposes of research. Experimental design, methods of data collection, and thesis proposal development. Includes practical application research laboratory. 3 hours lecture, 3 hours lab.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**HOME ECONOMICS EDUCATION****HEE 582 Program Planning in Home Economics.**

(3) S

Planning and development of home economics programs.

**583 Program Evaluation in Home Economics.**

(3) F

Theories and processes of program evaluation. Prerequisite: HEE 582.

**585 Administration and Supervision of Home Economics Education.**

(3) N

Development of individuals for state, city, school, and college leadership roles. Emphasis on supervision of student teachers.

**586 Current Trends of Teaching Home Economics.**

(3) N

Focus on teaching home economics related to current issues and problems facing families and society. Prerequisite: Family Resources and Human Development major or minor.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**Family Science****William L. Mermis***Director***(HEC 106) 602/965-6978****PROFESSORS**FABES, HOOVER, MERMIS, MORGAN,  
PETERSON, ROOSA**ASSOCIATE PROFESSORS**BALCAZAR, CHRISTOPHER, GRIFFIN,  
HUGHSTON, JOHNSTON,  
MARTIN, WILSON**ASSISTANT PROFESSORS**

DUMKA, MADDEN-DERDICH

The faculty in the Department of Family Resources and Human Development offer a degree program leading to the Doctor of Philosophy degree with a major in Family Science. An area of concentration is available in marriage and family therapy (MFT), with additional programs of study available in the nonclinical aspects of family studies.

**DOCTOR OF PHILOSOPHY DEGREE**

The Ph.D. in Family Science degree prepares clinicians and researchers in

marriage and family therapy, with a focus on family processes, family relationships, and human development within the context of families. Students receive advanced training in theory, clinical (preventive and therapeutic) strategies, research methodology, and several substantive fields that are part of family science.

The program is designed for graduates to assume leadership roles as directors or clinicians in public or privately funded mental health agencies, private practice, or government, or as researchers and academicians in universities. The program also prepares students for state certification to practice as certified marriage and family therapists.

A description of this program, along with opportunities for assistantships and fellowships, may be obtained from the director of the program.

**Admission.** Admission to the Ph.D. in Family Science is determined by the following criteria:

1. official transcripts of all undergraduate and graduate course work;
2. verbal, quantitative, and analytical GRE scores;
3. statement of goals relevant to the Ph.D. program;
4. three letters of recommendation; and
5. an application for admission to the Graduate College.

A Test of English as a Foreign Language (TOEFL) score of at least 600 is required of all applicants whose native language is not English.

**Program of Study.** Each student must prepare and submit a program of study in conjunction with the chair and members of his or her supervisory committee during the first year in the program. The program of study consists of a minimum of 105 semester hours for students entering after the bachelor's degree and 63 semester hours for students entering after the master's degree. Of the 105 semester hours for a post-baccalaureate program, six semester hours are thesis credit and 24 semester hours are research and dissertation credit. Correspondingly, the 63 semester hours of the post-master's program includes 24 semester hours of research and dissertation credit. The additional hours in both the postbaccalaureate and post-master's tracks involve

1. family science courses;
2. clinical approaches and clinical supervision courses;
3. statistics and research methods; and
4. a collateral area of study relating to family science taken outside the Department of Family Resources and Human Development.

**Foreign Language Requirements.**  
None.

**Evaluation and Comprehensive Examinations.** Progress through the program involves (1) annual evaluations of the student's performance and (2) comprehensive written examinations at the end of the student's course work.

**Practicum and Internship Requirements.** A total of 14 hours (postbaccalaureate) is required in clinical supervision, practicum, and internship. Practicum is for one year, and the internship lasts nine months.

**Dissertation Requirements.** The doctoral dissertation must be a work of original scholarship, make a significant contribution to knowledge about families, and reflect a mastery of systemic research methods.

**Final Examinations.** A final oral examination in defense of the dissertation is required.

**Research Activity.** The Department of Family Resources and Human Development provides advanced graduate training in marital and family therapy, family science, and child development. Specific areas of faculty research include marital and family therapy approaches, evaluation of marital therapy, marital and family relationships, marital interaction, parent-child relationships, parent-adolescent relationships, prevention research on children and families, children's social and emotional development, children's gender-role development, sexuality, dating relationships, and ethnic and socioeconomic diversity in marital and family relationships. Strong emphasis is placed on the acquisition of sophisticated theoretical, methodological, and statistical skills necessary to acquire research funding, publish in professional journals, and make significant contributions to existing knowledge.

**Research and Clinical Facilities.** The department's clinical and research facilities include a marriage and family clinic, marital interaction laboratory, children's social development laboratory, child development laboratory, and collaborative arrangements with the ASU Prevention Intervention Research Center. The Department of Family Resources and Human Development also provides access to sophisticated microcomputing technology within the department as well as to centralized computing services at ASU. The department offers several fellowships that provide students with collaborative research experiences under the supervision of faculty members.

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**French**

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See "Languages and Literatures,"  
pages 222-225.

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**Geography**

**Anthony J. Brazel**  
*Chair*  
(COB A338) 602/965-7533

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**REGENTS' PROFESSOR**  
GRAF

**PROFESSORS**

ARREOLA, BRAZEL, BURNS,  
COMEAX, GOBER, MARCUS,  
McTAGGART, PASQUALETTI

**ASSOCIATE PROFESSORS**

ALDRICH, BALLING, CERVENY,  
DORN, KUBY, McHUGH,  
MINGS, O'HUALLACHAIN

**ASSISTANT PROFESSORS**

FALL, SIERRA-MALDONADO

**PROFESSORS EMERITI**

ACKER, DURRENBERGER, FROST,  
HENKEL, LOUNSBURY,  
SARGENT, WEIGAND

The faculty in the Department of Geography offer graduate programs with a major in Geography leading to the Master of Arts and Doctor of Philosophy degrees. Students interested in human geography may choose areas of study in cultural, economic, land use systems, population, or urban geography; students interested in physical ge-

ography may choose areas of study in climatology or geomorphology. Students admitted to the Master of Education degree program with a major in Secondary Education may also elect geography as the subject matter field.

**MASTER OF ARTS DEGREE**

The Master of Arts program is designed to offer a specialized program of academic and professional training in geography so that the student may secure a sound graduate background for further specialization or for immediate service. The program has sufficient flexibility to allow for individual needs and interests of the student. A minimum of 30 semester hours of credit beyond the bachelor's degree is required. At least 24 hours must be in geography.

**Admission.** Applications for the Master of Arts program must be accompanied by the applicant's scores on the Graduate Record Examination (verbal and quantitative) and three letters of recommendation from professors. All applications are reviewed by the Graduate Committee and the chair of the Department of Geography. In order to be considered for financial assistance for the next academic year, students must be admitted by February 15.

It is presumed that all students entering the master's program have an adequate background in geography, including course work that is the equivalent of GPH 371 Cartography and GCU 495 Quantitative Methods in Geography. Additional prerequisite course work is required of students insufficiently prepared in geography. The program of study consists of the following elements:

GCU 529	Contemporary Geographic Thought .....	3
	or GCU 596 History of Geographic Thought (3)	
GCU 585	Advanced Research Methods in Geography .....	3
GCU/GPH 591	Seminar .....	3
GCU/GPH 599	Thesis .....	6
Total	.....	15

The remaining 15 hours are composed of a suitable combination of course work and/or research.

A student in the Master of Arts program is required to pass an oral and a written examination administered by the student's supervisory committee. The written examination consists of

questions from the area of interest. The oral examination serves as a defense of the thesis.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

Admission to the Ph.D. program requires a completed master's degree in Geography or equivalent preparation. At a minimum this preparation should include competence in cartography and quantitative methods and basic course work in human and physical geography. Students who have not already acquired these basic skills or taken these basic courses must do so during the first year of their graduate program. These courses are considered prerequisites.

To be considered for financial assistance for the next academic year, students must be admitted by February 15.

The specific academic program is carefully planned by the student in consultation with a supervisory committee. Special efforts are taken to plan a course of study compatible with the student's career objectives.

**Program of Study.** A minimum of 30 semester hours of course work at ASU beyond the master's degree is required, plus a minimum of 24 semester hours of credit in research and dissertation. All Ph.D. students are required to take GCU 585 and GCU 529 or 596.

**Foreign Language Requirements.** At the discretion of the student's supervisory committee, a reading proficiency in a foreign language may be required.

**Field Examination.** The Department of Geography requires the student to pass a two-week field problem examination before taking the comprehensive examination.

**Comprehensive Examinations.** Written and oral comprehensive examinations are required. These are taken at the completion of all course work. After students have passed the comprehensive examinations and satisfied the other requirements, they are eligible to apply for candidacy.

**Dissertation Requirements.** A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required.

**Final Examinations.** A final oral examination in defense of the dissertation is required.

### Research Activity

The university's location in the arid Southwest provides an ideal laboratory for research into arid land processes and fluvial geomorphology. In conjunction with the department's Office of Climatology, activities pursued include past climate reconstruction, climate monitoring, climate theories and models, and environmental studies from local to global scales. The Phoenix metropolitan area, populated by 2.5 million people, is an excellent setting for the investigation of land use and transportation conflicts, diverse communities, migration patterns, immigration tourism, and other issues associated with urban development in rapidly growing sunbelt cities. The region also offers the opportunity to study historical and cultural geography associated with, for example, Hispanic populations and Native American communities. Northern Mexico is within easy reach for those interested in field studies in Latin America.

### CULTURAL GEOGRAPHY

**GCU 421 Geography of Arizona and Southwestern United States.** (3) F

**423 Geography of South America.** (3) S  
Prerequisite: GCU 323 or instructor approval.  
*General Studies: SB, G.*

**424 Geography of Mexico and Middle America.** (3) A

Central America and Mexico. Prerequisite: GCU 323 or instructor approval. *General Studies: SB, G.*

**425 Geography of the Mexican-American Borderland.** (3) S

Geography of a binational and bicultural region. Examination of settlement, boundary issues, ethnic subregions, population change, industrial development, and urban growth. *General Studies: L2, G.*

**426 Geography of the Former Soviet Union.** (3) N

Prerequisite: GCU 121 or instructor approval. *General Studies: SB, G.*

**433 Geography of Southeast Asia.** (3) S  
Examines the biophysical and social features of Southeast Asian nations and peoples. Prerequisite: GCU 326 or instructor approval.

**441 Economic Geography.** (3) S  
Spatial distribution of primary, secondary, and tertiary economic and production activities. Prerequisite: GCU 141 or instructor approval.

**442 Geography of Transportation.** (3) N  
Geographic analysis of world trade routes and transportation systems. Prerequisite: GCU 141 or 441. *General Studies: SB.*

**444 Applied Urban Geography.** (3) S  
Designed to prepare the student for employment in planning agencies. Includes application of urban geographic principles to present-day planning problems. Prerequisite: GCU 361.

**453 Recreational Geography.** (3) N  
Examination of problems surrounding the organization and use of space for recreation. Introducing geographic field survey methods of data collection and analysis. Saturday field trips may be required.

**455 Historical Geography of U.S. and Canada.** (3) N

Changing geography of the United States and Canada from pre-Columbian times to about 1900. Emphasis on evolving economic patterns. Recommended for social studies teachers and students of American history.

**474 Federal Public Land Policy.** (3) F  
Geographic aspects of federal public lands, policy, management, and issues. Emphasis on western wilderness and resource development problems.

**495 Quantitative Methods in Geography.** (3) F, S

Statistical techniques applied to the analysis of spatial distributions and relationships. Introduction to models and theory in geography. Prerequisite: MAT 119. *General Studies: N2.*

**496 Geographic Research Methods.** (3) F, S  
Scientific techniques used in geographic research. Prerequisites: GCU 495; GPH 371, 491. *General Studies: L2.*

**515 Human Migration.** (3) F

Economic, political, social, and geographic factors underlying population movements. Migration selectivity, streams and counterstreams, labor migration, and migration decision making. Lecture, seminar. Prerequisite: GCU 351 or instructor approval.

**526 Spatial Land-Use Analysis.** (3) N

Determination, classification, and analysis of spatial variations in land-use patterns. Examination of the processes affecting land-use change. Prerequisite: 15 hours of geography or instructor approval.

**529 Contemporary Geographic Thought.** (3) S '97

Comparative evaluation of current philosophy concerning the nature and trends of geography. Prerequisites: 15 hours of geography; instructor approval.

**585 Advanced Research Methods in Geography.** (3) F

Specialized research techniques and methodologies in economic, political, or cultural geography.

**591 Seminar.** (1-3) F, S, SS

Selected topics in economic, political, or cultural geography. Field trips may be required.

**596 History of Geographic Thought.** (3) S '98

Development of geographic thought from Herodotus and Strabo to Humboldt and Ritter.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**PHYSICAL GEOGRAPHY****GPH 401 Topics in Physical Geography.** (1-3) A

Open to students qualified to pursue independent studies. Field trips may be required. Prerequisite: instructor approval.

**405 Energy and Environment.** (3) S

Sources, regulatory and technical controls, distribution, and consequences of the supply and human use of energy. Prerequisite: courses in the physical or life sciences or instructor approval.

**409 Synoptic Meteorology I.** (4) F '97

Diagnostic techniques and synoptic forecasting. Includes techniques of weather analysis, map interpretation, and satellite and radar analysis. Prerequisites: MAT 270; PHY 131, 132.

**410 Synoptic Meteorology II.** (4) S '98

Diagnostic techniques and synoptic forecasting. Includes techniques of weather analysis, map interpretation, and satellite and radar analysis. Prerequisite: GPH 409.

**411 Physical Geography.** (3) A

Introduction to physiography and the physical elements of the environment. Open only to students who have not taken GPH 111. Field trips.

**412 Physical Climatology.** (3) A

Physical processes in the earth-atmosphere system on regional and global scales; concepts and analysis of energy, momentum, and mass balances. Prerequisites: GPH 212 and 213 or instructor approval.

**413 Meteorological Instruments and Measurement.** (3) F '96

Design and operation of ground-based and aerological weather measurement systems. Collection, reduction, storage, retrieval, and analysis of data. Field trips are required. Prerequisites: GPH 212 and 213 or instructor approval.

**414 Climate Change.** (3) S

Processes that produce variations in climate over time and space. Includes changes in climate produced by human and natural forces and involves the analysis of climatic data to identify temporal and spatial variations. Prerequisite: GPH 212 or instructor approval.

**418 Landforms of the Western United States.** (3) A

Study landforms and geomorphic processes in the western United States, including lecture, topographical maps, aerial photographs, satellite imagery, and field trips. Lecture, critical inquiry, laboratory, field work. Prerequisites: GPH 211 or equivalent; completion of L1 class. *General Studies: L2.*

**433 Alpine and Arctic Environments.** (3) N

Regional study of advantages and limitations of the natural environment upon present and future problems involving resource distribution, human activities, and regional and inter-regional adjustments. Field trips are required. Prerequisite: GPH 111 or instructor approval.

**471 Geographic Information Systems.** (3) A

GIS as a basis for microcomputer spatial analysis and synthesis. Includes digitizing, database organization, spatial retrieval, and graphics. Prerequisite: instructor approval.

**474 Dynamic Meteorology I.** (3) F '96

Large-scale atmospheric motion, kinematics, Newton's laws, wind equation, baroclinics, vorticity, and the midlatitude depression. Prerequisites: GPH 213, 215; MAT 271; PHY 131, 132.

**475 Dynamic Meteorology II.** (3) S '97

Topics in climate dynamics. General circulation, numerical modeling, teleconnection phenomena, and surface-atmosphere interaction. Prerequisite: GPH 474 or instructor approval.

**481 Environmental Geography.** (3) A

Problems of environmental quality, including uses of spatial analysis, research design, and field work in urban and rural systems. Field trips are required. Prerequisite: instructor approval.

**491 Geographic Field Methods.** (6) S '97, SS

Field techniques, including use of aerial photos, large-scale maps, and fractional code system of mapping; urban and rural field analysis to be done off campus. Travel fees required. Prerequisites: GCU 102, 121; GPH 111.

**511 Fluvial Processes.** (3) A

Geographic aspects of fluvial geomorphology, with emphasis on river channel change, fluvial erosion, and sedimentation in the present environment. Prerequisites: GLG 101 (or GPH 111), 362 (or GPH 211).

**533 Snow and Ice.** (3) S '97

Processes, distribution, climatic interactions of snow/ice emphasizing mass balance, snow stratigraphy/metamorphism and glacier/snow-pack climatology. Lecture, field work. Prerequisite: instructor approval.

**571 Computer Mapping and Graphics.** (3) N

Utilization of the digital computer in analysis and mapping of geographic data. Includes plotting, surficial display, compositing, and graphics. Field trips. Prerequisites: GPH 371; instructor approval.

**575 Geographic Applications of Remote Sensing.** (3) N

Use of imaging and nonimaging methods of remote acquisition of data, including satellite sensors, airborne radar, multiband scanning, conventional photographic sensors, and ground-based equipment. Field trips are required. Prerequisites: GCU 585 (or GPH 491); GPH 372.

**591 Seminar.** (1-3) F, S

Selected topics in physical geography. Field trips may be required.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**Geology**

Jonathan Fink

Chair

(PS F686) 602/965-5081

**REGENTS' PROFESSORS**

BUSECK, GREELEY, MOORE

**PROFESSORS**BURT, CHRISTENSEN, FINK,  
HOLLOWAY, KNAUTH,  
LARIMER, STUMP, WILLIAMS**ASSOCIATE PROFESSORS**

PEACOCK, REYNOLDS, TYBURCZY

**ASSISTANT PROFESSORS**

ARROWSMITH, GRIMM, O'DAY

**PROFESSORS EMERITI**

KRINSLEY, LUNDIN, PÉWÉ, RAGAN

The faculty in the Department of Geology offer graduate programs with a major in Geology leading to the Master of Science and Doctor of Philosophy degrees. The faculty also participate in the programs leading to the Master of Natural Science degree when one of the concentrations is geology. (See page 67.) Students applying for admission to one of these programs must submit scores on the Graduate Record Examination Aptitude Test. Students admitted to the Master of Education degree program with a major in Secondary Education may also elect geology as the subject matter field.

**MASTER OF SCIENCE DEGREE**

The Master of Science degree consists of a minimum of 30 semester hours of work beyond the bachelor's degree; 20 or more semester hours consist of course work other than research and thesis. The program is designed to provide fundamental graduate training in geology and to prepare the student for certain careers in geology or for further graduate study.

**Entrance Examination.** All incoming students must take the Graduate Record Examination (GRE) Geology test. Course work may be assigned based on the student's performance.

**Program of Study.** The student, with the approval of the advisor, selects courses that make a coherent program of study. Each M.S. candidate must include on the program of study one hour of 500 Geology Colloquium and six hours of 592 Research and 599 Thesis, at least three of which must be 599 Thesis. A maximum of six hours of thesis may appear on a program of study. One-half of the credits applicable toward the degree must be in geology courses; the remainder may include work either in geology or related fields.

**Thesis Requirements.** A thesis based on field, laboratory, and library study is required.

**Final Examinations.** A final oral examination in defense of the thesis is required.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76–77 for general requirements.

The Doctor of Philosophy degree consists of a minimum of 54 semester hours of work beyond the master's degree. At least 25 hours must consist of course work other than research and dissertation. The program is designed to develop creative scholarship and to prepare the student for a professional career in geology.

**Entrance Examination.** All incoming students must take the Graduate Record Examination (GRE) Geology test. Course work may be assigned based on the student's performance.

**Program of Study.** The program of study is selected with the recommendation of the student's supervisory committee. Each Ph.D. candidate must include on the program of study one hour of 500 Geology Colloquium and at least 24 hours of a combination of 792 Research and 799 Dissertation.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** The student's supervisory committee must determine the content of the comprehensive examination, consisting of a written and an oral examination. Students are required to take the comprehensive examination during their third semester in residence in the Ph.D. program.

**Dissertation Requirements.** A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required.

**Final Examinations.** A final oral examination in defense of the dissertation is required.

### Research Activity

Recent faculty and student research topics include the following.

**Fission Track Analysis.** Development of fission-track techniques; application to tectonic processes and histories; uplift studies; thermal history studies; age dating.

**Geochemistry.** Isotope geochemistry and the geology of authigenic silica; environmental geochemistry; paleoclimate records; thermodynamics of fluid-mineral interfaces; synchrotron-based X-ray absorption spectroscopy (EXAFS); analytical and theoretical chemical studies of meteorites; geochemical exploration for ore deposits; trace element partitioning between minerals, fluids, and magmas; atmospheric geochemistry.

**Geomorphology.** Fault zone landforms and structure; earthquake surface rupture and paleoseismology; theoretical studies of faulting and hillslope development; engineering geologic field methods.

**Mineral Physics/Geophysics.** High-resolution transmission electron microscopy; order/disorder in clays and related minerals; amorphous to crystalline transitions; graphitic carbon and the structures of poorly crystalline materials; polytypism and stacking sequences in sheet silicates (micas, chlorites, clays); surface studies: scanning tunneling and atomic force microscopy of mineral surfaces; determination of oxidation states and specific site environments through electron energy-loss spectroscopy (EELS); TEM cathodoluminescence studies of defects; airborne minerals; small airborne particles, air quality, air pollution; electrical properties of silicate minerals, melts, and partial melts; effects of shock on hydrous minerals; grain boundary diffusion; physics and chemistry of the upper mantle; mineral thermodynamics and spectroscopy.

**Planetary Studies.** Compositional and physical properties of the terrestrial planets; comparative geomorphology of

the moon, Earth, Mars, Mercury, Venus, and the outer planet satellites; geophysical studies of planetary interiors; Venus tectonics; thermal infrared spectroscopy of planetary materials; planetary volcanic processes; laboratory simulation of eolian processes on Venus, Mars, and Earth; impact cratering experiments; meteorite studies.

**Petrology.** High temperature, high pressure phase equilibrium experiments, and models for the origin of major igneous rock types; volatile diffusion in silicate melts; experimental determination of mantle minerals and melts; field and analytical studies of temperature, pressure, and fluids during metamorphism; computer modeling of heat and mass transfer at convergent plate margins; subduction zones; continental extension; mineral equilibria in ore deposits.

**Remote Sensing.** Geologic mapping based on integrated field and remote sensing studies; multispectral mineralogical investigations; urban environmental studies.

**Seismology.** Seismic structure of active volcanic/geothermal regions; inversion for crustal attenuation and velocity; seismotectonics of active fault zones.

**Structure and Tectonics.** Structural and tectonic evolution of Arizona and the North American Cordillera; regional geology of the Transantarctic Mountains; Cordilleran tectonics; relation between fluid and tectonic processes; fission-track analysis applied to tectonics; active tectonic processes.

**Volcanology.** Explosive eruption processes; mechanisms of dike intrusion; structures in lava flows; multiphase flow in volcanic and geothermal systems textures and volatile contents of volcanic domes; mineralization related to rhyolite domes; laboratory simulation of lava flow processes; field studies throughout the western United States, Hawaii, and Central and South America.

**Center for Solid State Science and Affiliated Departments.** Analytical equipment routinely used by Geology students includes: a JEOL JSX-8600 electron microprobe analyzer/SEM equipped with an image analysis system; 10 transmission electron microscopes specialized for high-resolution imaging ( $\leq 1.7$  Å resolution), EELS and EDS chemical analysis, and surface studies, state-of-the-art scanning tun-

nelling, and "atomic" force microscopes. Automated X-ray diffraction and fluorescence facilities are available, as is an ion microprobe. The high-pressure laboratory for experimental petrology is equipped with a complete range of vessels for investigations ranging from hydrothermal alteration to partial melting of planetary mantles.

**Space Photography Laboratory.** The Space Photography Laboratory contains an extensive research collection of photographs of the moon, Mars, Mercury, and outer planet satellites. A dedicated image processing facility with interactive and hardcopy capabilities is available for research utilizing spacecraft images.

**Center for Meteorite Studies.** The Department of Geology houses one of the largest collections of meteorites in the world. Geochemical and cosmochemical research is being undertaken in the Center for Meteorite Studies, including the following topics: trace element geochemistry, nature of asteroidal interiors, computer models of condensation in the nebula, meteorite mineralogy, organic compound investigations, chemical fractionation in meteorites, elemental partitioning in meteoritic minerals, transmission electron microscopy of chondritic meteorites.



## GEOLOGY

**GLG 405 Geology of the Moon.** (3) N  
Current theories of the origin and evolution of the moon through photogeological analyses and consideration of geochemical and geophysical constraints. Possible weekend field trip. Prerequisite: GLG 105 or 305 or instructor approval.

**406 Geology of Mars.** (3) N  
Geological evolution of Mars through analyses of spacecraft data, theoretical modelling, and study of terrestrial analogs; emphasis on current work. Possible weekend field trip to Northern Arizona. Prerequisite: GLG 105 or 305 or instructor approval.

**412 Geotectonics.** (3) F  
Origin of continents and ocean basins. Evolution of the crust in time. Drifting, sea floor spreading, and other large-scale movements of the earth's crust. Upper mantle processes. Emphasis on current work. Prerequisite: GLG 310.

**416 Field Geophysics.** (3) S  
Methods of applied geophysical exploration; seismic refraction, gravity, electrical resistivity, geomagnetics. Includes survey planning, data acquisition, processing, analysis, and interpretation. Lecture, field exercises. Prerequisite: one course in geology or instructor approval.

**418 Geophysics.** (3) F  
Solid earth geophysics; geomagnetism, gravity, seismology, heat flow, emphasizing crust and upper mantle. 2 hours lecture, 3 hours lab, field trips during lab, possible weekend field trips. Prerequisites: GLG 101 and MAT 272 (or 291) and PHY 131 or instructor approval.

**419 Thermal-Mechanical Processes in the Earth.** (3) F  
Emphasis on applied mathematical techniques, heat conduction problems in geology, thermal convection, stresses in the lithosphere, and viscoelastic processes in the Earth. Prerequisite: PHY 131.

**420 Volcanology.** (3) A  
Distribution of past and present volcanism, types of volcanic activity, mechanism of eruption, form and structure of volcanoes, and geochemistry of volcanic activity. Possible weekend field trips. Prerequisite: GLG 424.

**424 Petrology-Petrography.** (4) S  
Theoretical and laboratory study of the origin and classification of igneous and metamorphic rocks. Hand specimen and thin-section study of rocks. 3 hours lecture, 3 hours lab. Possible weekend field trips. Prerequisites: GLG 321, 322.

**435 Sedimentology.** (3) S  
Origin, transport, deposition, and diagenesis of sediments and sedimentary rocks. Physical analysis, hand specimen examination, and interpretation of rocks and sediments. 2 hours lecture, 3 hours lab, possible weekend field trips. Prerequisites: GLG 102, 321, 322.

**436 Principles of Stratigraphy.** (3) N  
Principles of interpreting lithostratigraphic, magnetostratigraphic, biostratigraphic, seismic stratigraphic, and chronostratigraphic units; correlation and facies relationships in stratified rocks. Applied stratigraphy project(s). Lecture, possible field trips. Prerequisites: GLG 102; instructor approval.

**441 Ore Deposits.** (3) N  
Origin, occurrence, structure, and mineralogy of ore deposits. Possible weekend field trips. Prerequisite: GLG 424 or instructor approval.

**450 Geology Field Camp.** (6) SS  
Geological mapping techniques on aerial photos and topographic maps. Field based with excursions. Prerequisites: GLG 310, 321.

**455 Advanced Field Geology.** (3-4) F, S  
Geologic mapping in igneous, sedimentary, and metamorphic terrains of the Basin and Range province of Arizona. Weekend field trips. May be repeated for credit. Prerequisite: GLG 450 or instructor approval.

**456 Cordilleran Regional Geology.** (3) F  
Systematic coverage through space and time of the geological development of western North America, emphasizing the western United States. Prerequisite: senior major or graduate student in Geology or instructor approval.

**462 Environmental Geology of Cold Regions.** (3) N  
Geological and engineering importance of seasonal and perennially frozen ground (permafrost). Properties, distribution, and the origin of ice in the ground and its application to engineering and land utilization problems. Possible weekend field trips. Prerequisites: GLG 101 and 435 and PHY 111 and 113 or instructor approval.

**470 Hydrogeology.** (3) S  
Geology of groundwater occurrence, aquifer and well hydraulics, water chemistry and quality, contaminant transport, remediation. Emphasis on quantitative methods. Prerequisites: GLG 101 or 103; MAT 270; PHY 121.

**481 Geochemistry.** (3) F  
Origin and distribution of the chemical elements. Geochemical cycles operating in the earth's atmosphere, hydrosphere, and lithosphere. Cross-listed as CHM 481. Prerequisite: CHM 341 or 441 or GLG 321.

**485 Meteorites and Cosmochemistry.** (3) N  
Chemistry of meteorites and their relationship to the origin of the earth, solar system, and universe. Cross-listed as CHM 485.

**490 Topics in Geology.** (1-3) F, S, SS  
Special topics in a range of fields in geology. May be repeated for credit. Prerequisite: instructor approval.

**500 Geology Colloquium.** (1) F, S  
Presentation of recent research by faculty and invited guests. 1 semester required for all geology graduate students. May be repeated for total of 2 semesters. Research paper required. Prerequisite: instructor approval.

**501 Geology of Arizona.** (3) A  
Basic and historical geology, fossils, mining, energy resources, environmental problems, landscape development, and meteorites, cast in examples from Arizona. Research paper required.

**504 Geology of the Grand Canyon.** (2) S  
Review of the discovery, history, origin, and geology of the Grand Canyon of the Colorado River in Arizona. 6-day field trip down the river (first 6 days after commencement in May) required at student's expense. Field research and term paper on trip also required.

**510 Advanced Structural Geology.** (3) N  
Mechanics of rock deformation, emphasizing relationship between field observation, theory, and experiment. Stress, strain, simple constitutive relationships, failure criteria, and the basis of continuum methods. Possible field trips. Prerequisites: GLG 310 and 424 or instructor approval.



**520 Advanced Physical Volcanology.** (2-3) A

Selected volcanologic topics, including explosive eruption processes, lava flow mechanics, and intrusive mechanisms. Field trips possible. Prerequisite: GLG 420 or instructor approval.

**524 Advanced Igneous Petrology.** (3) N

Theoretical and practical aspects of the genesis of igneous rocks. Study of selected sites. Modern laboratory techniques. 2 hours lecture, 3 hours lab, possible weekend field trips. Prerequisite: GLG 424.

**525 Advanced Metamorphic Petrology.** (3) N

Theoretical and laboratory study of metamorphic rocks. Processes of contact and regional metamorphism. Advanced methods and instrumentations. 2 hours lecture, 3 hours lab, possible weekend field trips. Prerequisite: GLG 424.

**561 Glacial Geology.** (3) N

Properties, distribution, and origin of glacial deposits, including principles of their stratigraphy and correlation. Environmental geology problems in glaciated regions. 2 hours lecture, 3 hours lab, some field trips during lab, possible weekend field trips. Prerequisite: GLG 362.

**562 Quaternary Geology.** (3) N

Geology of the Quaternary Period in both glaciated and unglaciated areas. Stratigraphy, correlation, and environmental application of Quaternary deposits. Special reference to the Southwest. 2 hours lecture, 3 hours lab, some field trips during lab, possible weekend field trips. Prerequisite: GLG 362 or instructor approval.

**581 Isotope Geochemistry.** (3) N

Geochemistry and cosmochemistry of stable and radioactive isotopes; geochronology; isotope equilibria. Cross-listed as CHM 581. Prerequisite: instructor approval.

**582 Physical Geochemistry.** (3) N

Application of thermodynamic and kinetic principles to geochemical processes. Prerequisite: CHM 341 or 441 or GLG 321.

**583 Phase Equilibria and Geochemical Systems.** (3) N

Natural reactions at high temperatures and pressures; silicate, sulfide, and oxide equilibria. Cross-listed as CHM 583. Prerequisites: GLG 582; instructor approval.

**598 Special Topics.** (1-3) F, S, SS

Special topics in geology. May be repeated for credit. Prerequisite: instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## German

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See "Languages and Literatures," pages 222-225.

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## Gerontology

### Interdisciplinary Faculty

**Morris A. Okun**

*Director*

(WHALL 116) 602/965-3225

Fax: 602/965-9008

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#### ANTHROPOLOGY

Professor: Carr

#### COMMUNICATION

Professor: Kastenbaum

#### EXERCISE SCIENCE AND PHYSICAL EDUCATION

Professor: Stelmach

#### HEALTH SERVICES ADMINISTRATION

Professors: Kronenfeld, Williams

#### HISTORY

Professor: Gratton

#### NURSING

Associate Professors:

Killeen, Komnenich

#### PSYCHOLOGY

Professors: Okun, Reich, Zautra

#### PSYCHOLOGY IN EDUCATION

Professor: Strom

#### SOCIOLOGY

Associate Professors: Keith,

Miller-Loessi, Sullivan

#### SPEECH AND HEARING SCIENCE

Professor: LaPointe

An interdisciplinary, 24-semester-hour Certificate in Gerontology may be earned by graduate students who wish to study the psychological, sociological, biological, and policy-related aspects of aging and the health, economic, and social concerns of older people. Graduate students enrolled in the certificate program simultaneously pursue a major in an academic unit offering an advanced degree, whereas nondegree graduate students, typically, are either working with or seeking to work with older people. The Certificate in Gerontology provides a broad academic foundation for students who wish to apply the knowledge and skills acquired in their major and/or work experience to a variety of aging-related pursuits. Course work is evenly divided between required and elective courses. For their electives, students choose courses from the gerontology-related offerings of several departments. For more information, contact the Director, Adult Development and Aging Program, 602/965-3225.

## GERONTOLOGY

**GRN 580 Graduate Practicum.** (3) F, S

**590 Graduate Reading and Conference.** (3) F, S, SS

**591 Graduate Seminar.** (3) F, S

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Health Services Administration

**Frank G. Williams**

*Director*

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### PROFESSORS

FORSYTH, JOHNSON, KIRKMAN-LIFF,  
KRONENFELD, SCHNELLER,  
WESBURY, WILLIAMS, ZUCKERMAN

### PROFESSOR EMERITUS

EVELAND

The faculty in the School of Health Administration and Policy, College of Business, offer a graduate program leading to the Master of Health Services Administration degree (see pages 64-65). The faculty also participate in the programs leading concurrently to the Master of Business Administration/Master of Health Services Administration (M.B.A./M.H.S.A.), Master of Health Services Administration/Juris Doctor (M.H.S.A./J.D.), and Master of Health Services Administration/Master of Science in Nursing (M.H.S.A./M.S. in Nursing with a concentration in nursing administration). The faculty also offer a concentration in health services research under the Ph.D. in Business Administration. (Applications for the Ph.D. in Business Administration with a concentration in health services research are not being accepted at this time.) For information concerning these degree programs, refer to pages 58-59 and 137-138.

### Research Activity

The School of Health Administration and Policy is a major teaching and research component of the College of Business at ASU. The school is committed to an active program in research and development, promoting a deeper understanding of the delivery of health services at the local, state, and national level. Faculty at the school are frequent contributors to health services research and disciplinary journals. It is

the goal of the school to serve as a focal point for addressing the problems confronting practitioners in the health care field. Faculty frequently advise policy makers in major health care organizations, state and federal governments, and corporations.

The Industry/University Cooperative Research Center for Health Management, designated by the National Science Foundation, is based at ASU.

Current faculty research endeavors include assessment of Arizona's Health Care Cost Containment System, enhancing care of the elderly, assessment of organizational modeling for multi-hospital systems, the changes facing physicians in American society, the public policy implications of AIDS, analysis of causes and consequences of medical malpractice, discrimination against persons with disabilities, the health care costs of work injuries, and studies of behavioral factors in health care and health services utilization.

#### HEALTH SERVICES ADMINISTRATION

**HSA 473 Comparative Health Systems.** (3) A  
Comparison of health care financing and delivery in industrialized countries; covers insurance, hospital management and physician payment. Lecture, discussion. Cross-listed as HSA 573.

**502 Health Care Organization.** (3) A  
Concepts, structures, functions, and values which characterize contemporary health care systems in the United States.

**505 Community Health Care Perspectives.** (3) A  
Epidemiological, sociological and political perspectives, and techniques for analyzing health problems and responding to health care needs in communities. Prerequisite: HSA 502.

**512 Health Care Economics.** (3) A  
Economics of production and distribution of health care services, with special emphasis on the impact of regulation, competition, and economic incentives. Prerequisite: HSA 502.

**520 Health Care Organizational Structure and Policy.** (3) A  
Functional relationships among managerial elements of health care institutions with major focus on hospital governance and policy dynamics. Prerequisite: HSA 502.

**522 Health Care Management Systems.** (3) A  
Systems concepts, quantitative methods, and information systems applied to management problems in health institutions and community health planning. Prerequisites: HSA 505; QBA 502.

**532 Financial Management of Health Services.** (3) A  
Acquisition, allocation, and management of financial resources within the health care enterprise. Budgeting, cost analysis, financial planning, and internal controls. Prerequisites: ACC 503; FIN 502; HSA 502.

**542 Health Care Jurisprudence.** (3) A  
Legal aspects of health care delivery for hospital and health services administration. Legal responsibilities of the hospital administrator and staff. Prerequisites: HSA 505, 520.

**571 Ambulatory Care Management.** (3) A  
The evolution, planning, and management of multispecialty group practices, health maintenance organizations, and other alternative delivery systems. Prerequisite: HSA 502.

**573 Comparative Health Systems** (3) A  
Comparison of health care financing and delivery in industrialized countries; covers insurance, hospital management and physician payment. Lecture, discussion. Cross-listed as HSA 473.

**589 Integrative Seminar.** (3) A  
Capstone assessment of current policies, problems, and controversies across the broad spectrum of health services administration. Prerequisites: HSA 505, 520, 522, 532.

**591 Seminar.** (3) A  
Seminar topics such as the following may be offered:

- (a) Comparative Health Care Systems
- (b) Cost Containment and Quality Assurance
- (c) Behavioral Health
- (d) Long-Term Care
- (e) Health Care Economics
- (f) Health Care Labor Law
- (g) Topics in Health Services Research
- (h) Managing Physicians
- (i) Multihospital Systems

**593 Applied Project.** (3) F, S, SS  
Optional on-site experience in advanced development of managerial skills in health services administration and policy. Minimum of 10 weeks. Prerequisites: 18 hours of credit toward program of study; director approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Higher and Adult Education

Howard Simmons  
Program Coordinator  
(ED 108) 602/965-6248

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#### PROFESSORS

APPLETON, FENSKE, PADILLA,  
RENDÓN, RICHARDSON, SIMMONS

#### ASSOCIATE PROFESSORS

HARTWELL-HUNNICUTT, WILKINSON

The faculty in the Division of Educational Leadership and Policy Studies offer graduate programs leading to the Master of Education and Doctor of Education degrees with a major in Higher and Adult Education. The concentration currently available is in higher education. Applications are not currently being accepted for the concentration in adult education. Students interested in the Doctor of Philosophy

degree with a field of study encompassing higher education should refer to the major in Educational Leadership and Policy Studies on pages 177-178.

Applicants for admission to the Doctor of Education program must submit scores on the Graduate Record Examination. Applicants for admission to the M.Ed. degree program must submit scores on either the Graduate Record Examination or the Miller Analogies Test; scores on the Graduate Record Examination are preferred.

Candidates for the M.Ed. and Ed.D. program may be required to take certain College of Education core courses depending upon previous experience and education. Pre-approval by an advisor is required. The M.Ed. program requires 33 semester hours of course work, including a practicum. Candidates for all degrees must pass a written comprehensive examination, and candidates for the Ed.D. must also pass a final oral examination in defense of the dissertation. Candidates for the doctorate must complete the College of Education core for doctoral students, which amounts to 12 semester hours.

#### Research Activity

Faculty members in higher education are conducting research on a variety of significant topics according to their areas of special research interest. These include student access and retention, student financial assistance, marketing/institutional advancement in higher education, organizational influences on community college faculty teaching practices, Hispanic studies, legal aspects of higher education, and policy analysis.

The program has access to all of the current longitudinal data produced by the federal Center for Educational Statistics. Several databases created for a national study of state and institutional influences on baccalaureate attainment by underrepresented minorities support a number of dissertations and faculty research projects.

#### HIGHER EDUCATION

**HED 510 Introduction to Higher Education.** (3) F  
An overview of American higher education, including philosophical, political, and social aspects.

**533 The Community-Junior College.** (3) F, S  
History, functions, organization, and current issues. Meets Arizona community college course requirement for certification.

**602 Institutional Research/Strategic Planning.** (3) F

Provides an overview of policy research and planning in higher education at the campus system and governing/coordinating agency levels. Lecture, group discussion, and research projects. Prerequisite: HED 510.

**603 Computer-Assisted Qualitative Data Analysis.** (3) S

Emphasizes the applied and computing aspects of qualitative research design, data analysis, and reporting of results. Lecture, lab, demonstrations. Prerequisite: COE 503 or equivalent.

**611 Curriculum and Instruction.** (3) S  
Curriculum development, instructional organization, and improvement of instruction in higher education. Prerequisite: HED 510.

**644 Higher Education Finance and Budgeting.** (3) S

Financial planning and budgeting in higher education institutions. Issues related to financing public and private colleges and universities. Prerequisite: HED 510.

**649 Law of Higher Education.** (3) F

Analysis of legal issues related to higher education; examination of key court decisions. Prerequisite: HED 510.

**679 The American College Student.** (3) S

Provides overview of American college student from demographic, background characteristics and values/attitudes/perspectives. Includes access, persistence, and degree completion. Lecture, group discussion, and research projects. Cross-listed as CED 656. Prerequisite: HED 510.

**687 Governance, Coordination and External Influences in Higher Education.** (3) S '97

Study of governance and coordination in higher education systems and the impact of external forces on them. Lecture, discussion.

**688 Organizational Theory.** (3) S

Major views of organizations and their influence on role definition and participant behaviors in educational organization. Seminar, discussion. Cross-listed as SPF 622.

**689 Leadership in Higher Education.** (3) F  
Theory and practice of leadership and administration in higher education institutions.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**ADULT EDUCATION****AED 510 Introduction to Adult Education.** (3) N

Historical development, core content, and principal areas of adult education.

**512 Characteristics of Adult Learners.** (3) N  
Characteristics of the adult learner throughout the life span.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**History**

Retha M. Warnicke

Chair

(SS 204) 602/965-5778

**PROFESSORS**

BATALDEN, BURG, DAVIS, FUCHS,  
GIFFIN, GRATTON, IVERSON,  
KLEINFELD, LAVRIN, LUCKINGHAM,  
MackINNON, ROTHSCHILD, RUIZ,  
STOWE, TAMBS, TILLMAN,  
TRENNERT, WARNICKE

**ASSOCIATE PROFESSORS**

ADELSON, DELLHEIM, ESCOBAR,  
FULLINWIDER, HURTADO, KAHN,  
ROSALES, RUSH, SIMPSON,  
L. SMITH, R. SMITH, SOERGEL,  
STONER, VANDERMEER,  
WARREN-FINDLEY

**ASSISTANT PROFESSORS**

CARROLL, GRAY, GULLETT,  
HENDRICKS, LONGLEY, McKEE

**SENIOR INSTRUCTIONAL****PROFSSIONAL**

LUEY

The faculty in the Department of History offer graduate programs with a major in History leading to the Master of Arts and Doctor of Philosophy degrees. M.A. candidates are offered an opportunity to develop knowledge of a specific historical field, to study comparative history, and to learn research techniques. Students with various goals benefit from this degree program, including those planning to advance to Ph.D. study, those seeking positions in academe, in the public sector, or in business, and those now holding or looking for educational posts in elementary and secondary schools or junior colleges. Students admitted to the Master of Education degree program with a major in Secondary Education may elect history as the subject matter field.

**MASTER OF ARTS DEGREE**

See pages 53-55 for general requirements.

**Admission.** Applications for the master's program must be accompanied by the applicant's scores on the Graduate Record Examination (Master of Education applicants must report scores from both the GRE aptitude and advanced history tests). Examination scores more

than five years old are not accepted. Three letters of recommendation from faculty members or others who are qualified to judge the applicant's potential for advanced study in history, a writing sample, and a statement of purpose must be forwarded to the department. Forms and instructions are available from the departmental secretary.

All applications and supporting materials are reviewed by the graduate committee of the department which then recommends to the Graduate College that the student be granted regular or provisional admission or be denied admission.

**Areas of Concentration.** In consultation with the supervisory committee, the candidate may select a field of history from the following: Asian, British, European, Latin American, and the United States. Under the United States concentration, students may choose from the following four areas of study: American Indian, Chicana/Chicano, U.S. Western, or women. Candidates in any field may apply for admission to the public history concentration.

**Program of Study.** The candidate must complete a minimum of 30 semester hours of graduate courses, including the following program requirements:

1. A minimum of 24 hours of history courses is required. With the approval of the supervisory committee, the candidate may include within the minimum 30-hour program six semester hours of closely related graduate course work taken in another academic unit.
2. A minimum of 18 hours selected from graduate courses at the 500 level is required. If 400-level courses are included in the program of study, documented proof must be provided that they were taken for graduate credit. Please contact the department for specific details.
3. Two comparative courses are required. The comparative courses are not required of students in the public history concentration.
4. At least one research seminar (HIS 591), normally in the major field of study, is required.

Degree candidates in the public history concentration must complete HIS 502 and at least one short course.

Other core requirements specific to each emphasis are listed in the department's graduate handbook. The various emphases require the completion of a differing number of hours for each program: business, 41 semester hours; community history, 40; historic preservation, 40; historical administration, 37; historical editing and publishing, up to 44; public sector, 39. Course work taken outside the department for inclusion in a program of study must be approved in advance by the appropriate program director.

Candidates for the Master of Education degree must take 15 hours of HIS courses, of which three hours must be in HIS 512 or 515 and three hours in HIS 591 or in a comparative course (HIS 551-555); 12 of the 15 hours must be graduate courses at the 500 level. If 400-level courses are included in the program of study, documented proof must be provided that they were taken for graduate credit. Contact the department for specific details. The candidate must maintain at least a 3.00 GPA in HIS courses.

#### **Foreign Language Requirements.**

The student is expected to have a reading knowledge of one foreign language, but some other research skills may be substituted for this requirement by the supervisory committee.

**Thesis Requirements.** A thesis or equivalent is required.

Students must enroll in six hours of HIS 599 to prepare a thesis based on original research. The M.A. thesis must be approximately 100 pages long, prepared according to Graduate College requirements, defended and approved, bound, and placed in the university library.

In lieu of preparing a traditional thesis under HIS 599, a student may elect a two-part thesis equivalent: (1) two three-hour seminars (HIS 591) on a broad topic and (2) two three-hour research courses (HIS 592) on a topic derived from the first research course. Courses leading to the thesis equivalent give the student experience with historical research and writing in the form of historiographical essays similar to those published in a journal. The two papers must meet Graduate College thesis requirements and be bound as a single volume and placed in the University Library.

**Final Examinations.** A final oral examination in defense of the thesis or equivalent is required.

#### **DOCTOR OF PHILOSOPHY DEGREE**

See pages 76-77 for general requirements.

The Ph.D. in History offers candidates the opportunity to study past and contemporary civilizations and to learn research and writing techniques that may be used in scholarly careers at leading academic institutions, in historical societies and agencies, in the public sector, and in business.

Major emphasis is placed upon developing a disciplined and inquiring mind, expertise in a chosen subject area, and competence in research methodology. The program is composed of small classes that bring students into a close working relationship with faculty and other students and offers flexibility in designing degree programs.

The five areas of concentration are Asian history, British history, European history, Latin American history, and United States history. Students must select a minimum of three historical fields for examination. The fields must include a major geographical field of concentration (such as the British Isles, the United States, or Latin American), and a second broad geographical field outside the concentration. The third field should be in the specific area of the dissertation and be closely related to the major field. For example, typical field combinations might be U.S. history to 1877 (major), Latin America to 1820, and American Indian history; or, Modern Europe (major), Modern United States, and the history of women.

**Admission.** Applications for the Ph.D. in History program must be accompanied by the applicant's scores on the Graduate Record Examination, three letters of recommendation from faculty members or others who are qualified to judge the applicant's potential for doctoral study, a writing sample, and a statement of purpose. GRE scores may not be more than five years old. All applications and supporting materials are reviewed by the graduate committee of the Department of History, which then recommends to the Graduate College that the student be granted regular or provisional admission or be denied admission.

**Program of Study.** After admission to the program, the student, in consultation with the graduate director, selects a faculty advisor in the student's area of concentration. Together the faculty advisor and student select a Ph.D. committee consisting of at least three faculty members. The committee draws up a program of study that normally includes at least 60 graduate semester hours of history, 36 of which must be in 500-level or above courses, and 24 semester hours of dissertation. If 400-level courses are included in the program of study, documented proof must be provided they were taken for graduate credit. Contact the department for specific details. Two courses selected from the graduate offerings in historiography are required. The student must take at least three research seminars, two of which must be in the primary area of study, and one comparative course.

#### **Foreign Language Requirements.**

Demonstration of a satisfactory reading knowledge of two foreign languages is required before the student may take the comprehensive examinations. The student's program committee may approve substituting the demonstration of other research capabilities, such as quantitative or statistical analysis, archival research, historical preservation, or computer skills.

**Preliminary Reviews.** During the first academic year of residence the student is required to schedule the department's preliminary review. Students who fail this review must withdraw from the program. It is recommended that the student have demonstrated a satisfactory reading knowledge of at least one foreign language before scheduling the review.

**Comprehensive Examinations.** The program committee examines the student's competence in the fields chosen. Normally these oral and written examinations are taken after the student has completed at least 60 graduate semester hours of credit.

**Dissertation Committee.** Upon satisfactory completion of the comprehensive examination, the supervisory committee for the dissertation is selected. In consultation with the candidate, the director of graduate study recommends a chair; the recommended chair, after

consultation with the candidate (and with approval of the director), then recommends at least two other members to the chair of the department. The dissertation committee is appointed by the dean of the Graduate College upon the recommendation of the department chair. The role of this committee is to approve the subject and title of the dissertation and advise the candidate during the completion of the research and the dissertation.

**Dissertation Prospectus.** Each doctoral candidate will prepare a prospectus of from four to seven pages for the dissertation. The format and design of the prospectus will be determined by the candidate and committee chair. The topic will be in one of the candidate's fields of study and should include the following:

1. a thesis statement;
2. a discussion of relevant literature;
3. a discussion of possible research material and availability of sources;
4. a secondary bibliography; and
5. a historiographical statement.

This prospectus must be presented to the committee for its review by the end of the semester following the comprehensive examination. The committee must approve the proposal before the candidate may be admitted to candidacy and proceed with the research.

**Dissertation Requirements.** The dissertation must be an original contribution to knowledge and demonstrate the student's proficiency in independent research.

**Final Examinations.** A final oral defense of the dissertation is required.

### Graduate Preparation in Public History

The department offers several public history emphases preparing students to apply the skills of the historian in careers beyond the classroom. Public historians focus their historical insight, expertise, and critical abilities in the broad—that is, public—community. Six areas of emphasis are offered within public history: business, community history, scholarly publishing, historic preservation, historical administration, and the public sector. Graduate course work in public history may be included in both master's and doctoral programs of study.

The public history core combines specially designed course work and specific program requirements with traditional degree requirements. The public history area imposes additional admission requirements and includes periodic evaluations of its students' progress. (The business emphasis requires prerequisites in the business field.) Enrollment is limited to provide careful preparation and advisement. The curriculum integrates required course work in a public history component with courses in a geographic area concentration. As a special feature of the program, short courses are taught each year by visiting public historians. Each emphasis requires completion of at least one and in some cases two short courses. Courses from other disciplines, such as anthropology, business, public administration, fine arts, geography, political science, and architecture (architectural history and preservation planning) may be included in a program of study when students have the necessary prerequisites and if the courses meet particular student needs or are required within the various emphases of the concentration. Students who select the scholarly publishing option must be admitted to the Scholarly Publishing Certificate program and complete all certificate requirements. (See page 260 for a description of the certificate program.)

Course work for all areas of the program begins each fall semester with a required special workshop during the fall orientation week before classes start. Students are admitted for the fall semester, though some class work outside the public history field may be started earlier. With concentrated full-time study, the public history component may be completed in four semesters, depending on the public history area selected for emphasis. In some instances, the mandatory internship or other program requirements must be completed during the summer months.

Each student in the program completes a core of courses appropriate to an area of emphasis. Basic to each core is the completion of HIS 502 Public History Methodology during the first semester of study. The work introduced in this methodology class is continued in the public history research seminar (HIS 591)—required or optional, depending on the area of emphasis.

At the satisfactory completion of the training work and upon the recommendation of the appropriate director and the department, a certificate of completion is issued by the Department of History. Assistance is provided in job placement.

Students interested in this curriculum should consult the department's graduate handbook, which provides details about public history work.

### Research Activity

Recent faculty research includes the subjects described below.

**Women's History.** The Girl Scouts in America; women in 19th-century France; women of the English Renaissance and Reformation; feminism in modern Cuba; women and death in 17th-century England; Southwestern women; women in 20th-century China. **Social and Cultural History.** Social history of the elderly in America; history of sexuality; Russian religious history; Jewish, Christian, and Islamic popularism in the 20th-century; Europe since 1945; Hitler and the Third Reich; origins of modern Chinese social science; Confucianism during the Song, Jin, and Yuan periods; heroes in Chinese historical consciousness; royal courtship in Tudor England; corporate business cultures in England; social change in 20th-century Cuba; Japanese business culture; early American republic; rural history; New Deal music programs; cultural history of the Space Age.

**Western United States.** The development of Phoenix; American Indian policy; Indian education; Navajo history; social and family history of American Indians; Southwestern and frontier history; Arizona and Southwestern labor; trans-Appalachian West. **Political and Legal History.** Roman Athens; American political history; history of the legal profession in America; Chinese politics, 1930s; 20th-century Chinese military history; 20th-century Indonesian political culture; legal and political history—20th-century Cuba; history of Chinese journalism; Civil War and reconstruction; the American presidency.

**Minority History.** Afro-American history; Mexican labor in the United States; Mexican immigration to the United States; Indian history; Japanese-American experience.

*International Relations.* U.S./China/Japan relations; Colonial Southeast Asia; Anglo-American power and the Middle East in the 20th-century; U.S. perceptions of the Soviet Union; British Middle Eastern policy during World War I; Japan-U.S. relations; European community; Europe since 1945; U.S.-Latin American relations.

*Public History.* History of the book and the publishing industry; community development; a history of the accounting profession in Arizona; environmental and cultural resources; historical interpretation; preservation of Cold War artifacts.

## HISTORY

**HIS 401 American Colonial History.** (3) A Political, economic, social, and cultural history of the colonial era. Concentrates on English colonies, with some consideration of Spanish, French, and other colonial regions in North America. *General Studies: SB, H.*

**403 Revolution and Constitution.** (3) N The causes, course, and consequences of the American Revolution culminating in the ratification of the Constitution. Prerequisite: HIS 103 or instructor approval.

**404 The Early Republic, 1789-1850.** (3) A Political, social, economic, and cultural development of the United States from the Revolution to 1850. Prerequisite: HIS 103 or instructor approval. *General Studies: L2/SB, H.*

**406 Civil War and Reconstruction.** (3) A Explores the causes, conduct, and consequences of the American Civil War, emphasizing politics and policy. Prerequisite: HIS 103 or instructor approval. *General Studies: L2/SB, H.*

**407 The Emergence of Modern America.** (3) A The triumph of modern political, social, and economic structures and values, 1870-1918; role of region, religion, race, and ethnicity. *General Studies: SB, H.*

**409 Recent American History.** (3) A The United States from 1913-1932, including Wilsonian diplomacy and the First World War, the 1920s, the origins of the Great Depression, Hoover administration. Prerequisite: HIS 104 or equivalent. *General Studies: SB, H.*

**410 Recent American History.** (3) A The United States from 1932-1945, including the New Deal, society during the Depression, Second World War. Prerequisite: HIS 104 or equivalent. *General Studies: SB, H.*

**411 Contemporary America.** (3) A The United States from 1945 to the present. *General Studies: SB, H.*

**414 The Modern American Economy.** (3) A Origins of 19th-century slavery and industrialization; 20th-century crisis and regulation: political economy of an advanced capitalist democracy. Prerequisite: ECN 111 or 112 or HIS 103 or 104. *General Studies: SB, H.*

**415 American Diplomatic History.** (3) A American relations with foreign powers, 1776-1898. Prerequisite: HIS 103 or instructor approval. *General Studies: SB, H.*

**416 American Diplomatic History.** (3) A American relations with foreign powers from 1898 to the present. Prerequisite: HIS 104 or instructor approval. *General Studies: SB, G/H.*

**417 Constitutional History of the United States.** (3) N Origin and development of the American constitutional system from Colonial origins through Reconstruction. Prerequisite: HIS 103 or instructor approval. *General Studies: SB, H.*

**418 Constitutional History of the United States.** (3) N Origin and development of the American constitutional system, from Reconstruction to the present. Prerequisite: HIS 104 or instructor approval. *General Studies: SB, H.*

**419 American Urban History.** (3) A The history of the city in American life from colonial times to the late 19th century. *General Studies: SB, H.*

**420 American Urban History.** (3) A The history of the city in American life from the 19th century to the present. *General Studies: SB, H.*

**421 History of American Labor.** (3) A American workers, from the colonial period to the present, including farmers, slaves, housewives, the skilled and unskilled, unionized and nonunionized. Prerequisite: HIS 103 or 104 or MGT 301. *General Studies: SB, H.*

**422 Rebellious Women.** (3) A Examination of the roles of rebellious women in history through the study of autobiography, biography, and theory. *General Studies: L2/SB, C/H.*

**424 The Hispanic Southwest.** (3) N Development of the Southwest in the Spanish and Mexican periods to 1848. *General Studies: SB, H.*

**425 The American Southwest.** (3) N Development of the Southwest from 1848 to the present. *General Studies: L2/SB, H.*

**426 Indian History of the Southwest.** (3) S Comprehensive review of historical events from prehistoric peoples, the Spanish and Mexican periods, and the American period after 1846 to the present. Prerequisite: upper-division standing or instructor approval. *General Studies: SB, C/H.*

**428 Arizona.** (3) A Emergence of the state from early times to the present. Prerequisite: upper-division standing or instructor approval. *General Studies: SB, H.*

**430 20th-Century Chicano History.** (3) A Historical development of the Chicano community in the 20th century. *General Studies: SB, H.*

**431 The French Revolution and the Napoleonic Era.** (3) N Conditions in France before 1789, the Revolutionary decade from 1789 to 1799, the organization of France under Napoleon, and the impact of changes in France on European society. Prerequisite: upper-division standing or instructor approval. *General Studies: SB, H.*

**433 Modern France.** (3) A Social, political, economic, and cultural transformations of French society, 1815-present. Impact of industrialization, war and revolution on people's lives. Prerequisite: upper-division standing or instructor approval. *General Studies: SB, G/H.*

**434 Hitler: Man and Legend.** (3) N A biographical approach to the German Third Reich emphasizing nature of Nazi regime, World War II, and historiography. *General Studies: SB, H.*

**435 Modern Germany.** (3) A Germany since 1840. *General Studies: SB, G/H.*

**437 Eastern Europe and the Balkans.** (3) A Peoples and countries of eastern and southeastern Europe in the 19th and 20th centuries from 1800 to 1914, emphasizing the Hapsburg and Ottoman Empires. *General Studies: SB, H.*

**438 Eastern Europe and the Balkans.** (3) A Peoples and countries of eastern and southeastern Europe in the 19th and 20th centuries, emphasizing the successor states from 1914 to the present. *General Studies: SB, G/H.*

**441 Imperial Russia.** (3) A Development of Russian political, economic, social, religious, and intellectual institutions and traditions from the end of the 17th century to the collapse of the tsarist autocracy in 1917. *General Studies: SB, H.*

**442 The Soviet Union.** (3) A An examination of Soviet and post-Soviet politics, economic development, and foreign relations from the 1917 Revolution to the present. *General Studies: SB, G/H.*

**443 Russia and the United States.** (3) A Official and unofficial relations between Russia and the United States, from the late 18th century to the present, emphasizing period following the Bolshevik Revolution. *General Studies: SB, G/H.*

**445 Tudor England.** (3) A Political, social, economic, and cultural developments in 16th-century England. *General Studies: SB, H.*

**446 Stuart England.** (3) A Political, social, economic, and cultural developments in 17th-century England. *General Studies: SB, H.*

**449 Modern Britain.** (3) A Factors contributing to Britain's position as the world's leading power in the 19th century and its decline from that position in the 20th century. *General Studies: SB, G/H.*

**450 British Constitutional History.** (3) A Historical development of the constitutional system of Great Britain from the Middle Ages to the present, emphasizing the growth of democracy. *General Studies: SB, H.*

**451 The British Empire.** (3) A British imperialism and colonialism in Africa, the Americas, Asia, and the South Pacific. Prerequisite: upper-division standing or instructor approval. *General Studies: SB, H.*

**452 Economic History of Europe.** (3) N Impact of industrialism upon the political, social, and cultural life of Europe from the Renaissance to the 19th century. *General Studies: SB, H.*

**453 Economic History of Europe.** (3) N Impact of industrialism upon the political, social, and cultural life of Europe in the 19th and 20th centuries. *General Studies: SB, G/H.*

**455 Intellectual History of Modern Europe.** (3) A Major developments in European thought from Karl Marx to the present. Prerequisite: upper-division standing or instructor approval. *General Studies: HU, H.*



**456 History of Spain.** (3) N

Cultural, economic, political, and social development of Spain from earliest days to 1700.

*General Studies: HU/SB, H.*

**457 History of Spain.** (3) N

Cultural, economic, political, and social development of Spain from 1700 to the present.

*General Studies: HU/SB, G/H.*

**460 Spanish South America.** (3) N

Political, economic, and social development of the Spanish-speaking nations of South America since independence. 19th-century developments.

*General Studies: SB, H.*

**461 Spanish South America.** (3) N

Political, economic, and social development of the Spanish-speaking nations of South America. 20th-century developments.

*General Studies: SB, H.*

**463 Intellectual and Cultural History of Latin America.** (3) N

Main currents of thought, the outstanding thinkers, and their impact on 19th- and 20th-century Latin America. Cultural and institutional basis of Latin American life.

*General Studies: SB, H.*

**464 The United States and Latin America.** (3) N

The Latin American struggle for diplomatic recognition, attempts at political union, participation in international organizations since 1810, and relations between the United States and Latin America.

*General Studies: SB, G/H.*

**466 Mexico.** (3) A

Political, economic, social, and cultural developments from earliest times to 1810.

*General Studies: SB, H.*

**467 Mexico.** (3) A

Political, economic, social, and cultural developments from 1810 to the present.

*General Studies: SB, H.*

**468 Brazil.** (3) N

Discovery, conquest, and settlement by the Portuguese; achievement of independence; rise and fall of the empire; problems and growth of the republic to the present.

*General Studies: SB, H.*

**469 Chinese Thought and Way.** (3) N

China's classics in translation studied both for their intrinsic ideas and for the origins of Chinese thought.

*General Studies: SB, H.*

**470 Chinese Thought and Way.** (3) N

Evolution of Confucian Tao (Way), its synthesis of Taoism and Buddhism, and 20th-century reactions to that Tao.

*General Studies: SB, G/H.*

**471 The United States and Japan.** (3) A

Cultural, political, and economic relations in the 19th and 20th centuries. Emphasis on post-World War II period.

*General Studies: SB, G/H.*

**473 China.** (3) A

Political, economic, social, and cultural history of the Chinese people from early times to the late 17th century.

*General Studies: SB, H.*

**474 China.** (3) A

Political, economic, social, and cultural history of the Chinese people from mid-17th century to the present.

*General Studies: SB, G/H.*

**475 The American Experience in Vietnam, 1945-1975.** (3) N

Intersection of American and Asian histories in Vietnam, viewed from as many sides as possible.

*General Studies: SB, G/H.*

**477 Japan.** (3) A

Political, economic, social, and cultural history of the Japanese people from early times to the 19th century.

*General Studies: SB, H.*

**478 Japan.** (3) A

Political, economic, social, and cultural history of the Japanese people from 19th century to the present.

*General Studies: SB, G/H.*

**481 The People's Republic of China.** (3) N

Analysis of major political, social, economic, and intellectual trends in China since the founding of the People's Republic in 1949.

*General Studies: SB, G/H.*

**495 Methods of Teaching History.** (3) S

Methods in instruction, organization, and presentation of the subject matter of history and closely allied fields.

**498 History Pro-Seminar.** (3) F, S

Required course for majors on topic selected by instructor; writing-intensive course related to the development of research skills and writing tools used by historians.

Prerequisite: HIS 300.

**502 Public History Methodology.** (3) F

Introduction to historical research methodologies, techniques, and strategies used by public historians. Readings, short papers, and

guest speakers. Required for students in the public history concentration.

**512 Historians of Early Europe.** (3) N

A study of the history of European historical writing from the Greeks to the 18th century.

**513 Historians of Modern Europe.** (3) N

A study of 19th- and 20th-century European historical writing.

**514 Historians of the United States.** (3) N

A study of the history of American historical writing from the early colonial days to the 20th century.

**515 Studies in Historiography.** (3) F, S

Methods and theories of writers of history. May be repeated for credit.

**525 Historical Resource Management.** (3) F

Identification, documentation, and interpretation of historic period buildings, sites, and districts. Emphasis on interdisciplinary efforts among historians, architects, and anthropologists.

**526 Historians and Preservation.** (3) S

Preparation of historians for public and private historic preservation programs. Prerequisite: HIS 525 or instructor approval.

**527 Historical Administration.** (3) F

Preparation of historians in administration of archives, historical sites, historical museums, historical societies, and historical offices in government agencies.

**530 American Business History.** (3) F

Origins, evolution, and present form of various major U.S. industries. Required for public history business option.

**532 Community History.** (3) N

Techniques and methods of community history emphasizing local resources. Required for community history option. Seminar.

**551 Comparative Histories of War and Revolution.** (3) A

A comparative field course of the themes of war and revolution.

**552 Comparative History of Family and Community.** (3) N

A comparative course with a focus on family, including minority and ethnic groups, in society.

**553 Comparative History of State and Institutions.** (3) N

A comparative course that explores the changing nature of central institutions and government.

**554 Comparative Historical Population Studies: Ethnicity, Economy, and Migration.** (3) N

A comparative course that explores the impact of social, cultural, or economic changes in the population.

**555 Comparative Historical Topics.** (3) N

This course analyzes a variety of specific social, political, cultural, and intellectual topics.

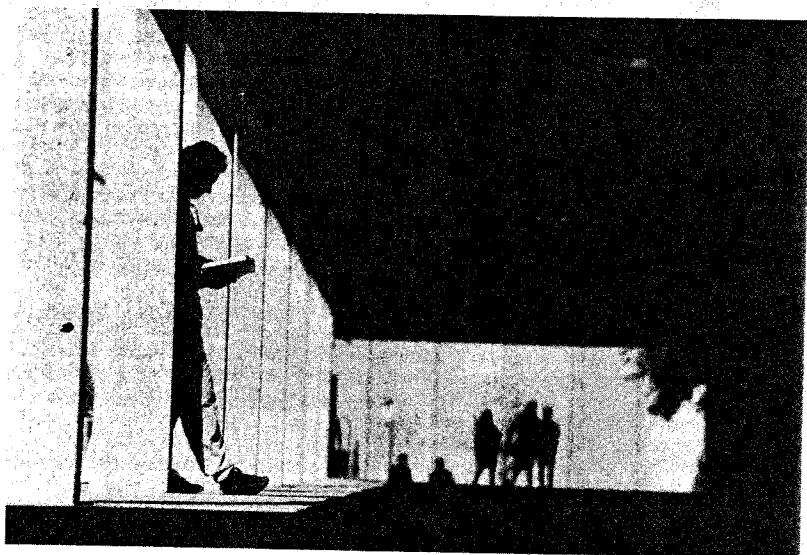
**591 Seminar.** (3) N

Topics may be selected from the following areas:

- (a) British History
- (b) East Asian History
- (c) English History
- (d) European History
- (e) Latin American History
- (f) U.S. History

May be repeated for credit.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.



## Humanities

### Interdisciplinary Faculty

Charles Dellheim

Director

(LL B605) 602/965-6747

#### ANTHROPOLOGY

Affiliated Faculty: E. Brandt, Winkelman

#### ARCHITECTURE

Affiliated Faculty: Biln, Boyle,  
B. Brandt, Cook, Kroloff

#### ART

Affiliated Faculty: Codell, Schleif, Serwint

#### COMMUNICATION

Affiliated Faculty: Nakayama

#### COMPUTER SCIENCE AND ENGINEERING

Affiliated Faculty: Findler

#### ENGLISH

Core Faculty: Vanden Heuvel;  
Affiliated Faculty: Bjork, J. Brink,  
Castle, Horan, Sensibar

#### HISTORY

Affiliated Faculty: Fuchs, Gray,  
Iverson, Rush, Simpson, Stowe,  
Tillman, Warnicke

#### HUMANITIES

Core Faculty: Baker, Dellheim,  
López-Lázaro, Privateer, Wright;  
Professor Emeritus: Doebler

#### JUSTICE STUDIES

Affiliated Faculty: Kelly

#### LANGUAGES AND LITERATURES

Core Faculty: Foster; Affiliated Faculty:  
Losse, Vitullo, Volek, Williams

#### PHILOSOPHY

Affiliated Faculty: White

#### PLANNING AND LANDSCAPE ARCHITECTURE

Affiliated Faculty: Fish

#### POLITICAL SCIENCE

Affiliated Faculty: McDonough

#### RELIGIOUS STUDIES

Affiliated Faculty: Coudert,  
Foard, Gereboff

The Graduate Committee on Humanities offers an interdisciplinary program leading to the Master of Arts degree with a major in Humanities. One of the unique features of this interdisciplinary program is that, because it uses faculty research/teaching interests from a number of academic units, a student may tailor a course of study to fit individual needs and goals. The committee is composed of members from several departments, as shown in the faculty list

at the beginning of this section. At the same time, the individualized program is balanced by a required core of several courses emphasizing interdisciplinary methodology and theory. Faculty and courses are not limited, however, to the departments and schools listed, since it is understood that many fields may be approached from a humanistic perspective.

#### MASTER OF ARTS DEGREE

The program leading to the Master of Arts degree in Humanities is individualized and interdisciplinary. It offers the student whose interests transcend disciplinary boundaries the opportunity to integrate graduate courses in two or more departments as a foundation for research leading to a thesis in the humanities. Two required core courses, HUM 511 Structures of Knowledge and HUM 512 Writing Cultures, offer students experience in integrative methodology. A third course, HUM 513 Interpretation of Cultures, gives students a culminating integrative experience. Students are also advised to select another course from several theoretical courses offered by individual departments. Topics for the thesis require an understanding of cultural history, particularly of times when relationships between cultural values and one or more of the arts have been especially dynamic in illuminating important questions. Generally, theses have centered upon the usual humanities disciplines, but the intention of the committee is to include humanistic approaches to topics that might be based in the sciences or engineering.

**Admission.** In addition to meeting Graduate College requirements, students must submit a letter of intent, GRE scores, and three letters of academic recommendation to the director of the program. Students whose applications are completed by February 15 should be advised of their admission status by April 1. Qualified students applying after March 1 should be admitted if openings are available. Students who fulfill general requirements of the Graduate College and have B.A. degrees in any one of the humanities disciplines listed by the National Endowment for the Humanities are usually welcomed into the program. These include American studies, art history, cultural anthropology, dance history, history, law, linguistics, English, Amer-

ican, comparative or foreign literatures, music history, philosophy, religious studies, and theatre history. In addition to (or as part of) this degree, it is desirable that students have a strong general education with at least introductory courses in two of the following subjects: history, literature, art, religion, theatre, music, and philosophy. Students who have bachelor's degrees in the social sciences or natural sciences and who wish to pursue graduate studies in interdisciplinary humanities are welcome to submit their applications for consideration.

**Program of Study.** For initial advising, students should consult the director of graduate studies. Students, in consultation with a faculty supervisory committee, should propose individual programs of study, including courses in interdisciplinary humanities and related disciplines. Ordinarily the program consists of 36 semester hours (including six hours of thesis) and includes nine hours of 500-level core courses exclusive of thesis hours. Students also select one or two courses from the designated theory courses offered by several disciplines as well as the individualized group of courses from two or more disciplines.

A theory course or a three-hour research methods course (or both) in the student's major discipline is to be taken during the first year of graduate study. If the major area does not offer a research methods course, a similar 500-level course in a related field may be taken with committee approval. The capstone course is HUM 513 Interpretation of Cultures, which provides an exploration of issues in the interdisciplinary study of cultures. To stimulate research and publication in the study of the humanities, each semester distinguished visiting scholars share their ideas with students and the university community.

#### Designated Theory Courses

Select from the courses below .....		3-6
ASB	591	S: Language and Culture (3)
DAH	502	Cultural Concepts of Dance (3)
ENG	591	S: Contemporary Critical Theory (3)
HIS	515	Studies in Historiography (3)
JUS	520	Qualitative Theory and Data Collection (3)
PHI	591	Seminar (1-3)
SOC	586	Contemporary Sociological Theory (3)
SPA	545	Concepts of Literary Criticism (3)

**Core**

HUM 511 Structures of Knowledge .....	3
HUM 512 Writing Cultures .....	3

**Subject Matter Courses**

Primarily in humanities disciplines in the area of the student's interdisciplinary interest; may include a methods course .....	15-21
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**Capstone Course**

HUM 513 Interpretation of Cultures ..	3-6
HUM 599 Thesis .....	6

Total .....	36
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**Foreign Language Requirements.** A reading knowledge of one foreign language is required; however, a reading knowledge of two languages is recommended.

**Comprehensive Examinations.** Before concentrating on the thesis, the student writes several interdisciplinary essays as a culminating examination. Topics are framed in relation to the student's individualized program.

**Thesis Requirements.** A thesis is required of all candidates. The thesis must be interdisciplinary and humanistic.

**Final Examinations.** A final oral examination in defense of the thesis is required.

**Research Activity**

A sample of recent thesis topics includes the following: *Romantic Re-evaluations of Thomas Gray's The Bard; Turner, Shelley and the Critics; A Literary High: Language and Inter-*

*textuality in the Work of William S. Burroughs; The Signifying Honkey: Reconstructing the Riddle; A Comparative Study of Kinesthetic Awareness in Ballet and T'ai Chi Chu'uan; The Use of Subversive Humor in Sesame Street; The Poetic Doctoring of Richard Selzer: Reconstructive Surgery on Modern Medicine's Dominant Paradigm; The Hidden Meaning of the Virgin Myth; The Aesthetic Imperatives of the Great Exhibition of 1851; The Frame Undone: A Comparative Study of John Donne and Mannerist Style in Renaissance Art; An Analysis of Rhetorical Strategies Employed in Medical Malpractice Trials; The Study of an Epidemic: Science, Society, and the (Re)Presentation of AIDS; Reading Space: A Question of Resistance; Social Peace, Unconstrained Consent, Social Justice, and the So-Called Liberal Tradition; Getting Around the Body: The Matter of Race and Gender in Faulkner's Light in August; Healing Patterns in Three Ethnic American Novels; Sorcery in Colonial Peru: The Cases Held by the Spanish Inquisition at the Tribunal of Lima.*

**Faculty Research Interests.** Pre-Columbian art and the colonial context; the nature of scientific change; history of biology; folklore and the oral traditions; ideological theory of Argentine narrative and drama; the influence of patronage on Renaissance literature; Native American religions; avant-garde theatre and performance; the art of dying well in 17th-century culture and lit-

erature; contemporary critical theory; 19th-century studies; gender studies; queer theory; film studies; subaltern studies; ideological approaches to literature; comparative literature.

**HUMANITIES**

**HUM 420 Interpreting Latin America.** (3) S Introduction to protocols and methodologies for cultural interpretation of Latin America, with emphasis on four principal cities as cultural space.

**440 Los Angeles and Cultural Theory.** (3) S Analysis of representations of Los Angeles in literary, film, and musical texts and broader implications for contemporary American society.

**450 Technology and Culture.** (3) S Explores sociocultural, ideological, postmodern implications of technology and the role technology plays in social constructions as well as the spaces it creates. Seminar discussion.

**460 Postmodern Culture and Interpretation.** (3) F Currents and interpretations of postmodern culture; international, comparative perspective on the culture and traditions of contemporary "Europes" and "Americas." Seminar discussion.

**462 Psychoanalysis and Culture.** (3) F Introduction to intellectual history of psychoanalytic movement of twentieth century and its contribution to humanities disciplines.

**465 Narrative in the Human Sciences.** (3) F Theories of narrative and narrativity in the Humanities, concentrating on the problems of specific disciplines and interdisciplinary solutions.

**511 Structures of Knowledge.** (3) F Theories and examples of structures of knowledge, including such topics as metaphor, semiotics, and knowledge of the "other."

**512 Writing Cultures.** (3) S Theories and methods of representing Western and non-Western cultures in literature, history, ethnography, and pictorial media.

**513 Interpretation of Cultures.** (3) A Methodologies and comparative theories for the study of relationships between various aspects of culture, the history of ideas, and the arts. May be repeated for a total of 6 semester hours, when topics vary.

**549 Contemporary Critical Theory.** (3) F An advanced survey of major schools of 20th-century literary and critical theory. Lecture, discussion. Cross-listed as ENG 502.

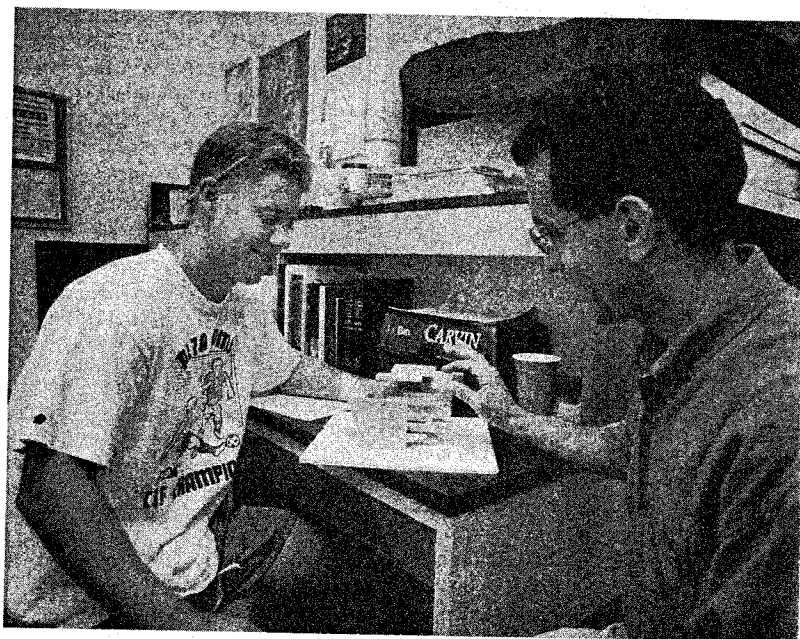
**591 Seminar.** (3) A Topics include

- (a) Comedy: Meaning and Form
- (b) Theory and Culture
- (c) Tragedy: Meaning and Form

**598 Special Topics in the Humanities.** (3) N Open to all students. Topics include

- (a) American Fine Arts
- (b) Comparative Fine and Performing Arts
- (c) Cultures of Ethnic Minorities
- (d) Non-Western Cultures
- (e) Western Historical or Contemporary Cultures

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.



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## Industrial Design

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For information on the postprofessional Master of Science in Design degree in Industrial Design, see pages 68-69.

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## Industrial Engineering

Gary L. Hogg  
*Chair*  
 (GWC 502) 602/965-3185

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### PROFESSORS

BAILEY, HOGG, MONTGOMERY,  
 SMITH, UTTAL, WOLFE

### ASSOCIATE PROFESSORS

ANDERSON-ROWLAND, COCHRAN,  
 DEAN, HUBELE, KEATS, MACKULAK,  
 MOOR, ROLLIER, SHUNK

### ASSISTANT PROFESSORS

FOWLER, MOU, ROBERTS

### PROFESSORS EMERITI

BEDWORTH, HOYT, KNIGHT, YOUNG

The faculty in the Department of Industrial and Management Systems Engineering offer graduate programs with a major in Industrial Engineering leading to the Master of Science in Engineering, the Master of Science, and the Doctor of Philosophy degrees.

It is recommended that students applying for one of the Master's degree programs submit scores (verbal, quantitative, analytical) on the Graduate Record Examination. Doctoral applicants are required to submit GRE scores, a statement of purpose, and three letters of recommendation.

Concentrations within industrial engineering include computer-aided processes, computer-integrated manufacturing, human factors, information systems, operations research, organization control (area of study may be in management of technology), and quality control/reliability.

The overall educational objective of graduate study in industrial engineering is to improve each student's ability to understand, analyze, and resolve problems within complex organizations. Industrial engineers must develop qualitative and quantitative abilities to assist

management in such diverse organizations as banks, government, hospitals, military, and manufacturing operations.

### MASTER OF SCIENCE DEGREE

For information concerning the Master of Science degree, refer to pages 53-55.

### MASTER OF SCIENCE IN ENGINEERING DEGREE

Students applying for the program leading to the Master of Science in Engineering degree in Industrial Engineering may have a baccalaureate degree in a major or field other than industrial engineering, although engineering, mathematics, science, or business is recommended. The student's qualifications are reviewed by the faculty.

For more information concerning this degree, refer to pages 69-70.

A dual degree is available. It is designed to enable qualified graduate students to pursue the Master of Science in Engineering (MSE) at ASU and a Master of International Management of Technology (MIMOT) at the American Graduate School of International Management (Thunderbird). Thunderbird is an internationally recognized private graduate school located in the Phoenix metropolitan area, offering course work in international studies, modern languages, and world business. Details are available from the departmental office.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

The Doctor of Philosophy degree in Industrial Engineering is conferred upon evidence of excellence in research that culminates in a dissertation representing a significant contribution to the field of industrial engineering.

**Program of Study.** The program of study should be developed early in the second semester of Ph.D. study or when the student has completed 6 semester hours of courses at ASU. Specific requirements may be obtained from the department.

**Early Evaluation.** Early in the second regular semester in residence, the student's program of study and academic accomplishment to date serve as a basis

for evaluation by the supervisory committee. The results of this evaluation are used to assist the student in improving or modifying the program of study, to encourage the continuance of Ph.D. studies or, if necessary, to discourage the student from continuing in the program.

### Foreign Language Requirements.

None.

**Comprehensive Examinations.** When the Ph.D. student has essentially completed the course work in the approved program of study and submitted a research proposal to the advisory committee, the student is given a written comprehensive examination relating to the research area. The written examination is followed by an oral exam.

**Dissertation Committee.** Upon successful completion of the comprehensive examinations, the student applies for candidacy. At this time a dissertation committee is appointed to assist in and evaluate the research project and dissertation.

**Dissertation Requirements.** A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required.

**Final Examinations.** A final oral examination in defense of the dissertation is required.

### Research Activity

The Industrial and Management Systems Engineering faculty are involved in a wide variety of research projects. Recent research includes manufacturability of machined parts using statistical process control, dynamic scheduling, object-oriented simulation and control, optimization of industrial processes using response surface methodology, the use of mixture experiments for product formulation, the use of variable sampling interval and variable sample size schemes for process monitoring, benefit-cost analysis for high-technology man-machine systems, ergonomics applied to workplace simulation and design, diagnostic characteristics and a methodology for a bivariate pattern recognition scheme in SPC, design for the environment in the electronics industry, development of a manufacturing cluster

growth methodology, a methodology for assessing system availabilities with finite queues, component redundancy, and spare components, a client-server relational database interface for a heterarchical generic discrete manufacturing simulation model, a taxonomy and a multiple criteria decision model for the evaluation of sourcing strategies for the make or buy problem, impact of graphics on user's performance within the human computer interaction environment, an integrated framework to manage technological complexity in an enterprise, development of a protocol for concurrent engineering, parameter estimation from probability plots using robust regression techniques, a methodology for the management of multi-facility virtual factory environments and an integrated computational model of an autonomous, visually guided, undersea vehicle.

### INDUSTRIAL AND MANAGEMENT SYSTEMS ENGINEERING

- IEE 505 Applications Engineering.** (3) F Develop working knowledge of application systems development tools needed for computer integrated enterprise. Includes techniques for application generation in fourth and fifth generation software environments. Topics include client server network systems, decision support systems, and transaction systems in distributed environment.
- 506 Statistics and Probability for Engineers.** (3) N Intensive calculus-based statistics. No graduate degree credit for College of Engineering and Applied Sciences students.
- 510 Measurement of Productivity.** (3) S '97 The engineering economic audit and its use with applications to break-even analysis, variable budget control cost analysis, and product pricing. Prerequisites: ECE 380; IEE 205 or equivalent.
- 511 Analysis of Decision Processes.** (3) S Methods of making decisions in complex environments and statistical decision theory; effects of risk, uncertainty, and strategy on engineering and managerial decisions. Prerequisite: ECE 380.
- 520 Ergonomics Design.** (3) S Human physiological and psychological factors in the design of work environments and in the employment of people in man-machine systems. Open-shop lab assignments in addition to class work. Prerequisite: IEE 437 or 547.
- 530 Enterprise Modelling.** (3) S Focus on social, economic, and technical models of the enterprise with emphasis on the management of technological resources. Included are organization, econometric, financial, and large-scale mathematical models.
- 531 Topics in Engineering Administration.** (3) S '98 Consideration given to philosophical, psychological, political, and social implications of administrative decisions. Prerequisite: IEE 532 or instructor approval.
- 532 Management of Technology.** (3) F Topics include designing a technical strategy; technological forecasting; interfacing marketing engineering and manufacturing; designing and managing innovation systems; creativity; application of basic management principles to technology management. Prerequisite: IEE 431 or 541 or instructor approval.
- 533 Scheduling and Network Analysis Models.** (3) S '98 Application of scheduling and sequencing algorithms, deterministic and stochastic network analysis, and flow algorithms. Prerequisites: ECE 380; IEE 476 or 546.
- 541 Engineering Administration.** (3) F Introducing quantitative and qualitative approaches to management functions, engineering administration, organizational analysis, decision making, and communication. IEE 431 students ineligible.
- 542 Information System Design.** (3) N Emphasis on the application of system analysis and design to information systems. Micro-processor MIS project required. Open only to students without previous credit for IEE 422. Prerequisite: IEE 205 or equivalent.
- 543 Computer-Aided Manufacturing and Control.** (3) F, S Computer control in manufacturing, CIM, NC, logic controllers, group technology, process planning and robotics. IEE 463 students ineligible. Prerequisite: "C" programming capability.
- 544 Concurrent Engineering.** (3) S Understanding and analysis of complex design issues, including product attributes, manufacturing processes and service issues. IEE 464 students ineligible. Prerequisites: ECE 100; IEE 205.
- 545 Introduction to Simulation.** (3) F, S Using simulation and modeling in analysis and design of network and discrete systems with statistical aspects. IEE 475 students ineligible. Prerequisites: ECE 380; IEE 205.
- 546 Operations Research Techniques/Applications.** (4) F, S Linear programming, network optimization, Markov processes, queuing models, emphasizing model building for solving industrial system problems. IEE 476 students ineligible. Prerequisites: ECE 380; MAT 242.
- 547 Human Factors Engineering.** (3) F Study of people at work; designing for human performance effectiveness and productivity. Considerations of human physiological and psychological factors. Open only to students without previous credit for IEE 437.
- 548 Industrial Engineering Analysis.** (3) S Cost estimation and risk analysis including labor, material, overhead, budget limitations, quality, life cycle costs. IEE 488 students ineligible. Prerequisites: ECE 380; IEE 300.
- 552 Strategic Technological Planning.** (3) S Study of concept of strategy, strategy formulation process, and strategic planning methodologies with emphasis on engineering design and manufacturing strategy, complemented with case studies. An analytical executive planning decision support system is presented and used throughout course. Pre- or corequisite: IEE 545 or 566 or 567 or 574 or 575.
- 560 Database Concepts for Industrial Management Systems.** (3) S Application of object oriented database technology concepts to manufacturing and enterprise systems.
- 561 Production Control Information Systems.** (3) F Development of information system designs for production control. Topics include MRP I, MRP II, scheduling, sequencing, and inventory control. On-line design concepts are covered. Prerequisites: ASE 485 or 500; IEE 461; MAT 242.
- 562 Computer-Aided Manufacturing (CAM) Tools.** (3) F Current topics in automation, distributed control, control code generation, control logic validation, CAM integration, CAD/CAM data structures, planning for control systems. Topics vary by semester. Prerequisite: IEE 463 or 543 or equivalent.
- 563 Systems Analysis for Distributed Systems.** (3) S Analysis and design of distributed groupware applications for manufacturing and enterprise systems. Prerequisite: ECE 380.
- 564 Planning for Computer-Integrated Manufacturing.** (3) F Theory and use of IDEF methodology in planning for flexible manufacturing, robotics, and real-time control. Simulation concepts applied to computer-integrated manufacturing planning. Prerequisite: IEE 463 or 543.
- 565 Computer-Integrated Manufacturing Research.** (3) S Determination and evaluation of research areas in computer-integrated manufacturing, including real-time software, manufacturing information systems, flexible and integrated manufacturing systems, robotics, and computer graphics. Prerequisite: IEE 564.
- 566 Simulation in Computer-Integrated Manufacturing Planning.** (3) F Use of simulation in the planning of computer-integrated manufacturing planning related to robotics, flexible, and integrated manufacturing systems. Use of computer graphics combined with simulation analysis for CIM decision support. Prerequisite: IEE 475 or 545.
- 567 System Simulation.** (3) S Use of simulation in the analysis and design of systems involving continuous and discrete processes; simulation languages; statistical aspects of simulation. Prerequisite: IEE 475 or 545.
- 569 Advanced Statistical Methods.** (3) F '96 Application of statistical inference procedures, based on ranks, to engineering problems. Efficient alternatives to classical statistical inference constrained by normality assumptions. Prerequisite: ASE 485 or 500.
- 570 Advanced Quality Control.** (3) S Economic-based acceptance sampling, multi-attribute acceptance sampling, narrow limit gauging in inspector error and attributes acceptance sampling, principles of quality management, and selected topics from current literature. Prerequisite: ASE 485 or 500 or equivalent.
- 571 Quality Management.** (3) F Total quality concepts, quality strategies, quality and competitive position, quality costs, vendor relations, the quality manual, and quality in the services. Prerequisite: IEE 431 or 541.



**572 Design of Engineering Experiments.**

(3) F, S  
Analysis of variance and experimental design. Topics include general design methodology, incomplete blocks, confounding, fractional replication, and response surface methodology. Prerequisite: ASE 485 or 500.

**573 Reliability Engineering.**

(3) S  
Nature of reliability, time to failure densities, series/parallel/standby systems, complex system reliability, Bayesian reliability, and sequential reliability tests. Prerequisite: ECE 380.

**574 Applied Deterministic Operations Research Models.**

(3) F  
Formulation, solution, analysis, and application of deterministic models in operations research, including those of linear programming, integer programming, and nonlinear programming. Prerequisite: IEE 476 or 546.

**575 Applied Stochastic Operations Research Models.**

(3) S  
Application of stochastic models, including inventory theory, queuing theory, Markov processes, stochastic programming, and renewal theory. Prerequisite: ASE 485 or 500.

**577 Decision and Expert Systems Methodology.**

(3) F  
Systems approach to the analysis, design, and implementation of decision support systems. Emphasis on development of data-bases, model bases dialogs, and systems architecture as well as systems effectiveness. Introduction to expert systems as decision aid included. Term project required. Prerequisite: IEE 205 or equivalent.

**578 Regression Analysis.**

(3) F  
A course in regression model building oriented toward engineers/physical scientists. Topics include linear regression, diagnostics biased and robust fitting, nonlinear regression. Prerequisite: ASE 485 or 500.

**579 Time Series Analysis and Forecasting.**

(3) F '97  
Forecasting time series by the Box-Jenkins and exponential smoothing techniques; existing digital computer programs are utilized to augment the theory. Prerequisites: ASE 485 or 500; IEE 461.

**582 Response Surfaces and Process Optimization.**

(3) S  
An introduction to response surface method and its applications. Topics include steepest ascent, canonical analysis, designs, and optimality criteria. Prerequisite: IEE 572.

**672 Advanced Topics in Experimental Design.**

(3) S '98  
Engineering applications of factorial and fractional factorial designs with randomization restrictions, analysis techniques in parameter comparison, missing data, unbalanced designs. Prerequisite: IEE 572 or instructor approval.

**677 Regression and Linear Models.**

(3) S '97  
General linear models, applications, theory, including least squares, maximum likelihood estimation, properties of estimators, likelihood ratio tests and computational procedures. Prerequisite: IEE 578 or instructor approval.

**679 Time Series Analysis and Control.**

(3) F '96  
Identification, estimation, diagnostic checking techniques for ARIMA models, transfer functions, multiple time series models for feedback and feedforward control schemes. Prerequisite: IEE 579 or instructor approval.

**681 Reliability, Availability, and Serviceability.**

(3) F '96  
Organizing hardware and software, integrity and fault-tolerant design, maintenance design and strategy, Markov models, fault-free analysis, and military standards. Prerequisite: ECE 380.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Interior Design

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For information on the postprofessional Master of Science in Design degree in Interior Design, see pages 68-69.

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## Justice Studies

### Master's Program

**David Goldberg***Director*

(WILSN 327) 602/965-7682

**REGENTS' PROFESSORS**

ALTHEIDE, PALUMBO

**PROFESSORS**

CAVENDER, FIGUEIRA-McDONOUGH, GOLDBERG, HAYNES, HEPBURN, JOHNSON, KELLY, LAUDERDALE, MUSHENO, SCHNEIDER, ZATZ

**ASSOCIATE PROFESSORS**

BORTNER, JURIK, LUJAN, SCHADE

**ASSISTANT PROFESSORS**

HILL, MENJIVAR, RIDING IN

The faculty in the School of Justice Studies offer a program leading to the Master of Science degree in Justice Studies. The study of justice is an interdisciplinary field of scholarship, research, and teaching, embracing those aspects of social and behavioral sciences relevant to an understanding of law, justice, crime, and social deviance. It includes a critical examination of the policies and organizational processes that have evolved for handling attendant problems. The Master of Science degree has been designed to prepare students for professional positions in justice-related agencies, for teaching in community colleges, and for further study and research in the justice field.

**Admission.** In addition to meeting Graduate College requirements, the applicant must submit Graduate Record

Examination (GRE) scores, a one- or two-page statement outlining the applicant's educational and career goals related to Justice Studies, and three letters of recommendation, preferably from academic referees.

**Selection Criteria.** In selecting persons of the most promising potential, the admissions committee evaluates past academic performance, scores from the Graduate Record Examination (GRE) and potential for success as indicated by recommendations and personal statements.

Applications to the program may be made at any time; however, complete files must be submitted to the Graduate College by February 5 for Fall admission.

**International Applicants.** In addition to admission material, international applicants whose native language is not English must submit scores from the Test of English as a Foreign Language (TOEFL). Evidence that sufficient funds are available for financing the student's academic program also must be submitted. See page 45 for more information.

**Advisory Committee.** Upon admission of the applicant, a temporary advisor is appointed. The temporary advisor is a faculty member who assists students in the selection of courses for the first semester until an advisory committee is formed. By the second semester of study or completion of 12 hours, the student must form an advisory committee consisting of a chair and two other faculty members. The chair and at least one member must be faculty of the School of Justice Studies.

The committee members must be appointed by the dean of the Graduate College upon the recommendation of the director of the School of Justice Studies. The advisory committee works with the student to establish a program of study, to direct the thesis, and to administer the oral examination.

**Program of Study.** The Master of Science degree in Justice Studies has two options: a thesis or an applied project. The thesis option requires the completion of 36 semester hours, of which six are thesis hours. The applied project option requires the completion of 42 semester hours, of which three are JUS 593 Applied Project. The foundation



of the master's degree program is an interdisciplinary approach in which a student may take nine to 15 hours from other academic disciplines. Each student's program is developed in concert with the advisory committee, in accord with the student's background of preparation and educational and career objectives. The program of study has three major categories: foundation courses, elective courses, and thesis requirements.

**Foundation Courses.** The required foundation courses provide students with a fundamental understanding of the theories, methods, and analytic techniques associated with the study of justice.

**Elective Courses.** Offered by the School of Justice Studies and other academic units, elective courses develop a unique research area in justice studies. Students may choose these courses in consultation with their advisory committees. Alternatively, students may choose one of the following areas within justice studies:

1. adolescence and justice;
2. American Indian justice;
3. comparative justice;
4. crime and justice.
5. dispute resolution;
6. gender and justice;
7. law, ecology, and society;
8. law, policy, and evaluation;
9. race, ethnicity, and justice; or
10. social and economic justice.

**Thesis Requirements.** To satisfy the research requirement for the Master of Science degree, candidates must present a thesis and defend it in an oral examination.

**Applied Project Requirements.** Candidates pursuing the applied project option must present their applied project and defend it in an oral examination conducted by the faculty member who supervises the project. The project can be an analytical report based on field experience or a paper dealing with a theoretical issue related to the student's area of study.

**Foreign Language Requirements.** None.

**Concurrent M.S. Justice Studies/ M.A. Anthropology.** Graduate students in the School of Justice Studies and the Department of Anthropology are able to receive a concurrent Master of Science degree in Justice Studies and Master of Arts in Anthropology with a concentration in social-cultural anthropology. The principal purpose of the program is to prepare individuals with complementary knowledge and skills for basic and applied research and to provide administrative and educational activities related to justice studies and anthropology.

Students must be admitted separately to each program, following the guidelines of the Graduate College, Department of Anthropology, and School of Justice Studies. Additional information on the M.A. in Anthropology and the M.S. in Justice Studies may be obtained from each academic unit.

**Doctor of Philosophy Degree.** Information about the interdisciplinary Ph.D. in Justice Studies may be obtained from the graduate coordinator's office.

**Financial Assistance.** A limited number of assistantships are available on a competitive basis for well-qualified students at the master's level. To be eligible for an assistantship, students must be admitted to a graduate degree program with regular admission status. Application should be made directly to the School of Justice Studies.

#### Research Activity

The School of Justice Studies has a strong commitment to ongoing research programs. Graduate students have ample opportunities to participate in these pursuits through paid research assistantships as well as research apprenticeships and independent studies at the graduate level.

Areas of faculty research include the following: administration and management in justice-related agencies, American Indians and justice, analyses of criminal justice reforms, comparative legal systems, corrections, criminological theory, deviant behavior, dispute resolution, distributive justice, ethical theory, family violence, female criminality, grievance processes, justice and

the media, juvenile justice, law and society, legal studies, normative and empirical inquiry of social policy, organizational theory and behavior, police, political deviance, race and ethnic relations, social control and conflict, victimization, white collar and corporate deviance, women, justice and policy, workplace inequality, and world systems.

#### JUSTICE STUDIES

**JUS 500 Justice Research Methods.** (3) F, S, SS

Theories and methods of research with emphasis on development of designs most relevant to justice data and problems.

**501 Justice System, Theory, and Issues.** (3) F, S

Analysis of the justice structure and process within various theoretical frameworks. Issues such as discretion, diversion, and plea negotiations.

**503 Crime and Social Causation.** (3) S

Theories of deviance and crime as they relate to social policies and specific response of the justice complex.

**509 Statistical Problems in Justice Research.** (3) F, S

Methodological problems of research design and statistical methods specific to justice studies.

**510 Understanding the Offender.** (3) F

Survey of learning, personality, and biological theories of causation and their relevance to understanding criminal and delinquent behavior.

**514 Justice Policy.** (3) F

Assessment of the politics of justice policy as well as an understanding of the basic tools available to social scientists for analyzing the formulation, implementation, and evaluation of justice policy.

**515 Comparative Justice.** (3) F, S

Focuses on justice, legality, and human rights cross-culturally, examining both theoretical and methodological issues. Seminar.

**520 Qualitative Theory and Data Collection.** (3) F

The basic theoretical rationale and perspectives for justice related qualitative research, e.g., symbolic interactionism. Techniques for data collection, e.g., ethnography and depth interviewing.

**521 Qualitative Data Analysis and Evaluation.** (3) S

Analysis of qualitative data, e.g., field notes, depth interview transcripts, document analysis, coding, and retrieval with a microcomputer; qualitative evaluation.

**540 Justice Administration.** (3) S

Administrative policies and practices used in justice agencies and their application to the various facets of the justice administrative process.

**541 Justice Planning: Innovation and Change.** (3) S

Normative factors in planning for standards and goals in the justice system. Application of innovation and change techniques in an interdependent system.

**542 American Indian Justice.** (3) F, S, SS

Designed to provide a broad overview of American Indian and Alaskan Native issues of justice and injustice in contemporary society.

**547 Program Evaluation.** (3) F, S, SS

Nature/role of program evaluation; types, program monitoring, impact and process assessment, evaluability assessment, methods, utilization, and politics of evaluation. Lecture, lab. Cross-listed as PAF 547. Pre- or corequisites: JUS 500 recommended.

**550 Alternatives to Incarceration.** (3) F, S, SS

Investigation of various alternatives to incarceration; advantages/disadvantages; major is-

ssues including net widening, cost effectiveness, risk assessment, community crime prevention. Lecture, research.

**560 Women, Law, and Social Control.** (3) F

Gender issues in the exercise of formal and informal mechanisms of social control, including economic, social, legal factors, both violent and non-violent.

**570 Juvenile Delinquency.** (3) F

Study of delinquency, including causation theories. Alternative definitions of delinquency, official statistics, and the critique and analysis of the interaction between social institutions and youth.

**571 Juvenile Justice System.** (3) S

Graduate-level introduction to juvenile justice system, including historical development, philosophical orientation, organizational structure, and contemporary controversies.

**579 Political Deviance.** (3) F

The seminar examines the politics of deviance by integrating the study of conflict with aspects of social organization, especially state formation.

**584 Internship.** (3 or 6) F, S, SS

Assignments in a justice agency designed to further the student's integration of theory and practice. Placements are arranged through consultation with students and agencies.

**588 Justice and the Mass Media.** (3) F, S, SS

An analysis of the nature and impact of mass media messages about justice concerns for social order. Lecture, discussion.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.



## Justice Studies

### Doctoral Program Interdisciplinary Faculty Committee on Law and Social Sciences

Pat Lauderdale  
Director, Executive Committee  
(WILSN 376) 602/965-7071

#### ANTHROPOLOGY

Associate Professor: Aguilar

#### COMMUNICATION

Professor: Kastenbaum

#### DECISION AND INFORMATION SYSTEMS

Professor: Mayer

#### ECONOMICS

Professor: McPheters

#### HISTORY

Professor: Fuchs;  
Associate Professor: Hurtado

#### JUSTICE STUDIES

Regents' Professors: Altheide,  
Palumbo; Professors: Cavender,  
Figueira-McDonough, Goldberg,  
Haynes, Hepburn, Johnson, Kelly,  
Lauderdale, Musheno, Schneider, Zatz;  
Associate Professors: Bortner, Jurik,  
Lujan; Assistant Professor: Riding In

#### LANGUAGES AND LITERATURES

Professor: Baldini

#### LAW

Professors: Bartels, Lowenthal,  
Stanton, Strouse, Tesón

#### PHILOSOPHY

Associate Professor: McGregor

#### PHILOSOPHY AND LAW

Regents' Professor: Murphy

#### POLITICAL SCIENCE

Associate Professors: Ashley,  
Dantico, Stookey

#### PSYCHOLOGY

Professors: Lanyon, Russo

#### PUBLIC AFFAIRS

Professor: Weschler

#### RECREATION MANAGEMENT AND TOURISM

Professor: Allison

#### RELIGIOUS STUDIES

Associate Professor: Gereboff

#### SOCIAL WORK

Professor: Ashford

#### SOCIOLOGY

Professors: Nagasawa, Thomas;  
Associate Professor: Benin

#### WOMEN'S STUDIES

Associate Professor: Ferraro

The Committee on Law and Social Sciences offers an interdisciplinary graduate program leading to the Doctor of Philosophy degree in Justice Studies. The Ph.D. in Justice Studies integrates philosophical, legal, and historical approaches with social science training. The committee is interdisciplinary and sets guidelines and supervises programs of study. The interdisciplinary program offers faculty research and teaching interests from a number of academic units, enabling a student to tailor a course of study to fit individual needs and goals. The committee is composed of members from the Departments of Anthropology, Communication, Economics, Languages and Literatures, History, Management, Philosophy, Political Science, Psychology, Religious Studies, Sociology, the College of Law, and the Schools of Justice Studies, Public Affairs, Recreation Management and Tourism, and Social Work. An executive committee, appointed by the dean of the Graduate College from this larger body of faculty, has the primary responsibility for the operation of the Ph.D. program.

#### DOCTOR OF PHILOSOPHY DEGREE

The focus of the Ph.D. in Justice Studies is the study of law and justice in society and the creation of new knowledge. Subject matter includes assessing the impact of legal systems and other institutions on the distribution of rights, benefits, and burdens from diverse comparative and historical perspectives.

This interdisciplinary program aims to produce scholars whose research activities contribute to the knowledge and understanding of conflicts and dilemmas surrounding social change. Courses on the study of Justice are a part of the curriculum of many academic disciplines, and academic books and journals increasingly stress issues of justice and injustices. In addition to the interdisciplinary programs featuring justice, students may enter academic programs that focus on gender, race, ecology, class, law, and public and business administration. Justice Studies graduates from the interdisciplinary Ph.D. program will have a strong theoretical background, interdisciplinary training in law, humanities, and the social sciences, and may possess the technical skills associated with both qualitative and quantitative research methodology. These qualifications can provide

graduates with the opportunity to successfully compete for a variety of positions in academic and justice-related fields.

**Admission.** Applications are reviewed on an annual basis by an admissions committee representing the Committee on Law and Social Sciences. Recommendations for admission are made by the director of the Executive Committee to the dean of the Graduate College. In addition to meeting minimum Graduate College admission requirements, each applicant must provide a statement of educational and career goals and the reasons for seeking the interdisciplinary Ph.D. in Justice Studies, a Graduate Record Examination (GRE) test score (or LSAT score), a sample of written work, and three letters of recommendation, preferably from academic referees. Because of enrollment limits, candidates who meet minimum requirements are cannot automatically be admitted.

**Advisory Committee.** An advisory committee consisting of at least three persons, a committee chairperson, and two other faculty members, is appointed by the dean of the Graduate College upon the recommendation of the director of the Committee on Law and Social Sciences. The advisory committee advises the student in developing a program of study and assumes primary responsibility for assessing the student's progress in the program. The advisory committee prepares and evaluates the comprehensive examination.

**Core Courses.** Four core courses are required of all students in the program. The core courses are taken within the first three semesters of the student's program of study. Each core course is interdisciplinary in nature, and, to the extent possible, team taught. The core courses are as follows:

JUS 610	Law and the Social Sciences .....	3
JUS 620	Justice Research and Methods .....	3
JUS 640	Theoretical Perspectives on Justice .....	3
Approved doctoral-level analysis course ...		3

**Areas of Concentration.** Students use elective courses to develop a specialization in an area relevant to justice studies from a law and social sciences perspective. The specialization is to be developed through consultation with the student's advisory committee. Five

areas of concentration have been established, based on the research and teaching expertise of participating faculty. These formalized concentrations are:

1. criminal and juvenile justice;
2. dispute resolution;
3. law, justice, and minority population;
4. law, policy, and evaluation; and
5. women, law, and justice.

From these broad concentrations, students can develop areas of study emphasizing:

1. adolescence and justice;
2. American Indian justice;
3. comparative justice;
4. crime and justice;
5. dispute resolution;
6. gender and justice;
7. law, ecology, and society;
8. law, policy, and evaluation;
9. race, ethnicity, and justice; and
10. social and economic justice.

Students may develop other areas of study in consultation with their advisory committee. Courses are not limited to those departments and schools participating in the Committee on Law and Social Sciences.

**Program of Study.** Students who enter the program with a master's degree in the social sciences, philosophy, a relevant interdisciplinary field, or a Juris Doctorate (J.D.), must complete a minimum of 54 semester hours of study beyond the master's or J.D. degree. Applicants holding only the baccalaureate degree are required to complete 84 hours of graduate credit. As part of the overall program of study, each student must register for a minimum of 24 semester hours of research and dissertation credit. The student should expect to devote at least one to two years to completing the dissertation. At least 30 hours of the approved Ph.D. program in which the student is enrolled, exclusive of dissertation and research hours, including four core courses, must be taken at ASU. After students are admitted to the Ph.D. program, they must spend at least two consecutive semesters in full-time residence at ASU.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Upon completion of course work and before the start of dissertation research, the student is given a written examination in the core area and in the substantive area of concentration. The examination, with a written and optional oral component, is designed to evaluate the student's accumulation of interdisciplinary knowledge and ability to communicate across disciplines. The comprehensive examination is developed and administered by the student's advisory committee.

**Dissertation Committee.** After passing the comprehensive examination, a dissertation committee is formed and approved by the dean of the Graduate College upon the recommendation of the director of the Executive Committee. The dissertation committee must be composed of at least three faculty members, including the dissertation committee chairperson. The dissertation committee must approve the subject and title of the dissertation. The committee must be representative of an interdisciplinary faculty, and must have sufficient interdisciplinary knowledge and skills to advise the student during the formulation of the research topic and during the completion of the research and dissertation.

The advisory and dissertation committees may have different memberships.

**Advancement to Candidacy.** Ph.D. students will achieve candidacy status in a letter from the Graduate College dean upon (1) passing the comprehensive examination, and (2) successfully defending the dissertation prospectus.

**Dissertation Requirements.** The dissertation consists of a fully documented written analysis demonstrating an appropriate level of interdisciplinary skills and competence associated with a justice issue. Each student must register for a minimum of 24 semester hours of dissertation and research; 12 of these semester hours must be completed after candidacy.

**Final Examinations.** The oral examination in defense of the dissertation must be scheduled and conducted by the student's dissertation committee. A candidate must pass the final examination within five years after completing the comprehensive examination.

**Concurrent Ph.D. in Justice Studies/J.D. in Justice Studies/J.D. degrees** is to provide a rigorous education for highly qualified students interested in pursuing academic careers in law, law and the social sciences, or law and philosophy. In order to seek concurrent degrees, the prospective student must first gain separate admission to the College of Law and the interdisciplinary Ph.D. program in Justice Studies. The student must then obtain special approval to pursue concurrently the J.D. and Ph.D. degrees. For this purpose, two members of the Ph.D. program admissions committee and two members of the College of Law admissions committee meet regularly to review requests and approve which students are allowed to seek concurrent degrees. These recommendations are forwarded by the chairperson of the Committee on Law and the Social Sciences to the appropriate administrative bodies. No more than three students per year are permitted to pursue concurrent degrees.

#### Research Activity

Faculty making up the Committee on Law and Social Sciences are engaged in a variety of research activities. Faculty research interests are as follows: alternative organizations and social services; American and European women's history; American Indian history; American Indian repatriation; bureaucratic power; comparative legal studies; corporate crime; corrections, including privatization and alternatives; domestic relations; domestic violence; ecological justice; economic models of crime; educational reforms for inner city schools; environmental law; ethics theory; European social institutions; gender justice; indigenous law; informal justice and dispute resolution; international law; judicial administration; judicial behavior; jurisprudence; justice for the physically challenged; justice and minority populations; juvenile justice and law; juveniles and status offenses; law and ecology; law and social control; logic of policy inquiry; nature and law; official information and deviance; organizational ethics; philosophy and the law; political deviance; psychology, law and public policy; racism; religion and moral issues; rights of AIDS victims and AIDS educational strategies; rights of older adults; ser-



vices equity; sexual deviation; social inequality and ethnicity; social theory; women and crime; women and politics; women and work; and world system's theory.

### JUSTICE STUDIES

**JUS 610 Law and the Social Sciences.** (3) S  
Analysis of the theoretical grounds underlying diverse studies of law and society; creation and administration of law; and jurisprudence and politics.

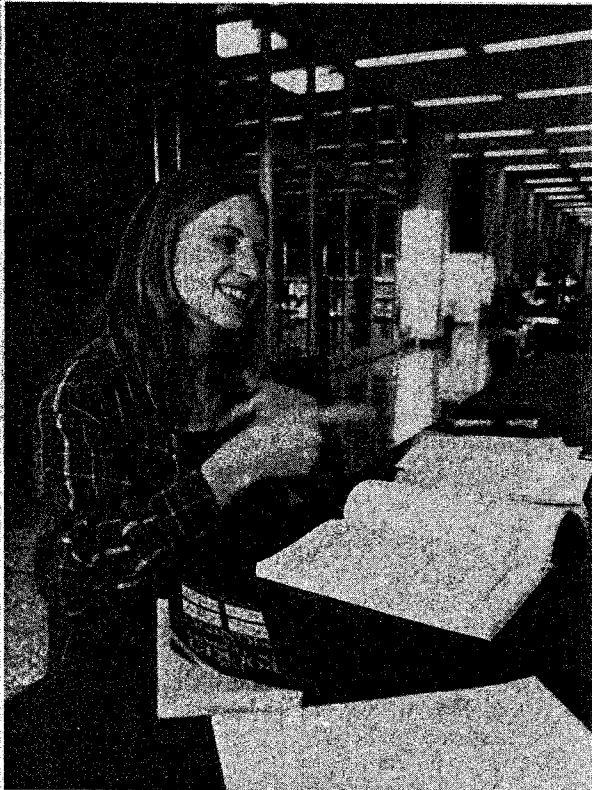
**620 Justice Research and Methods.** (3) F  
Concept development, research design, data collection strategies, legal research, and building computer databases relevant to the study of justice.

**630 Data Analysis for Justice Research.** (3) F  
Bivariate and multivariate techniques of data analysis and hypothesis testing for justice-related research and use of information and statistical programs.

**640 Theoretical Perspectives on Justice.** (3) F  
Analysis of philosophical perspectives of justice; linkages between social science theory and justice constructs; application of justice to social issues.

**669 Political Trials and Indigenous Justice.** (3) S  
Focuses upon research on political trials, deviance, and conceptions of indigenous and contemporary justice. Lecture, discussion.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.



## Languages and Literatures

**Pier Raimondo Baldini**  
*Chair*  
(LL B404) 602/965-6281

### REGENTS' PROFESSORS FOSTER, KELLER

**PROFESSORS**  
ALARCON, ALEXANDER, BALDINI,  
COUCH, CROFT, CURRAN, EKMANIS,  
FLYS, HORWATH, LOSSE,  
VALDIVIESO, VOLEK,  
WETSEL, WIXTED

**ASSOCIATE PROFESSORS**  
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COTA-CÁRDENAS, GUNTERMANN,  
W. HENDRICKSON, LAFFORD,  
REIMAN, SENNER, WILLIAMS

**ASSISTANT PROFESSORS**  
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GARCIA-FERNANDEZ, GRUZINSKA,  
HERNÁNDEZ-G., JULIEN, MARSHALL,  
OSSIPOV, SANCHEZ, TIPTON,  
URIOSTE-AZCORRA, VITULLO

**INSTRUCTORS**  
HABERMAN, MORGAN, TU

**LECTURERS**  
FOARD, S. HENDRICKSON

**PROFESSORS EMERITI**  
ACEVEDO, CARLSON, CARVER,  
GROBE, KNOWLTON, LAETZ,  
LANDEIRA, LOWE, LUENOW,  
MARTÍNEZ, RADKE, SHEPPARD,  
VIRGILLO, VON DER HEYDT,  
WIRTZ, WOLLAM

The faculty in the Department of Languages and Literatures offer graduate programs leading to the Master of Arts degree with majors in French, German, and Spanish. Concentrations are available in the following areas:

1. literature;
2. language and culture (except in French);
3. comparative literature (in cooperation with the faculty in the Department of English); and
4. linguistics (in French and Spanish only).

The faculty also offers a graduate program with a major in Spanish leading to the Doctor of Philosophy degree.

Students admitted to the Master of Education degree program in Secondary Education may elect foreign languages as the subject matter field.

It is recommended, but not required, that students applying for admission to one of these programs submit scores on the Graduate Record Examination.

### MASTER OF ARTS DEGREE

Candidates for the Master of Arts degree should, upon entrance, present the equivalent of an undergraduate major in the language in which the degree is sought. Those who lack this background, but who show strong potential and meet Graduate College admissions requirements, may be admitted to a graduate program on a provisional basis, pending removal of specified deficiencies. These deficiencies must be completed in addition to the regular program of study for the master's degree.

Students in all graduate programs are expected to maintain a high level of linguistic fluency acceptable to a native speaker. Before acceptance in the program, applicants may be requested to furnish evidence of their proficiency.

The program of study for the Master of Arts degree includes a minimum of 30 semester hours of graduate-level work, as approved by the candidate's supervisory committee. The program must include a 500-level Bibliography and Research Methods course offered by the department. It is recommended that the course be taken, if possible, in the first semester of the candidate's graduate career. (Students in the Spanish program [literature concentration] also are required to enroll in SPA 545 Concepts of Literary Criticism.) When approved by the candidate's supervisory committee, nine hours in another language or in closely related courses may be included in the program.

Students pursuing their graduate studies in a program with a concentration in literature, comparative literature, or linguistics present an acceptable thesis for which six hours of credit are granted.

Students who are primarily interested in teaching on the secondary or community college levels may select, with the approval of the supervisory committee, a program of study with a concentration in language and culture. Students in this program present a thesis for which six hours of credit are granted.

**Comprehensive Examinations.** All candidates are required to pass a comprehensive written or oral examination designed to evaluate the candidate's knowledge in the area of specialization. A reading list is provided as a guide to preparation for this examination.

**Thesis Requirements.** A thesis is required.

**Final Examinations.** A final oral examination in defense of the thesis is required.

## DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

The Ph.D. degree is offered with a major in Spanish.

**Program of Study.** The student's individual program of courses covering the various periods of Spanish and Latin American literature, as well as the historical and political background of both areas, is determined in consultation with the supervisory committee. Specifically required are SPA 500 Bibliography and Research Methods, SPA 540 History of the Spanish Language, and SPA 545 Concepts of Literary Criticism.

At least 15 graduate credits must be earned in the subfield, and the candidate's program of study in the subfield must be approved by the subfield department. Normally the comprehensive examination on the subfield, administered by the subfield department, must be satisfied before the comprehensive in Spanish. Students are urged to consult the *Handbook for Spanish Graduate Students*.

### Foreign Language Requirements.

Each candidate is expected to demonstrate a reading knowledge of two languages other than Spanish. The language requirements must be satisfied before the candidate is eligible to take the comprehensive examination.

**Comprehensive Examinations.** A written and oral comprehensive examination, designed to ascertain the candidate's knowledge and orientation in the field of study and competency to proceed with the dissertation, is required at or near the end of course work.

**Dissertation Requirements.** The candidate must present an acceptable dissertation based on original investigation. The dissertation must represent a significant contribution to knowledge and demonstrate the candidate's ability to do independent, scholarly research.

**Final Examinations.** A final oral examination is required. This examination covers the subject matter of the dissertation and appropriate field.

### Research Activity

Commitment to professional research in the Department of Languages and Literatures is evidenced by the large number of faculty publications and conference papers. Faculty members are engaged in editorial work for scholarly presses and journals. The Bilingual Press is now based at the university. The ASU Library collection has extensive holdings in all the fields of foreign languages. Both faculty and students have access to computer aids to research. In addition, the Center for Latin American Studies coordinates Latin American research programs for faculty and students involved in Latin American research. The Hispanic Research Center focuses on the Spanish-speaking population of the U.S. Faculty in all Romance languages are active in the Arizona Center for Medieval and Renaissance Studies and in the Interdisciplinary Humanities Program.

Specific topics of faculty research are described below.

**French.** In addition to the presentation of the general range of French and Francophone civilization, language, and literature, faculty members are engaged in research projects on the following topics: interpreting; literary translation; stylistics; critical text and textbook preparation; the *chanson de geste*; medieval lyric poetry; Renaissance narrative (Rabelais, Marguerite de Navarre); classical aesthetics; the Philosophical Tale; the relationship of 19th-century literature, art, music, and criticism; French opera and the art song; the contemporary novel (Proust, Pinget, Chérid); Romanian authors in France; French African and French Canadian narrative; sociolinguistics and French syntax, 18th-century literature, philosophical approaches to literature, and autobiography; French women in literature and art.

**German.** In addition to general coverage of German literary topics, faculty members are engaged in research on the following topics: literary theory and stylistics, Old Norse, the Baroque novel and drama, the epoch of Goethe and Schiller, Romanticism, Austrian literature, individual figures such as Kleist and Kafka, and women's role in German literature.

**Spanish.** In addition to broad coverage of Spanish and Spanish-American literary topics, particular regional emphases lie with the U.S. Southwest, Mexico, the Caribbean, the Andes, and the River Plate. Specific research projects by Spanish faculty members include topics in Chicano literature, literary translation, Hispanic literary bibliography, literary theory, Argentine narrative, contemporary Spanish poetry, Hispanic women writers, Latin American popular culture, prose narrative of the Golden Age, contemporary Spanish and Spanish-American theatre, Hispanic linguistics and bilingualism/sociolinguistics, and various topics in Brazilian literature.

## FOREIGN LANGUAGES

### FLA 515 Second Language Acquisition. (3) S

Description and analysis of second language acquisition and learning simultaneously or sequentially in natural and artificial settings. Prerequisite: FLA 400 or equivalent or instructor approval.

### 525 Trends and Issues in Foreign Language Teaching. (3) N

Advanced methods seminar, designed for experienced teachers.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## FRENCH

### FRE 416 French Civilization II. (3) S

Political, intellectual, social, economic, and artistic development of France from the 18th century to present. Prerequisite: 6 hours of upper-division French. *General Studies:* HU, G.

### 421 Structure of French. (3) F

Phonology, morphology, syntax, semantics, and varieties of French. Prerequisites: FRE 311 and 312 or instructor approval.

### 422 Applied French Linguistics. (3) S

Application of linguistic theory and second language acquisition theory to teaching of French. Prerequisite: ASB 480 or ENG 213 or FLA 400.

### 423 French Syntax. (3) F

The analysis of French syntactic structure by contemporary theoretical models. Prerequisite: ASB 480 or ENG 213 or FLA 400.



**424 French Phonology.** (3) S  
Introduction to phonological theory and its application to French. Prerequisites: FRE 311 and 312 or instructor approval.

**441 French Literature of the 17th Century.** (3) N  
From 1600 to 1660. Prerequisite: 9 hours of 300-level French, including FRE 321, or instructor approval. *General Studies: HU.*

**442 French Literature of the 17th Century.** (3) N  
From 1660 to 1700. Prerequisite: 9 hours of 300-level French, including FRE 321, or instructor approval. *General Studies: HU, H.*

**445 French Literature of the 18th Century.** (3) N  
Contributions of the philosophers and the development of the novel and drama. Prerequisite: 9 hours of 300-level French, including FRE 321, or instructor approval. *General Studies: L2/HU.*

**451 French Poetry of the 19th Century.** (3) N  
From Romanticism to Parnassian poetry to Symbolism. Prerequisite: 9 hours of 300-level French, including FRE 322, or instructor approval.

**452 French Novel of the 19th Century.** (3) N  
From Constant, Hugo, Balzac, Stendhal, and Sand to Flaubert and Zola, with emphasis on major literary movements. Prerequisite: 9 hours of 300-level French, including FRE 322, or instructor approval. *General Studies: HU.*

**453 Theater of the 19th Century.** (3) N  
From Romantic drama to the Symbolist Theater. Representative plays of Hugo, Musset, Vigny, Dumas, Becque, Rostand, Feydeau, and Mirbeau. Prerequisite: 9 hours of 300-level French, including FRE 322, or instructor approval.

**461 Preatomic Literature.** (3) F  
Representative authors from Proust and Malraux to Sartre from 1900 to 1945. Prerequisite: 9 hours of 300-level French, including FRE 322, or instructor approval. *General Studies: HU.*

**462 Postatomic Literature.** (3) S  
Representative authors including Camus, Duras, and Robbe-Grillet from 1945 to present. Prerequisite: 9 hours of 300-level French, including FRE 322, or instructor approval. *General Studies: HU.*

**471 The Literature of Francophone Africa and the Caribbean.** (3) N  
Selected prose, poetry, and drama of black authors from Africa and the Caribbean. Prerequisite: 9 hours of 300-level French, including FRE 322, or instructor approval. *General Studies: L2/HU.*

**472 Franco-Canadian Civilization.** (3) S  
A study of the civilization of Quebec in particular through its history, language, literature, music, and customs. Prerequisite: 9 hours of 300-level French or instructor approval. Cross-listed as FRE 598.

**500 Bibliography and Research Methods.** (3) F  
Required of all graduate students.

**510 Explication de Textes.** (3) N  
Detailed analysis of literary texts.

**515 Intellectual Currents in France, from the Middle Ages to the 18th Century.** (3) N  
Significant social, aesthetic, philosophic, and scientific ideas as presented by major writers of fiction and nonfiction.

**516 Intellectual Currents in France, from the 19th Century to the 20th Century.** (3) N  
See FRE 515.

**521 History of the French Language.** (3) N  
Principal phonological, morphological, and semantic developments of French from Latin to present, with emphasis on old and middle French. Some familiarity with Latin is recommended.

**531 Medieval French Literature.** (3) F  
Readings in the epics, early drama, roman courtois, and other representative literary genres of the Middle Ages.

**535 French Literature of the 16th Century.** (3) S  
Readings in French Renaissance literature with special attention to the humanist movement and to Rabelais, Montaigne, and the Pleiade.

**591 Seminar.** (3) N  
Topics may be selected from the following:  
(a) Advanced Problems in French Literature  
(b) Balzac  
(c) Corneille, Molière, and Racine  
(d) Diderot, Voltaire, and Rousseau  
(e) Flaubert  
(f) French Existentialist Literature  
(j) French Literary Criticism  
(h) Proust  
(i) Realism and Naturalism  
(j) Romanticism  
(k) Stendhal and Zola

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## GERMAN

**GER 421 German Literature.** (3) F  
From the beginning to classicism. Prerequisite: 6 hours of 300-level German. *General Studies: HU.*

**422 German Literature.** (3) S  
From Romanticism to the present. Prerequisite: 6 hours of 300-level German. *General Studies: L2/HU.*

**500 Bibliography and Research Methods.** (3) N  
Required of all graduate students.

**511 German Stylistics.** (3) N  
Art of writing literary German, comparative stylistics.

**521 History of German Language.** (3) N  
Linguistic development of German from the earliest records to the present.

**523 German Drama.** (3) N  
Drama of the 19th and 20th centuries.

**525 German Novel.** (3) N  
Special studies in the German novel.

**527 The Nouvelle.** (3) N  
Special studies in the German short story.

**531 Middle High German Language and Literature.** (3) N  
Reading and discussion of specimens of the Middle High German epics, romances, and other literary genres.

**551 Romanticism.** (3) N  
Treatment of early and late Romanticism.

**555 Modern German Literature.** (3) N  
Major works from the period of Expressionism to 1945.

**591 Seminar.** (3) N  
Special topics are concerned with a figure, theme, or work in German literature or Germanic studies. Topics may be selected from the following:  
(a) Faust  
(b) Germanic Studies  
(c) Goethe  
(d) Grass and Boll  
(e) Hesse  
(f) Kafka  
(g) Kleist  
(h) Schiller

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## SPANISH

**SPA 500 Bibliography and Research Methods.** (3) F  
Required of all graduate students.

**536 Generation of 1898.** (3) N  
Works of Unamuno, Baroja, Azorín, and their contemporaries, studied against the ideological background of the turn of century in Spain. Prerequisite: SPA 325.

**540 History of the Spanish Language.** (3) S  
Linguistic development of the Spanish language from the epoch of Vulgar Latin to the present day.

**541 Spanish Language in America.** (3) F  
The major dialects of Spanish in the Americas, and their historical, social, and cultural development. Prerequisite: SPA 540 or instructor approval.

**542 Studies in the Spanish of the Southwest.** (3) S  
Examination of bilingualism and the social and regional dialects of Spanish in the Southwest. Prerequisite: FLA 400 or equivalent.

**543 Structure of Spanish.** (3) S  
Analysis and discussion, within the framework of contemporary linguistic theories, of selected problems in Spanish morphology, syntax, and semantics. Prerequisite: FLA 400 or equivalent.

**545 Concepts of Literary Criticism.** (3) S  
Aims and methods of modern literary scholarship. Discussion of major theories of literary analysis.

**555 Spanish-American Modernism.** (3) N  
Principal works and figures of literary Modernism, 1880-1920, with emphasis on international literary context of the movement. Prerequisite: SPA 325.

**557 Contemporary Spanish-American Poetry.** (3) N  
Major works and problems in contemporary poetry and poetics, with emphasis on Paz, Parra, Cardenal, and new poetry since 1960. Prerequisite: SPA 325.

**560 Medieval Spanish Literature.** (3) N  
Major figures and works of the Middle Ages in Spain.

**561 Golden Age Spanish Prose Fiction.** (3) N  
Major figures and works of the 16th and 17th centuries, with emphasis on the picaresque novel.

**562 Golden Age Spanish Poetry.** (3) N  
Major figures and works of the 16th and 17th centuries, with emphasis on lyric poetry.

**563 Spanish Romanticism.** (3) N  
Principal figures and works of the Spanish Romanticism, with emphasis on international literary context of the movement.

**564 19th-Century Spanish Prose Fiction.** (3) N  
Principal figures and works of Realism in the 19th-century novel, with emphasis on Galdós.

**565 20th-Century Spanish Drama.** (3) N  
Principal figures and works of Spanish dramatic literature from the Generation of 1898 to the present.

**566 Generation of 1927.** (3) N  
Major poets of the Generation of 1927, with emphasis on works of Lorca, Guillén, Salinas, and Aleixandre.

**567 Contemporary Spanish Novel.** (3) N  
Major works of post-Civil War Spanish fiction.

**568 Cervantes.** (3) N  
An extensive analysis of the prose and theater of Cervantes as a key figure of the Spanish Golden Age. Lecture, seminar.

**570 Indigenous Literatures of Spanish America.** (3) N  
The indigenous literary traditions, with emphasis on Nahuatl, Mayan, and Quechua literatures through readings in Spanish translations.

**571 Colonial Spanish-American Literature.** (3) N  
The major figures and works from Conquest to Independence.

**572 Spanish-American Drama.** (3) N  
Major contributions of Spanish-American drama, with emphasis on contemporary dramatists.

**573 Spanish-American Essay.** (3) N  
Major works of the essay, within the framework of intellectual history and literary movements.

**574 Spanish-American Vanguard Poetry.** (3) N  
Examination of poetic developments, 1920-1940, with emphasis on Huidobro, Vallejo, Neruda, and the international context of their works.

**575 Contemporary Spanish-American Novel.** (3) N  
Principal novels of the *Nueva Narrativa Hispanoamericana*, within the context of contemporary theories of the narrative.

**576 Contemporary Spanish-American Short Story.** (3) N  
Principal short stories of the *Nueva Narrativa Hispanoamericana*, within the context of contemporary theories of the narrative.

**577 Regional Spanish-American Literature.** (3) N  
The figures and works of major national (Peru, Argentina, Chile, and Mexico) and regional (Caribbean) literatures. Topics offered on a rotating basis. May be repeated for different topics.

**578 Novel of the Mexican Revolution.** (3) N  
Representative works and authors of this genre (Guzmán, Azuela, Urquiza, Muñoz, and Romero), including related or peripheral offshoots in indigenous novels.

**581 Latin American Popular Culture.** (3) N  
Studies in selected topics of Latin American popular culture, with emphasis on appropriate academic models for the critical analysis of these materials.

**582 Studies in Latin American Film.** (3) N  
Examination of the role of film in contemporary Latin American culture; films viewed and analyzed as casebook examples. Seminar.

**591 Seminar.** (3) N  
Spanish and Spanish-American literary, cultural, and linguistic topics.

**691 Figures and Works Seminar.** (3) N  
Topics may be selected from Spanish and Spanish American literatures.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Laws

Hannah Arterian  
Director, Graduate Committee  
(LAW 201) 602/965-1474

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### REGENTS' PROFESSORS

KAYE, MURPHY

### PROFESSORS

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ELLMAN, FELLER, FURNISH, GREY,  
GUERIN, KADER, KARJALA, LESHY,  
LOWENTHAL, MATHESON, MORGAN,  
ROSE, SCHROEDER, STANTON,  
STROUSE, TESÓN, TUCKER, WARD,  
WEINSTEIN, WINER

### ASSOCIATE PROFESSORS

BRITO, JONES, O'GRADY, TSOSIE

### PROFESSORS EMERITI

DAHL, PEDRICK

### CLINICAL PROFESSIONALS

DALLYN, WEEKS

### DIRECTORS

Center for the Study of Law, Science,  
and Technology  
STROUSE

Indian Legal Program  
RUSSELL

Legal Research and Writing and  
Academic Support Group  
ROITHMAYR

Through the Graduate College, the faculty in the College of Law offer a graduate program leading to the Master of Laws degree. For information concerning this degree program, refer to page 65. Applications are not currently being accepted for the Master of Laws degree program.

For information concerning the Juris Doctor, see the *College of Law Bulletin*.

**Law Journal.** The College of Law publishes a professional law review, the *Arizona State Law Journal*, edited by students of the second- and third-year classes. Membership on the law journal is determined by grade performance in the first year and, for some, by submitting written work in a writing competition. Participation on law review is hard but rewarding work. For those eligible, the review provides one of the finest avenues for legal education thus far developed. Its work contributes to the student's intellectual advancement, to the development of law and the legal profession, and to the stature of the law school.

**Law Library.** The John J. Ross-William C. Blakley Law Library, which is named in memory of two prominent Phoenix attorneys, is one of the finest law libraries in the Southwest with a collection of over 310,000 volumes and microform volume equivalents. The collection includes a broad selection of Anglo-American case reports and statutes, as well as legal treatises, periodicals, encyclopedias, digests, citators, and administrative materials. The collection includes growing special collections in the areas of international law, Indian law, Mexican law, and law and technology. The library is also a selective U.S. government depository.

The library is housed in a dramatic and functional new building that opened August 1993. The new building provides accessible shelving for the library's expanding collections and comfortable study space at carrels, tables, and lounge seating located throughout the library. The library has a 30-station computer lab, as well as LEXIS and WESTLAW rooms each containing ten stations. The new library also has 27 meeting and study rooms, a microforms facility, and a classroom.

Students also have ready access to the other campus libraries, including the Charles Trumbull Hayden Library, The Daniel E. Noble Science and Engineering Library, the Architecture and Environmental Design Library, and the Music Library. The collections of the university's libraries comprise more than 2.8 million volumes.

### Center for the Study of Law, Science, and Technology

The center is a multidisciplinary research center created by the Arizona Board of Regents in 1984. It publishes research studies, sponsors seminars and symposia, and houses visiting scholars and teachers. Through these programs, the center seeks to contribute to the formulation and improvement of law and public policy affecting science and technology, and the wise application of science and technology in the legal system. In cooperation with the American Bar Association Section on Science and Technology, the center edits the *Jurimetrics Journal of Law, Science and Technology*.

### Indian Legal Program

In the spring of 1988, the faculty of the College of Law voted to devote substantial new resources and energy to an Indian Legal Program with a three-part mission: education, legal scholarship, and public service to tribal governments.

The ASU College of Law is located at the center of an active and diverse community of Indian people, tribes, and governments. In the state of Arizona, 21 tribal governments exercise sovereign authority over more than 23 million acres, or approximately 27% of the state. The closest reservation, that of the Salt River Pima-Maricopa Indian Community, is located within two miles of the law school, and eight other reservations are located within a 100-mile radius of the school.

Students at the College of Law have the opportunity to participate in all phases of the Indian Legal Program and gain in-depth understanding of the legal issues affecting Indian tribes and people. Courses of federal Indian law and seminars on advanced Indian law topics are offered on a regular basis. Students may participate in externships with the local tribal courts or spend a semester in Washington, D.C., working with the Senate Select Committee on Indian Affairs. This variety of academic and work experience provides the students an outstanding legal education with a firm grounding in both the theoretical and practical aspects of Indian law.

### LAW

#### LAW 515 Contracts I. (3) F

Exploration of common law legal method and the structure of Article 2 of the U.C.C. in the context of issues of contract formation.

#### 516 Criminal Law. (3) F

The substantive law of crimes.

#### 517 Torts I. (3) F

Legal protections of personality, property, and relational interests against physical, economic, and emotional harms.

#### 518 Civil Procedure I. (3) F

Exploration of the structure of a lawsuit and techniques of alternative dispute resolution. Specific topics include commencement of suit, joinder of parties, discovery, pretrial motions, and subject matter jurisdiction.

#### 519 Legal Method and Writing. (2) F

Examination of methods used to analyze legal problems. Review of precedent statutory construction and basic *res judicata* problems. Use of basic legal writing formats.

#### 520 Contracts II. (2) S

Continuation of Contracts I focusing on contract interpretation.

#### 522 Constitutional Law I. (3) S

Role of courts in the federal system, distribution of powers between state and federal governments, and the role of procedure in litigation of constitutional questions.

#### 523 Property I. (2) F

Indicia of ownership, found property, estates in land, landlord tenant.

#### 524 Legal Research and Writing. (2) S

Continuation of LAW 519.

#### 525 Torts II. (2) S

Continuation of Torts I with emphasis on strict and products liability.

#### 526 Property II. (3) S

Non-possessory interests in property (easements, covenants, servitudes), nuisance, land use planning, and transfers of interests in property.

#### 527 Civil Procedure II. (3) S

Continuation of LAW 518; subjects in LAW 518 are addressed in greater depth as well as personal jurisdiction, *res judicata*, collateral estoppel, and choice of law under the *Erie* doctrine.

#### 600 Administrative Law. (3) A

Administrative process, emphasizing nature of powers exercised by administrative agencies of government, problems of procedure, and scope of judicial review.

#### 601 Antitrust Law. (3) A

Legislation and its implementation to prevent monopoly and business practices in restraint of trade, including restrictive agreements involving price-fixing, trade association activities, and resale price maintenance.

#### 602 Partnership Taxation. (2-3) N

Federal tax consequences of forming, operating, terminating, or transferring partnerships.

#### 603 Conflict of Laws. (3) N

Problems arising when the operative facts of a case are connected with more than one state or nation. Choice of law, bases of jurisdiction, effect of foreign judgments, and underlying federal and constitutional issues.

#### 604 Criminal Procedure. (3) F, S

The nature of the criminal procedural system with special focus on constitutional protections for the accused.

#### 605 Evidence. (3) A

Principles and practice governing the competency of witnesses and presentation of evidence, including the rules of exclusion and roles of lawyer, judge, and jury under the adversary system.

#### 606 Federal Income Taxation. (3) F, S

Federal income tax in relation to concepts of income, property arrangement, business activity, and current tax problems, with focus on the process of tax legislation and administration.

#### 607 Advanced Civil Procedure. (3) F, S

An overview of the structure and life cycle of a lawsuit from pleadings to appeal, emphasizing the Federal Rules of Civil Procedure.

#### 608 Business Associations I. (3) A

Partnerships, limited partnerships, and small business corporations. Includes a brief introduction to accounting. Detailed analysis of the problems of forming a close corporation, state law duties of care and loyalty, management, dividends and redemptions, issuance of stock, internal dispute resolution, dissolution, and the general law of derivative actions.

#### 609 Business Associations II. (3) A

Interrelationship of federal and state law and a brief introduction to corporate finance (1933 Act). A broad overview of large company regulations including reporting rules, proxy regulation, insider trading, sale of control, tender offers and takeovers, and going private. Prerequisite: LAW 608.

#### 610 Advanced Criminal Procedure. (2-3) A

Topics in criminal procedure, with emphasis on legal constraints on grand jury investigations, police practices, pretrial release, preliminary hearings, prosecutorial discretion, and plea bargaining.

#### 611 Estate Planning I. (3) N

Tax laws relating to transfer of wealth both at death and during lifetime, including federal estate tax, gift tax, and income taxation of estates and trusts.

#### 612 Family Law. (3) A

Legal and nonlegal problems that an individual may encounter because of a situation as a family member.

#### 613 Federal Courts. (3) N

Federal judicial system; relationship of federal and state law; jurisdiction of federal courts and their relation to state courts.

#### 614 Labor Relations. (3) N

Collective bargaining, including the right of employees to organize and to engage in concerted activities; resolution of questions concerning the representation of employees; duty of employers and unions to bargain; administration and enforcement of collective bargaining agreements.

#### 615 Public International Law. (3) A

Role of law in international disputes. Drafting and interpretation of treaties and multilateral conventions are considered.

#### 616 Jurisprudence. (3) A

Introduction to legal philosophy, with readings on the nature of law and legal reasoning, the relationship between law and morality and equality and social justice.

**618 Trusts and Estates I. (3) A**

Substantive concepts involved in transmitting wealth, including interstate succession, wills and will substitutes, the modern trust as a family protective device, creation of future interests in a planned estate, social restrictions of a nontax nature, and methods of devoting property to charitable purposes.

**620 Civil Rights Legislation. (2-3) N**

Coverage of the rights and remedies provided by federal civil rights legislation, principally, the key provisions of the Reconstruction Era Civil Rights Acts, portions of the employment discrimination legislation, and voting rights legislation.

**621 Commercial Law: Sales and Negotiable Instruments. (3) A**

Transactions in the sales of goods and mechanisms for payment and credit. Subjects include contract information, warranty, risk of loss, damages, and documentary transactions in sales of goods under Uniform Commercial Code Article 2; the use of checks, promissory notes, letters of credit, and other instruments under UCC articles 3, 4, and 5; related banking practices and credit transactions.

**622 Commercial Law: Secured Transactions. (3) A**

Secured transactions under Article 9 of the Uniform Commercial Code and other relevant sections. An overview of the creation, perfection, and priority effects of security interests. Financing of business enterprise and consumer credit.

**623 Commercial Torts. (3) A**

Involves an analysis of actionable wrongs against a business entity or against proprietary rights held by that entity, covering the entire spectrum of private remedies for competitive wrongs.

**624 Community Property. (1-2) F, S**

Property rights of husband and wife; the Arizona community property system; homestead.

**625 Constitutional Law II. (3) F, S**

Fundamental protection for person, property, political, and social rights.

**627 Corporate Taxation. (3) A**

Problems in taxability of the corporation, corporate distributions, and corporate reorganizations.

**628 Creditor-Debtor Relations. (3) A**

Creditors' remedies in satisfaction of claims and debtors' protection and relief under bankruptcy, other laws.

**630 Employment Discrimination. (2) N**

Focus on Title VII of the Civil Rights Act of 1964, which forbids discrimination in employment based upon race, religion, national origin, or sex. The substance and procedural aspects of Title VII are covered in detail, including coverage, administrative procedures, burdens of proof, special problems of religious and sex discrimination, statutory and court created defenses, seniority systems, and remedies.

**631 Environmental Law. (3) A**

Litigation, administrative law, and legislation relating to problems of environmental quality. Topics covered may include air and water pollution, toxic substances, pesticides, and radiation.

**632 Indian Law. (3) A**

Inquiry into legal problems special to American Indians and tribes.

**634 Judicial Remedies. (3) A**

The nature and limits of injunctive, restitutionary, and compensatory remedies for the protection of personal, property, political, and civil rights.

**635 Juvenile Justice System. (3) N**

Special problems in the juvenile system.

**636 Land Use Regulation. (3) A**

Legal problems in the regulation and control of land development by state and local governments. Administration of zoning, subdivision, and other planning controls; issues of fairness and procedure in the utilization of such controls.

**638 Legal Profession. (2) F, S**

Organized bar, distribution of legal services in modern society, economics of the profession, professional canons of ethics for the bar and judiciary, and problems in policing the profession.

**639 Natural Resource Law. (3) A**

Examines the constitutional basis for federal land management and the different kinds of public lands management schemes (e.g., parks, forests, wildlife refuges), emphasizing acquisition of right to, and regulation of, the different uses of public lands and resources (e.g., mining, grazing, timber, wildlife habitat, recreation).

**640 Securities Regulation. (2) A**

Selected problems arising under the major statutes concerned with regulating the securities market.

**641 State and Local Government. (2-3) N**

Legal problems involved in the organization and administration of governmental units including the city, county, town, village, school district, and special district.

**643 Water Law. (3) A**

Acquisition of water rights; water use controls; interstate conflicts.

**644 Intellectual Property. (3) A**

The protection of intellectual property and encouragement of creativity—trade values, trade secrets, patents, copyrights, performing arts, and visual arts.

**702 Alternative Dispute Resolution. (2-3) A**

A broad exposure to methods of settling disputes in our society such as mediation, arbitration/conciliation, and negotiation, including examination of the current litigation model.

**703 Law, Science, and Technology. (2-3) A**

The legal mechanisms used in dealing with various issues raised by contemporary science and technology. Current legal responses to science and technology are explored.

**705 Mass Communications. (2-3) A**

An examination of First Amendment principles and statutory and regulatory requirements with respect to the conventional print and broadcast media, as well as recent technologies such as cable.

**706 Immigration Law. (2-3) N**

Exploration of political, economic, social, and legal issues concerning immigration. Specific topics covered include citizenship and naturalization, denaturalization, deportation, and refugee rights and asylum.

**709 International Human Rights. (2-3) N**

International rules and procedures governing the protection of human rights.

**710 Real Estate Tax Planning. (2-3) A**

Discussion of topics, including but not limited to real estate investments as tax shelters, alternative acquisition finance devices, refinancing techniques, and nontaxable exchanges.

**711 Real Estate Transfer. (2-3) A**

An examination of the legal aspects of the sale and purchase of real property encompassing three areas: the role of the lawyer and broker in the transaction, the sales contract, and issues relating to title protection.

**712 Religion and the Constitution. (2-3) A**

An in-depth study of the "establishment" and "free exercise" clauses of the First Amendment to the U.S. Constitution.

**714 Law and Social Science. (2-3) N**

Investigation of the use of social science research and methods in the legal system. Topics include psychology of eyewitness identification, social-psychological studies of decision making, statistical evidence of discrimination, econometric studies of the deterrent effects of capital punishment, and clinical predictions of violent behavior.

**715 Professional Sports. (2-3) N**

Unique legal problems relating to professional sports, including their relationship to antitrust laws, the nature of player contracts, and associated tax problems.

**717 Legislative Process. (2-3) N**

Explore both the legal and the practical context within which the legislative process operates with a major component of the course being a legislative drafting project.

**721 Education and the Law. (2-3) N**

Current legal problems affecting institutions of higher education, faculty, students, and governing boards.

**733 Negotiation, Mediation, and Counseling. (3) A**

Explores alternative models of negotiated dispute resolution, as well as the roles of lawyer and client in the negotiation process. Extensive use of simulation exercises.

**735 Estate Planning II. (2-3) N**

Preparation of actual estate plans and implementing legal documents for a variety of typical private clients. Both tax and nontax elements in preparation of the plans are considered. Prerequisite: LAW 611.

**736 Planning for the Business Client. (2-3) N**

Planning transactions involving business organizations with special emphasis on income tax and corporate considerations.

**738 Practice Court. (2-3) F, S**

Students act as lawyers in conducting a case through all stages of trial, from commencement of the action to final judgment.

**745 The Supreme Court. (2-3) A**

Intensive examination of selected current decisions of the U.S. Supreme Court.

**768 International Business Transactions. (2-3) N**

Problems and policy considerations involved in international trade; tariffs, international monetary controls, and development loans.

**770 Law Journal. (1-3) F, S**

Academic credit for successful completion of work by a member of the staff of *Arizona State Law Journal*; maximum of 5 semester hours.

**772 Internships in Law.** (1-6) F, S, SS  
Civil, defender, or prosecutor placement and related classroom component.

**773 Internships in Law.** (1-6) F, S, SS  
Placement in the Law School Clinic and related classroom component.

**774 Internships in Law.** (1-6) F, S, SS  
Placement in Prosecutor Clinic and related classroom component.

**780 Moot Court.** (1-3) F, S  
Academic credit for successful completion of work as a member of the Moot Court Board of Directors; maximum of 3 semester hours.

**781 Individual Study.** (1) F, S, SS  
With the approval of a faculty member, a student may research a legal subject of special interest and prepare a paper suitable for publication.

**782 Individual Study.** (2) F, S, SS  
See LAW 781.

**783 Individual Study.** (3) F, S, SS  
See LAW 781.

**784 Moot Court Competition.** (1-4) F, S  
Successful participation and completion of a national moot court competition.

**785 Externship.** (1-12) F, S, SS  
Supervised, practical lawyering in an external placement proposed by the student or established by a sponsoring agency and approved by the College of Law. In addition, an associated academic component is established by the student with a member of the faculty.

**791 Seminar in Law.** (1-12) F, S

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Learning and Instructional Technology

Gail Hackett

Director

(EDB 301) 602/965-3384

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### REGENTS' PROFESSORS

BERLINER, KULHAVY

### PROFESSORS

FREEMAN, SULLIVAN

### ASSOCIATE PROFESSORS

KLEIN, SAVENYE

The faculty in the Division of Psychology in Education offer graduate programs leading to the Master of Arts, Master of Education, Doctor of Philosophy, and Doctor of Education degrees in Learning and Instructional Technology. The areas of concentration for the Doctor of Philosophy are (1) learning and (2) instructional technology.

The graduate programs leading to a degree in Learning and Instructional Technology prepare students for a variety of positions consistent with their

professional goals. Most doctoral graduates of the program accept appointments as university faculty members, instructional designers, or training managers in business, industry, and government or as instructional designers in universities and community colleges. Potential employment opportunities for master's degree graduates include positions as training specialist in business, industry, and government, as educational designers in educational agencies, or as classroom teachers.

Applicants for admission to Master of Arts and doctoral degree programs in Learning and Instructional Technology must submit scores for the Graduate Record Examination. Master of Education program applicants must submit scores for either the Graduate Record Examination of the Miller Analogies Test.

At the master's level, students may specialize in instructional design and development or training and development. A minimum of 30 semester hours is required for the master's degree programs.

At the doctoral level, students may specialize in learning or in instructional





technology. All application materials should be received at least three months prior to the semester in which the applicant wishes to begin study.

### Research Activity

Faculty maintain an active program of research and development that has been supported with funds from federal agencies and the university. General research areas include investigations dealing with instructional effectiveness and educational motivation. Doctoral students participate actively in research and development activities as an integral part of their degree programs. Learning research includes studies of spatial cognition, organization and memory for prose materials, knowledge structures, the effects of extralinguistics factors on learning and memory, and training research and evaluation.

### LEARNING AND INSTRUCTIONAL TECHNOLOGY

#### LNT 501 Foundations of Educational Technology. (3) F, S

Introduction to instructional development. An examination of accomplishments and problems in the field.

#### 502 Design and Development of Instruction. (3) F, S

Design, development, and formative evaluation of objectives-based instructional materials.

#### 503 Research Techniques for Instructional Development. (3) F

Procedures for analyzing the effects of alternative instructional practices.

#### 504 Educational Evaluation. (3) S

Evaluation procedures in instruction and training.

#### 510 Essentials of Classroom Learning. (3) F, S, SS

Theoretical and empirical foundations of learning in the classroom milieu. Critical exposure to research and method in instructional psychology. Cross-listed as EDP 510.

#### 540 Theoretical Views of Learning. (3) F, S

Classical and cognitive theories of learning, plus recent orientations. Illustrative experimental and rational foundations; implications for educational practice. Cross-listed as EDP 540.

#### 542 The Psychology of Learning and Instruction. (3) S

Critical review and evaluation of research on learning variables relevant to acquisition and retention of instructional materials. Lab. Cross-listed as EDP 542.

**545 Cognition and Instruction. (3) F**  
Current developments in research relating cognitive models to the instructional process. Seminar. Prerequisites: EDP 552; LNT 540.

#### 584 Educational Technology Internship. (1-6) F, S, SS

Prerequisites: LNT 501, 502; instructor approval. Pre- or corequisite: EMC 521.

#### 780 Advanced Instructional Development. (1-3) S

Conducting and documenting selected instructional development activities. Prerequisites: LNT 502; instructor approval.

**792 Advanced Instructional Research. (3) F**  
Design and execution of instructional research on selected topics. Prerequisites: LNT 503; instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Mass Communication

Douglas A. Anderson

Director

(STAUF A231B) 602/965-5011

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### PROFESSORS

ANDERSON, CRAFT, CRONKITE,  
GODFREY, HALVERSON,  
MERRILL, SYLVESTER

### ASSOCIATE PROFESSORS

ALLEN, BRAMLETT-SOLOMON,  
GALICIAN, HOY, LENTZ, MATERA,  
WATSON, YOUM

### ASSISTANT PROFESSORS

BARRETT, GORMLY,  
RUSSELL, RUSSOMANNO

### CLINICAL ASSOCIATE PROFESSORS

ITULE, LEIGH (Associate Director)

### LECTURERS

CASAVANTES, NASH

### PROFESSORS EMERITI

BENNETT, BROWN, CROWDER,  
ELLIS, MILNER, RANKIN,  
SILVER, SMITH

The faculty in the Walter Cronkite School of Journalism and Telecommunication offer a graduate program leading to the professional degree Master of Mass Communication. For information concerning this degree program, refer to pages 65-66.

The purposes of the program are as follows:

1. to help students expand their knowledge in mass communication fields;
2. to help students gain a deeper understanding of an area related to mass communication;
3. to prepare students for professional positions in mass communication fields; and
4. to help advance students' careers in mass communication fields.

The program is directed to the professional communicator who seeks personal enrichment with mid-career education, to the baccalaureate degree holder in mass communication who wishes to study a related area while refining academic preparation in mass communication, to graduates of other disciplines who wish to prepare for careers in the mass media and closely allied fields, and to graduate students in other areas who need a compatible second field.

Students admitted to the Master of Education degree program in Secondary Education may elect journalism education as the subject matter field.

### Research Activity

Research activities in the School of Journalism and Telecommunication complement its teaching and service missions. Research interests of faculty are varied. The school encourages inquiry into mass communication problems and issues by drawing upon diverse approaches, including legal, historical, and quantitative methods. Faculty are involved in creative activity and research for both academic and professional publication. Recent and current projects include technological effects on the mass media, effects of U.S. Supreme Court decisions on the mass media, media portrayal of the elderly, perceptions of good news and bad news on television, and media and minorities.

In addition to publications in journals on varied research projects, the following titles of faculty-written books represent a diversity of interest areas: *Business Management of Consumer Magazines*; *Contemporary Sports Reporting*; *Photojournalism: The Visual Approach*; *Target: Cancer*; *The Practice of Newspaper Management*; *Electronic Age News Editing*; *The Gene Age*; *A "Washington Merry-Go-Round" of Libel Actions*; *News Writing and Reporting for Today's Media*; *Contemporary News Reporting*; *Visual Editing: A Graphic Guide for Journalists*; *Symbols, the News Magazines, and Martin Luther King*; *Eisenhower and the Mass Media*; *Reruns on File: A Guide to Electronic Media Archives*; *Press Law in South Korea*; and *The Healing Blade: A Tale of Neurosurgery*.



## MASS COMMUNICATION

- MCO 402 Communications Law.** (3) F, S, SS  
Legal aspects of the rights, privileges, and obligations of the press, radio, and television. *General studies: L2.*
- 418 History of Communications.** (3) F, S  
American journalism from its English and colonial origins to the present day. Development and influence of newspapers, magazines, radio, television, and news gathering agencies. *General studies: SB, H.*
- 430 International Communication.** (3) F, S  
Comparative study of communication and media systems. Information gathering and dissemination under different political and cultural systems. *General studies: G.*
- 450 Visual Communication.** (3) F, S, SS  
Theory and tradition of communication through the visual media with emphasis on the continuity of traditions common to modern visual media. *General studies: HU.*
- 456 Political Communication.** (3) F, S  
Theory and research related to political campaign communication. The persuasive process of political campaigning, the role of the media, the candidate, and image creation. *General studies: SB.*
- 460 Race, Social Change, and Media.** (3) S  
A readings seminar designed to give students a probing examination of the interface between AHANA Americans and the mass media in the United States. *General studies: C.*
- 463 Introduction to Media Statistics.** (3) F, S  
An introduction to statistical analysis as applied to the mass media. Prerequisite: professional status in Broadcasting or Journalism.
- 501 Newswriting and Reporting.** (3) F  
Designed for graduate students in the MMC program who have undergraduate degrees in nonjournalism areas. Objective is to teach fundamentals of writing and reporting. Lecture, lab. Prerequisite: acceptance into MMC graduate program.
- 503 Press Freedom Theory.** (3) S  
Examination of philosophical and legal aspects of press freedom. Emphasis on First Amendment theory evolution from 1791 to present.
- 510 Research Methodology in Mass Communication.** (3) F, S  
Identification of research problems in mass communication. Overview of questionnaire construction. Attention to survey, historical, content analysis, experimental, and legal research methods.
- 520 Mass Communication Theories and Process.** (3) F  
Analysis of various theoretic models of mass communication with emphasis on the applications of these theories to various professional communication needs.
- 522 Mass Media and Society.** (3) S  
Mass media as social institutions, particularly interaction with government and public. Emphasis on criticism and normative statements.
- 530 Media Ethics.** (3) F  
Ethical conventions and practices of print and electronic media as they relate to the government and private sectors of the society.
- Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## JOURNALISM

- JRN 401 Public Relations Techniques.** (3) F, S  
Theory and practice of publicity, public relations, and related techniques and procedures. Prerequisites: JRN 301 or TCM 315; major.
- 412 Editorial Interpretation.** (3) N  
The press as an influence on public opinion. The role of the editorial in analyzing and interpreting current events. Prerequisite: JRN 301.
- 413 Advanced Editing.** (3) F, S  
Theory and practice of newspaper editing, layout and design, picture, and story selection. Prerequisite: JRN 313.
- 414 Business and Industrial Publications.** (3) F, S  
Theory and practice of layout, typography, and design for magazines, brochures, and industrial publications. Prerequisite: JRN 401.
- 415 Writing for Public Relations.** (3) F, S  
Development of specific writing techniques for the practitioner in public relations agencies and divisions of major organizations. Prerequisite: JRN 401.
- 420 Reporting Public Affairs.** (3) F, S  
Instruction and assignments in reporting the courts, schools, government, city hall, social problems, and other areas involving public issues. Prerequisite: JRN 301.
- 440 Magazine Writing.** (3) F, S  
Writing and marketing magazine articles for publication. Prerequisite: JRN 301 or instructor approval.
- 451 Photojournalism II.** (3) F, S  
Theory and practice of photojournalism with emphasis on shooting, lighting, and layout for the media. Prerequisite: JRN 351.
- 452 Photojournalism III.** (3) F, S  
Advanced theory and practice of photojournalism with emphasis on the photo essay and illustrations in black and white and color. 2 hours lecture, 2 hours lab. Prerequisite: JRN 451.
- 465 Precision Journalism.** (3) S  
An advanced writing course with focus on reporting polls and surveys and other numerically-based stories as well as on understanding the concepts that underlie polls and surveys. Lecture, lab. Prerequisite: JRN 301 or instructor approval.
- Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.
- TELECOMMUNICATION**
- TCM 431 Advanced Radio-TV Writing.** (3) N  
Technique and practice in nonnews writing for radio and television, emphasizing creative and commercial approaches to copywriting and copy presentations. Prerequisite: TCM 201.
- 433 Broadcast Sales and Promotion.** (3) F, S  
Basics of electronic media marketing practices, including commercial time sales techniques and radio/TV promotion fundamentals. Prerequisite: TCM 200.
- 435 Cable TV and Emerging Telecommunication Systems.** (3) F, S  
Structures and utilization of cable, industrial, and instructional television, satellite, and videocassettes. Prerequisite: TCM 200.

- 437 Advanced TV Production.** (3) F, S  
Emphasis on individual production projects of the student's own conception and design utilizing studio, field, and postproduction techniques. Prerequisite: TCM 235.
- 472 Broadcast Station Management.** (3) F, S, SS  
Management principles and practices, including organization, procedures, policies, personnel problems, and financial aspects of station management. Prerequisite: TCM 332.
- 480 Television News Practicum.** (1-3) F, S  
Writing, reporting, and production of the television newscast. Prerequisite: TCM 330.
- Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Mathematics

William T. Trotter  
Chair  
(PS A216) 602/965-3951

### REGENTS' PROFESSOR TROTTER

#### PROFESSORS

ARMBRUSTER, BREMNER, BUSTOZ,  
FELDSTEIN, GRACE, HELTON,  
HOPPENSTEADT, IHRIG,  
JACKIEWICZ, JACOBOWITZ, KADELL,  
KIERSTEAD, KUIPER, LEONARD,  
McDONALD, MITTELMANN,  
NICOLAENKO, RINGHOFER,  
H.A. SMITH, H.L. SMITH, THIEME,  
A. WANG, C. WANG, WEISS, YOUNG

#### ASSOCIATE PROFESSORS

BAER, DRISCOLL, FAN, FARMER,  
HASSETT, KAWSKI, KOSTELICH,  
KUANG, KURTZ, LOHR, McCARTER,  
MOORE, QUIGG, RENAUT,  
SPIELBERG, STEWART,  
SWIMMER, TAYLOR

#### ASSISTANT PROFESSOR

BARCELO, BLOUNT, CARLSON,  
CHILDRESS, HURLBERT, JONES,  
MAHALOV, PREWITT, WELFERT

The faculty in the Department of Mathematics offer graduate programs with a major in Mathematics leading to the Master of Arts and Doctor of Philosophy degrees. The faculty also participate in the program leading to the Master of Natural Science degree when one of the concentrations is mathematics. In addition, the faculty participate in the interdisciplinary program leading to the Master of Science in Statistics degree (see page 272). It is recommended but not required that students

applying to one of these programs submit scores on the Graduate Record Examination.

Students in the College of Education admitted to the Master of Education or Doctor of Education degree program with a major in Secondary Education may elect mathematics as the subject matter field. These programs are offered and administered through the College of Education. For information concerning these programs, refer to pages 60 and 74-75.

### MASTER OF ARTS DEGREE

See pages 53-55 for general requirements.

This degree is designed for students who wish to extend their knowledge of mathematics or prepare for certain careers related to mathematics. In order to be admitted without deficiencies, the student's background should include an undergraduate mathematics major or an equivalent preparation such as may be obtained in certain undergraduate programs in engineering or the sciences. In particular, it is required that the student's preparation include courses in linear algebra and foundations of analysis. A certain degree of familiarity with computer languages may also be required for some areas of study.

Students pursuing the Master of Arts degree in Mathematics may choose one of the following areas: general mathematics, applied mathematics, statistics and probability, and computational mathematics. Information concerning the requirements for each area may be obtained from the Department of Mathematics.

**Program of Study.** The program of study, including courses in mathematics and related subjects, is selected with the recommendation of the student's supervisory committee. Ordinarily, a program of study consists of a minimum of 30 semester hours.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** A written comprehensive examination is required. For details inquire in the Department of Mathematics.

**Thesis Requirements.** A thesis is required.

**Final Examinations.** A final oral examination in defense of the thesis is required.

### MASTER OF NATURAL SCIENCE DEGREE

The faculty of the Department of Mathematics participate in programs leading to the Master of Natural Science degree (see page 67). This degree is intended for the student who is interested in an interdisciplinary program with a major emphasis in mathematics and a minor emphasis in a related subject outside mathematics. The student's supervisory committee consists of two faculty members of the Department of Mathematics and one faculty member of the department in the related area. The supervisory committee designs a program of study of at least 36 semester hours that is appropriate for the type of interdisciplinary work the student wishes to pursue. For more information contact the Department of Mathematics.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

This degree is intended for the student with superior mathematical ability, emphasizing the development of creative scholarship and breadth and depth in background knowledge. Admission to the Ph.D. degree program is normally granted after completion of the master's degree.

**Program of Study.** The program of study is selected with the recommendation of the student's supervisory committee.

#### Qualifying Examinations

Qualifying examinations are required. They test a student's mastery of basic material in two of the following five areas: algebra, differential equations, mathematical statistics, numerical methods, and real analysis. Normally, students entering the graduate program with a bachelor's degree take these qualifying examinations at the beginning of the third semester, and those entering with a master's degree at the beginning of the second semester. These examinations are given once each semester.

**Foreign Language Requirements.** A student is required to have a reading knowledge of a language other than English in which mathematics research is published.

**Comprehensive Examinations.** Written and oral comprehensive examinations are required.

**Dissertation Requirements.** A dissertation reporting significant, original research suitable for publication in a professional research journal is required. (See dissertation requirements, pages 73-74.)

**Final Examinations.** A final oral examination in defense of the dissertation is required.

#### Research Activity

Department members are actively engaged in research in the following areas: applied mathematics; mathematical physics; mathematical modeling; mathematical biology; mathematical neurobiology; bifurcation analysis; dynamical systems; control theory; nonlinear analysis; ordinary and partial differential equations; integral equations; computational mathematics; real, complex, and functional analysis; operator algebras; operator theory; algebra; number theory; topology; discrete mathematics; probability; theoretical and applied statistics; mathematical education.

The department has several clusters of high-end UNIX workstations both for number-crunching and for graphics. Most students will do both class projects and their research computing on these computers. A number of PC and Macintosh computers are also available to students. In addition all students have access to central computing facilities, which include IBM mainframes, UNIX clusters, and multiprocessor computers.

### MATHEMATICS

#### MAT 410 Introduction to General Topology. (3) A

Topological spaces, metric spaces, compactness, connectedness, and product spaces. Prerequisite: MAT 300 or 371 or instructor approval.

**415 Combinatorial Mathematics I.** (3) F Permutations and combinations, recurrence relations, generating functions, graph theory, and combinatorial proof techniques. Prerequisites: MAT 300 and 342 or instructor approval.

**416 Combinatorial Mathematics II.** (3) S Continuation of MAT 415 considering some advanced aspects of the theory as well as applications. Topics chosen from transport networks, matching theory, block designs, coding theory, Polya's counting theory, and applications to the physical and life sciences. MAT 443 is recommended. Prerequisite: MAT 415 or instructor approval.

- 419 Linear Programming.** (3) S  
Linear programming and the simplex algorithm, network problems, quadratic, and nonlinear programming. Prerequisites: MAT 242 or 342; 1 semester of college calculus. *General Studies: N2.*
- 431 Foundations of Mathematics.** (3) N  
Topics from mathematical logic and set theory. May be repeated for credit with instructor approval. Prerequisites: MAT 300 and 342 or instructor approval.
- 442 Advanced Linear Algebra.** (3) F  
Fundamentals of linear algebra, dual spaces, invariant subspaces, canonical forms, bilinear and quadratic forms, and multilinear algebra. Prerequisites: MAT 300 and 342 or instructor approval.
- 443 Introduction to Abstract Algebra.** (3) F  
Introduction to concepts of abstract algebra. Not open to students with credit in MAT 444. Prerequisites: MAT 300 and 342 or instructor approval.
- 444 Intermediate Abstract Algebra.** (3) S  
Basic theory of groups, rings, and fields, including an introduction to Galois theory. Appropriate as preparation for MAT 543. Prerequisites: MAT 300 and 342.
- 445 Theory of Numbers.** (3) S  
Prime numbers, unique factorization theorem, congruences, Diophantine equations, primitive roots, and quadratic reciprocity theorem. Prerequisites: MAT 300 and 342 or instructor approval.
- 451 Mathematical Modeling.** (3) S  
A detailed study of 1 or more mathematical models that occur in the physical or biological sciences. May be repeated for credit with instructor approval. Prerequisites: MAT 242 (or 342) and 274 or instructor approval. *General Studies: N2.*
- 460 Applied Real Analysis.** (3) S  
Vectors, curvilinear coordinates, Jacobians, implicit function theorem, line and surface integrals, Green's, Stokes', and divergence theorems. Not open to students with credit in MAT 372. Prerequisites: MAT 242 (or 342), 272, 274.
- 461 Applied Complex Analysis.** (3) F, SS  
Analytic functions, complex integration, Taylor and Laurent series, residue theorem, conformal mapping, and harmonic functions. Prerequisite: MAT 272 or equivalent.
- 462 Partial Differential Equations.** (3) F, S, SS  
Second order partial differential equations, emphasizing Laplace, wave, and diffusion equations. Solutions by the methods of characteristics, separation of variables, and integral transforms. Prerequisites: MAT 242 (or 342), 274.
- 464 Numerical Analysis I.** (3) F, S  
Theory and methods for numerical solution of algebraic and transcendental equations; iterative methods; eigenvalues and eigenvectors; interpolation; introductory computer arithmetic. Prerequisites: MAT 342 and 371 and fluency in computer programming or instructor approval. *General Studies: N3.*
- 465 Numerical Analysis II.** (3) F, S  
Theory and methods for numerical solution of analysis problems; differentiation; quadrature; solution of differential equations. Prerequisite: MAT 342 and 371 and fluency in computer programming or instructor approval. *General Studies: N3.*
- 466 Applied Computational Methods.** (3) F, S  
Numerical methods for quadrature, differential equations, roots of nonlinear equations, interpolation, approximation, linear equations, floating-point arithmetic, and roundoff error. Prerequisites: MAT 271 (or equivalent) and fluency in computer programming (preferably FORTRAN) or instructor approval. *General Studies: N3.*
- 467 Computer Arithmetic.** (3) S  
Number systems, hardware/software arithmetic, overflow, significance, rounding, multiple precision, and automatic error control; impact on languages, architectures, robust programming, and software development. Prerequisite: CSE 100 or 200 or MAT 464, 465, or 466 or instructor approval. *General Studies: N3.*
- 472 Intermediate Real Analysis.** (3) F  
Introduction to analysis in metric spaces with emphasis on the real line. Appropriate as preparation for MAT 570. Prerequisites: MAT 300, 342.
- 475 Differential Equations.** (3) S  
Asymptotic behavior of solutions of linear and nonlinear ordinary differential equations, stability, Sturm-Liouville problems, boundary value problems, and singular point behavior of autonomous systems. Prerequisites: MAT 242 (or 342), 274.
- 485 History of Mathematics.** (3) N  
Topics from the history of the origin and development of mathematical ideas. Prerequisite: MAT 272 or equivalent.
- 510 Point Set Topology.** (3) F  
Topological spaces, metric spaces, compactness, connectedness, local properties, product and decomposition spaces, mappings, covering properties, and separation properties. Prerequisite: MAT 371 or 410 or instructor approval.
- 511 Point Set Topology.** (3) S  
Continuation of MAT 510. Prerequisite: MAT 510 or instructor approval.
- 520 Numerical Linear Algebra.** (3) A  
Direct solution of linear systems, iterative methods, eigenvalues and eigenvectors, singular value decomposition, the QR algorithm, error propagation, arithmetic, and stability. Prerequisites: MAT 342 and 464 (or 466) or instructor approval.
- 521 Iterative Methods.** (3) N  
Numerical methods for solving linear/nonlinear systems of equations (symmetric, nonsymmetric). Iterative methods for linear systems, conjugate gradients, multigrid methods, preconditioning, Krylov methods. Prerequisites: MAT 371 and 464 (or 466) or instructor approval.
- 523 Numerical Optimization.** (3) N  
Linear programming, unconstrained nonlinear minimization, line search algorithms, conjugate gradients, quasi-Newton methods, constrained nonlinear optimization, gradient projection, and penalty methods. Prerequisite: MAT 342 or 371 or 460 or 520 or equivalent or instructor approval.
- 524 Parallel Numerical Algorithms.** (3) N  
Algorithms for massively parallel, hypercube architectures; "parallel" FORTRAN; solution of linear, nonlinear systems; partial differential equations; iterative methods; multigrid; domain decomposition. Prerequisites: MAT 371 and 464 (or 466) or instructor approval.
- 526 Numerical Solution of Bifurcation Problems.** (3) N  
Nonlinear parameter-dependent differential, algebraic equations, numerical solutions; bifurcation, turning points; continuation methods, branch switching; steady-state, time-dependent cases; Hopf Bifurcation. Prerequisites: MAT 371 and 464 (or 466) or instructor approval.
- 528 Advanced Numerical Analysis.** (3) N  
Finite difference equations, orthogonal polynomials, quadrature, approximation and integration theory, numerical solution of differential equations, and numerical linear algebra. May be repeated for credit with instructor approval. Prerequisite: MAT 464 or instructor approval.
- 529 Advanced Numerical Analysis.** (3) N  
Continuation of MAT 528. Prerequisite: MAT 528 or instructor approval.
- 530 Numerical Solution of Ordinary Differential Equations.** (3) N  
One step, linear multistep methods; consistency, order, stability, convergence; discretization, round-off errors, error estimation, adaptive strategy; implementation, software for nonstiff equations. Prerequisites: MAT 371 and 464 (or 466) or instructor approval.
- 531 Numerical Solution of Stiff Differential Systems.** (3) N  
Runge-Kutta methods, order conditions, construction of highly stable methods, order stars, error estimation, stepsize selection, contractivity properties, linear multistep methods. Prerequisites: MAT 371 and 464 (or 466) or instructor approval.
- 533 Computational Elliptic and Parabolic Partial Differential Equations.** (3) N  
Parabolic and elliptic equations, finite difference, finite element methods, stability, consistency, convergence, practical aspects, applications, software. Prerequisites: MAT 371 and 464 (or 466) or instructor approval.
- 534 Computational Hyperbolic Partial Differential Equations.** (3) N  
Numerical solutions of hyperbolic PDEs, finite difference methods, well-posedness, stability, consistency, convergence, adaptive grids; Maxwell's equations, elastic wave propagation; Navier-Stokes. Prerequisites: MAT 371 and 464 (or 466) or instructor approval.
- 535 Spectral Methods for Partial Differential Equations.** (3) N  
Spectral, pseudo-spectral theory; Galerkin, collocation methods; Tau-methods, global approximation properties, stability; convergence; solutions for linear, nonlinear systems. Prerequisites: MAT 371 and 464 (or 466) or instructor approval.
- 536 Numerical Solution of Boundary Value Problems.** (3) N  
Difference methods, finite element methods, defect correction, irregular meshes, nonlinear problems, bifurcation, boundary layers, and sparse systems. May be repeated for credit with instructor approval. Prerequisites: MAT 371 (or 460 or 462) and 464 (or 466) or instructor approval.
- 543 Abstract Algebra.** (3) F  
Groups, modules, rings and fields, Galois theory, homological algebra, and the representation theory. Prerequisite: MAT 443 or instructor approval.
- 544 Abstract Algebra.** (3) S  
Continuation of MAT 543. Prerequisite: MAT 543 or instructor approval.

**550 Variational Methods.** (3) F  
Calculus of variations and its applications to extremal problems, classical mechanics, and partial differential equations. Prerequisites: MAT 274 and 462 or equivalents.

**551 Linear Operators and Integral Equations.** (3) S  
Bounded linear and compact operators on Hilbert spaces. Linear integral equations, Fredholm and Hilbert-Schmidt theory, and approximate methods. Distributions. Prerequisites: MAT 242 and 462 or equivalents.

**570 Real Analysis.** (3) S  
Lebesgue integration, selected function spaces, differentiation, abstract measure theory, and elements of functional analysis. Prerequisite: MAT 372 or instructor approval.

**571 Real Analysis.** (3) F  
Continuation of MAT 570. Prerequisite: MAT 570 or instructor approval.

**572 Complex Analysis.** (3) F  
Analytic functions, series and product representations, entire and meromorphic functions, normal families, Riemann mapping theorem, harmonic functions, and Riemann surfaces. Prerequisite: MAT 371 or instructor approval.

**573 Complex Analysis.** (3) S  
Continuation of MAT 572. Prerequisite: MAT 572 or instructor approval.

**574 Theory of Ordinary Differential Equations.** (3) N  
Systems, existence proofs, singularities, asymptotic behavior of solutions, boundedness of solutions, eigenvalues and eigenfunctions, and perturbation theory. Prerequisite: MAT 372 or instructor approval.

**575 Theory of Ordinary Differential Equations.** (3) N  
Continuation of MAT 574. Prerequisite: MAT 574 or instructor approval.

**576 Theory of Partial Differential Equations.** (3) N  
Existence and uniqueness theorems, boundary value and initial value problems, characteristics, Green's functions, maximum principle, distributions, and weak solutions. Prerequisite: knowledge of Lebesgue integration or instructor approval.

**577 Theory of Partial Differential Equations.** (3) N  
Continuation of MAT 576. Prerequisite: MAT 576 or instructor approval.

**578 Functional Analysis.** (3) N  
Locally convex, normed, and Hilbert spaces. Linear operators, spectral theory, and application to classical analysis. Prerequisite: MAT 472 or 571 or instructor approval.

**579 Functional Analysis.** (3) N  
Continuation of MAT 578. Prerequisite: MAT 578 or instructor approval.

**591 Seminar.** (1-3) N  
Topics may be selected from the following:  
(a) Algebra  
(b) Analysis  
(c) Applied Mathematics  
(d) Combinatorial Mathematics  
(e) Mathematical Logic  
(f) Numerical Analysis  
(g) Topology

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**MATHEMATICS EDUCATION**

**MTE 480 Mathematics in the Upper-Elementary Grades I.** (3) N  
An introduction to probability and statistics, including open-ended data gathering and processing, counting techniques, sampling strategies, estimation, and decision making. Prerequisite: MTE 381 or instructor approval.

**481 Mathematics in the Upper-Elementary Grades II.** (3) N  
Elementary functions and their applications. A thorough investigation of some of the algorithms of basic arithmetic. Prerequisite: MTE 480 or instructor approval.

**482 Methods of Teaching Mathematics in Secondary School.** (3) F, SS  
Examination of secondary school curricular material and analysis of instructional devices. Teaching strategies, evaluative techniques, diagnosis, and remediation and problem solving. Prerequisite: instructor approval.

**483 Mathematics in the Secondary School.** (3) S, SS  
Topics in geometry, number theory, algebra, and analysis. Emphasis on unifying principles. Prerequisite: MAT 310 or instructor approval.

**582 Modern Mathematics for Teachers.** (3) A  
Theory of sets, real number system, transfinite numbers, and other selected topics. Prerequisite: instructor approval.

**583 Abstract Algebra for Teachers.** (3) A  
Postulational approach to algebra and elementary mathematical systems, including groups and fields. Prerequisite: instructor approval.

**585 Modern Geometry for Teachers.** (3) A  
Euclidean, projective, and non-Euclidean geometries. Prerequisite: instructor approval.

**587 Analysis for Teachers.** (3) N  
Subject matter in mathematics appropriate for accelerated programs in secondary schools, including analytic geometry and calculus. Prerequisite: instructor approval.

**588 Analysis for Teachers.** (3) N  
Continuation of MTE 587. Prerequisite: MTE 587 or instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**STATISTICS AND PROBABILITY**

**STP 420 Introductory Applied Statistics.** (3) F, S, SS  
Introductory probability, descriptive statistics, sampling distributions, parameter estimation, tests of hypotheses, chi-square tests, regression analysis, analysis of variance, and nonparametric tests. Prerequisite: MAT 117 or equivalent. *General Studies: N2.*

**421 Probability.** (3) F  
Laws of probability, combinatorial analysis, random variables, probability distributions, expectations, moment generating functions, transformations of random variables, and central limit theorem. Prerequisites: MAT 300 and STP 420 or equivalents.

**425 Stochastic Processes.** (3) S  
Markov chains, stationary distributions, pure jump processes, 2d order processes, and other topics in stochastic processes. Prerequisites: MAT 342; STP 421.

**427 Mathematical Statistics.** (3) S  
Limiting distributions, interval estimation, point estimation, sufficient statistics, and tests of hypotheses. Prerequisite: STP 421.

**429 Experimental Statistics.** (3) S  
Statistical inference for controlled experimentation. Multiple regression, correlation, analysis of variance, multiple comparisons, and nonparametric procedures. Prerequisite: STP 420 or equivalent. *General Studies: N3.*

**525 Advanced Probability.** (3) N  
Measure-theoretic foundations of probability, distribution functions and characteristic functions, laws of large numbers and central limit theorems, conditional probabilities, martingales, and topics in stochastic processes. Prerequisites: MAT 571 and STP 421 or instructor approval.

**526 Theory of Statistical Linear Models.** (3) F  
Multinomial distribution, distribution of quadratic forms, full and nonfull rank models, generalized inverses, unbalanced data, variance components, and the large sample theory. Prerequisites: STP 427; knowledge of matrix algebra.

**527 Theory of Statistical Linear Models.** (3) S  
Continuation of STP 526. Prerequisite: STP 526 or instructor approval.

**530 Applied Regression Analysis.** (3) F  
Method of least squares, simple and multiple linear regression, polynomial regression, analysis of residuals, dummy variables, and model building. Prerequisite: STP 420 or equivalent.

**531 Applied Analysis of Variance.** (3) S  
Factorial designs, balanced and unbalanced data, fixed and random effects, randomized blocks, Latin squares, analysis of covariance, and multiple comparisons. Prerequisite: STP 420 or equivalent.

**532 Applied Nonparametric Statistics.** (3) F  
One sample test, tests of 2 or more related or independent samples, measures of correlation, and tests of trend and dependence. Prerequisite: STP 420 or equivalent.

**533 Applied Multivariate Analysis.** (3) S  
Discriminant analysis, principal components, factor analysis, cluster analysis, and canonical correlation. Prerequisite: STP 420 or equivalent.

**534 Applied Discrete Data Analysis.** (3) N  
Models for discrete and count data, measures of association, and log-linear and regression models for contingency tables. Prerequisite: STP 420 or equivalent.

**591 Seminar.** (1-3) N  
Topics may be selected from the following:  
(a) Probability  
(b) Statistics

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Mechanical Engineering

Don L. Boyer

Chair

(EC G346) 602/965-3291

### PROFESSORS

BOYER, DAVIDSON, EVANS,  
FERNANDO, HENDERSON,  
JACOBSON, JANKOWSKI,  
KRAJCINOVIC, PECK, ROY, SHAH,  
TONG, TSENG, WOOD, YAO

### ASSOCIATE PROFESSORS

KUO, SIERADZKI

### ASSISTANT PROFESSORS

MCNEILL, PHELAN

### PROFESSORS EMERITI

BEAKLEY, S. CHEN, DITSWORTH,  
FLORSCHUETZ, FRY, KAUFMAN,  
LOGAN, RICE, SHAW, THOMPSON,  
TURNBOW, WILCOX, WOOLDRIDGE

The faculty in the Department of Mechanical and Aerospace Engineering offer graduate programs leading to the degrees of Master of Science, Master of Science in Engineering, and Doctor of Philosophy with a major in Mechanical Engineering. A number of areas of study may be pursued, including design and manufacturing, dynamics and control, energy systems, engineering mechanics, and thermosciences. The faculty also offer graduate degree programs in Aerospace Engineering and Engineering Science. All of the department's graduate programs stress a sound foundation in fundamentals leading to a specialized area of study.

**Graduate Record Examination.** All applicants are required to take the Graduate Record Examination; the subject test in engineering is highly recommended but not required.

### MASTER OF SCIENCE DEGREE

For information concerning the Master of Science degree, refer to pages 53-55.

### MASTER OF SCIENCE IN ENGINEERING DEGREE

For information concerning the Master of Science in Engineering degree, refer to pages 69-70.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

The Doctor of Philosophy degree is conferred upon evidence of excellence in research leading to a scholarly dissertation that is an original contribution to knowledge in the field of mechanical engineering.

**Program of Study.** The program of study must be established no later than the first semester after successfully completing the qualifying examination.

**Qualifying Examinations.** The purposes of the qualifying criteria are to assess if the student is qualified to continue in the doctoral program and to detect deficiencies in the student's background that can be corrected by appropriate course work and individual study. Within the first year of his/her graduate studies at ASU, a graduate student pursuing a Ph.D. program of study in Mechanical Engineering or in Engineering Science must complete three 500-level core courses in the major area of interest and one 500-level mathematics course, both with an average GPA of 3.25 or above. Specific qualifying course requirements for each major area are available from the department.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Written and oral comprehensive examinations are required. The examinations are administered by the program committee.

**Dissertation Requirements.** A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required.

**Final Examinations.** A final oral examination in defense of the dissertation is required.

### Research Activity

The department has established a wide variety of theoretical and experimental research programs in mechanical engineering to prepare graduate students for careers with industry, universities, and government agencies. The faculty are informally organized into groups pursuing research topics directly related to the general improvement of

knowledge in engineering fields or to the application of engineering principles to problems with high national priorities.

Some recent and current examples of faculty and student research projects include studies in aerospace vehicle dynamics, guidance, and control; laser diagnostics in combustion; solar energy systems; modeling and optimal design of rotor-bearing systems; feature-based modeling; design automation; expert systems for manufacturing; concurrent engineering; kinematic geometry of mechanisms and robots; modeling and control of robots for manufacturing; infrared detection of surface defects; development of finite element models; acoustic fatigue; noise control; failure analysis and life predictions; crystal growth; fluid mechanics; metal cutting; transonic airfoil design; hydrodynamic stability; turbulence modeling; numerical modeling of reacting flows; robotics; magnetic bearing development; thermionics; experimental and analytical studies in two-phase flow; convective heat transfer in complex flows and turbine cooling; unsteady aerodynamics; nonlinear waves; perturbation methods; turbulent mixing in stratified flows; double diffusive instabilities; internal waves and internal gravity currents; topography effects in rotating and stratified flows, experimental and analytical studies on pulverized-coal combustion, pollutant formation and spray burning; combustion diagnostics and modeling of continuous flow combustion.

Experimental investigations are carried out in a number of specialized facilities: computer-aided engineering and expert systems laboratory, computer-aided design/computer-aided manufacturing laboratory, combustion laboratory, composite materials laboratory, direct energy conversion laboratory, dynamics and controls laboratory, heat transfer laboratory, laser diagnostics laboratory, hydrodynamic stability laboratory, robotics laboratory, solar energy laboratory, stratified flow laboratory, rotating flow laboratory, supersonic wind tunnel laboratory, thermoscience laboratory, unsteady wind tunnel facility, turbulent fluid mechanics laboratory, and vibrations laboratory. Equipment fabrication is supported by the college's well-equipped Development Shop, which has a staff of machinists and electronic technicians.



### Computer Resources and Facilities

Mechanical Engineering graduate education and research is supported by an extensive array of college- and university-supported computer hardware and software, in addition to laboratory minicomputers and microcomputers. The ASU Computing Commons is equipped with three IBM RS/6000-590, one MASPAR, several DEC VAX 5000, numerous Sun Sparc servers, and, many other platforms. Access to these computers is via the ASU Advanced Communications Support System (ACSS) broadband network as well as via dial-in lines. The university also operates microcomputer sites with more than 400 IBM and Apple Macintosh systems.

### MECHANICAL AND AEROSPACE ENGINEERING

#### MAE 402 Introduction to Continuum Mechanics. (3) A

Application of the principles of continuum mechanics to such fields as flow in porous media, biomechanics, electromagnetic continua, and magneto-fluid mechanics. Prerequisites: ECE 313; MAE 361 or 371; MAT 242 or 342.

**404 Finite Elements in Engineering.** (3) A Introduction to ideas and methodology of finite element analysis. Applications to solid mechanics, heat transfer, fluid mechanics, and vibrations. Prerequisites: ECE 313; MAT 242 or 342.

**406 CAD/CAM Applications in MAE.** (3) A Solution of engineering problems with the aid of state-of-the-art software tools in solid modeling, engineering analysis, and manufacturing; selection of modeling parameters; reliability tests on software. Prerequisite: instructor approval.

**417 Control System Design.** (3) A Tools and methods of control system design and compensation, including simulation, response optimization, frequency domain techniques, state variable feedback, and sensitivity analysis. Introduction to nonlinear and discrete time systems. Prerequisite: MAE 317.

**430 Introduction to Nuclear Engineering.** (3) A Neutron interactions with matter. Principles of neutron chain reacting systems. Neutron diffusion and moderation. Heat removal from nuclear reactors. Point reactor kinetics. Prerequisite: PHY 361.

**434 Internal Combustion Engines.** (3) A Performance characteristics, combustion, carburetion and fuel-injection, and the cooling and control of internal combustion engines. Computer modeling. Lab. Prerequisite: MAE 388.

**435 Turbomachinery.** (3) A Design and performance of turbomachines, including steam, gas and hydraulic turbines, centrifugal pumps, compressors, fans, and blowers. Pre- or corequisite: MAE 361 or 371.

**436 Combustion.** (3) A Thermochemical and reaction rate processes; combustion of gaseous and condensed-phase

fuels. Applications to propulsion and heating systems. Pollutant formation. Prerequisite: MAE 388.

**437 Direct Energy Conversion.** (3) N Unconventional methods of energy conversion; fuel cells, thermoelectrics, thermionics, photovoltaics, and magnetohydrodynamics. Prerequisites: ECE 340, 350.

**438 Solar Energy.** (3) A Solar radiation and instrumentation, design and testing of collectors, performance analyses of systems, thermal storage, photovoltaics, materials, and economic analysis. Prerequisite: MAE 388.

**447 Robotics and Its Influence on Design.** (3) A Robot applications, configurations, singular positions, and work space; modes of control; vision; programming exercises; design of parts for assembly. Prerequisite: MAE 317.

**455 Polymers and Composites.** (3) F Relationship between chemistry, structure, and properties of engineering polymers. Design, properties, and behavior of fiber composite systems. Cross-listed as MSE 470. Prerequisite: ECE 350.

**462 Advanced Dynamics and Control of Aerospace Vehicles.** (3) A Spacecraft attitude dynamics and control. Aircraft lateral-directional motion and stability derivatives, aircraft control systems. Lecture, design projects. Prerequisites: MAE 317, 413.

**463 Propulsion.** (3) F, S Fundamentals of gas-turbine engines and design of components. Principles and design of rocket propulsion and alternative devices. Lecture, design projects. Pre- or corequisite: MAE 361 or 371.

**465 Rocket Propulsion.** (3) A *Effective through fall 1996.* Rocket flight performance; nozzle design; combustion of liquid and solid propellants; component design; advanced propulsion systems; interplanetary missions; testing. Prerequisite: MAE 460.

**465 Rocket Propulsion.** (3) A *Effective starting spring 1997.* Rocket flight performance; nozzle design; combustion of liquid and solid propellants; component design; advanced propulsion systems; interplanetary missions; testing. Prerequisite: MAE 361 or 371.

**466 Rotary Wing Aerodynamics and Performance.** (3) A Introduction to helicopter and propeller analysis techniques. Momentum, blade-element, and vortex methods. Hover and forward flight. Ground effect, autorotation, and compressibility effects. Prerequisites: ECE 386; MAE 361 or instructor approval.

**467 Aircraft Performance.** (3) A Integration of aerodynamic and propulsive forces into aircraft performance design. Estimation of drag parameters for design. Engine, airfoil selection. Conceptual design methodology. Lecture, design projects. Prerequisite: MAE 361 or 371. Pre- or corequisite: MAE 441.

**471 Computational Fluid Dynamics.** (3) A Numerical solutions for selected problems in fluid mechanics. Prerequisites: ECE 384; MAE 361 or 371.

**504 Laser Diagnostics.** (3) S Fundamentals of optics and the interaction of light with matter. Laser sources, laser spec-

troscopy, velocimetry, particle sizing, and surface characterization.

**505 Perturbation Methods in Mechanics.** (3) N Nonlinear oscillations, strained coordinates, renormalization, multiple scales, boundary layers, matched asymptotic expansions, turning point problems, and WKB method.

**506 Advanced System Modeling, Dynamics, and Control.** (3) S Lumped-parameter modeling of physical systems with examples. State variable representations and dynamic response. Introduction to modern control. Prerequisite: ASE 582 or MAT 442.

**507 Optimal Control Theory and Application.** (3) F Optimal control of physical systems. Calculus of variations, Pontryagin's principle, minimum time/fuel problems, linear quadratic regulator, and numerical methods. Prerequisite: MAE 506.

**509 Robust Multivariable Control.** (3) S Characterization of uncertainty in feedback systems, robustness analysis, synthesis techniques, multivariable Nyquist criteria, computer-aided analysis and design. Prerequisites: MAE 417, 506.

**510 Dynamics and Vibrations.** (3) F Lagrange's and Hamilton's equations, rigid body dynamics, gyroscopic motion, and small oscillation theory.

**511 Acoustics.** (3) F Principles underlying the generation, transmission, and reception of acoustic waves. Applications to noise control, architectural acoustics, random vibrations, and acoustic fatigue.

**512 Random Vibrations.** (3) S Review of probability theory, random processes, stationarity, power spectrum, white noise process, random response of single and multiple DOF systems, and Markov processes simulation. Prerequisite: MAE 510 or instructor approval.

**515 Structural Dynamics.** (3) S Free vibration and forced response of discrete and continuous systems, exact and approximate methods of solution, finite element modeling, and computational techniques. Prerequisite: MAE 510 or instructor approval.

**517 Nonlinear Oscillations.** (3) F Existence, stability, and bifurcation of solutions of nonlinear dynamical systems. Methods of analysis of regular and chaotic responses. Prerequisite: MAE 510 or instructor approval.

**518 Dynamics of Rotor-Bearing Systems.** (3) S Natural whirl frequency, critical speed, and response analysis of rigid and flexible rotor systems. Bearing influence and representation. Stability analysis. Methods of balancing.

**520 Solid Mechanics.** (3) F Introduction to tensors: kinematics, kinetics, and constitutive assumptions leading to elastic, plastic, and viscoelastic behavior. Applications.

**522 Variational Principles of Mechanics.** (3) S Virtual work, stationary, and complementary potential energies. Hamilton's principle. Application of these and direct methods to vibrations, elasticity, and stability. Prerequisite: MAE 520 or equivalent.



**523 Theory of Plates and Shells.** (3) F  
Linear and nonlinear theories of plates. Membrane and bending theories of shells. Shells of revolution. Prerequisite: MAE 520.

**524 Theory of Elasticity.** (3) S  
Formulation and solution of 2- and 3-dimensional boundary value problems. Prerequisite: MAE 520.

**527 Finite Element Methods in Engineering Science.** (3) F  
Discretization, interpolation, elemental matrices, assembly, and computer implementation. Application to solid and fluid mechanics, heat transfer, and time dependent problems. Prerequisite: ASE 582.

**536 Combustion.** (3) N  
Thermodynamics; chemical kinetics of combustion. Explosion and ignition theories. Reactive gas dynamics. Structure, propagation, and stability of flames. Experimental methods. Prerequisite: MAE 436 or instructor approval.

**540 Advances in Engineering Design Theory.** (3) F  
Survey of research in engineering design process, artifact and design, knowledge, formal and informal logic, heuristic and numerical searches, theory of structure and complexity. Prerequisite: graduate standing.

**541 CAD Tools for Engineers.** (3) F  
Elements of computer techniques required to develop CAD software. Data structures, including lists, trees, and graphs. Computer graphics, including 2- and 3-dimensional algorithms and user interface techniques.

**542 Geometric Modeling in CAD/CAM.** (3) S  
Geometric and solid modeling, curve and surface design, CAD database architectures, and integration of solid modeling into engineering processes. Prerequisite: MAE 541 or instructor approval.

**544 Mechanical Design and Failure Prevention.** (3) F  
Modes of mechanical failure; application of principles of elasticity and plasticity in multi-axial state of stress to design synthesis; failure theories; fatigue; creep; impact. Prerequisite: MAE 443.

**546 CAD/CAM Applications in MAE.** (3) F  
Solution of engineering problems with the aid of state-of-the-art software tools in solid modeling, engineering analysis, and manufacturing; selection of modeling parameters; reliability tests on software. Open only to students without previous credit for MAE 406 or with instructor approval.

**547 Mechanical Design and Control of Robots.** (3) N  
Homogeneous transformations, 3-dimensional kinematics, geometry of motion, forward and inverse kinematics, workspace and motion trajectories, dynamics, control, and static forces.

**548 Mechanism Synthesis and Analysis.** (3) S  
Algebraic and graphical methods for exact and approximate synthesis of cam, gear, and linkage mechanisms; design optimization; methods of planar motion analysis; characteristics of plane motion; spatial kinematics.

**557 Mechanics of Composite Materials.** (3) S  
Analysis of composite materials and applications. Micromechanical and macromechanical behavior. Classical lamination theory developed with investigation of bending-extension coupling.

**560 Propulsion Systems.** (3) N  
Design of air-breathing gas turbine engines for aircraft propulsion; mission analysis; cycle analysis; engine sizing; component design.

**561 Computational Fluid Dynamics.** (3) S  
Finite-difference and finite-volume techniques for solving the subsonic, transonic, and supersonic flow equations. The method of characteristics. Numerical grid-generation techniques. Prerequisite: MAE 571 or instructor approval.

**563 Unsteady Aerodynamics.** (3) S  
Unsteady incompressible and compressible flow. Wings and bodies in oscillatory and transient motions. Kernel function approach and panel methods. Aeroelastic applications. Prerequisites: MAE 460 (or 461), 562.

**564 Advanced Aerodynamics.** (3) F  
Perturbation method. Linearized subsonic and supersonic flows. Thin wing/slender body theories. Lifting surface theory. Panel method computation. Prerequisite: MAE 460 or 461.

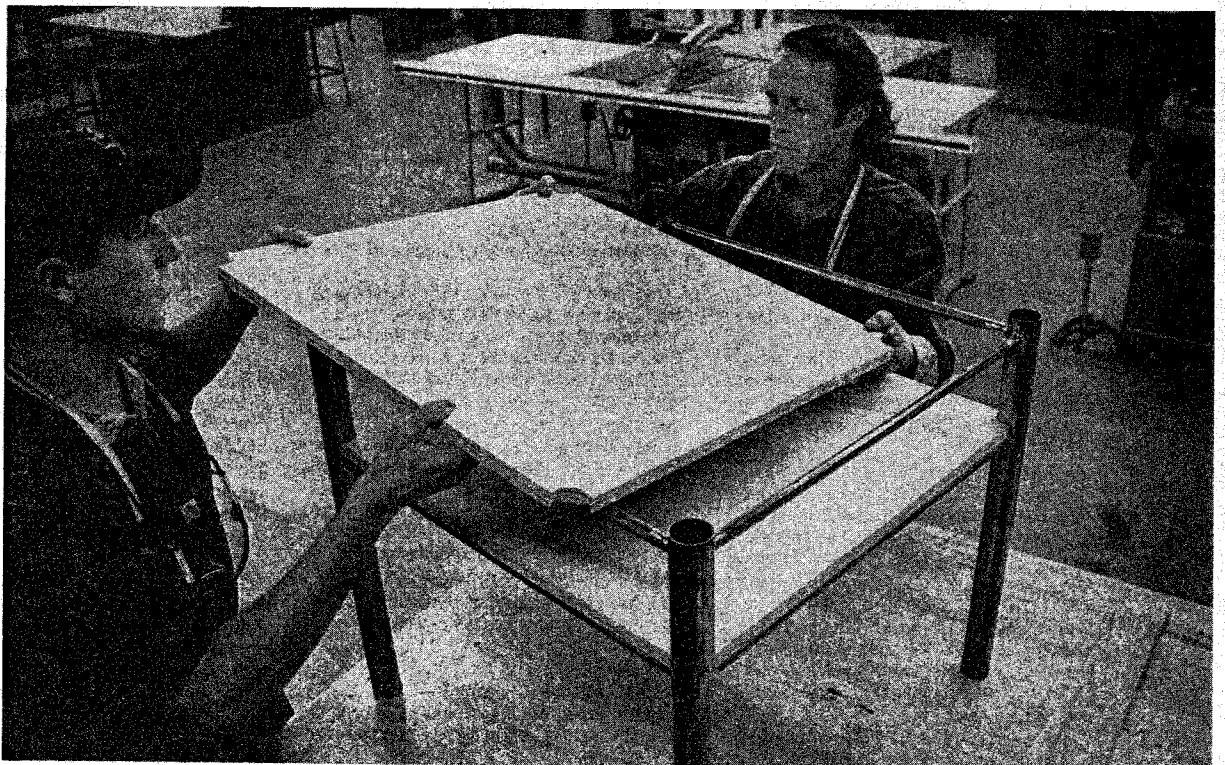
**565 Turbomachinery.** (3) N  
Design and performance of turbomachines, including turbines, compressors, pumps, fans, and blowers.

**566 Rotary-Wing Aerodynamics.** (3) F  
Introduction to helicopter and propeller analysis techniques. Momentum, blade-element, and vortex methods. Hover and forward flight. Ground effect, autorotation, and compressibility effects. Prerequisite: MAE 361.

**571 Fluid Mechanics.** (3) F  
Basic kinematic, dynamic, and thermodynamic equations of the fluid continuum and their application to basic fluid models.

**572 Inviscid Fluid Flow.** (3) S  
Mechanics of fluids for flows in which the effects of viscosity may be ignored. Potential flow theory, waves, and inviscid compressible flows. Prerequisite: MAE 571.

**573 Viscous Fluid Flow.** (3) F  
Mechanics of fluids for flows in which the effects of viscosity are significant. Exact and ap-



proximate solutions of the Navier-Stokes system, laminar flow at low and high Reynolds number. Prerequisite: MAE 571.

**575 Turbulent Shear Flows.** (3) F Homogeneous, isotropic, and wall turbulence. Experimental results. Introduction to turbulent-flow calculations. Prerequisite: MAE 571.

**577 Turbulent Flow Modeling.** (3) S Reynolds equations and their closure. Modeling of simple and complex turbulent flows, calculations of internal and external flows, and application to engineering problems. Prerequisite: MAE 571.

**581 Thermodynamics.** (3) F Basic concepts and laws of classical equilibrium thermodynamics. Applications to engineering systems.

**582 Statistical Thermodynamics.** (3) N Kinetic and quantum theory. Statistical mechanics; ensemble theory. Structure and thermodynamics of non-interacting and interacting particles. Boltzmann integro-differential equation. Cross-listed as MSE 531. Prerequisite: MAE 581.

**585 Conduction Heat Transfer.** (3) F Basic equations and concepts of conduction heat transfer. Mathematical formulation and solution (analytical and numerical) of steady and unsteady, one- and multidimensional heat conduction and phase change problems. Prerequisites: ECE 386; MAE 388.

**586 Convection Heat Transfer.** (3) S Basic concepts and governing equations. Analysis of laminar and turbulent heat transfer for internal and external flows. Natural and mixed convection. Prerequisite: MAE 388.

**587 Radiation Heat Transfer.** (3) F Advanced concepts and solution methodologies for radiation heat transfer, including exchange of thermal radiation between surfaces, radiation in absorbing, emitting, and scattering media and radiation combined with conduction and convection. Prerequisite: MAE 388.

**588 Two-Phase Flows and Boiling Heat Transfer.** (3) S Pool and flow boiling heat transfer, condensation heat transfer, various models of vapor-liquid mixture flows, gas-solid mixture flows, and experimental measurement techniques.

**589 Heat Transfer.** (3) F Basic concepts; physical and mathematical models for heat transfer. Applications to conductive, convective, radiative, and combined mode heat transfer. Prerequisite: MAE 388.

**594 Graduate Research Conference.** (1) F, S Topics in contemporary research. Required every semester of all departmental graduate students registered for 9 or more semester hours. Not for degree credit.

**598 Special Topics.** (1-3) F, S Special topics courses, including the following, which are regularly offered, are open to qualified students:

- (a) Boundary Layer Stability
- (b) Polymers and Composites
- (c) Hydrodynamic Stability
- (d) Advanced Spacecraft Control
- (e) Plasticity
- (f) Aeroelasticity
- (g) Aerospace Vehicle Guidance and Control

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Medieval and Renaissance Studies

**Robert E. Bjork**  
*Director*  
(SS 224) 602/965-5900  
Fax 602/965-1681

### AMERICAN STUDIES

Assistant Professor: Moulton

### ARCHITECTURE

Professor: Meunier

### ART

Associate Professor: Schleif;  
Assistant Professor: Wolfthal

### ENGLISH

Professors: Bjork, Brink, Evans;  
Associate Professors: Corse, Gutierrez,  
Mahoney; Assistant Professors: Colby,  
Perry, Stevens; Lecturer: Obermeier

### HAYDEN LIBRARY

Associate Librarian: Reynolds

### HISTORY

Professors: Batalden, Burg, Tillman,  
Warnicke; Associate Professor: Soergel;  
Assistant Professor: McKee, Thornton

### LANGUAGES AND LITERATURES

Professors: Alexander, Losse, Wixted;  
Associate Professors: Hendrickson,  
Senner; Assistant Professors: Candela,  
Sanchez, Vitullo

### MUSIC

Professor: Metz;  
Associate Professor: Haefer

### PHILOSOPHY

Professor: White

### RELIGIOUS STUDIES

Associate Professor: Coudert;  
Assistant Professor: Clay

### THEATRE

Professor: Knapp

### UNIVERSITY HONORS COLLEGE

Lecturer: Facinelli

Graduate students admitted to a degree program in any field may earn one of two M.A.- or Ph.D.-level certificates: the Certificate in Medieval Studies or the Certificate in Renaissance Studies. Since medieval and Renaissance Studies are by nature interdisciplinary, students in the certificate program receive interdisciplinary training. Besides the course work and examinations required in their major field, students take six to nine semester hours of credit outside their discipline and receive training in a medieval vernacular language or a modern European language.

The core of the program has two components: (1) Latin, the international language for both the Middle Ages and Renaissance, and (2) paleography, the study of the physical medium through which Latin and other languages were transmitted.

The certificate program prepares students for advanced study or for academic positions by augmenting their skills and knowledge, thereby making them more equipped to handle the demands of their fields. For more information, contact the director of the Arizona Center for Medieval and Renaissance Studies by phone, by fax, or by e-mail (robert.bjork@asu.edu).

## Microbiology

**Edward A. Birge**  
*Chair*  
(LS E210) 602/965-1457

### PROFESSORS

BURKE, MOSSMAN, SCHMIDT

### ASSOCIATE PROFESSORS

BIRGE, HOFFMAN, JACOBS

### ASSISTANT PROFESSORS

BLOOM, MISRA, STOUT

### PROFESSORS EMERITI

JOHNSON, LEATHERS,  
NORTHEY, REEVES

The faculty in the Department of Microbiology offer programs leading to the Master of Science and the Doctor of Philosophy degrees with a major in Microbiology. The faculty also participate in the program leading to the Master of Natural Science degree when one of the concentrations is microbiology (see page 67).

The GRE is recommended for all applicants. Three letters of recommendation and a statement of personal goals must be submitted for admission to the graduate programs. Applicants are expected to have completed the requirements for an undergraduate major in microbiology, biology, or chemistry, including an adequate background in related courses in chemistry, mathematics, physics, and botany or zoology. Applicants without this background may be asked to take the GRE subject test. Applications are accepted throughout the year. To be considered

for assistantships and fellowships, completed applications must be received by February 15 for the fall semester and by October 15 for the spring semester.

The graduate programs are designed to prepare students for careers in teaching and in research on various aspects of microbiology in educational institutions, industry, or government agencies. To ensure proper course selection, new students must have the department's approval for all course registrations.

### MASTER OF SCIENCE DEGREE

**Program of Study.** A minimum of 30 semester hours of graduate credit are required, of which at least six hours must be thesis and research credit. The program is planned by the student in consultation with the supervisory committee.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Students are expected to achieve, through coursework, a fundamental understanding of the following subdisciplines: bacterial genetics, immunology, molecular biology, physiology and metabolism, and virology. Alternatively, the student may demonstrate this fundamental understanding by a comprehensive examination prepared by the student's supervisory committee.

**Thesis Requirements.** A thesis is required.

**Final Examinations.** A final oral examination covering the thesis and related subject matter is required.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

**Program of Study.** At least 60 semester hours of graduate credit, in addition to 24 hours of dissertation and research, are required; a minimum of 24 hours of this total is in formal course work. The program is planned in consultation with the supervisory committee.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Written and oral comprehensive examinations are required.

**Dissertation Requirements.** A dissertation based on original work of high quality, demonstrating proficiency in the student's area of interest, is required. (See dissertation requirements, pages 73-74.)

**Final Examinations.** A final oral examination in defense of the dissertation is required.

### Research Activity

The following represent major areas of research emphasis by faculty and graduate students in microbiology: bacterial enzymology, bacterial genetics, immunology, host-parasite relationships, medical molecular biology, neuroimmunology, physiology, systematics, and virology.

Recent studies include the following: structure and function of the outer membrane of *Escherichia coli*; genetics of outer membrane proteins; control and regulation of metabolic pathways; regulation of environmentally responsive genes in bacteria; protein kinases and phosphoprotein phosphatases; genetics of *E. coli* isocitrate dehydrogenase; site-specific conjugal recombination in *E. coli*; development of *Bacillus* cloning systems; genetic studies of entomocidal *Bacilli*; biology of budding and appendaged bacteria; biology of the genus *Seliberia*; molecular mechanism of interferon action; translational control of gene expression in reovirus; immune system-nervous system interactions; CNS involvement in autoimmune disease; immune system signaling of the brain; the molecular/cellular mechanisms of stress effects on chronic immunologic diseases; elucidating the neuroimmunologic circuit.

### MICROBIOLOGY

**MIC 420 Introductory Immunology.** (3) F Fundamental concepts in research and medicine. Cellular immunity, antibody and antigen, immunogenetics, immunoregulation, hypersensitivity, clinical immunology, and nervous-immune system interactions. Prerequisites: CHM 231 (or 331) and MIC 205 (or 220) or instructor approval.

**421 Experimental Immunology.** (2) S An introduction to the basic techniques, methods, and assays used in immunology. 6 hours lab. Prerequisites: CHM 231 and 331 and MIC 302 or instructor approval.

**425 Advanced Immunology.** (3) S '98 A survey of recent advances in immunology, including lymphocyte membranes, lymphokines/biochemistry, molecular genetics, theoretical immunology, immunoregulation, neuroimmunology, and immunologic diseases. Prerequisite: MIC 420 or instructor approval.

**441 Bacterial Genetics.** (3) S Survey of genetic exchange and regulatory processes in bacteria and their viruses. Bacteria and viruses as tools in genetic engineering. Prerequisites: BIO 340 and MIC 205 (or 220) or instructor approval.

**442 Bacterial Genetics Laboratory.** (1) F Techniques of mutagenesis, mapping, and strain construction. 4 hours lab. Prerequisites: MIC 206, 302. Pre- or corequisite: MIC 441.

**470 Bacterial Diversity and Systematics.** (3) F Enrichment culture, biology, and classification of the nonpathogenic bacteria. 1 hour lecture, 6 hours lab. Prerequisite: MIC 302.

**485 General Virology.** (3) F Fundamental nature of viruses, their replication, pathogenesis, and ecology. Prerequisites: BIO 340 and CHM 331 or instructor approval.

**486 General Virology Laboratory.** (2) N An introduction to the growth, assay, and detection of viruses. 6 hours lab. Prerequisite: MIC 302. Pre- or corequisite: MIC 485.

**527 Neuroimmunology.** (3) S '97 Studying mind's influence on immunity and the immune system's influence on the mind, neuroimmunologic diseases, and the neuroimmunologic circuitry involved. Seminar. Prerequisite: MIC 420 or instructor approval.

**530 Bacterial Differentiation.** (3) N Molecular biology of sporulation and germination in bacteria. Emphasis on the control of cellular differentiation. Prerequisite: BIO 443 or MIC 441 or instructor approval.

**545 Recombinant DNA Methodology.** (3) N Principles of genetic engineering using in vitro DNA recombination; characteristics of plasmid and phage vectors; recombinant selection and physical characterization. Prerequisites: BIO 443; MIC 441; instructor approval.

**546 Recombinant DNA Laboratory.** (2) N Basic techniques in isolation of chromosomal, plasmid, and bacteriophage DNA; transformation; gene-splicing methods. Corequisite: MIC 545.

**581 Molecular Mechanism of Pathogenesis.** (3) F Pathogenic mechanisms and host responses in bacterial diseases. Prerequisites: MIC 381 and 420 or instructor approval.

**585 Molecular Virology.** (3) S '98 Selected topics concerning molecular aspects of eukaryotic virus replication and pathogenesis. Prerequisite: instructor approval.

**591 Seminar.** (1-3) F, S

Topics may be selected from the following:

- (a) Bacterial Ecology
- (b) Current Research in Microbiology
- (c) Enzymology
- (d) Genetic Engineering
- (e) Genetics
- (f) Immunology
- (g) Molecular Virology
- (h) Neuroimmunology
- (i) Pathogenic Bacteriology

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Molecular and Cellular Biology

### Interdisciplinary Faculty

*Director, Executive Committee*  
(PS D121) 602/965-0743

#### BOTANY

Professors: Aronson, Backhaus, Hooper, Trelease, Vermaas;  
Associate Professors: Frasch, Roberson, Stutz, Webber; Assistant Research Scientist: LoBrutto

#### CHEMISTRY AND BIOCHEMISTRY

Professors: Bieber, Blankenship, Lohr, Rose; Associate Professors: Allen, Woodbury

#### MICROBIOLOGY

Professor: Schmidt;  
Associate Professors: Hoffman, Jacobs;  
Assistant Professors: Misra, Stout

#### ZOOLOGY

Regents' Professor: Markow;  
Professors: Capco, Chandler, Doane, Hazel, McGaughey, Satterlie;  
Associate Professors: Goldstein, Smith;  
Assistant Professor: Cooper

The interdisciplinary M.S. and Ph.D. degrees with a major in Molecular and Cellular Biology are administered by the Interdisciplinary Committee on Molecular and Cellular Biology. The participating faculty are drawn primarily from four core departments (the Departments of Botany, Chemistry and Biochemistry, Microbiology, and Zoology), with additional faculty from the Departments of Anthropology and Physics and Astronomy. One striking aspect of studies in this broad area of biological science is the interdisciplinary nature of the field. Similar approaches and techniques are used for studies of biological systems whether they are viral, bacterial, plant, or animal.

The graduate degrees offered by the faculty through this program prepare students for careers that span traditional disciplinary boundaries. The broad-based training provides the necessary skills for professional careers in academic institutions, governmental institutions, and industry, particularly those related to health and chemical sciences.

**Graduate Record Examination.** All applicants are required to take the Graduate Record Examination. Submission of scores on the verbal, quantitative, analytical, and advanced sections of the GRE is required for admission to the M.S. and Ph.D. degree programs. The subject test in the sciences is highly recommended.

**TOEFL and SPEAK Test.** Students whose native language is not English are required to take the TOEFL. A TOEFL score of 610 is required for admission to the MCB program. Students whose native language is not English must pass the SPEAK test with a score of at least 250 if they wish to be considered for teaching assistantship support.

#### MASTER OF SCIENCE DEGREE

See pages 53-55 for general requirements.

**Program of Study.** Thirty semester hours are required. A minimum of 10 designated semester hours of MCB courses and six hours of Research and Thesis are required. The remaining courses are selected by the student in consultation with the supervisory committee.

**Thesis Requirements.** A written thesis based on original research is required.

**Final Examinations.** A final oral examination in defense of the thesis is required.

#### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

**Program of Study.** Eighty-four semester hours are required. A minimum of 12 designated semester hours of MCB courses, six semester hours of elective course work, and 24 semester hours of Research or Dissertation are required. The remaining courses are selected by the student in consultation with the supervisory committee.

**Comprehensive Examinations.** Written and oral comprehensive examinations are required.

**Dissertation Requirements.** A written dissertation based on original research of high quality that demonstrates proficiency in the area of specialization is required.

**Final Examinations.** The final oral examination in defense of the dissertation is required. Evidence must be presented that the research contribution is publishable in the primary literature.

**Research Activity.** Refer to individual programs (Botany, Chemistry and Biochemistry, Microbiology, and Zoology) for descriptions of research activities.

#### MOLECULAR AND CELLULAR BIOLOGY

##### MCB 500 Research Methods in Molecular and Cellular Biology. (2) F, S

Rotation laboratory experiences in which students participate in research under the direction of an MCB faculty member. May be repeated for credit.

##### 501 Seminar: Molecular and Cellular Biology Colloquium. (1) F, S

Presentation of current research by noted researchers in the field. May be repeated for credit.

##### 555 Advanced Molecular and Cellular Biology I. (3) F

Study of structural and functional organization of biomolecules and cells, based on current literature. 3 hours lecture, discussion. May be repeated once for credit. Pre- or corequisites: BIO 443 or equivalent; CHM 461.

##### 556 Advanced Molecular and Cellular Biology II. (3) S

Continuation of MCB 555. 3 hours lecture, discussion. May be repeated once for credit. Pre- or corequisites: BIO 432 or equivalent; CHM 462.

##### 591 Seminar: Current Literature in Molecular and Cellular Biology. (1) F, S

Presentation and discussion of current research in the areas of molecular and cellular biology. May be repeated for credit.

##### 700 Research Methods in Molecular and Cellular Biology. (2) F, S

Rotation laboratory experiences in which students participate in research under the direction of an MCB faculty member. May be repeated for credit.

##### 701 Seminar: Molecular and Cellular Biology Colloquium. (1) F, S

Presentation of current research by noted researchers in the field. May be repeated for credit.

##### 791 Seminar: Current Literature in Molecular and Cellular Biology. (1) F, S

Presentation and discussion of current research in the areas of molecular and cellular biology. May be repeated for credit.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Music

### Master's:

**Jack D. Rausch**  
Associate Director  
(MUSIC 177A) 602/965-2816

### Doctoral:

**Jerry Doan**  
Doctoral Program Coordinator  
(MUSIC 211) 602/965-4223

### REGENTS' PROFESSOR HICKMAN

#### PROFESSORS

ATSUMI, BACON, BOSWELL,  
D. BRITTON, M. BRITTON, CLARK,  
CROWE, DOAN, FLEMING,  
HACKBARTH, HAMILTON,  
HARRIS, HOFFER, HUMPHREYS,  
KLIWER-BRITTON, KOONCE,  
LOCKWOOD, LYNE, MAGERS,  
MAROHNIC, METZ, MEYER, OLDANI,  
PAGANO, PILAFIAN, RUSSELL,  
E. SELLHEIM, SHINN, SKOLDBERG,  
SPINOSA, SPRING, STOCKER,  
STRANGE, SWAIM, UMBERSON,  
WELLS, WILLIAMSON, WYTKO

#### ASSOCIATE PROFESSORS

BARROLL-ASCHAFFENBURG,  
CARPENTER, COSAND, DeMARS,  
DREYFOOS, FERRIS, HAEFER,  
HOLBROOK, PETERSON, RAUSCH,  
RAVE, REBER, REYNOLDS, ROGERS,  
J. SELLHEIM, J.B. SMITH, SOLÍS,  
STAUFFER, SUNKETT, WILSON

#### ASSISTANT PROFESSOR MONTGOMERY

#### PROFESSORS EMERITI

ANDRESS, BOWERS, D'ANDREA,  
DEBENPORT, DRESSKELL,  
ENGLISH, FLETCHER, HANNA,  
HINES, LAMM, LOMBARDI, McEWEN,  
RICKEL, ROBINSON, ROSEN,  
SCOLAR, SEIPP, H.C. SMITH,  
M.W. SMITH, STALZER

The faculty in the School of Music offers graduate programs with a Masters of Arts in Music degree with concentrations in ethnomusicology, music history and literature, and music theory. The faculty also offer a graduate program leading to the professional degree Master of Music with majors in Composition, Music Education, and Performance and the professional degree Doctor of Musical Arts with a major Music, with concentrations in choral

music, general music, instrumental music, music composition, and solo performance.

A Doctor of Education in Curriculum and Instruction degree program option is available. The Ed.D. is offered and administered through the College of Education. See pages 74-75 for program description.

**Graduate Diagnostic Examinations.** All students admitted to graduate degree programs must satisfactorily complete examinations before any comprehensive examinations may be scheduled. In music theory, the areas are as follows:

1. aural skills;
2. form;
3. analytical skills: 19th-century music; and
4. analytical skills: 20th-century music.

In music history, the areas are (1) medieval, Renaissance, and baroque and (2) classical, romantic, and 20th century.

**Undergraduate Deficiencies.** Deficiencies are determined by the school. Removal of all deficiencies is the responsibility of the student and is considered additional to the minimum hours for graduation.

**Graduate Assistantships.** The deadline is February 15 for teaching assistantship applications.

### MASTER OF ARTS DEGREE

The School of Music offers the Master of Arts degree with a major in Music. The concentrations within the major are ethnomusicology, music history and literature, and music theory.

**Prerequisites.** Applicants are expected to have a Bachelor of Arts degree in Music or its equivalent from an accredited institution.

**Admission.** Application must be accompanied by evidence of scholarly achievement or potential (e.g., a term paper) and by letters of recommendation from two persons qualified in the field.

### Program of Study

**Ethnomusicology.** A minimum of 30 semester hours of graduate credit is required, of which at least 16 semester hours must be in the field of ethnomusi-

cology, including six semester hours of thesis and at least six semester hours in music theory.

**Music History and Literature.** A minimum of 30 semester hours of graduate credit is required, of which at least two-thirds must be in the field of music history and literature.

**Music Theory.** A minimum of 32 semester hours of graduate credit is required, of which at least 18 must be in the field of music theory and at least 10 must be selected from the fields of music theory, music composition, and music history.

### Course Requirements

**Ethnomusicology.** MUP 587 (two semesters), MHL 568, 591, 592, 599 (thesis), and six semester hours of music theory.

**Music History and Literature.** MUP 582 (two semesters), MHL 532, 591 (two semesters), 599 (Thesis), and six hours of music theory.

**Music Theory.** MTC 520, 525, 527, 528, 599, (Thesis); six semester hours of music history.

**Foreign Language Requirements.** A passing grade on the foreign language reading examination in French or German is required.

**Final Examinations.** A final examination (written, oral, or both) is required. An oral examination in defense of the thesis is also required.

### MASTER OF MUSIC DEGREE

Refer to page 66 for information concerning the program leading to the professional Master of Music degree.

### DOCTOR OF MUSICAL ARTS DEGREE

Refer to pages 75-76 for information concerning the program leading to the professional Doctor of Musical Arts degree.

### MUSIC HISTORY/LITERATURE

**MHL 532 Music Bibliography.** (3) F Major historical and analytical writings; systematic and historical collections of music. Reading knowledge of a foreign language recommended.

**535 Medieval Music.** (3) S '97 Music of Europe in the Middle Ages, Gregorian chant, religious; and secular monophony and polyphony to 1400.



- 536 Music of the Renaissance.** (3) S '98 Music in Europe, with emphasis on stylistic concepts and changes, c. 1400–1580.
- 544 World Music I.** (3) F '97 Music of traditional and folk cultures of Africa, Europe, and the Americas.
- 545 World Music II.** (3) F '96 Traditional, folk, and art music of the Pacific, Near East, and Asia.
- 547 Topics in American Music.** (3) S '97 Selected topics in the history of music. Composers working in the Americas with emphasis upon music since 1900.
- 557 Topics in Symphonic Literature.** (3) S '98 An examination of the evolution of the symphony and symphonic poem from the early classic era through the 19th century, with emphasis on the analysis of selected works.
- 566 Area Studies in Ethnomusicology.** (3) S '98 Study of the music of a particular culture, country, or area (e.g., music of Mexico, Latin America, China, Africa). May be repeated for credit.
- 568 Introduction to Ethnomusicology.** (3) F '97 Introduction to the theory and methodology of the discipline, including bibliography, fieldwork, transcription, analysis, and organology.
- 575 History of Choral Music.** (3) F Major choral works.
- 644 Notation of Polyphonic Music.** (3) S '98 Music notation from the 15th through 17th centuries, including problems of transcription into modern notation.
- Omnibus Graduate Courses:** See pages 41–42 for omnibus graduate courses that may be offered.

### MUSIC THEORY AND COMPOSITION

- MTC 516 Baroque Music.** (3) S '98 Detailed analysis of selected examples from the Baroque period.
- 519 Late 19th-/Early 20th-Century Music.** (3) F '97 Detailed analysis of selected examples of music from the late 19th and early 20th centuries.
- 520 Analytical Techniques.** (3) S, SS Analytical techniques systematically applied to music. Concentration on structural and compositional procedures.
- 523 Advanced Composition.** (2–3) F, S Advanced music composition, including complex techniques and larger structure. May be repeated for credit. Prerequisite: instructor approval.
- 525 Pedagogy of Theory.** (3) F '96 Practices and principles of teaching music theory. Emphasizes most desirable and practical offerings possible. Comparative studies of existing practices.
- 527 History of Music Theory.** (3) F, S Theory from Pythagoras to the 16th century. Need not be taken in sequence with MTC 528.
- 528 History of Music Theory.** (3) F, S Theory from the 17th century to the present. Need not be taken in sequence with MTC 527.
- 555 Computer Music Notation.** (2) N Instruction in preparing score and parts of music compositions using various music-notation software packages. Credit cannot be applied
- toward the graduate theory requirement. Lecture, lab. Prerequisite: instructor approval.
- 647 Directions in New Music.** (3) N Studies in contemporary idioms and aesthetics drawn from recent works of visiting composers; involves analytical discourse, critical writing, and applied concepts in composition. Lecture, discussion, exercise. Prerequisite: instructor approval.
- 723 Advanced Composition.** (3) F, S Special problems in writing in complex forms and textures. May be repeated for credit. Studio.
- 755 Music Composition Technology.** (3) N Advanced study in digital sampling, synthesis, sequencing, computer-generated sound, and computer/performer interfaces. May be repeated for credit. Lecture, lab. Prerequisites: MTC 436 and 437 or equivalent.
- Omnibus Graduate Courses:** See pages 41–42 for omnibus graduate courses that may be offered.

### MUSIC EDUCATION

- MUE 548 Introduction to Research in Music Education.** (3) F, SS Survey of research methods and literature in music education. Focus on interpretation and evaluation.
- 549 Foundations of Music Education.** (3) A A treatment of historical perspectives, philosophy-aesthetics identified with music education, and learning theories applied to music teaching/learning. Basic research and writing skills appropriate to graduate studies in music education.
- 550 Studies in Music Curricula.** (3) A Scope and sequence of musical experiences. Development of criteria for the evaluation of music curricula.
- 551 Advanced Studies in Elementary School Music.** (3) A For experienced teachers; organization and content of the general music classes in kindergarten and the first 6 grades of elementary school. Emphasis on teaching music reading and ear training to young children.
- 552 General Music, Music Theory, and Music History Classes in the Junior and Senior High School.** (3) N Organization and content of school music classes which are not performance oriented.
- 553 Contemporary Elementary Music.** (3) F Identification and development of materials and techniques for teaching special units of music study to elementary (K–8) children.
- 564 Instrumental Music, Advanced Rehearsal Techniques.** (3) A An in-depth analysis of instrumental techniques in preparation for a thorough discussion of band tuning problems and solutions. Discussion of productive conducting and rehearsal techniques for school music teachers.
- 566 Instrumental Literature for Schools.** (3) N Comprehensive study and analysis of all types of instrumental music.
- 568 Choral Music, Advanced Rehearsal Techniques.** (3) A Musical and vocal techniques necessary for presentation of choral literature. Analysis and experimentation with psychological, acoustical, and other problems of rehearsal and performance.

- 570 Choral Literature for Schools.** (3) A Comprehensive study and analysis of choral music for the high school with special emphasis on octavo literature.
- 579 Psychology of Music.** (3) N The nature of musicality and its evaluation. A review of recent research.
- 585 Vocal Acoustics and Production.** (3) A An in-depth approach to the psychological/physiological workings of the vocal mechanism.
- 733 Contemporary Issues and Research in Music Education.** (3) S Emphasis upon recent research relating to music instruction at all levels; current and historical issues in choral, general, and instrumental music.
- 744 Higher Education Instruction.** (3) F Philosophical and psychological principles of college/university teaching. Patterns of music teacher education and a projection of course outlines.
- 755 Philosophy and Aesthetics in Music Education.** (3) SS Philosophy and aesthetics as they influence curriculum content and teaching procedures.
- Omnibus Graduate Courses:** See pages 41–42 for omnibus graduate courses that may be offered.

### MUSIC PERFORMANCE

- MUP 507 Group Piano Practicum.** (2) F Curricula, materials, and teaching techniques for group teaching at the university and community college levels. Observation/supervised teaching in group piano.
- 508 Studio Observation.** (1) F, S Weekly observation of studio teaching by various piano faculty. Paper as final requirement. Prerequisite: M.M. performance/pedagogy piano student.
- 511 Studio Instruction.** (2) F, S For majors in Music degree program. Bassoon, cello, clarinet, contrabass, cornet, euphonium, flute, guitar, harp, harpsichord, horn, oboe, organ, percussion, piano, saxophone, trombone, trumpet, tuba, viola, violin, voice. Minimum contact of 1 hour plus studio class weekly. May be repeated for credit. May not be taken for audit. Prerequisites: Placement examination and audition.
- 521 Studio Instruction.** (1) F, S, SS For secondary or minor instrument instruction and non-majors in the university. Bassoon, cello, clarinet, contrabass, cornet, euphonium, flute, guitar, harp, harpsichord, horn, oboe, organ, percussion, piano, saxophone, trombone, trumpet, tuba, viola, violin, voice. Minimum contact of 1/2 hour per week. May be repeated for credit. May not be taken for audit. Prerequisites: Placement examination and audition.
- 527 Studio Instruction.** (2 or 4) F, S For Performance majors in Master of Music degree program only. Bassoon, cello, clarinet, contrabass, cornet, euphonium, flute, guitar, harp, harpsichord, horn, oboe, organ, percussion, piano, saxophone, trombone, trumpet, tuba, viola, violin, voice. Minimum contact of 1/2 hour per week. May be repeated for credit. May not be taken for audit. Prerequisites: Placement examination and audition.



**540 Advanced Conducting.** (3) F  
Score preparation and conducting techniques for instrumental music. Concentration on study of historical styles. Required of D.M.A. students in Instrumental Music.

**541 The Art Song.** (3) N  
Solo song from its beginning to the present day.

**544 Chamber Orchestra.** (1) F, S  
Important masterpieces from all periods of music will be performed throughout the year. May be repeated for credit. Prerequisite: instructor approval.

**545 Symphony Orchestra.** (1) F, S  
Open on the basis of audition with the director. Masterpieces of symphony orchestra literature. Three times per week. May be repeated for credit.

**550 Choral Union.** (1) F, S  
Open to all students in the university and to interested singers in the community by audition. Preparation and performance of the larger choral works. 2 hours per week. May be repeated for credit.

**551 Repertoire.** (2) N  
Literature available for performance in all performing media. May be repeated for credit.

**552 Concert Choir.** (1) F, S  
4 hours per week. May be repeated for credit. Prerequisite: instructor approval.

**553 University Choir.** (1) F, S  
4 hours per week. May be repeated for credit. Prerequisite: instructor approval.

**555 Men's Chorus.** (1) F, S  
Open to male students in the university who can qualify on the basis of audition. Rehearsal and performance of music for male voices. 2 hours per week. May be repeated for credit. Prerequisite: instructor approval.

**557 Women's Chorus.** (1) F, S  
2 hours per week. May be repeated for credit. Prerequisite: instructor approval.

**561 Marching and Concert Bands.** (1) F, S  
Open by audition only. Staging of formations and drills for football games and other events (fall); masterpieces of symphonic band literature (spring). Meets daily. May be repeated for credit.

**570 Music Theatre: Techniques.** (1) F, S  
Exercises and improvisations for the singing actor emphasizing body awareness, isolations, and freedom of the vocal and breath mechanisms. Section 1 (Interpretation); Section 2 (Expression); Section 3 (Movement for Singers). Each Section: 3 hours per week. May be repeated for credit.

**571 Music Theatre: Workshops.** (1) F, S  
Development of specific skills for the musical-dramatic interpretation. Section 1 (Role Preparation); Section 2 (Styles); Section 3 (Opera Scenes); Section 4 (Musical Comedy); Section 5 (Revue Ensembles). Each section: 1 hour lecture, demonstration, 1 lab per week. May be repeated for credit.

**572 Music Theatre: Orchestras.** (1) F, S  
Open to all students who can qualify on the basis of auditions with the instructor. Participation in Lyric Opera Theatre productions. Section 1 (Orchestra); Section 2 (Chamber Orchestra); Section 3 (Chamber Ensemble). May be repeated for credit. Prerequisite: instructor approval.

**573 Music Theatre: Performance.** (1) F, S  
Open to all students who can qualify on the basis of auditions with the instructor. Participation in Lyric Opera Theatre productions. Section 1 (Principal Roles); Section 2 (Chorus). May be repeated for credit. Prerequisite: instructor approval.

**574 Music Theatre: Production.** (1) F, S  
Participation in Lyric Opera Theatre productions. Section 1 (Vocal Performance); Section 2 (Technical Music Theatre); Section 3 (Problems in Production) to be taken concurrently with MUP 373, Section 2. May be repeated for credit.

**579 Chamber Music Ensembles.** (1) F, S  
String, brass, woodwind, percussion, keyboard, vocal, and mixed ensembles. 2 hours per week. May be repeated for credit. Prerequisite: instructor approval.

**581 Performance Pedagogy and Materials.** (2) N  
Principles and methods of performance techniques for each performance field. May be repeated for credit.

**582 Collegium Musicum.** (1) F, S  
Singers and instrumentalists specializing in the performance of early and unusual music. 2 hours per week. May be repeated for credit. Prerequisite: instructor approval.

**583 New Music Ensemble.** (1) F, S  
Rehearsal and performance of music written in the last 20 years. May be repeated for credit. Prerequisite: instructor approval.

**584 Brass Choir.** (1) F, S  
Public performance of music written for brass instruments. 2 hours per week. May be repeated for credit. Prerequisite: instructor approval.

**585 Percussion Ensemble.** (1) F, S  
Rehearsal and performance of standard and original repertoire for the percussion ensemble and related instruments. 2 hours per week. May be repeated for credit. Prerequisite: instructor approval.

**586 Stage Band.** (1) F, S  
Rehearsal and performance of literature for the stage band. 4 hours per week. May be repeated for credit. Prerequisite: instructor approval.

**587 Ethnomusicology Ensembles.** (1) F, S  
Performance learning experience for the music of various cultures of the world. May be repeated for credit. Prerequisite: knowledge of instrument or instructor approval.

**588 Piano Accompanying.** (1) F, S  
Performance majors with a concentration in piano accompanying (others at the discretion of the instructor). Piano accompaniments found in vocal and instrumental literature; discussion of styles and performance practices; experience in public performance. 2 hours per week. May be repeated for credit.

**595 Solo Performance.** (1) F, S  
For Master of Music candidates in applied music only. May be full recital, major operatic role, solo performance with orchestra, ensemble, or lecture recital.

**596 Solo Performance.** (1) F, S  
See MUP 595.

**727 Studio Instruction.** (2 or 4) F, S  
For D.M.A. candidates only. Minimum contact of 1 hour per week. May be repeated for credit.

**796 Solo Performance.** (1-5) F, S  
For D.M.A. candidates only. May be repeated for credit.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Natural Science

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See "Master of Natural Science," page 67.

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## Nursing

Nancy Melvin  
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Programs and Research  
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### PROFESSORS

DURAND, KENNEY, MELVIN, PERRY

### ASSOCIATE PROFESSORS

BAGWELL, GALE, ISMEURT,  
KILLEEN, KOMNENICH, MATTSON,  
MOORE, NORTH, PRIMAS,  
ROOT, THURBER

### ASSISTANT PROFESSORS

ADAMS, ALPERS, CESAROTTI,  
CLARK-STEFFEN, GARRISON,  
GARRITY, MCCARTHY, PICKENS,  
RODRIGUEZ, SEHESTED, TOBIASON

### PROFESSORS EMERITI

BARDEWYCK, BRANSTETTER,  
BRUNER, FELLER, FINCH,  
GRONSETH, JOHNSON,  
KATZMAN, KNUDSEN, KRUEGER,  
LUDEMANN, LUDLOW, MILLER,  
MURPHY, RICHARDS, ROBERTS,  
SQUIRES, STEFFL, STUMPF,  
TAYLOR, THEOBALD, WURZELL

The faculty in the College of Nursing offer a graduate program leading to the Master of Science degree with a major in Nursing. Concentrations are available in one of the following areas:

1. adult health nursing;
2. community health nursing;
3. community mental health/psychiatric nursing;
4. parent-child nursing with the tracks of the childbearing family and nursing of children; and
5. nursing administration.

The College of Nursing and the School of Health Administration and Policy also offer a concurrent M.H.S.A./M.S. in Nursing (with a concentration in nursing administration) degree program enabling students to pursue concurrent work in health services administration and nursing administration.

The purpose of the graduate program is to provide an academic environment that fosters scholarship, critical thinking, creativity, and prepares nurses for leadership as nurse specialists and beginning researchers. The graduate program offers advanced level courses that can be used as a base for doctoral study and for functional role development in teaching, management, or practice as a nurse practitioner.

The master's program is designed to prepare the graduate to

1. synthesize advanced knowledge using concepts, theories, principles, and research from nursing, humanities, and sciences to develop advanced nursing practice knowledge which emphasizes the holistic approach;
2. demonstrate leadership, management, and teaching abilities in advanced nursing practice;
3. assume leadership, responsibility, and accountability for holistic therapeutic interventions within or across levels of care for diverse clients including individuals, families, groups, or communities;
4. participate in professional nursing organizations and political arenas;
5. participate in research and utilize research findings;
6. communicate scholarly ideas and professional knowledge to colleagues, other disciplines, and the public;
7. provide leadership in collaboration with clients and other health care professionals in the planning and delivery of holistic health care that is responsive to changing needs and societal trends;
8. examine critically the health of populations and related health care issues; and
9. demonstrate lifelong personal and professional learning.

**Functional Areas.** The curriculum also provides creative study in teaching, management, and clinical nurse

practitioner role, including adult, pediatrics, women's health, psychiatric, and family. In addition, students may pursue special interests, such as health problems of selected groups, or unique aspects of the student's area of concentration.

#### MASTER OF SCIENCE DEGREE

**Admission.** See the general requirements for admission to the Graduate College, pages 43-46.

Admission to graduate status in the College of Nursing is based upon meeting the following requirements:

1. junior or senior status or a cumulative GPA equal to 3.00 (A=4.00);
2. a baccalaureate degree in nursing accredited by the National League for Nursing (NLN) or a program in nursing similar to the ASU College of Nursing undergraduate program;
3. current Arizona license to practice as a registered nurse and/or to enroll in some nursing practicum courses;
4. satisfactory completion of the Graduate Record Examination (GRE) in the past five years with scores of 500 or higher in each of the three areas preferred;
5. one year of work experience in a relevant area of professional nursing (additional years may be required for nurse practitioner roles);
6. a descriptive statistics course in a college or university with a grade of "C" or better;
7. recommendations from three professional persons knowledgeable about the applicant's academic and nursing leadership potential;
8. an interview with a representative of the specialty area;
9. eligibility for admission to the Graduate College;
10. completion of the TOEFL with a score of 550 or better and of all requirements for the Commission on Foreign Graduate Nursing Schools (CFGNS) if considered an international student; and
11. completion of a baccalaureate level health assessment course within the preceding five years for all Nurse Practitioner programs.

Applicants who reside and work, or plan to reside and work in rural or medically underserved areas are encouraged to apply for admission.

**Supervisory Committee.** The dean of the Graduate College, upon recommendation of the College of Nursing associate dean of Graduate Programs and Research, appoints the supervisory committee. The supervisory committee recommends the program of study, administers any special qualifying examinations, administers the final oral examination, and approves the thesis or the nonthesis option project.

**Program of Study.** The program of study for the Master of Science degree consists of a minimum of 40 semester hours for the nursing administration area and 45-52 hours for nurse practitioner role specialty areas.

The program of study for the Master of Science degree in Nursing requires the completion of a strong research component. This requirement can be accomplished by either of two pathways: (1) completion of the required research course and six hours of thesis or (2) completion of the nonthesis option that includes the required research course (three hours), an applied project course (three hours), and a presentation of the completed project. The completed project and presentation are evaluated by the student's supervisory committee.

**Foreign Language Requirements.** None.

**Degree Requirements.** The student must successfully complete the following as defined by the supervisory committee and as approved by the dean of the Graduate College:

1. the program of study;
2. comprehensive written examination as required; and
3. thesis and final oral examination in defense of the thesis or nonthesis option project.

#### Research Activity

The faculty and student research projects of the College of Nursing reflect a wide array of research interests. Studies have focused on the nursing profession, the nursing process, and the broad spectrum of health promotion, health maintenance, and developmental processes pertinent to nursing and health care.

Examples of faculty research include research in the area of minorities, such as studies on perceptions of disease by Native Americans with diabetes; the utilization of health care by Latino mothers and their children; Latino and non-Latino caregivers of the elderly; African-American women and cardiovascular disease; and battering in pregnant Latino women. Additional research focuses on the special health needs of homeless children; care of the elderly, including home health care; sociocultural influences on functional health in women; pediatric infectious diseases and family communication; children's temperament; biomedical ethics, clinical decision making, and community health nursing.

### NURSING

#### **NUR 500 Research Methods.** (3) F, S

Research methods including research conceptualization and design in nursing. Pre- or corequisite: graduate-level inferential statistics course.

#### **501 Advanced Adult Health Assessment/Promotion.** (3) F

Designed to expand adult health assessment/promotion skills through knowledge/strategies essential for developing and interpreting data. Lecture, demonstration. Prerequisites: college core courses except thesis/project; undergraduate health assessment course. Corequisite: NUR 580.

#### **502 Management and Maintenance of Adults with Chronic Health Alterations: Theory.** (3) S

Includes theory/research that guides the management/maintenance of adults with chronic health alterations. Psychophysiological interrelationships of illnesses emphasized. Lecture, seminar. Prerequisites: NUR 501, 580; admission to graduate Nursing program; all flexible core courses except thesis/project.

#### **503 Management and Maintenance of Adults with Acute Health Alterations: Theory.** (3) S

Emphasizes theoretical research foundations essential for advanced practice involving care of adults with acute episodic alterations in health. Lecture, seminar. Prerequisite: NUR 501. Pre-/corequisite: NUR 580.

#### **512 Community Health Nursing: Advanced Theory I.** (3) F

Students identify and analyze theoretical perspectives and models guiding advanced community health nursing practice. Lecture, seminar. Prerequisites: all graduate program core courses. Corequisite: NUR 580.

#### **513 Community Health Nursing: Advanced Theory II.** (3) S

Drawing from their internship, students critically examine the application of theory to advanced community health nursing/public health practice. Lecture, seminar. Prerequisite: NUR 512. Corequisite: NUR 580.

#### **521 Community Mental Health/Psychiatric Nursing: Advanced Mental Health Assessment.** (3) S

Students gain knowledge of theories related to holistic health assessment for the promotion

of physical/psychological health and develop skill in mental health assessments. Lecture, seminar, lab. Prerequisites: all graduate program core courses.

#### **522 Community Mental Health/Psychiatric Nursing: Advanced Theory I.** (3) F

Analysis of issues, theories, and research in restoration and promotion of mental health. Emphasizes developing conceptual framework for psychiatric nursing. Prerequisite: NUR 521. Corequisite: NUR 580

#### **523 Community Mental Health/Psychiatric Nursing: Advanced Theory II.** (3) S

Focus of this course is development of theoretical basis for intervention and a knowledge base for collaboration and consultation in the mental health area. Prerequisite: NUR 522. Corequisite: NUR 580.

#### **524 Psychoneuroimmunology Approaches to Practice.** (3) F, SS

Overview of theories, concepts, and research in psychoneuroimmunology including physiological aspects and application to a holistic nursing model. Seminar. Prerequisite: graduate standing.

#### **531 Nursing of Children: Theory I.** (3) F

Focus on current practices, research, and issues related to health promotion and disease prevention for children and adolescents. Lecture, seminar. Prerequisite: All core and flexible courses except thesis and/or applied project. Corequisite: NUR 580.

#### **532 Nursing of Children: Theory II.** (3) S

Focus on concepts, theories, and research as basis for strategies related to management of illness and health maintenance for children. Lecture, seminar. Prerequisite: NUR 531. Corequisite: NUR 580.

#### **533 Nursing of Children with Special Needs: Theory II.** (3) S

Focus on concepts, theories, and research related to acute and chronic health deviations of children. Lecture, seminar. Prerequisite: NUR 531 or instructor approval. Corequisite: NUR 580.

#### **534 Women's Health: Theory I.** (4) F

Focuses on theories, principles, and research related to managing the health of normal perinatal women and families. Cooperative learning strategies. Prerequisite: all graduate program core courses. Corequisite: NUR 580.

#### **535 Women's Health: Theory II.** (4) S

Focuses on management of nursing care for high-risk perinatal women and women with common health problems. Cooperating learning strategies. Prerequisite: NUR 534. Corequisite: NUR 580.

#### **542 Nursing Administration Theory I.** (1-3) F

Critical analysis of leadership theories, organizational dynamics, and nursing administration processes. Seminar, case study. Prerequisite: all graduate program core courses.

#### **543 Nursing and Health Care Finance.** (3) S

Provides an understanding of finances in nursing and health care accounting; language, concepts, budgeting, rates, reimbursement, and capital financing are analyzed. Lecture, discussion.

#### **544 Nursing Administration Theory II.** (1-3) S

Synthesis of knowledge from previous courses to develop advanced nursing role. Analysis of resource and quality management and informatics. Lecture, seminar. Prerequisites: NUR 542, 543.

#### **551 Theoretical Foundations of Advanced Practice Nursing.** (3) F, S

Designed to facilitate student exploration and examination of the foundations of advanced

nursing practice. Lecture, seminar. Prerequisite: enrollment in graduate Nursing program.

#### **552 Health Care Issues and Systems.** (3) F, S

Analysis of organization, financing, service delivery and outcomes of the health system. Emphasizes policy issues, roles, and challenges for nurses. Lecture, seminar.

#### **553 Life Span Development.** (3) F

Critical examination of concepts, theories, issues, and research related to developmental periods throughout the life span. Biological and health, cognitive, psychological, and sociocultural influences are analyzed. Lecture, discussion. Prerequisite: Undergraduate course in human development, admission to the graduate Nursing program, or instructor approval.

#### **554 Population-Based Health Care.** (3) F

Identification and assessment of specific community health needs and health care patterns of target populations. Promotion, protection, and improvement of health is addressed when planning health care services. Lecture, seminar. Prerequisite: admission to the graduate Nursing program or instructor approval.

#### **560 Advanced Health Assessment.** (2) S

Expansion of basic health assessment skills and development of clinical problem-solving skills are emphasized for the role of the advanced practice nurse. Assessments of infants, children, adolescents, and adults included. Lecture, lab. Prerequisite: admission to the graduate Nursing program and undergraduate health assessment within the last five years.

#### **561 Advanced Practice Nursing Role.** (2) S

Focuses on the examination and implementation of the role of the advanced practice nurse, emphasizing major components and subcomponents of the role. Lecture, seminar. Prerequisite: admission to the graduate Nursing program or instructor approval.

#### **562 Family Nurse Practitioner Theory I: Health Promotion, Management, and Maintenance.** (4) F

First didactic role specialty course. Focus on concepts and strategies to promote, manage, and maintain health of child, adult, and family. Corequisite: NUR 580.

#### **563 Family Nurse Practitioner Theory II: Health Promotion, Management, and Maintenance.** (4) S

Second didactic role specialty course utilizing knowledge from previous courses to formulate therapeutic promotion, management, and maintenance for individuals across the life span. Corequisite: NUR 580.

#### **564 Applied Pharmacotherapeutics for Advanced Practice.** (2) SS

Lifespan course for advanced nurse practitioners to expand knowledge and encourage synthesis of pharmacological concepts and principles. Lecture, discussion, case studies. Prerequisite: admission to the graduate Nursing program or instructor approval.

#### **565 Applied Physiology/Pathophysiology in Advanced Practice.** (3) SS

Lifespan course for advanced nurse practitioners designed to expand previously acquired anatomy and physiology knowledge and discern pathological alterations within a psychoneuroimmunology framework. Lecture, seminar, case studies. Prerequisites: admission to the graduate Nursing program or instructor approval and undergraduate anatomy and physiology.



**571 Teaching in Nursing Programs.** (3) S  
Analysis of theories, issues, and research related to teaching in nursing. Focus on the process of teaching/learning. Seminar, cooperative learning. Prerequisite: graduate standing. Corequisite: teaching practicum.

**576 Computer Applications in Health Care.** (3) F  
Analysis of current and developing computer applications in health care. Emphasis on nursing applications in administration, education, and practice. Prerequisites: NUR 440 or equivalent; graduate standing in Nursing or related field.

**578 Gestalt Therapy I.** (3) F  
An introduction to theory and methodology of Gestalt therapy and its uses for mental health promotion and restoration.

**579 Gestalt Therapy II.** (3) S  
Focus is on further development of Gestalt therapy and its application in working with various client populations. Prerequisite: NUR 578.

**580 Practicum (Electives).** (1-4) N  
Clinical application of theories, concepts, and principles such as health promotion, health management, health maintenance, teaching, management, and special clinical studies.

**580 Advanced Nursing Practicum I, II.** (2-6) F, S  
Clinical application of theories, concepts, and principles. The areas of concentration include the following:

- (1) Adult Health Nursing
- (2) Community Health Nursing
- (3) Community Mental Health/Psychiatric Nursing
- (4) Parent-Child Nursing

Conferences. Prerequisites: admission to the graduate program; instructor approval.

**581 Family Systems Theory in Health Care.** (3) F  
Critical analysis of issues and research relevant to family systems theory. Emphasis on relationship between theory and practice.

**582 Advanced Human Physiology.** (3) F  
Analyzes major theories and concepts of human physiology. Interrelationship of physiology and health is explored.

**583 Pathophysiology.** (3) S  
Manifestation of altered human physiology and disease. Systems theory is used to analyze the relationships of disease and physiology.

**584 Community Health Nursing Internship.** (3) S  
Students operationalize community health nursing/public health content in leadership roles in a variety of community agencies. Clinical internship. Prerequisites: NUR 512, 580. Corequisite: NUR 513.

**585 Stress Reduction.** (3) A  
Theory, application, and evaluation of mind/body relaxation methods, including physiological effects. Research findings emphasized. Daily student practice. Prerequisite: graduate standing or instructor approval.

**588 Qualitative Methods in Nursing Research.** (2) SS  
Provides an introduction to the use of qualitative approaches, discovery procedures, analysis, interpretation of data, and contribution to theory building.

**591 Seminar.** (2-4) N  
Advanced topics, including curriculum development and health promotion. Prerequisite: instructor approval in selected courses.

**593 Applied Project.** (3)  
Emphasis on the synthesis and application of research to an identified clinical nursing problem. Prerequisites: NUR 500; inferential statistics; all program core courses.

**598 Special Topics.** (2-4) N  
Special study, including issues in health care and organizations, management in nursing, ethical issues, and clinical nurse specialist role. Prerequisite: instructor approval in selected courses.

**599 Thesis.** (1-6) F, S, SS  
Research proposal development, data collection and analysis, thesis writing, and thesis oral defense. Six hours required.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Performance

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See "Music," pages 240-242.

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## Philosophy

Jane Maienschein

Chair

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**REGENTS' PROFESSOR**  
MURPHY

**PROFESSORS**  
CREATH, FITCH, HUMPHREY,  
MAIENSCHIN, WHITE

**ASSOCIATE PROFESSORS**  
ARMENDT, COHEN, GULESERIAN,  
KOBES, MCGREGOR, REYNOLDS

**ASSISTANT PROFESSORS**  
BLACKSON, COWLES, de MARNEFFE

**PROFESSORS EMERITI**  
ARNER, CARNEY, GIESCHEN,  
HOWELLS, LIU, VOTICHENKO

The faculty in the Department of Philosophy offer a graduate program with a major in Philosophy leading to the Master of Arts degree.

### MASTER OF ARTS DEGREE

**Prerequisites.** At least 15 semester hours of upper-division course work in philosophy, including history of philosophy, epistemology, metaphysics and the equivalent of PHI 333 Introduction to Symbolic Logic are required.

No course credits in which a grade of less than "B" has been earned may count toward meeting this 15-semester-hour requirement. Persons otherwise qualified for admission but lacking the above prerequisites may make up this deficiency by enrolling as a nondegree graduate student and taking those philosophy courses necessary to complete the prerequisite. If some or most of the prerequisites have already been met, the student may be admitted into the program under "provisional status" or under "regular status with deficiencies." All applicants for admission to the program must submit scores for the general section of the GRE.

**Program of Study.** The M.A. degree program in Philosophy is designed to prepare students either to teach philosophy at the community college level, to enter doctoral programs in philosophy at other institutions, or to be employed in any areas that require critical, analytical thinking (such as medicine, law, government, or publishing). The program seeks to maintain a balance between a breadth of course offerings in the traditional areas of philosophy—metaphysics, ethics, epistemology, logic, and history of philosophy—and opportunities for study in current philosophical developments, such as the philosophy of science, philosophy of language, and philosophical psychology. The program of study includes at least 30 semester hours of approved graduate-level courses, not including PHI 599 Thesis. An additional six hours of PHI 599 Thesis is required. The details of each student's program are worked out with the director of graduate studies.

**Course Requirements.** Each student is required to take an approved graduate-level course of three semester hours and to obtain at least a "B" in each course: metaphysics/epistemology, value theory and logic; and any two of the following: history of early philosophy, history of modern philosophy, and history of contemporary philosophy.

**Foreign Language Requirements.** None.

**Thesis Requirements.** A thesis is required. This written work must demonstrate the ability to carry out independent research in philosophy.

**Final Examinations.** A final oral examination in defense of the thesis is required.

### Research Activity

The department offers a solid program in traditional and contemporary philosophy. Areas of recent and current faculty research include the following: belief ascription, the nature of singular propositions, time and time travel, modality and belief, philosophical problems of cognitive psychology, reference and attribution, modal set theory, God and modality, God and evil, divine freedom, theories of punishment and criminal law, freedom and coercion, mercy and legal justice, evolution and morality, Kantian autonomy, liberalism, social justice and basic rights, growth and character of experimentation, the rise of American biology, the roles of research traditions and working hypotheses in science, the character of theoretical entities, observation and justification, coherence theories of knowledge, foundational theories of knowledge, theories of rational choice, knowledge of oneself, the riddles of induction, skepticism, analyticity, literary relativism, the notion of following rules, Plato, Aristotle, ancient theories of freedom and determination, critical theory, 19th-century idealism, actualism, causality, space, time and continuity, Kant, Carnap, Quine, and Rawls.

A selection of books and forthcoming books of the faculty include the following: *Perception, Reason, and Knowledge* (editor); *Fundamentals of Logic* (co-author); *Introduction to Symbolic Logic*; *Dear Carnap, Dear Van: The Quine-Carnap Correspondence and Related Work* (editor); *Analyticity: The Carnap-Quine Debate; Naming and Believing; Welches sind die wirklichen Fortschritte, die die Metaphysik seit Leibnizens und Wolf's Zeiten in Deutschland gemacht hat?* (translator, editor); *Perpetual Peace and Other Essays* (translator); *Transforming Traditions in American Biology, 1880-1915; Defining Biology: Lectures From the 1890's* (editor); *The Coming of Age of American Biology; The Emergence of Biology in America* (co-editor); *Kant: The Philosophy of Right; Retribution, Justice and Therapy: Essays in the Philosophy of Law; Evolution, Morality and the Meaning of Life; The Philosophy of Law: An Introduction to Jurisprudence* (co-author); *Agency and Inte-*

*grality: Philosophical Themes in the Ancient Discussions of Determinism and Responsibility; Retribution Reconsidered; The Continuous and the Discrete: Ancient Physical Theories from a Contemporary Perspective; Inquiry, Forms, and Substances: A Study in Plato's Metaphysics and Epistemology.*

The department has also developed interdisciplinary programs linking philosophy with other disciplines, e.g., philosophy of law and history and philosophy of science and technology.

## PHILOSOPHY

### PHI 401 Rationalism. (3) N

Examination of classical philosophical rationalism, as in Descartes, Spinoza, Malebranche, or Leibniz. Contemporary rationalist thought may also be examined. Prerequisites: PHI 302; 1 course from among PHI 305, 309, 312, 316, 317.

### 402 Empiricism. (3) N

Examination of representatives of either classical or contemporary philosophical empiricism, e.g., Bacon, Hobbes, Locke, Butler, Berkeley, Reid, Hume, Mill, Carnap, and Ayer. Prerequisites: PHI 302; 1 course from among PHI 305, 309, 312, 316, 317. *General Studies: HU.*

### 403 Contemporary Analytic Philosophy. (3) A

Aims and methods of such 20th-century philosophers as Frege, Moore, Russell, Wittgenstein, Carnap, Ayer, Wisdom, Ryle, Austin, Strawson, Quine, and Sellars, with application to metaphysics and epistemology. Prerequisites: PHI 302; 1 course from among PHI 312, 314, 315, 316, 317, 401, 402. *General Studies: HU.*

### 413 Advanced Symbolic Logic. (3) N

Properties of formal systems axiomatizing propositional and 1st-order predicate logic. May also include modal logic, number theory, and limits of logicism. Prerequisite: PHI 333.

### 420 Topics in Philosophy. (3) A

Course descriptions on file in department. Topics may be selected from the following:

- History of Philosophy
- Metaphysics/Epistemology
- Philosophy of Language/Logic
- Philosophy of Science
- Value Theory

Courses may be repeated for credit. Prerequisite: one relevant upper-division PHI course or instructor approval.

### 591 Seminar. (1-3) A

Topics may be selected from the following:

- Aesthetics
- Epistemology
- Ethics
- History of Philosophy
- Logic
- Metaphysics
- Philosophy of Language
- Philosophy of Law
- Philosophy of Science
- Social and Political Philosophy

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.



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## Physics

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### REGENTS' PROFESSOR SPENCE

#### PROFESSORS

BURSTEIN, COMFORT, A. COWLEY,  
 DOAK, DOW, HANSON, HESTENES,  
 JACOB, KAUFMANN, LINDSAY,  
 NIGAM, PAGE, SANKEY, SMITH,  
 STARRFIELD, TILLERY, TSONG,  
 VENABLES, VOSS, WYCKOFF

#### ASSOCIATE PROFESSORS

AANNESTAD, ACHARYA, ALARCON,  
 BENIN, BENNETT, CHAMBERLIN,  
 CLBERTSON, MARZKE, MENÉNDEZ,  
 REZ, RITCHIE, SCHEINFEIN,  
 SCHMIDT, TSEN, WINDHORST

#### ASSISTANT PROFESSORS

HERBOTS, HESTER

#### REGENTS' PROFESSORS EMERITI

J. COWLEY, STEARNS

#### PROFESSORS EMERITI

KEVANE, LU, RAWLS, SNYDER

The faculty in the Department of Physics and Astronomy offer graduate programs with a major in Physics leading to the Master of Science and Doctor of Philosophy degrees. In the Master of Science program, options are available in physics, physics with an emphasis in astronomy, interdisciplinary physics, technical physics, or physics teaching. In the Doctor of Philosophy program, options are available in physics, physics with an emphasis in astronomy, or applied physics. The faculty in the Department of Physics and Astronomy also participate in the program leading to the Master of Natural Science degree (see page 67) when one of the concentrations is physics, and in the interdisciplinary program leading to the Doctor of Philosophy degree with a major in the Science and Engineering of Materials (see pages 261-263).

Students admitted to the Master of Education degree program with a major in Secondary Education may elect physics or science education as the subject matter field. A Doctor of Education degree program option is also available. The M.Ed. and Ed.D. are offered and administered through the College of Education. For information

concerning these degree programs, refer to pages 60 and 73-74.

The master's and doctoral programs are designed to prepare students for professional research careers in government, industrial, or academic institutions and for teaching at the university, college, or secondary school levels.

An evaluation of the progress of all graduate students is made during the spring semester by the Graduate Program Committee. Students whose progress is considered to be unsatisfactory are placed on probation. Failure to maintain a GPA of 3.00 in courses taken while enrolled as a graduate student, exclusive of research, thesis, and dissertation, is an indication of unsatisfactory progress and may result in dismissal from the program.

Courses can include up to six hours of 400-level courses (see "Graduate Credit Courses," page 49). Timely attempts at examination are also required.

Teaching experience in undergraduate physics and astronomy laboratories and recitations is valuable training for graduate students and is considered part of the graduate program.

Departmental colloquia are an essential part of the graduate program. Regular attendance at colloquia is expected of all graduate students intending to earn graduate degrees.

### MASTER OF SCIENCE DEGREE

**Admission.** To be admitted without deficiencies, entering graduate students should have adequate undergraduate preparation equivalent to an undergraduate major of 30 semester hours in physics and 20 semester hours in mathematics. Courses in analytic mechanics, electromagnetism, and modern physics, including quantum mechanics, are particularly important. Students applying for admission must submit scores for the verbal, quantitative, and analytical sections of the Graduate Record Examination.

Applicants for financial support must submit a score on the physics advanced examination of the GRE. Subsequent financial support in the form of teaching or research assistantships is contingent upon satisfactory performance in course work, timely completion of the final examination for the M.S. degree as described below, and need and availability of such support. Students on probation will be offered financial support only under exceptional circumstances.

**Program of Study.** The faculty in the Department of Physics and Astronomy offer the Master of Science degree under two options: option I—emphasizing physics, or astronomy, and option II—emphasizing one of the following aspects:

1. interdisciplinary physics;
2. technical physics; or
3. physics teaching.

A supervisory committee is formed for each student, usually during the first year of study. In each case an appropriate program of study is selected with the approval of the supervisory committee. A research project resulting in a thesis is required of all students enrolled in the M.S. program.

#### Option I

**Physics.** An individual program of study, including courses in physics, astronomy, mathematics, or related subjects, is selected with the approval of the supervisory committee to make up a coherent program of graduate study. The courses and research project are to be conducted primarily within the Department of Physics and Astronomy.

#### Option II

**Interdisciplinary Physics.** The courses taken are approximately half in physics and half in some other subject area.

The research project must be in an interdisciplinary area and conducted under the joint supervision of one faculty member from the Department of Physics and Astronomy and one faculty member from another department.

**Technical Physics.** The research project involves active collaboration with some industrial or government laboratory under the supervision of a faculty member from the Department of Physics and Astronomy and may be conducted either in the Department of Physics and Astronomy or in the outside laboratory. At least half the courses taken must be in physics.

**Physics Teaching.** The course of study and research are designed to prepare for a career in physics teaching, with appropriate modifications for teaching at the high school or community college level. At least half the courses taken must be in physics. Students participate in directed, evaluated teaching experiences.

**Foreign Language Requirements.**  
 None.



**Thesis Requirements.** A thesis is required of all students obtaining the M.S. degree. Every student must obtain at least six semester hours in PHY 592 or PHY 599. However, no more than nine semester hours in these courses can be counted toward the 30 semester hours required for the M.S. degree.

**Final Examinations.** The final examination for the M.S. degree is an oral examination on the subject of the student's thesis and on graduate course work taken.

### MASTER OF SCIENCE DEGREE IN PASSING

Students enrolled in the Doctor of Philosophy degree program may be awarded a M.S. degree in passing (see below).

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

**Admission.** This program is designed for students of high ability who show promise for independent research. An applicant holding a baccalaureate degree should have the same undergraduate preparation as for admission to the master's program. An applicant presenting acceptable graduate credit, earned at this or another institution must demonstrate mastery of this material on the comprehensive examinations (see below).



Students applying for admission must submit scores for the verbal, quantitative, and analytical sections of the Graduate Record Examination.

Applicants for financial support must submit a score on the physics advanced examination of the GRE. Subsequent financial support in the form of teaching or research assistantships is contingent upon satisfactory performance in course work, timely completion of examinations, including the written and oral Ph.D. comprehensive examinations as described below, and need and availability of such support. Students on probation will be offered support only under exceptional circumstances. The period for which a Ph.D. candidate may receive financial support through the Department of Physics and Astronomy will not normally exceed six years.

**Program of Study.** In order to accommodate the needs for training in preparation for the wide variety of occupations of professional physicists, in areas ranging from academic faculty positions to industrial research or administrative positions, doctoral degree programs are offered under two options: physics (Track I) and physics with an emphasis in astronomy or applied physics (Track II). The goal is to provide, through course work and independent study, competence at advanced levels in fundamental, applied and interdisciplinary branches of physics and astronomy, and demonstrated ability in independent research.

Students enrolled in the Ph.D. program may obtain an "M.S. degree in passing" by satisfactorily filing and completing an M.S. Program of Study, obtaining a GPA of at least 3.00 in a set of core courses which total 24 semester hours, and passing a written comprehensive examination. The core courses shall be those designated for one of the tracks in the Ph.D. program. Graduate core courses satisfactorily completed at other institutions may be waived upon petition by the Graduate Program Committee. Up to nine semester hours of classroom-based courses may be substituted for core courses that are waived by the Graduate Program Committee.

Each student's progress is overseen by a supervisory committee appointed for the student usually during the first year of study. This committee also approves the student's program of study.

### Track I

**Physics.** The student's individual program includes courses selected, with the approval of the supervisory committee, to make up a coherent program for the achievement of these goals. The program may be directed toward either theoretical or experimental aspects, and frequently includes courses in cognate fields, particularly mathematics, depending on the student's selected field.

### Track II

**Applied Physics.** Under advisement by the supervisory committee, a program of study is selected with a major portion in physics and a minor portion (nine semester hours or more to be passed with at least a "B" average) in another area. The supervisory committee should include appropriate representation from the minor area.

**Course Requirements.** The following basic core of courses, or their equivalents, is required of both Track I and Track II students:

PHY 501	Methods of Theoretical Physics .....	3
PHY 521	Classical Mechanics .....	3
PHY 531	Advanced Electricity and Magnetism .....	3
PHY 541	Statistical Physics .....	3
Total	.....	12

In addition, the following courses are required of all Track I students:

PHY 502	Methods of Theoretical Physics .....	3
PHY 532	Electrodynamics .....	3
PHY 576	Quantum Theory .....	3
PHY 577	Quantum Theory .....	3
Total	.....	12

Additional course work in both tracks is selected with the advisement and approval of the supervisory committee.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** The following examinations are required of all students intending to earn the Ph.D. degree.

### Written Comprehensive Examination

**Track I.** The subject matter of this examination is classical and quantum mechanics, statistical mechanics, and electricity and magnetism, as represented by the courses PHY 521, 531, 532, 541,

576, and 577. The examination is given in two four-hour sessions on separate days, but there is no division of subject matter for the separate sessions.

**Track II.** This examination consists of parts A and B.

Part A emphasizes quantum mechanics, classical mechanics, and electricity and magnetism, as represented by the courses PHY 471, 472, 521, and 531, and is written in a four-hour examination period.

Part B is a written examination prepared by the student's supervisory committee and approved by the graduate examination committee, and is given within three days after the Part A exam. This examination is graded by the student's committee.

The written comprehensive examination is normally given twice yearly, approximately during registration weeks of the fall and spring semesters. Ph.D. candidates must attempt the examination before the beginning of their fifth semester as full-time students in the physics graduate program and must pass the examination before the beginning of the sixth semester.

**Course Changes.** The department has established new degree requirements and is in the process of making changes to the course offerings over the next few years. PHY 471 has been replaced by PHY 315; this replacement is not available for credit but is a prerequisite to PHY 416. PHY 472 has been replaced by PHY 416. Full details are available from the department.

### Oral Comprehensive Examination

Ph.D. candidates are required to pass the oral comprehensive examination by the end of their sixth semester as full-time students in the physics graduate program. The examination is administered and graded by the student's supervisory committee. It tests the student's general knowledge of one of the following four broad areas of current activity in physics:

1. astronomy and astrophysics;
2. atomic and molecular physics;
3. nuclear and particle physics; and
4. solid state and many-body physics.

The area tested is to be chosen by the student at the time of scheduling of the examination. The student may request

to be examined on specific subjects in addition to one of the above areas. In all cases, a student's specific dissertation topic, should it exist at the time of the examination, is to be excluded from the material covered by the examination.

**Dissertation Requirements.** A dissertation representing an original contribution to the field, as a result of independent work suitable for publication in a refereed physics or astronomy journal, is required.

**Final Examinations.** A final oral examination that covers, but is not necessarily limited to, the subject of the dissertation is required.

### Research Activity

The Department of Physics and Astronomy is engaged in a large number and a broad spectrum of research activities. The following is a list of current and recent research interests of the faculty.

**Applied Physics.** Mechanisms of inelastic effects of particle-solid interactions; surface characterization and depth-profiling by secondary ion mass spectrometry and sputter-induced photon spectroscopy; surface structure determination by low-energy ion-scattering spectrometry; and scanning tunneling microscopy.

**Astronomy.** Comets, hydrodynamic studies of compact stellar objects and of novae outbursts; ultraviolet observations of novae in eruption; stellar atmosphere studies of supernovae, novae, and cool stars; pulsating white dwarfs and hot, evolved stars; studies of the interstellar medium, ionized regions and dust in our galaxy; normal galaxies; 21 cm HI studies of galaxies; stellar populations; dynamics and kinematics of galaxies; classification of spiral galaxies; clusters of galaxies; galaxy formation and evolution; distribution of matter in space; quasars and active galaxies.

**Experimental Condensed Matter Physics.** Lattice dynamics of crystals near the covalent-ionic boundary; superionic conductors; optical studies at very high pressures; NMR and related magnetic measurements in small particles and metal ammonia compounds; resonance Raman spectroscopic studies of electron-phonon interactions and Raman and Brillouin scattering studies of

phonon-phonon interactions; picosecond and frequency domain Raman studies of semiconductors; dielectric measurements of various polymer systems; scattering by transverse waves in polymers; random interferometer studies of polymer dynamics; EXAFS studies of local environments in solids; magnetic and structural properties of compositionally layered materials; magnetic properties of metallic thin films; organic low-dimensional conductors; and spin glasses.

**Theoretical Condensed Matter Physics.** Resonance Raman scattering; development of techniques for photoacoustic measurement of the photophysical properties of biological molecules; electronic structure of solids; band gap levels in semiconductors due to defects and surfaces; dynamics and transport properties of perfect and imperfect crystals; electron-phonon interaction, phonons in superfluid He; and *ab initio* calculations of the structural and electronic properties of semiconductor surfaces.

**Diffraction Physics.** Development of techniques and the theoretical basis for electron microscopy and electron diffraction; the design and construction of electron optical instruments and attachments; determination of the structures of crystals and of their defects and disorder by the scattering of electrons and the generation of secondary radiation using ultra-high resolution microscopy; scanning transmission electron microscopy; microdiffraction, and microanalysis; the structure and reactions of solid surfaces studied by high resolution imaging, diffraction, and spectroscopies; channeling phenomena and their application in the analysis of crystals; the electronic states of surfaces and defects in solids; scanning Auger spectroscopy; growth of overlayers on surfaces.

**Theoretical High Energy and Particle Physics.** Dispersion relation phenomenology; pion-nucleon scattering and associated reactions; current algebra; models of chiral symmetry breaking; electromagnetic interactions of hadrons; gauge field theories; and unified gauge field theories.

**Experimental Nuclear Physics.** Meson physics, including pion-induced reactions (such as pion-nucleon and pion-nucleus scattering, charge exchange, and absorption), pion decay and meson

photoproduction; proton-nucleus scattering and reactions at medium energies; polarization measurements, including observables for polarized targets; electron scattering and electro-nuclear reactions in few-body systems; studies of nucleon resonances with real and virtual photons; studies of subnuclear degrees of freedom.

**Theoretical Nuclear Physics.** Charge exchange reactions of pions with light nuclei; three-body problems; kaonic and antiprotonic atoms; electron-nucleus interactions; and nuclear form factors.

**Science Education.** Theoretical and experimental work related to the development of advanced logical and analogical reasoning, and problem solving heuristics and concepts through science instruction; attitudes towards science; role of peer interaction; evaluation of preservice and in-service teacher education programs; role of cultural influences.

**Theoretical Physics.** Local observables in quantum theory; electron theory; and applications of the WKB method.

## PHYSICS

*Changes are planned for some PHY courses. Note statements about the timing of these changes.*

### PHY 412 Classical Particles, Fields and Matter III. (3) F

*Effective fall 1997; replaces PHY 332.* Electromagnetic fields of moving charges, Maxwell's equations, harmonic phenomena, oscillations, waves, electromagnetic radiation, covariant electromagnetism, introduction to general relativity. Prerequisites: PHY 302, 310, 333. Corequisite: PHY 416 or instructor approval.

### 416 Quantum Physics III. (3) F

*Effective fall 1997; replaces PHY 472.* Introduction to the quantum theory of atoms, molecules, solids and nuclei, Dirac's equation. Prerequisites: PHY 311, 315. Corequisite: PHY 412 or instructor approval.

### 420 Research Paper. (1) F, S

*Effective spring 1997.* Scientific report writing. Culminates in a paper based on library or laboratory research or both. Taken in conjunction with other courses as approved. Conference. Prerequisite: instructor approval.

### 441 Statistical and Thermal Physics I. (3) F

*Effective fall 1997; replaces PHY 441.* Statistical and experimental basis of heat, temperature, and entropy. Mechanical and statistical basis of the laws of thermodynamics. Applications of macroscopic thermodynamics. Phase equilibrium. Prerequisites: PHY 201, 314.

### 442 Statistical and Thermal Physics II. (3) S

*Effective spring 1998; replaces PHY 442.* Principles and applications of statistical mechanics. Quantum statistics of ideal gases and simple solids. Equilibrium of phases and chemical species. Transport theory. Irreversible processes and fluctuation. Prerequisite: PHY 302, 310, 441.

### 452 Physical Optics. (3) F

*Effective fall 1997; replaces PHY 452.* Principles of reflection, refraction, diffraction. Additional topics from contemporary optics may include Fourier transform spectroscopy, linear systems theory, holography. 2 hours lecture, 2 hours lab. Prerequisites: PHY 302, 311, 315. Corequisite: PHY 412.

### 462 Nuclear and Particle Physics. (3) S

*Effective spring 1998; replaces PHY 462.* Static properties of nuclei, natural and induced radioactivity, nuclear reactions, nuclear models and energy levels, mesons and hyperons, and interaction of photons and electrons with matter. Prerequisite: PHY 315.

### 465 Advanced Laboratory II. (2) F, S

*Effective fall 1997; replaces PHY 465.* Continuation of PHY 334. Students are encouraged to substitute laboratory research project in consultation with faculty sponsor. Prerequisite: PHY 334.

### 466 Advanced Laboratory III. (1-3) F, S

*Effective spring 1998; replaces PHY 466.* Continuation of PHY 465. Prerequisite: PHY 465.

### 480 Methods of Teaching Physics. (3) S

Evaluation of various approaches to the teaching of high school physics. Preparation of demonstrations and experiments. Organization of a laboratory. Designed for secondary school physics teachers. Prerequisite: instructor approval.

### 481 Solid State Physics. (3) S

*Effective spring 1998; replaces PHY 481.* Structure, elastic properties, and dynamics of crystals; electron motions in crystals under applied fields. Prerequisite: PHY 315.

### 501 Methods of Theoretical Physics. (3) F, S

Provides mathematical foundations for graduate students in basic and applied physics. Complex variables, vector spaces, operators, matrices, ordinary differential equations, integral equations and transforms, and special functions. May include additional topics. Prerequisites: PHY 201 and 302 or instructor approval.

### 502 Methods of Theoretical Physics. (3) F, S

Continuation of PHY 501. Prerequisite: PHY 501.

### 503 Physical Applications of Group Theory. (3) N

Fundamentals and applications of the theory of finite and continuous groups as they occur in physics. Atomic, molecular, solid state, and elementary particle physics. Prerequisite: instructor approval.

### 521 Classical Mechanics. (3) F

Variational principles, Lagrange's and Hamilton's equations, rigid body motion, canonical transformations, Hamilton-Jacobi theory. Prerequisite: PHY 310.

### 522 Advanced Topics in Classical Mechanics. (3) S

Continuum mechanics, elements of hydrodynamics, elasticity theory, and special relativity. Prerequisites: PHY 322, 521.

### 523 Relativity. (3) N

Special and general theories of relativity. Prerequisites: PHY 522 and 532 or instructor approval.

### 531 Advanced Electricity and Magnetism. (3) F

Electrostatics and magnetostatics; potential theory and theory of constitutive relations; Maxwell's equations; the wave equation, plane electromagnetic waves, cavities, and wave guides. Prerequisite: PHY 311 or instructor approval.

### 532 Electrodynamics. (3) S

Special theory of relativity, covariant formulation of electromagnetic interactions; inhomogeneous wave equations, Lienard-Wiechert potentials, and radiation fields; interactions of charged particles and electromagnetic waves, scattering, dispersion. Prerequisites: PHY 412 and 531 or instructor approval.

### 541 Statistical Physics. (3) F

Probability theory and principles of statistical inference; evaluating experimental data; foundations of statistical mechanics; general laws of thermodynamics from microscopic theories; calculation of specific properties of bulk matter. PHY 442 recommended. Prerequisites: PHY 315, 441.

### 542 Advanced Topics in Statistical and Thermal Physics. (3) S

Theory of irreversible processes, Onsager-reciprocity laws, and the fluctuation-dissipation theorem; relaxation and transport processes in fluids and plasmas; Liouville equation; the BBGKY hierarchy of distribution functions; kinetic theory; hydrodynamics from many-body theory; phase changes and equilibrium; ferromagnetism. Prerequisite: PHY 541.

### 551 X-Ray and Electron Diffraction. (3) S

Fresnel and Fraunhofer diffraction in integral formulation; diffraction of X-rays and neutrons by crystal lattices; structures of solids, including crystal structure analysis; theory and techniques of electron microscopy/diffraction of crystalline/noncrystalline specimens. Prerequisite: PHY 481 or instructor approval.

### 561 Nuclear Physics. (3) F, S

Two nucleon interaction, Clebsch-Gordon coefficients, internucleon forces, meson theory and high energy scattering, nuclear binding energy, nuclear models, transition probability estimates, nuclear reactions, and beta decay. Prerequisites: PHY 462 and 576 or instructor approval.

### 562 Nuclear Physics. (3) F, S

Continuation of PHY 561. Prerequisite: PHY 561 or instructor approval.

### 566 Elementary Particle Physics. (3) N

Classification of particles; phenomenology of strong, electromagnetic and weak interactions, cross sections, and decay rates; isotopic spin and higher symmetries; structure of reaction amplitudes. Prerequisite: PHY 577.

**569 Elementary Particle Theory.** (3) N  
Continuation of PHY 568. Prerequisite: PHY 568.

**576 Quantum Theory.** (3) F, S  
Abstract approach to quantum mechanics in Hilbert space; observables and their corresponding operators, eigenstates, and eigenvalues; quantum dynamics; approximation methods; systems of identical particles; angular momentum and group representation theory; collision processes; relativistic quantum theory. Prerequisites: PHY 315, 521.

**577 Quantum Theory.** (3) F, S  
Continuation of PHY 576. Prerequisite: PHY 576.

**578 Relativistic Quantum Theory.** (3) F, S  
Relativistic 1-particle equations, Klein-Gordon equation, Dirac equation, 2d quantization, theory of scattering, S-matrix, Feynman diagrams, quantum electrodynamics, and renormalization procedures. Prerequisite: PHY 577.

**579 Relativistic Quantum Theory.** (3) F, S  
Continuation of PHY 578. Prerequisite: PHY 578.

**581 Solid State Physics.** (3) F  
Quantum theory of solids, including phonons, lattice specific heats, band structure models, Fermi surfaces, thermal expansion, plasmons, electron-phonon interactions, and scattering by lattice defects. Pre- or corequisites: PHY 416, 481, 576.

**582 Solid State Physics.** (3) S  
Elements of transport theory, thermal conduction, electronic conduction in metals, mobility in semiconductors, Hall effect, magnetoresistance, and selected topics of current research. Prerequisite: PHY 581.

**587 Quantum Optics.** (3) F, S  
Quantization of the electromagnetic field. Quantum theory of coherence, photon counting, photon states, lasers, density operators, and atomic Raman scattering. Prerequisite: PHY 315.

**588 Quantum Optics.** (3) F, S  
Continuation of PHY 587. Prerequisite: PHY 587.

**595 Current Physics Literature.** (1) N  
Weekly seminar to introduce the graduate student to current activity in physics through the contemporary literature. May be repeated for credit.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## ASTRONOMY

**AST 421 Astrophysics I.** (3) F  
Aspects of observational astronomy; atomic properties of matter; stellar atmospheres; stellar structure, evolution; nucleosynthesis; compact objects; close binary systems. Prerequisites: AST 321; PHY 311, 314.

**422 Astrophysics II.** (3) S  
Interstellar medium; gaseous nebulae; shock waves; stellar dynamics; star clusters and stellar populations; galaxies and their evolution; cosmology. Prerequisites: AST 321; PHY 412.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Political Science

**Patrick J. Kenney**  
*Director, Graduate Studies*  
(SS 412) 602/965-7667

### REGENTS' PROFESSOR MILLER

**PROFESSORS**  
BERMAN, DAGGER, JONES,  
McDONOUGH, McGOWAN, SIMON,  
WALKER, YOUNGBLOOD

**ASSOCIATE PROFESSORS**  
ASHLEY, CRITTENDEN, DANTICO,  
KAHN, KENNEY, MITCHELL, OLSON,  
READER, STOOKEY

**ASSISTANT PROFESSORS**  
BOWER, DOTY, ELMAN, HERRERA,  
REYNOLDS, SIMHONY

### ASSISTANT INSTRUCTIONAL PROFESSOR KEATING

The faculty in the Department of Political Science offer graduate programs with a major in Political Science leading to the Master of Arts and Doctor of Philosophy degrees. Concentrations are available in American politics, international relations, comparative politics, and political theory.

Students admitted to the Master of Education degree with a major in Secondary Education may also elect political science as the subject matter field.

### MASTER OF ARTS DEGREE

See pages 53-55 for general requirements.

**Admission.** The Master of Arts degree provides advanced education for those students preparing for teaching, research, or applied careers in political science. It may be taken as a terminal program or as a step toward eventual fulfillment of the requirements for the Ph.D.

In addition to the materials sent to the Graduate College, the following items should be submitted to the director of graduate studies of the Department of Political Science by April 15 in order to ensure recommendations for admission to the M.A. program beginning the following fall:

1. scores from the verbal, quantitative, and analytical sections of the Graduate Record Examination;

2. three letters of recommendation from persons who can evaluate the applicant's academic performance and potential; and
3. a career overview statement which describes the applicant's educational objectives.

Applicants for financial aid should submit these items and complete the application form for graduate assistantships by February 15.

Undergraduate course work in political science is not a prerequisite for admission.

It is assumed, however, that M.A. students have a basic understanding of elementary statistics and the undergraduate content of the political science fields of concentration that they wish to study. Students without such a background should allow sufficient time to acquire it.

**Program of Study.** A minimum of 30 semester hours is required for the Master of Arts degree. All candidates must take POS 501 and 503. The program must include a combination of at least six semester hours of research (POS 592) and thesis (POS 599) credit. An additional 18 hours must be taken in graduate-level courses and seminars. A maximum of six semester hours in approved courses taken outside the department and six hours of independent study courses may count toward the 30-hour requirement. Grades of "A," "B," or "Y" must be obtained in all course work counted for the Master of Arts degree.

**Foreign Language Requirements.** None.

**Thesis Requirements.** A thesis is required.

**Final Examinations.** An oral examination in defense of the thesis is required.

### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

**Admission.** In addition to meeting Graduate College requirements, an applicant for the Ph.D. program must take the verbal, quantitative, and analytical sections of the Graduate Record Examination, supply a career overview statement that describes the applicant's

educational objectives; submit three letters of recommendation from persons who can evaluate the applicant's undergraduate and graduate work; and provide a sample of writing. These items should be submitted to the director of graduate studies of the Department of Political Science by April 15. Applicants for financial aid should also complete and submit the application form for graduate assistantships by February 15.

It is assumed that Ph.D. students have a basic understanding of elementary statistics and the content of the areas of concentration that they wish to study. Students without such a background should allow sufficient time to acquire it.

**Program of Study.** A minimum of 60 semester hours of graduate courses beyond the baccalaureate degree and approved by the student's supervisory committee shall constitute the formal course preparation, followed by a minimum of 24 semester hours of research and dissertation work. The supervisory committee has three members, including the committee chair from the student's major field, and two members from a minor field. As part of the 60 semester hours, the student must take POS 501, 503, and 603. A maximum of 12 semester hours of approved course work outside the department and 12 semester hours of approved independent study courses (POS 590, 690, and 790) may count toward the 60 semester hours. Grades of "A," "B," or "Y," must be obtained in all course work counted for the Ph.D. degree.

**Foreign Language and Research Requirements.** Each Ph.D. student must show proficiency in a foreign language. The supervisory committee may also require up to six additional semester hours to build the student's research skills.

**Comprehensive Examinations.** The student is required to take three examinations from the fields and subfields of American politics, international relations, comparative politics, and political theory. In the major field, the student takes a written general examination. Additionally, the student takes a written field or subfield examination in one of the remaining fields of political science. An oral examination over the dissertation proposal follows the written examinations.

**Dissertation Requirements.** The dissertation must be an original contribution to knowledge and demonstrate the student's proficiency as an independent investigator. The dissertation proposal is approved by the chair of the department upon the recommendation of the student's dissertation committee. The department chair also approves the dissertation committee. This committee must have a minimum of three members from the department of political science, including a chair from the student's major field.

**Final Examinations.** A final oral examination is required. This examination is the occasion for the student to defend the dissertation, both as to methods and conclusions, and to demonstrate general competence in the area of concentration.

#### Research Activity

The political science faculty and curriculum are organized into four areas of concentration. The faculty in each area offer courses and conduct research from a variety of methodological orientations, all with a common thread of theoretically-oriented scholarship.

**American Politics.** Faculty emphasize political behavior and use survey research, experimental designs, and content analysis to collect data and conduct statistical analyses of mass voting patterns, campaign strategies, party politics, the role of the media in political communication, and elite-mass linkages. Other faculty emphasize public law and policy with a focus primarily at the state and local levels of government. They analyze aggregate and interview data, archival materials and legal texts with a focus on campaign finance regulations, intergovernmental relations, gender issues, electoral reform, third parties, and interest groups.

**International Relations.** One group of faculty focus upon foreign policy theory and international security, using event chronologies, institutional differences, archival materials, and public records to guide comparative analyses of foreign policy decision-making by different types of regimes, case studies of leaders and their decision-making strategies, and policy analyses of issues in the Asia-Pacific region. Another cluster of faculty emphasize critical theory and international political economy, employing archival sources, sta-

tistical data, and texts of legal norms and state practices to conduct analyses of global inequalities in wealth and income, the evolution of statecraft, and the impact of hierarchically-ordered gender and race categories in North-South relations.

**Political Theory.** Faculty research interests in the area of political theory cover a range of topics in the history of political thought and contemporary political theory. Historical topics include Rousseau, conceptual history, and positive idealisms of the 19th and 20th centuries. Research in contemporary political theory includes autonomy and freedom; rights and obligations; citizenship, civic virtues, and the idea of the common good; various issues in democratic political theory (with particular attention to education); aspects of political and legal theory regarding corporate personality; conceptions of self in various cultures; analysis of myths in aboriginal societies (particularly Native Americans); punishment; justice; community; language and politics; social ecology; and peace and non-violence.

**Comparative Politics.** Faculty in the area of comparative politics investigate a variety of topics in several regions of the globe. Research interests include the political economy of uneven development in Africa, democratization processes within formerly authoritarian regimes in Europe, Latin America, and East Asia, church and state relations in the Philippines, ethnic minority problems in Brazil, problems of federalism in India, party leadership in France and Italy, and mass-elite responses to natural disasters in Central and South America.

Many of these research interests have recently been the basis for graduate seminars (POS 691) and for special topics courses (POS 598). Moreover, students have the opportunity to do advanced work in these areas through reading and conference courses (POS 590 and 790) and independent research (POS 592 and 792).

**Research Facilities.** The department has its own political data laboratory for research and teaching purposes. Both faculty and students have access to data processing equipment and machine-readable data collections. The ASU Library collection has extensive holdings

in all of the fields of political science. The facilities of the ASU School of Public Affairs, School of Justice Studies, Center for Latin American Studies, and the Center for Asian Studies are accessible to graduate students in political science.

### POLITICAL SCIENCE

**POS 431 Campaigns and Elections.** (3) A Examine campaigns from a multitude of perspectives including the politician, reporter, campaign strategist, and voter. Lecture, discussion. *General Studies: SB.*

**433 Money and Politics.** (3) A The role of money and special interests in elections, campaign politics, and public policy-making in American politics. Lecture, discussion. *General Studies: SB.*

**434 Media and Politics.** (3) A The study of mass media and politics in the United States, e.g., media and elections, media and government. Lecture, discussion. *General Studies: SB.*

**501 Methods of Political Science.** (3) A Problems of method and knowledge in political science, strategies of political inquiry, and issues in philosophy of social science.

**502 Philosophy of Political Inquiry.** (3) A Problems of knowledge and method in political science, with attention to both empirical and evaluative analysis.

**503 Empirical Political Inquiry.** (3) A Research methods and techniques of the discipline, emphasizing empirical foundations and analytic methods employed in subfields. Prerequisites: POS 401 or equivalent; instructor approval.

**530 American Politics.** (3) A Examines major debates in the study of American political processes. Covers parties, media, elections, public opinion, nominations, and social choice theory. Seminar.

**532 American Political Institutions.** (3) N Examines major debates in the study of American governmental institutions. Covers legislative branch, executive branch, judicial branch, and interest groups. Seminar.

**545 Themes in Political Thought.** (3) N Examination of a particular theme or problem in political thought from both a historical and contemporary perspective. Seminar. Prerequisite: instructor approval. Course may be repeated with approval of the director of graduate studies.

**550 Comparative Politics.** (3) A Surveys major approaches across topical areas such as revolutions, authoritarianism, policy processes, interest groups, and electoral politics. Focus varies with instructor. Seminar.

**560 International Relations.** (3) A Surveys major theoretical approaches and debates in international relations. Seminar.

**563 Comparative Asian Security Policies.** (3) N Analyzes domestic and international constraints, belief systems, and economic components in security decisions by major powers and Asian nations. Seminar. Prerequisite: instructor approval.

**591 Seminar.** (3) A  
(a) American Politics  
(b) Comparative Politics  
(c) Global Politics  
(d) Political Theory

**598 Special Topics.** (3) A  
(a) American Politics  
(b) Comparative Politics  
(c) Global Politics  
(d) Political Theory

**601 Advanced Experimental Research.** (3) N Introduces experimental and quasi-experimental research designs in political research, including laboratory techniques and topics in the analysis of variance. Prerequisite: POS 503 or equivalent.

**602 Advanced Survey Research.** (3) N Presents design and conduct of political surveys, including sampling, instrument design, scaling, and statistical and graphical analysis of survey data. Prerequisite: POS 503 or equivalent.

**603 Polimetrics I.** (3) A Introduces theory and practice of linear regression analysis. Provides skills to read, understand, and evaluate professional literature using regression analysis. Prerequisites: POS 401 and 503 or instructor approval.

**604 Polimetrics II.** (3) A Apply quantitative techniques to research topics producing publishable papers through exposure to time-series, logit and probit, and simultaneous equations. Prerequisites: POS 401 and 503 and 603 or instructor approval.

**635 State Politics and Public Policy.** (3) N Introduction to comparative state policy emphasizing policy or performance differences among the states and the reasons for these differences. Seminar. Prerequisites: POS 530 and 603 or instructor approval.

**636 Electoral Behavior.** (3) N Introduces fundamental concepts of electoral behavior. Emphasizes presidential elections and examines why people vote and how their votes are determined. Seminar. Prerequisites: POS 530 and 603 or instructor approval.

**638 Law and Politics.** (3) N Emphasizes research into such topics as constitutional law, women and the law, American legal system, judicial process, and judicial selection. Seminar. Prerequisite: instructor approval.

**651 Politics of Change and Development.** (3) N Examines contending approaches to national, social, and political change. Seminar. Prerequisite: instructor approval.

**660 The Modern World System.** (3) N Theoretically driven, historical analysis of the organization and operation of the international political economy since the 16th century. Seminar. Prerequisite: instructor approval.

**661 The State.** (3) N Examines theories of state, state-society relations, and interstate politics emphasizing questions of sovereignty, territoriality, violence, representation, democracy, and change. Seminar. Prerequisite: instructor approval.

**662 International Organization.** (3) N History, practical political significance, and future of international institutions, transnational regimes, and other approaches to international organization. Seminar. Prerequisite: instructor approval.

**664 War, Peace, and Conflict Processes.** (3) N The systematic analysis of the causes of war, the preconditions for peace, and approaches to the resolution of conflict. Seminar. Prerequisite: instructor approval.

**665 Foreign Policy Theory.** (3) N Examines foreign policy theory and methods. Development and critique of research designs analyzing foreign policy processes within and among nations. Seminar. Prerequisite: instructor approval.

**792 Research.** (3) F, S Projects in various areas of political science. Prerequisite: doctoral student.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Psychology

J. Jay Braun  
Chair

(PSY B237C) 602/965-3326

### REGENTS' PROFESSORS

CIALDINI, EISENBERG

### PROFESSORS

AIKEN, BARRERA, BERNAL, BRAUN, BRAVER, CHASSIN, HAYGOOD, HOMA, KAROLY, KENRICK, KILLEEN, KNIGHT, LANYON, LINDER, OKUN, PARKINSON, PRESSON, REICH, RUSSO, SADALLA, SANDLER, SOMERVILLE, WEST, WOLCHIK, ZAUTRA

### ASSOCIATE PROFESSORS

CASTRO, CHARTIER, FABRICIUS, FEHR, LESHOWITZ, MacKINNON, NAGOSHI, NEMEROFF, NEUBERG, ROSSI, SAENZ, STONE, VAN ORDEN

### ASSISTANT PROFESSORS

CASTANEDA, DAVIS, MADDOX

### LECTURERS

BOHNSACK, WEIGAND

The faculty in the Department of Psychology offer graduate programs with a major in Psychology leading to the Doctor of Philosophy degree. Although there is no formal Master of Arts program as such, doctoral students are required to complete a Master of Arts degree as part of their doctoral training. Concentrations are available in clinical, developmental, environmental, and social psychology, as well as in behavioral neuroscience and cognitive/behavioral systems.

All applicants are required to submit scores on the Graduate Record Examination (verbal, quantitative, and



analytical sections; advanced section is required for clinical psychology), transcripts, three letters of reference, and a statement of purpose.

**Program of Study.** A minimum of 30 semester hours is required for the master's degree.

**Foreign Language Requirements.** None.

**Thesis Requirements.** A thesis is required.

**Final Examinations.** A final oral examination in defense of the thesis is required.

## DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

**Application Deadline.** Completed applications for admission in the fall semester, including all letters and supporting documents, should be received by January 1.

The Department of Psychology requires all applicants to provide scores from the aptitude sections of the Graduate Record Examination for clinical psychology. A score from the advanced (psychology) section is required. However, these scores are not used exclusively to determine admission but are viewed in the context of other supporting materials, such as GPAs and letters of recommendation.

**Program of Study.** At present the Department of Psychology offers the Ph.D. degree in the following research areas: behavioral neuroscience, clinical, cognitive/behavioral systems, developmental, environmental, and social psychology. A minimum of 60 semester hours of course credit beyond the bachelor's degree is required, plus 24 semester hours of credit in research and dissertation.

In addition to a core curriculum, students take courses related to their area of interest as determined in consultation with their supervisory committees.

**First-Year Evaluation.** At the end of the first year of study, each student receives a comprehensive evaluation by the faculty based upon performance in courses and in professional or laboratory assignments and upon the evidence of professional responsibility and ethical behavior.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Written and oral examinations are required near the end or upon completion of all course work. After passing the comprehensive examinations and meeting other requirements, the student is eligible to apply for candidacy.

**Dissertation Requirements.** The dissertation must be an original contribution to knowledge, demonstrating the student's proficiency as an independent investigator. (See dissertation requirements, page 73.)

**Final Examinations.** A final oral examination in defense of the dissertation is required.

### Research Activity

**Behavioral neuroscience.** Biochemical and neural concomitants of behavior; neurobiology of behavioral recovery after brain damage; neurodegenerative diseases; drug abuse.

**Clinical.** Three areas of emphasis: child-clinical, community, and health psychology. Topics include risk factors for mental health and substance abuse problems of children and adolescents, mental health of minority groups; stress and coping processes; self-regulation and goal systems; the interface of psychology and the law; women's health, cardiovascular reactivity, psychoneuroimmunology; development and testing of preventive interventions for children at risk; validation of cognitive, behavioral and systems interventions for families in crisis; health promotion and relapse prevention in Hispanic populations; contagion theory, social support; adjustment to separation and divorce; measurement of self-deception, processes underlying ethical judgments in professional contexts.

**Cognitive/behavioral systems.** Perception: psychophysics, selective attention, word recognition; Cognition: short-term memory, semantic memory, abstract categories, reasoning, effects of emotion; Learning: experimental analysis of behavior, reinforcement theory; Action: categorization, scientific reasoning; Modeling: neurally inspired models of cognitive processes, quantitative models of behavior, and process models of perception.

**Developmental.** Prosocial behavior, empathy, and moral development; political attitudes; sex roles; spatial cogni-

tion; child language and drawing; cooperation and competition; inference and reasoning; child and adolescent health psychology; development of ethnic identity; children's theory of mind; social psychology of aging; dynamics of college departure among adults.

**Environmental.** Psychology of resource conservation, memory for architectural form, information storage and spatial cognition, house form and identity, urbanization, territoriality, person-situation interaction, and aversive environments.

**Social.** Interpersonal attraction and conflict, cognitive models of attitude change and formation, attribution processes, compliance techniques, human judgment and social cognition, evolutionary psychology, gender issues, and consultation methods.

**Applied Social Psychology.** Evaluation research, drug and alcohol abuse, criminal justice, victimization, social traps, coping and adaptation, medical compliance, and health psychology. Students interested in this topic may choose it as a subspecialization in social psychology.

## PSYCHOLOGY (PSY)

**PSY 420 Analysis of Behavior.** (3) N Research, applications, and philosophy of the analysis and control of human behavior. Prerequisite: PSY 290. *General Studies: L2.*

**424 Genetic Psychology.** (3) S Introduction to the concepts, methodologies, and findings of behavioral genetics for Psychology majors. Prerequisites: PGS 100; PSY 230, 290. *General Studies: L2.*

**425 Biological Bases of Behavior.** (3) N Critical study of physiological psychology; brain mechanisms underlying motivation, and learning. Prerequisite: PSY 325. *General Studies: L2.*

**426 Neuroanatomy.** (4) N Structure and function of mammalian brain, including sheep brain dissection. 3 hours lecture, 3 hours lab. Prerequisite: PSY 325 or equivalent. *General Studies: L2.*

**433 Human Psychophysiology.** (3) S Emphasis on human physiological-behavioral relationships. Topics include physiological change associated with imagery, stress, attention, skill learning, lying, and biofeedback. Prerequisite: PSY 325.

**434 Cognitive Psychology.** (3) S The human organism as a processor of information, from perception to cognition. Abstract concepts, semantic memory, attention, and mental imagery. Prerequisite: PSY 323 or 324 or instructor approval. *General Studies: L2.*

**437 Human Factors.** (3) F Emphasis on human factors in high technology systems. Specific topics include systems development, systems analysis techniques, displays, and controls. Prerequisites: PSY 290 and upper-division standing or instructor approval. *General Studies: L2.*

- 470 Psychopharmacology.** (3) F, S  
Basis of drug action at physiological and behavioral levels. Psychological and medical applications and limitations of drugs used in the treatment of mental illness. Prerequisites: PSY 325; 1 semester each of biology and chemistry.
- 490 Course Programming.** (2) F, S  
Supervised experience in the development and administration of programmed instruction. Designed for students who proctor self-paced or personalized courses. May be repeated for a total of 4 credits. Prerequisites: PSY 230; instructor approval.
- 501 Supervised Teaching.** (4) F  
Experience in and examination of perspectives on teaching undergraduate psychology. Prerequisites: graduate standing in psychology; instructor approval.
- 506 Survey of Research in Environmental Psychology.** (3) F  
Major topics and paradigms in the study of person-environment relationships. Prerequisite: instructor approval.
- 512 Advanced Learning.** (3) N  
Principles and theories of learning, emphasizing research literature. Prerequisite: instructor approval.
- 524 Advanced Physiological Psychology.** (3) N  
Contributions of physiological processes and brain function to fundamental behavioral processes. Prerequisite: instructor approval.
- 528 Sensation and Perception.** (3) N  
Principles of sensory and perceptual processes, emphasizing research literature. Prerequisite: instructor approval.
- 529 Correlation and Psychometric Theory.** (3) S  
Principles of correlational techniques, including regression and multiple correlation. Psychometric theory, including reliability and validity. Prerequisite: instructor approval.
- 530 Intermediate Statistics.** (3) F  
Continuation of PSY 529. Psychological statistics, emphasizing the analysis of variance and the design of experiments. Prerequisite: PSY 529 or instructor approval.
- 535 Cognitive Processes.** (3) N  
Theoretical/empirical treatment of the human organism as a processor of information, including abstraction, memory structure, problem solving, and thinking. Prerequisite: instructor approval.
- 541 Research in Cognitive Development.** (3) N  
Theoretical and empirical issues in the study of children's knowledge and cognitive processes. Comparison of research in Piagetian and other traditions. Prerequisite: admission to Psychology Ph.D. program or instructor approval.
- 542 Social Development.** (3) N  
Major issues in the area of social development are topics for review and critique. Theory, research, and content are covered. Prerequisite: instructor approval.
- 543 Moral Development.** (3) N  
A variety of issues in moral development, including positive and negative behaviors, are considered. Theory and research are major foci. Prerequisite: instructor approval.
- 550 Advanced Social Psychology.** (3) F, S  
Theory and research concerning interpersonal perception, decision making, attitude forma-

tion and change, group processes, social motivation, and interaction processes. Prerequisite: instructor approval.

**551 Advanced Social Psychology.** (3) F, S  
Continuation of PSY 550. Prerequisite: PSY 550 or instructor approval.

**553 Social Influence.** (3) N  
Research literature relevant, for example, to attitude formation and change, conformity, obedience, power, compliance, and altruism. Prerequisite: PSY 551 or instructor approval.

**555 Experimental and Quasi-Experimental Designs for Research.** (3) N  
Review of research techniques. Laboratory and field research analyzed; applications to specific topics. Prerequisite: instructor approval.

**556 Social Perception.** (3) N  
Theoretical and empirical implications of topics in social perception and cognition, e.g., attribution, attraction, and impression formation. Prerequisite: PSY 551 or instructor approval.

**558 Interpersonal Processes.** (3) N  
One or more topics chosen from the following: empathy, modeling, vicarious processes, contagion, group phenomena, social communication, and behavior exchange. Prerequisites: PSY 550 and 551 or instructor approval.

**569 Advanced Study of Personality.** (3) N  
Personality as a theoretical concept in psychology, including definitional problems, behavioral and traditional approaches, the measurement of personality, and current research issues. Prerequisite: instructor approval.

**572 Psychological Assessment.** (3) F  
Theory and research on assessment of personality, psychopathology, and intelligence, and construction of psychological assessment instruments. Prerequisite: admission to clinical Ph.D. program or instructor approval.

**573 Psychopathology.** (3) F  
Theory and research relating to the contribution of psychological, social, physiological, and genetic factors to the development and persistence of abnormal behavior. Prerequisite: admission to Psychology Ph.D. program or instructor approval.

**574 Psychotherapy.** (3) S  
A detailed survey of the theoretical and empirical literature relating to verbal psychotherapy and interviewing methods. Structured role-playing practice in the major procedures. Prerequisite: admission to the clinical Ph.D. program or instructor approval.

**575 Behavior Therapy.** (3) F  
Theory and research relating to the use of behavior therapy in modifying abnormal behavior. Structured practice. Prerequisite: admission to the clinical Ph.D. program or instructor approval.

**578 Child Psychopathology.** (3) N  
Major theories and research related to the development of deviant behaviors in children, including some supervised experience in child assessment. Prerequisite: PSY 572 or instructor approval.

**582 Community Psychology.** (3) SS  
Community systems, intervention techniques, consultation models, history and current status of community mental health movement, and conceptualization of the roles of community psychologists in social system intervention. Prerequisite: advanced standing in Psychology Ph.D. program or instructor approval.

**588 Consultation Methods.** (3) N  
Several theories and strategies of organizational consultation. The development of consultative skills through simulation and practical experience. Prerequisite: advanced standing in Psychology Ph.D. program or instructor approval.

**624 Clinical Neuroscience.** (3) S  
An examination of the biological underpinnings of psychological disorders at the molecular, cellular, and system levels (schizophrenia, depression, anxiety, etc.). Lecture, pro-seminar. Prerequisites: graduate standing; instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### PSYCHOLOGY (PGS)

**PGS 414 History of Psychology.** (3) F, S  
Historical development of psychology from its philosophical beginnings to the present. Prerequisites: PGS 101; PSY 230, 290. *General Studies: L2/SB.*

**461 Interpersonal Influence.** (3) N  
Principles and procedures that affect the process of social influence, consideration of attitudinal, compliance inducing, and perceptual influences. Prerequisite: PGS 350. *General Studies: SB.*

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Public Administration

### Master's Program

Dickinson McGaw

Director

(WILSN 211) 602/965-3926

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### PROFESSORS

CAYER, COOR, DANEKE, HALL,  
MANKIN, McGAW, MONTIEL,  
MUSHKATEL, PERRY, WESCHLER

### ASSOCIATE PROFESSORS

ALOZIE, BROWN, DeGRAW, VINZANT

### ASSISTANT PROFESSORS

CAMPBELL, LAN

### DISTINGUISHED RESEARCH

FELLOW

PFISTER

### PROFESSORS EMERITI

BECKER, SACKTON

### MISSION

The School of Public Affairs is a professional graduate school in public administration that prepares students for careers in public management, public policy analysis and evaluation, urban management and planning, and public information management. To

improve public management, the school maintains public service programs that educate and advise public service practitioners. To improve public policymaking, the school maintains research and service programs that identify issues, disseminate information, and propose solutions to major public problems. To foster the next generation of scholars, the school maintains research programs designed to advance understanding of the processes by which public resources and personnel are organized to formulate, implement, and manage public policy decisions.

## DEGREES

Faculty in the School of Public Affairs offer a 42-semester-hour professional Master of Public Administration (M.P.A.) degree. Faculty also participate in offering an interdisciplinary degree leading to the Doctor of Public Administration (D.P.A.). Refer to pages 77-78 for information about this professional doctoral degree program.

### Morrison Institute for Public Policy

As an integral part of the School of Public Affairs, the Morrison Institute is an applied public policy research center that conducts research on public policy, informs policymakers and citizens about issues, and advises leaders on choices and actions. In partnership with government officials, university faculty, and the private sector, the Morrison Institute conducts research, policy forums, program evaluations, and strategic planning for public, private, and nonprofit clients. The Institute produces publications on a wide range of topics, including urban growth, education, natural resources, governmental systems and relations, health care, social services, quality of life, and economic development.

### Advanced Public Executive Program (APEP)

APEP is continuing education program designed to provide public-sector executives with analytical approaches and skills in leadership, policy analysis, total quality management, media relations, organizational development, team-building, and communication. Located at the ASU Downtown Center, APEP sponsors the Certified Manager Program (CPM), the Institute for Public Executives, Total Quality Management

in the Public Sector, the County Elected Officials' Certification Program, and presents custom-tailored professional development programs for public-sector managers.

## MASTER OF PUBLIC ADMINISTRATION

The M.P.A. is an interdisciplinary, professional degree designed to prepare students for public service, public management, and policy analysis at the local, state, and national levels of government. The M.P.A. degree is accredited by the National Association of Schools of Public Affairs and Administration (NASPAA). See pages 67-68 for the degree description.

## PUBLIC AFFAIRS

### PAF 401 Statistics. (3) F, S

Survey of statistical concepts and techniques with application to public administration. Does not count toward program of study. Satisfies statistics prerequisite requirement for PAF 501 and 502.

### 501 Public Service Research. (3) F, S

Philosophy, scope, methods, design values, and ethics of public service research. Prerequisite: an approved course in statistics.

### 502 Public Program Analysis. (3) F, S

Application of research methods and techniques to evaluate the implementation of decisions in public organizations. Prerequisite: PAF 501.

### 503 Public Affairs. (3) F, S

The development and context of American public administration and policy, the role of administration in governance, and values and ethics in administration.

### 504 Public Affairs Economics. (3) F, S

The basics of public sector economics, microeconomic and macroeconomic concepts applied to public sector decisions and policies.

### 505 Public Policy Analysis. (3) F, S

Institutional and formal analysis of policy processes, decision making, and problem solving; values, ethics, and the uses of policy analysis.

### 506 Public Budgeting and Finance. (3) F, S

The legal, social, economic, political, institutional, and ethical foundations of governmental finance, budgets, and budgeting. Prerequisite: PAF 504.

### 507 Public Human Resource Management. (3) F, S

Personnel systems, behavior and management of people in public organizations, collective behavior, unionism, conflict management, motivation, productivity, and ethics.

### 508 Public Service. (3) F, S

Capstone application of core course knowledge, skills, and abilities required for public service. Prerequisites: PAF 501, 502, 503, 504, 505, 506, 507.

### 510 Governmental Budgeting. (3) N

Theories, applications, and consequences of budget decision making. Prerequisite: PAF 504.

### 511 Governmental Finance. (3) N

Sources of funding, management of funds and debts, and general pattern of expenditures in states, counties, cities, and districts. Prerequisite: PAF 504.

### 520 Public Management. (3) A

The management process in government and public agencies, with emphasis on the executive leadership within the public sector.

### 521 Organization Theory. (3) N

Organization theory and current research emphasis with application to public administrative organizations.

### 522 Public Labor Relations. (3) N

Rise of public unionism, managerial policy toward unionism, conflict resolution, impact of unionism on budgets, personnel policies, and public policy.

### 523 The City and County Manager. (3) N

The manager's role and resources in the differing forms of administrative, legislative, and community sectors.

### 525 Public Program Management. (3) N

Governmental service programming: formulating, financing, operating, evaluating, and reporting. Analysis of interagency relationships and the role and conduct of research in the programming process.

### 526 Public Sector Human Resource Development. (3) N

Concepts and techniques of organizational development in the public sector, including staffing, supervisor training, executive development, resource planning, and employee training.

### 529 Organization Change and Development. (3) N

Exploring the nature and management of change and development as a tool to achieve organizational goals; effecting planned change.

### 530 Management of Urban Government. (3) N

Administrative practices and behavior within the urban political administrative environment. Functional areas such as citizen participation, urban planning, urban transportation, and the conflicts between urban politics and administrative efficiency.

### 531 Community Conflict Resolution. (3) N

Interdisciplinary approach to understanding the dynamics of community conflict. Strategic considerations in policy design and advocacy; potential reaction to conflict. Relevant models and research findings generated by both case studies and comparative methods.

### 532 Urban Planning Administration. (3) N

Historical and present day uses of urban planning and procedures for its implementation. Basic principles and practices.

### 533 Urban Growth Administration. (3) N

Examines the process of urban growth and change. Partnership roles played by public and private sectors in management are emphasized.

### 535 Urban Housing Policy. (3) N

Comprehensive consideration of the revitalization of American cities with major emphasis upon the housing process and related institutions and services.

### 536 Urban Policy Making. (3) N

Analysis of the opportunities and costs of influencing public policy and the roles of officials and bureaucracies in decision making.

**540 Advanced Policy Analysis.** (3) A  
Emphasizes the structure of policy problems, forecasting policy alternatives, optimizing resources, and reducing uncertainty in policy making. Prerequisite: PAF 505 or instructor approval.

**541 Program Evaluation.** (3) N  
Various methodologies available for the evaluation of public policies and programs. Cross-listed as JUS 547. Prerequisite: PAF 501 or instructor approval.

**546 Environmental Policy and Management.** (3) N  
Analysis of environmental policy and planning issues and principles related to the analysis and management of natural and urban/regional resources.

**547 Science, Technology, and Public Affairs.** (3) N  
The influence of science and technology on governmental policy making, scientists as administrators and advisors, governmental policy making for science and technology, government as a sponsor of research and development.

**548 Women, Politics, and Public Policy.** (3) N  
Explores how political philosophy, politics, and public policy affect and are affected by women.

**549 Diversity Issues and Public Policy.** (3) N  
Examination of public policy issues concerning or affecting women, black, Latino, Asian, and American Indian communities, as well as those groups' impact on the policy process.

**550 Information Management.** (3) N  
Concepts and theory of information and information technology in public sector organizations.

**551 Computers in Administration.** (3) N  
Experience in use of computer technology for public administration problem solving.

**552 Public Information Systems.** (3) N  
Systems analysis concepts and theory as applied to administration. Alternative modes of information organization and their impact on public decision making.

**555 Research Data Management.** (3) N  
Techniques and problems associated with data management in a research environment. Database management systems, security and integrity, accessibility, and cost.

**556 Database Management Systems.** (3) N  
Concept and use of modern database management systems in an administrative organization. Advantages and disadvantages of this approach.

**561 Comparative Administration.** (3) N  
Literature on comparative public administration theory. Bureaucracies and their impact on the political development process. Selected nations are studied.

**562 Intergovernmental Relations.** (3) N  
Evolution, growth, present status, and characteristics of the U.S. federal system of government. Federal-state relations, state-local relations, regionalism, councils of government, interstate cooperation, grants-in-aid, and revenue sharing.

**563 Report Preparation.** (3) N  
Intensive practice in written and oral presentation of reports to conferences with problems in public administration. Visual aid techniques.

**564 Political Economy.** (3) S  
Classical and contemporary literature and historical development of governmental and economic arrangements, with special emphasis on the role of the state.

**591 Seminar.** (1-12) F, S  
Topics may include but are not limited to the following:

- (a) General Public Administration
- (b) Public Finance Administration
- (c) Public Management
- (d) Urban Affairs and Urban Planning
- (e) Public Policy Analysis
- (f) Information Management
- (g) Business and Government
- (h) Emergency Management

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Public Administration

### Doctoral Program Interdisciplinary Faculty

Alvin H. Mushkatel  
*Director, Executive Committee*  
(WILSN 131) 602/965-4505

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#### AGRIBUSINESS

Professors: Edwards, Thor

#### COMMUNICATION

Professor: Petronio

#### ECONOMICS

Professor: Hogan

#### GEOGRAPHY

Professor: Burns

#### HEALTH SERVICES ADMINISTRATION

Professor: Johnson

#### JOURNALISM AND TELECOMMUNICATION

Professor: Merrill

#### JUSTICE STUDIES

Regents' Professors: Altheide,  
Palumbo; Professors: Hepburn, Kelly,  
Musheno, Schneider

#### MANAGEMENT

Professor: Bohlander

#### PLANNING

Professor: Pijawka

#### POLITICAL SCIENCE

Professor: Berman

#### PSYCHOLOGY

Associate Professor: Castro

#### PUBLIC AFFAIRS

Professors: Cayer, Daneke, Mankin,  
McGaw, Monteil, Mushkatel, Perry,  
Weschler; Associate Professors: Alozie,  
Vinzant; Assistant Professors:  
Campbell, Lan

#### RECREATION MANAGEMENT AND TOURISM

Associate Professor: Virden

#### SOCIAL WORK

Professors: Kettner, MacEachron

#### SOCIOLOGY

Professor: Nagasawa;  
Associate Professor: Benin

The Committee on Public Administration offers an interdisciplinary graduate program leading to the Doctor of Public Administration degree.

The purpose of the degree is to prepare skilled professional public administrators for work in the public sector and for university teaching. A unique feature of this interdisciplinary program is its utilization of faculty research and teaching interests from a number of academic units. A student may tailor a course of study to fit individual needs and goals. The program is designed to emphasize both normative and conceptual content pertaining to value assessments, theoretical assumptions, ethics and modes of decision making, as well as practitioner problem-solving skills in budgeting, public personnel management, public finance, planning, program evaluation, and policy analysis. The admission and program requirements for the Doctor of Public Administration degree are described on pages 77-78 of this catalog.

#### PUBLIC AFFAIRS

**PAF 600 Research Design and Methods.** (3) A

Advanced methods of research design and analysis. Prerequisites: formal graduate level course work in statistics and in research methods.

**601 Seminar: Policy Analysis and Program Evaluation.** (3) A

Normative and conceptual issues of policy formulation, implementation, and evaluation; empirical approaches and methods of program evaluation and policy analysis.

**602 Seminar: Foundation of Public Administration.** (3) A

Ethical, social, legal, and philosophical foundations of public administration.

**603 Seminar: Organization and Behavior in the Public Sector.** (3) A

Structure, organization, conduct, and performance of public sector institutions in the administration of public policy. Prerequisite: PAF 602.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Recreation

Carlton F. Yoshioka

Chair

(MOEUR 131) 602/965-7291

### PROFESSORS

ALLISON, HALEY, YOSHIOKA

### ASSOCIATE PROFESSORS

TEYE, VIRDEN

### ASSISTANT PROFESSORS

ASHCRAFT, SCHNEIDER,  
SONMEZ, VOGT

### PROFESSOR EMERITUS

GREEY

The faculty in the Department of Recreation Management and Tourism offer a program leading to the Master of Science degree with a major in Recreation.

### MASTER OF SCIENCE DEGREE

The Master of Science degree program is designed to prepare students to analyze critical topics and issues pertinent to the field of leisure and recreation. Its four areas of concentration are: outdoor recreation, recreation administration, social/psychological aspects of leisure, and tourism and commercial recreation.

There are two options: The thesis option or the nonthesis option that includes the completion of an applied project.

**Admission.** Students applying to the Master of Science program must have achieved a GPA of 3.00 or the equivalent in the last two years of work leading to the bachelor's degree. Applicants should submit their application, application fee, and all undergraduate transcripts to the Graduate College prior to February 15. To be considered for fall admission, candidates must have their Graduate Record Examination (or Miller's Analogy Test) scores, a statement of professional and academic goals, and three letters of recommendation sent to the Department of Recreation Management and Tourism by March 15. Only complete application files will be reviewed by the graduate faculty for admission and assistantship consideration. Students without undergraduate academic work in the recreation/tourism disciplines will be re-

quired to take 12 semester hours of deficiency course work in addition to the Master of Science degree requirements. Deficiency course work may be taken in conjunction with Master of Science degree classes.

**Program of Study.** Completion of the Master of Science degree in Recreation on the average requires approximately two years of study. Students may select a thesis or nonthesis option. The thesis option is a research-oriented degree and is recommended for students planning to continue graduate studies beyond the master's degree. The non-thesis option is intended for students seeking additional knowledge and expertise relevant to professional career development in the recreation field. Advisement and direction in both options are under the direct supervision of a faculty member.

**Program Requirements: Thesis Option.** The thesis option requires the successful completion of a minimum of 30 semester hours, of which six to nine hours can be taken outside of the department of recreation management and tourism. Included in the 30 semester hours are six hours of thesis (REC 599), which must be defended in an oral examination before a supervisory committee of at least three faculty members.

REC 500	Research Methods I .....	3
REC 501	Research Methods II .....	3
REC 552	Historical and Philosophical Foundations of Leisure ...	3
REC 555	Social and Psychological Aspects of Leisure Behavior .....	3
REC	electives (within the major) .....	6-9
REC	Electives (outside the major) .....	6-9
Thesis	.....	6
Minimum total	.....	30

**Program Requirements: Nonthesis Option.** The nonthesis option consists of 39 semester hours, of which 12 semester hours may be taken outside the Department. The option includes three hours of applied project (REC 593). The applied project should reflect a substantive analysis of a professionally oriented topic related to the student's area of concentration. Before final approval, the student's project must be defended in an oral examination and must receive the written approval of two Department faculty members who serve on the supervisory committee.

REC 500	Research Methods I .....	3
REC 552	Historical and Philosophical Foundations of Leisure ...	3
REC 555	Social and Psychological Aspects of Leisure Behavior .....	3
REC 593	Applied Project .....	3
REC 598	Special Topics .....	3
REC	Electives (within the major) .....	12
REC	Electives (outside the major) .....	12
Minimum total	.....	39

### Foreign Language Requirements.

None.

**Thesis Requirements.** A thesis is an option.

**Final Examinations.** A final oral examination in defense of the thesis or an applied project is required.

### Research Activity

The study of leisure and recreation is a multidisciplinary field of research, scholarship, and program development. Recent scholarly activity of departmental faculty and students reflects this approach. Major research areas include the following: international travel and tourism; philosophy of leisure; recreation resource policy and planning; social and psychological analyses of leisure behavior; sociological bases of play, leisure and recreation; leisure and adolescent development; travel and tourism policy and planning; urban recreation administration; outdoor recreation and wilderness management; cross-cultural analysis of play and leisure; gender differences in leisure behavior patterns; historical developments in leisure and recreation services.

### RECREATION

- REC 500 Research Methods I. (3) A**  
Introduction to recreation research methods, with emphasis on methodological questions, research issues, and techniques relevant to contemporary social research. Prerequisite: 500-level or higher approved statistics course.
- 501 Research Methods II. (3) N**  
Advanced treatment of methodological issues, analysis of data, computer applications, and thesis proposal development. Prerequisite: REC 500.
- 540 Recreation Services for the Aged. (3) N**  
An applied orientation to the social/psychological theories of recreation and the aged.
- 552 Historical and Philosophical Foundations of Leisure. (3) A**  
An analysis of the fundamental historical and philosophical concepts, issues, and problems confronting the leisure studies profession.
- 555 Social and Psychological Aspects of Leisure Behavior. (3) A**  
An empirical and theoretical analysis of social, cultural, and psychological foundations of leisure behavior.

**558 Integrative Seminar.** (3) A  
Advanced exploration and assessment of current trends within the leisure studies profession. This course has variable topics, including, but not limited to: cross-cultural analysis of leisure, urban recreation, planning and resources, sociocultural dimensions of tourism development, wilderness management. Prerequisite: REC 552.

**569 Current Issues in Tourism.** (3) A  
General survey of the tourism literature with an emphasis on relevant theories, concepts, and current research.

**570 Social Aspects of Outdoor Recreation Management.** (3) A  
An analysis of the social aspects of natural resource recreation management and planning. Prerequisite: REC 370 or equivalent.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Religious Studies

Linell E. Cady  
Chair  
(EC A377) 602/965-7145

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### PROFESSORS

CADY, FELDHAUS, WENTZ

### ASSOCIATE PROFESSORS

COUDERT, FOARD, GEREBOFF,  
MOORE, MORRISON,  
SWANSON, WOODWARD

### ASSISTANT PROFESSORS

CLAY, FESSENDEN, SCHOBER

The faculty of the Department of Religious Studies offer a graduate program leading to the Master of Arts degree with a major in Religious Studies. This program is designed to serve three main purposes. It offers intensive training in research methods and in select special fields for students who seek to qualify for doctoral programs at leading universities. It serves as specialized training for those who plan to teach religious studies subject matters in colleges and high schools or who wish to bring cultural and cross-cultural analytical tools to professions such as business, social work, government, and journalism. It allows qualified persons in nonacademic occupations the opportunity to acquire competence in the study of religions, broadly defined, and in areas of special interest.

Course offerings and faculty appointments reflect the commitment of the department to a balance of Western and Asian, historical and conceptual, methodological, and subject-oriented areas

of study. This programmatic diversity is maintained in a context of scholarly collegiality involving both faculty and graduate students.

### MASTER OF ARTS DEGREE

**Admission.** In order to be eligible for admission to the graduate program in Religious Studies, an applicant must meet Graduate College requirements (pages 53-55) and the requirements described below:

1. The student must submit test scores from the Graduate Record Exam (older returning students may petition the department to have this requirement waived).
2. The student must have completed the equivalent of 15 hours of undergraduate work in the study of religions, including advanced courses in both Western and Asian or other non-Western religions. Students without the necessary background in religious studies may remove deficiencies by taking additional specified courses (which may or may not count toward the fulfillment of degree requirements) at the beginning of their program of study.
3. The student must request three academic letters of reference to be sent to the graduate coordinator of the department.
4. The student must submit an essay of approximately 1,000 words outlining the academic background, career goals, and specific area of interest in religious studies in relation to fields offered by the faculty.

Complete applications are due on or about February 1. Students will receive notification from the department by April 1. Graduate assistantship awards are also announced on or about April 1. Late applications and applications for spring semester are reviewed on an individual basis.

### Graduate Program Requirements

The student must satisfy the following requirements:

1. reading knowledge of French, German, or another language relevant to the proposed thesis topic is normally required. At the discretion of the student's supervisory committee, the requirement may be waived for students who either are

not planning to enter a doctoral program or are planning to pursue doctoral work that does not require proficiency in foreign languages;

2. 24 hours of course work, including three hours in research methods (REL 500); three hours of research in the field of the thesis topic (REL 592); and nine hours of graduate seminar (REL 591), offered each semester on varying topics within the academic study of religion;
3. a thesis that earns six semester hours of Thesis 599 credit; and
4. an oral defense of the thesis.

### Research Activity

Areas of recent and current faculty research include the following: American folk religion, American civil religion, and American spirituality (Wentz); African-American religions (Moore); Islam (Woodward); medieval and folk Hinduism (Feldhaus); popular religion and culture in Japan from medieval times to the present (Foard); Rabbinic Judaism and religion and ethics (Gereboff); North and South Native American religions, including issues in cross-cultural contact (Morrison, Swanson); Russian and East European religions (Clay); modern religious thought and philosophical theology, including methodological problems in contemporary theology (Cady); religion and gender (Fessenden); the religions of Southeast Asia, including issues of modernization (Schober, Woodward).

### RELIGIOUS STUDIES

**REL 410 Judaism in Modern Times.** (3) N  
Variety of expressions of Judaism and Jewishness in the modern period. Topics may include American Judaism or religious responses to the Holocaust. *General Studies: HU, H.*

**415 The Jewish Mystical Tradition.** (3) A  
Examination of some of the esoteric lore of Judaism. Movements and literature such as Hasidism and Kabbalah are studied. *General Studies: HU.*

**420 Religion in American Life and Thought.** (3) A  
The influence of religion on American society, culture, and ideas; the distinctive character of religion in America. Prerequisite: REL 320 or 321 or equivalent. *General Studies: L2/HU.*

**426 American Preachers and Preaching: The Sermon in America.** (3) N  
The life and work of notable American preachers. The emergence of the preacher as representative of American religion. Prerequisite: REL 320 or 321 or equivalent. *General Studies: L2/HU.*



**427 American Religious Thought.** (3) N  
The thought of representative American religious thinkers, i.e., Jonathon Edwards, William Ellery Channing, Horace Bushnell, and Reinhold Niebuhr. Prerequisite: REL 320 or 321 or equivalent. *General Studies: HU, H.*

**444 Religion in Japan.** (3) F  
Religion in Japanese history, especially the development of Japanese Buddhism, and religion in the modern transformation of Japan. Prerequisite: instructor approval. *General Studies: HU, G/H.*

**454 Hindu Religious Thought.** (3) A  
Readings in classical systems, such as Samkhya and Vedanta, and in the works of modern Hindus, such as Aurobindo and Gandhi. REL 345 or 350 recommended.

**460 Studies in Islamic Religion.** (3) A  
Issues in the interpretation and understanding of Islamic texts, history, society, culture, and rituals. Prerequisites: REL 365 and Religious Studies major or instructor approval. *General Studies: HU, G.*

**470 Religion in the Middle Ages.** (3) A  
Religious aspects of medieval life and thought; variety of forms of dissent, heresy, and reform movements from the 4th to 13th centuries. *General Studies: HU, H.*

**471 Reformation and Modern Christianity.** (3) A

Protestant Reformation to contemporary Christian movements; includes factors in the dissolution of the Medieval Christian synthesis, variety of reform movements and reformation patterns, Catholic counter-reform measures, formation of liberal theology, ecumenical movement, and the World Council of Churches. *General Studies: HU, H.*

**486 Modern Critics of Religion.** (3) A  
Major theories and critiques of religion among modern social, philosophical, and religious thinkers. *General Studies: HU.*

**494 Special Topics in Religious Studies.** (3) N  
Open to all students, freshmen by instructor approval only. Topics may be selected from various areas.

**498 Pro-Seminar in Religious Studies.** (3) A  
For students with a major or minor emphasis in Religious Studies.

**501 Research Methods in Religious Studies.** (3) F  
An exploration of the major themes and methods in the study of religion, with primary focus on classical texts. Lecture, discussion.

**502 Research Methods in Religious Studies.** (3) F, S  
An exploration of the major themes and methods in the study of religion, with primary focus on contemporary texts. Lecture, discussion.

**591 Seminar.** (3) N  
Topics on methodological issues in the study of religion. Prerequisite: Religious Studies graduate student or instructor approval.

**598 Special Topics.** (3) F, S  
Topics are selected from the following areas:

- (a) Christianity, Greco-Roman Religion
- (b) Comparative Western, Ancient Near East, Judaism
- (c) Islam
- (d) Native American Religion
- (e) Problems in Religious Studies
- (f) Religion in America
- (g) Religion in East Asia
- (g) Religion in South Asia

- (i) Study of Religion, Comparative Religion
  - (j) Western Religious Thought, Ethics
- May be repeated for credit.

**Omnibus Graduate Courses:** See pages 41–42 for omnibus graduate courses that may be offered.

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## Renaissance Studies

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See "Medieval and Renaissance Studies," page 237.

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## Scholarly Publishing

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Beth Luey

Director

(SS 225H) 602/965–4188

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### SENIOR INSTRUCTIONAL PROFESSIONAL LUEY

Graduate students in any discipline may earn a Certificate in Scholarly Publishing in conjunction with their degree programs. The program is also open to students who already hold graduate degrees. Students gain an understanding of the structure of scholarly publishing (scholarly books, journals, reference books, college textbooks, and scholarly electronic media), its role and responsibilities in society, the legal and ethical issues that impinge upon it, and its economics. They also learn to perform the responsibilities of editors, designers, or producers of scholarly publications. Course work includes a required core, required courses in editing or design, and electives from a variety of disciplines. The certificate requires 28 hours of course work, including six internship hours. Some courses may be applied to both the certificate and the student's degree program. Applicants are strongly urged to submit GRE aptitude scores; a writing sample is required. For more information, contact the director, Scholarly Publishing Program, SS 225H, 602/965–4188.

### SCHOLARLY PUBLISHING

**PUB 501 Introduction to Scholarly Publishing.** (3) F

An introduction to the purpose, organization, and operation of scholarly publishing, including its history, societal role, and current issues. Lecture, discussion. Prerequisite: graduate standing.

**502 Scholarly Editing.** (3) F

Publishing procedures, proofreading, and manuscript editing of scholarly books, textbooks and scholarly journals. Lecture, discussion. Prerequisite: admission to scholarly publishing certificate program. Pre- or corequisite: PUB 501.

**503 Advanced Scholarly Editing.** (3) S  
Advanced manuscript editing, acquisitions, developmental editing, and indexing of scholarly books, textbooks, and scholarly journals. Lecture, discussion. Prerequisites: PUB 501, 502.

**510 Research in Scholarly Publishing.** (3) S  
Individual or group research projects on issues in scholarly publishing, including legal, economic, design, technological, and related topics. Directed research, discussion. Prerequisites: PUB 501; admission to scholarly publishing certificate program.

**584 Scholarly Publishing Internship.** (1–6) A  
Structured, supervised, practical experience with a scholarly publisher or other appropriate publishing enterprise. Internship. Prerequisites: PUB 501; 9 hours in scholarly publishing core; instructor approval.

**598 Special Topics in Scholarly Publishing.** (1) S

One-week short courses covering special topics in scholarly publishing, to be taught by visiting publishing professionals. Lecture, discussion. Prerequisites: PUB 501; admission to scholarly publishing certificate program.

**Omnibus Graduate Courses:** See pages 41–42 for omnibus graduate courses that may be offered.

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## School Library Science

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Applications for admission are not being accepted for the Master of Arts and Master of Education degree programs in School Library Science.

### LIBRARY SCIENCE

**LIS 410 Children's Literature.** (3) F, S, SS  
Selecting, analyzing, and using modern and classic literature with young readers.

**510 Computers and Technology in the School Library.** (3) F  
Library uses of technology and computers. Fundamental concepts and issues in library media centers. Prerequisites: LIS 571 and 581 or instructor approval.

**533 Current Library Problems.** (3) F  
Critical analysis of current practices and problems in school librarianship. Prerequisites: LIS 540 and 561 and 571 and 581 or instructor approval.

**540 Classification and Cataloging.** (3) F  
Descriptive cataloging and Dewey Decimal Classification of print and nonprint library materials.

**561 Selection of Library Materials.** (3) F  
Principles and procedures used in the selection of materials for the school library.

**563 Children's Literature.** (3) F, S, SS  
Selecting and using children's literature and related nonprint media to support the elementary school curriculum. Cross-listed as RDG 563.

**565 Literature for Hispanic Youth/Literatura para Jóvenes Hispanoparlantes.** (3) S Selecting, analyzing, and utilizing literature for Hispanic and Spanish speaking children and adolescents.

**571 Basic Reference Resources.** (3) S Providing reference service in the school library. Content and use of basic resources.

**581 School Library Administration.** (3) S Administration of K-12 libraries and media centers.

**584 School Library Internship.** (1-6) F, S Prerequisites: LIS 410, 540, 561, 571, 581; instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Science and Engineering of Materials Interdisciplinary Faculty

**Ray Carpenter**  
*Director*  
(PS A323) 602/965-2460

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### CENTER FOR SOLID STATE SCIENCE

Regents' Professor: Mayer;  
Professors: Carpenter, Smith;  
Associate Professor: Rez; Affiliated  
Faculty: Kim, McKelvy, Sharma

### CHEMICAL, BIO AND MATERIALS ENGINEERING

Professors: Cale, Carpenter,  
Jacobson, Krause, Raupp;  
Associate Professors: Burrows, Dey;  
Assistant Professor: Alford

### CHEMISTRY AND BIOCHEMISTRY

Regents' Professors: Buseck, Lin;  
Professors: Glausinger, McMillan;  
Associate Professor: Petuskey

### ELECTRICAL ENGINEERING

Regents' Professor: Ferry;  
Professors: Roedel, Schroder;  
Associate Professors: Shen, Skromme;  
Assistant Professor: Allee

### MECHANICAL AND AEROSPACE ENGINEERING

Professor: Jacobson;  
Associate Professor: Sieradzki

### PHYSICS AND ASTRONOMY

Regents' Professor: Spence;  
Professors: Cowley, Sankey, Smith,  
Tsong, Vengbles; Associate Professors:  
Bennett, Culbertson, Marzke

The Committee on the Science and Engineering of Materials offers an interdisciplinary graduate program leading to the Doctor of Philosophy degree with a major in the Science and Engineering of Materials. The members of

the faculty comprising the committee are from several academic research units of the College of Liberal Arts and Sciences and the College of Engineering and Applied Sciences: the Center for Solid State Science; the Departments of Chemical, Bio and Materials Engineering; Chemistry and Biochemistry; Electrical Engineering; Mechanical and Aerospace Engineering; Physics and Astronomy.

## DOCTOR OF PHILOSOPHY DEGREE

The Doctor of Philosophy degree with a major in Science and Engineering of Materials is an interdisciplinary program that integrates courses offered by faculty representing various disciplines noted above, along with courses in mathematics, to provide a sound foundation for research leading to a dissertation. Emphasis is placed upon applications of the core fundamentals for investigation of the relationships between microstructure and properties and performance of solids, and the dependence of microstructure on processing.

**Admission.** All prospective graduate students must satisfy the general admission requirements of the Graduate College. In addition, each applicant must provide the program admissions committee with Graduate Record Examination (GRE) scores (verbal, quantitative, and analytical). International students must submit TOEFL scores; the TSE (Test of Spoken English) is optional but is required for students who are interested in applying for a teaching assistantship. The SEM Admissions Committee also requires that applicants submit a statement of career goals and objectives, a professional résumé, and three letters of recommendation. Application materials must be received by the SEM Program Office by the following established deadlines: for fall, documents must be received by February 15; for spring, by August 30.

**Program of Study.** The program consists of a minimum 84 semester hours beyond the bachelor's degree, at least 24 of which are research and dissertation credit, and a research dissertation. Programs of individual students are defined during discussions between the student and the faculty supervisory committee. At least 30 semester hours of the approved program including the

core, exclusive of research and dissertation, must be completed after admission to the Ph.D. at ASU.

A minimum of 10 graduate-level courses beyond the bachelor's degree is required.

The curriculum includes core courses that define the essential course work for all students, involving 22 semester hours of selected courses in the science and engineering of materials, chemistry, and physics. Students who previously have taken courses fulfilling some of the core requirements may select electives.

### **Preliminary/Qualifying Examination.**

The student must take a preliminary examination at the end of the first year in the program. Under exceptional circumstances, the student can petition to the Curriculum and Examination Committee to postpone taking the exam until the third or fourth semester. The examination is principally for diagnostic purposes and unsatisfactory performance may require additional coursework or study. The examination addresses topics central to the science and engineering of materials, such as classical thermodynamics, physical metallurgy, materials science, and materials characterization, kinetics and diffusion, structure, continuum mechanics and defects in solids, quantum mechanics and chemistry, solid structure, inorganic chemistry, statistical thermodynamics, and experimental methods. Results of the examination are used by the student's advisor and/or faculty supervisory committee in formulating a program of study for the student. Students with thorough undergraduate preparation in physical chemistry, engineering physics, solid state physics, engineering science, solid state device engineering, physical metallurgy, physical ceramics, applied mathematics, and similar backgrounds are best prepared for study of the science and engineering of materials.

**Foreign Language Requirements.**  
None.

**Comprehensive Examinations.** Near completion of course work and no later than three years after admission to the program, the student is given a comprehensive examination with oral and written components. The written component examines the student's knowledge in the core course materials as well as

those topics covered in the preliminary examination. The examination is administered by the Curriculum and Examination Committee. The oral portion will require the presentation of a research proposition to the student's faculty supervisory committee. The student must define a research problem of current relevance to the science and engineering of materials. The problem may be experimental, theoretical, or a combination of both. The presentation should be based on the study of literature and discussions with members of the supervisory committee and materials researchers. The student will define the problem, describe its significance in the field, propose a method of investigation leading to a solution of the problem, and defend the problem and proposed solution before the faculty supervisory committee. The proposed problem may be from any area of materials research except that it may not be directly related to the student's dissertation topic. The student must prepare and deliver to the members of the supervisory committee an extended abstract describing the research proposition not less than two weeks prior to the scheduled examination date. The comprehensive exams may be taken no more than twice upon formal application to, and under conditions specified by, the student's program committee, the director of the executive committee, and the dean of the Graduate College. Upon successful completion of this examination, the student is expected to apply to the dean of the Graduate College for formal admission to candidacy for the degree.

**Dissertation Requirements.** The dissertation, which is the final and most important product of the student's effort in this program, must report original research in the field and demonstrate the student's ability to conduct creative, independent research. Each candidate must register for at least 24 semester hours of research and dissertation credit as part of the requirement.

**Final Examinations.** The final oral examination in defense of the dissertation is conducted by the student's dissertation committee and others appointed by the dean of the Graduate College.

### Research Activity

The faculty of the Science and Engineering of Materials Committee have established vigorous research programs in the field. Current results are discussed regularly by faculty, research staff, graduate students, and external invited speakers in several regular seminar series. Students in the program have the opportunity to participate and interact directly with speakers.

Areas of current research include the structure and properties of semiconductors such as the following: silicon and gallium arsenide; fabrication of ultra-small solid state electronic devices; the structure of the free surfaces of crystalline solids; the structure and properties of intercalated layer compounds; the effects of ion implantation on solids (lattice defect formation, mixing, phase transformations); environmental effects on spectral emissivity of solids; the effects of high pressure on solids; study of phase transformation mechanisms in many different types of solids; atomic structure of interfaces in metal matrix/ceramic and crystal/polymer composites. Several different laboratories containing specialized equipment and computing facilities are available to students conducting research in the program. These include the following: the Facility for High Resolution Electron Microscopy; the Center for Solid State Electronics Research; electron spin and nuclear magnetic resonance spectroscopy laboratories; several materials preparation laboratories; a Raman spectroscopy laboratory; atomic absorption, X-ray fluorescence, and mass spectroscopic laboratories; X-ray diffraction laboratories; optical microscopy laboratories; computer-controlled high temperature mechanical deformation facilities for constant or variable strain rate plasticity and fracture research; creep research; high temperature electron emission and thermionic energy conversion research.

Courses applicable to the Science and Engineering of Materials interdisciplinary program are taught by faculty in related departments such as chemistry and biochemistry, physics, electrical engineering, chemical, bio and materials engineering, mechanical and aerospace engineering, and mathematics. For descriptions of these courses, see the listings under appropriate headings in this catalog.

### SCIENCE AND ENGINEERING OF MATERIALS

#### SEM 556 Electron Microscopy Laboratory. (3) F

Lab support for SEM 558. Cross-listed as MSE 556. Pre- or corequisite: MSE/SEM 558.

#### 557 Electron Microscopy Laboratory. (3) S

Lab support for SEM 559. Cross-listed as MSE 557. Pre- or corequisite: MSE/SEM 559.

#### 558 Electron Microscopy I. (3) F

Microanalysis of the structure and composition of materials using images, diffraction, and X-ray and energy loss spectroscopy. Knowledge of elementary crystallography, reciprocal lattice, stereographic projections, and complex variables is required. Cross-listed as MSE 558. Prerequisite: instructor approval.

#### 559 Electron Microscopy II. (3) S

Microanalysis of the structure and composition of materials using images, diffraction, and X-ray and energy loss spectroscopy. Knowledge of elementary crystallography, reciprocal lattice, stereographic projections, and complex variables is required. Cross-listed as MSE 559. Prerequisite: instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### Social and Philosophical Foundations of Education

Mary Lee Smith  
Program Coordinator  
(ED 104) 602/965-6357

#### PROFESSORS

APPLETON, GLASS, RENDÓN,  
SMITH, STOUT

#### ASSOCIATE PROFESSORS

CASANOVA, HARTWELL-HUNICUTT,  
LEVAN, NOLEY

The faculty in the Division of Educational Leadership and Policy Studies offer a graduate program leading to the Master of Arts degree with a major in Social and Philosophical Foundations of Education. Students may also select policy analysis as an area of study.

Applicants for admission to the M.A. degree program must submit scores on the Graduate Record Examination. Candidates for the M.A. degree must pass a written comprehensive examination, in addition to writing a thesis or equivalent. An oral examination in defense of the thesis or equivalent is required.

**Research Activity**

Faculty research incorporates both qualitative and quantitative methodologies. Studies are being conducted on minority education, including cultural pluralism, multicultural and bilingual education, and education of women. Philosophical, sociological, historic, economic, and comparative approaches are employed. Research also focuses on the theory of evaluation and educational policy. In addition to the social and philosophical foundations of education faculty, students have the opportunity to collaborate on research projects with the faculty in higher education, educational administration and supervision, and policy studies.

**SOCIAL AND PHILOSOPHICAL FOUNDATIONS**

**SPF 510 Introduction to Organization and Administration of American Public Schools.** (3) F, S

Organizational structure and administration of public education are explored through the application of legal and ethical concepts and relevant information of the social sciences. Cross-listed as EDA 510.

**511 School and Society.** (3) F, S, SS

Interrelationship of school and society and the role of education in social change.

**515 Education of Women.** (3) N

Analysis of roles and status of women, educational practices, and alternatives.

**520 Cultural Diversity in Education.** (3) S

Philosophic and sociological investigation of cultural diversity in the United States and how it relates to education.

**533 Comparative Education in the Western World.** (3) N

Educational practices and traditions in the leading nations of Europe and the Soviet Union.

**534 Education and Change: Developing Nations.** (3) N

Education as economic and sociopolitical change agent in Africa, Asia, the Middle East, and Latin America.

**543 Bilingual Education Models.** (3) N

Bilingual education programs in other countries; analysis of political, social, economic, and educational implications; practice in planning bilingual education curricula.

**544 Philosophical Foundations of Education.** (3) F

Theories of education in ancient, medieval, and modern classical and contemporary philosophies.

**566 History of Education.** (3) S

Development of educational institutions and ideas in the Western World, from ancient times to the 20th century.

**622 Theory of Educational Organizations.** (3) S

An investigation of how educational organizations function and the implications of these views on role definition and performance of administrators as they design organizational processes. Cross-listed as HED 688.

**711 Social and Historical Foundations of Education.** (3) N

Problems of American education and their sociohistorical context.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**Social Work**

**Emilia E. Martinez-Brawley**  
*Dean*  
(WHALL 150) 602/965-3304

**PROFESSORS**

ASHFORD, COUDROGLOU,  
DALEY, HUDSON, KETTNER,  
LeCROY, MacEACHRON,  
MARTINEZ-BRAWLEY, MORONEY

**ASSOCIATE PROFESSORS**

FAUSEL, GUSTAVSSON, LEYBA,  
LIE, McMURTRY, MONTERO,  
NICHOLS, SEGAL

**ASSISTANT PROFESSORS**

BELL, BRZUZY, CARTER, CROSS,  
GERDES, MARSIGLIA, PATTERSON,  
PAZ, RISLEY-CURTISS,  
VILLERREAL, ZORITA

**ACADEMIC PROFESSIONALS**

GONZALEZ-SANTIN, JOHNSTON

**PROFESSORS EMERITI**

CRANMER, ENGELHARDT,  
HEPWORTH, LUNDBERG,  
POLENZ, WOODMAN

The faculty in the School of Social Work offer programs leading to the Master of Social Work degree and the Doctor of Philosophy degree with a major in Social Work.

**MASTER OF SOCIAL WORK**

The professional program leading to the Master of Social Work degree prepares social workers for advanced direct practice, administration, and community practice. The program is designed to prepare social workers capable of responding effectively to the needs of special populations in the Southwest—the ethnic groups of the region, the aged, urban and rural poor, children at risk, the disabled, and

women who are victims of poverty, discrimination and violence—in its curriculum and its practicum assignments. The Master of Social Work degree program is accredited by the Council on Social Work Education.

**Regular Admission.** In addition to the requirements on pages 70-72, the school also requires that applicants must either

1. have graduated with a liberal arts undergraduate degree;
2. have graduated with a B.S.W. from a Council on Social Work Education accredited school of social work; or
3. for students with other undergraduate degrees, have taken 30 semester hours in liberal arts courses at the undergraduate or graduate level.

The 30 semester hours described in item 3 above must include course work from the social/behavioral sciences, natural sciences, and humanities. The distribution should approximate the current policy for the B.S.W. program: 18 hours in social and behavioral sciences, six hours in natural sciences with at least one course in human biology, and six hours in humanities.

All students are required to successfully complete a course in human biology prior to enrollment in the graduate program. Additionally, all students must have successfully completed a course in statistics either prior to admission or by the end of the first year in the Master of Social Work program.

**Waiver Exams.** Waiver policy is in place for all foundation-level courses except Practicum. See page 71, "Exemptions and Waiver Examinations."

**Application Procedures.** Students applying to the graduate program in Social Work must follow the procedures for admission to the Graduate College (see pages 44-46). In addition the applicant must submit the following:

1. application to the graduate Social Work program;
2. statement of educational and career goals in sufficient detail to indicate compatibility with the educational objectives and capabilities of the School of Social Work;
3. three letters of reference that must use the reference letter forms provided by the School of Social Work; and

- test scores from either the Graduate Record Examination or the Miller Analogies Test.

This information must be sent to  
 SCHOOL OF SOCIAL WORK  
 STUDENT SUPPORT SERVICES  
 PO Box 871802  
 ARIZONA STATE UNIVERSITY  
 TEMPE AZ 85287-1802

For details of the Master of Social Work program, refer to pages 70-72.

### DOCTOR OF PHILOSOPHY DEGREE

The program seeks to prepare future social work scholars who are cognizant of the importance of practice-oriented and evaluative research in applied agency and community settings, who are involved in the development and application of theories in social work practice, and who plan to enhance social work knowledge through its communication and translation in the classroom and field settings.

The program introduces students to the complex range of roles and responsibilities of faculty leadership, to the challenging expectations of critical thinking and creativity in research and teaching, and to the multiple ways of integrating the tripartite demands of research, teaching, and service in the social work profession.

The Social Work faculty advocate for and support the human potential in the distinct experiences and perspectives of the Southwest region. The cultural and economic diversity of the Southwest makes it possible for faculty and students to engage in many issues in their community-based research and practice. Social Work graduates play key roles in creatively and ethically integrating their professional applied activities with local, state, tribal, and regional interests in the realm of social welfare.

**Admission.** Admission decisions are made every even year (e.g., 1996, 1998). Applicants must hold an MSW degree from an accredited school of social work, preferably have a minimum of two years of post-MSW professional social work paid employment, and apply to both the ASU Graduate College and the School of Social Work.

Admission to the Ph.D. program requires completion of all admission requirements and procedures set forth by

the Graduate College and test scores from the Graduate Record Examination (verbal, quantitative, and analytical). Applications are accepted up to March 1 preceding the fall semester to which the applicant is seeking admission. Students are admitted only in the fall semester of the biennial year.

**Application Procedure.** The following should be submitted to

ADMISSIONS OFFICE  
 GRADUATE COLLEGE  
 PO Box 871003  
 ARIZONA STATE UNIVERSITY  
 TEMPE AZ 85287-1003:

- the application for admission to the Graduate College;
- two official transcripts from each institution where the applicant has attended previously; and
- test scores from the Graduate Record Examination.

The following should be submitted to

STUDENT SUPPORT SERVICES  
 SCHOOL OF SOCIAL WORK  
 PO Box 871802  
 ARIZONA STATE UNIVERSITY  
 TEMPE AZ 85287-1802:

- application to the Ph.D. program in Social Work;
- completed essay questions; and
- four letters of reference that must use the reference letter forms provided by the School of Social Work.

**Program of Study.** Students must demonstrate scholarly competencies in several broad areas identified during the mentoring and advising process. These areas must include: micro/macro theories and perspectives on critical issues in social work and social welfare (24 semester hours), quantitative/qualitative research methodologies (12 semester hours), and professoriate training and mentoring in research, teaching, and service. The program requires a minimum of 36 semester hours beyond the M.S.W. degree and 84 semester hours beyond the baccalaureate degree. Because students must achieve competency requirements, they may need to take additional course work to achieve these competencies.

The program emphasizes enhancement of scholarship through:

- applied social work research in diverse community settings and populations of the Southwest;
- teaching, from syllabus development to classroom teaching across the professional continuum;
- participation in collegial decision making; and
- participation in field education and community services.

Students are expected to participate fully in research, teaching, and field liaison activities during their course of studies.

**Advisement.** The individualized plan for becoming a social work scholar and for learning associated faculty roles is developed by students and their advisors over time.

**Residency.** Students should expect to complete the equivalent of four semesters of course work. The minimum residency requirement for the Ph.D. program is 18 semester hours in courses relating to the program of study, exclusive of dissertation. The residency must be completed in two consecutive semesters, not including summer sessions.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Upon completion of course work and the substantive paper but before beginning dissertation research, the student is given a written examination covering research, theory, and methods in the substantive area. If the student should fail one or more components of the examination, a reexamination may be administered no sooner than three months and no later than one year from the date of the original examination. Approval of the reexamination must be obtained from the supervisory committee and the dean of the Graduate College.

**Dissertation Requirements.** Each candidate must register for a minimum of 24 semester hours of semester for research and dissertation. The final copy of the dissertation must be received by the supervisory committee and the dean of the Graduate College at least three weeks before the degree conferral date.

**Final Examinations.** The final oral examination in defense of the dissertation is scheduled and conducted by the student's dissertation committee. A

candidate must pass the final examination within five years after completing the comprehensive examination.

### Research Activity

The School of Social Work offers excellent opportunities for empirical research on social, community, and individual problems and issues. Computer facilities and research support are available to faculty and students. Research is carried out in diverse community settings in conjunction with social agencies, as well as with public and private institutions. The faculty and students are engaged in a number of projects of local, regional, and national significance.

The areas of study for typical faculty research in any given year might include such topics as child abuse, adoption, foster care, reconstituted families, minority aging, chemical dependency, mental health, social welfare planning, social service agency administration, and community practice.

### SOCIAL WORK (SWG)

#### SWG 501 Human Behavior in the Social Environment I. (3) F

Analyzes theories of personality and life-span development from methodological, ecological, and systems perspectives up to adolescence.

#### 502 Human Behavior in the Social Environment II. (3) S

Life span development from middle childhood to maturity. Prerequisite: SWG 501.

#### 510 Direct Practice I. (3) F

Basic social work methods with an emphasis on the problem-solving process as it pertains to individuals, families, and small groups. Prerequisite: Social Work major.

#### 511 Direct Practice II. (3) S

Theory and methods of direct practice with groups and selected practice models. Lecture, lab. Prerequisite: SWG 510.

#### 520 Practice-Oriented Research. (3) S

Accelerated course in application of scientific principles to field practice, problem formulation, intervention procedures, and impact assessment. Prerequisites: Social Work major; an approved course in statistics.

#### 531 Social Policy and Services I. (3) F

Conceptual, analytical, and historical perspectives on the social welfare institution. Emphasis on poverty and inequality. Principles of policy analysis.

#### 533 Ethnic Minorities and Social Work. (3) S

Explores ethnic/cultural variables significant to southwestern ethnic minority populations and ways in which these factors affect social work practice.

#### 541 Field Practicum I. (3) F, S

With SWG 542, two consecutive semesters (480 hours) of supervised social work practice in an approved placement. Pre- or corequisite: SWG 510.

#### 542 Field Practicum II. (3) F, S

See SWG 541. Pre- or corequisite: SWG 511.

#### 580 Community and Organizational Change. (3) F

Examines communities and human service organizations as social systems. Introduces strategies for initiating planned change.

#### 605 Substance Abuse. (3) N

Psychological and sociocultural determinants of substance abuse. Overview of social policies and treatment approaches. Prerequisite: SWG 502 or instructor approval.

#### 606 Psychopathology. (3) F

Theories and concepts of mental health and illness. Attention to the development of environmental, interpersonal, psychosocial, stress factors in human behavioral dynamics. Prerequisite: SWG 502 or instructor approval.

#### 611 Social Work with Families. (3) F

Theory, concepts, and skills for working with diverse family populations. Emphasis on a systems and integrative approach. Prerequisite: SWG 511.

#### 612 Social Work with Groups. (3) N

Practice applications of knowledge and skill to social work with groups.

#### 613 Social Work with Individuals. (3) S

Treatment of prevalent disorders encountered by social workers, selected from the following: anxiety disorders, personality disorders, depression, and schizophrenia. Lecture, seminar. Prerequisites: SWG 606, 611.

#### 614 Social Work with Families in Transition. (3) S

Analyzes the psychosocial dynamics of families disrupted by divorce, separation, or death of a parent. Offers differential social work interventions. Prerequisite: SWG 611 or instructor approval.

#### 616 Social Work with Chemically Dependent Families. (3) S

The dynamics of the chemically dependent family are examined and clinical approaches for intervening in the family system and subsystems are presented. Prerequisite: SWG 611 or instructor approval.

#### 617 Assessment and Treatment with Children and Adolescents. (3) S

Theory, research, intervention that focus on children and adolescents. Prerequisite: SWG 611 or instructor approval.

#### 618 Family Violence. (3) S

Theory, research, intervention, and prevention strategies relevant to child maltreatment, partner abuse, and elder abuse. Prerequisite: SWG 611 or instructor approval.

#### 620 Research Methods in Social Work. (3) F

Conceptual foundations and methods of non-mothetic research in social work. Includes problem identification, hypothesis formulation, measurement, sampling, and experimental design.

#### 621 Integrative Seminar. (3) S

Explores the fit between theoretical frameworks and practice with clients. Requires presentation of empirical studies with clients. Prerequisite: SWG 620. Corequisite: SWG 641 or 642.

#### 622 Community Research in Social Work. (3) N

Application of research design techniques to assessing need and measuring efficiency and effectiveness of community-wide programs. Prerequisite: SWG 520. Corequisite: SWG 680.

#### 623 Agency Research in Social Work. (3) S

Application of research design techniques to data collection in human service agencies, including use of statistical analysis for program evaluation. Prerequisite: SWG 622.

#### 632 Social Policy and Services II. (3) S

Development of advanced knowledge and skills in social welfare policy analysis, policy formulation, and advocacy and intervention for policy change. Prerequisite: SWG 531.

#### 641 Advanced Practicum: Direct Practice I. (3) F, S

With SWG 642, two consecutive semesters (480 hours) of supervised social work practice in an approved placement related to the student's career goal. Prerequisites: SWG 541, 542. Pre- or corequisite: SWG 611.

#### 642 Advanced Practicum: Direct Practice II. (3) F, S

See SWG 641. Prerequisites: SWG 541, 542, 611. Pre- or corequisite: SWG 614 or 616 or 617 or 618.

#### 643 Advanced Practicum: Planning, Social Work Administration, and Community Practice I. (3) F, S

With SWG 644, two consecutive semesters (480 hours) in social work practice in an approved placement related to the student's career goal. Prerequisites: SWG 541, 542. Pre- or corequisite: SWG 680.

#### 644 Advanced Practicum: Planning, Social Work Administration, and Community Practice II. (3) F, S

See SWG 643. Prerequisite: SWG 643. Pre- or corequisite: SWG 681 or 682.

#### 680 Program Planning in Social Services. (3) S

The social services planning process includes needs assessment, goals and objectives, program design, budgeting, management information systems, and program evaluation. Prerequisites: SWG 681, 682. Corequisite: SWG 623.

#### 681 Social Work Administration. (3) F

Administrative skill building and theory application within human service nonprofit social work settings. Prerequisite: SWG 580.

#### 682 Community Participation Strategies. (3) F

Course reviews strategies to involve citizens and the consumers of social and human services in community decision making systems. Participation is viewed as means to facilitate the empowerment of oppressed peoples. Prerequisite: SWG 580.

#### 683 Developing Grants and Fund Raising. (3) N

Identification of potential funding sources, technical and interpersonal/political aspects of proposal development, and fund raising. Prerequisite: SWG 580 or instructor approval.

#### 720 Philosophy of Science Issues in Social Work. (3) F

Critical examination of social science, social work practice and policy in terms of philosophical assumptions and varying frames of reference.

#### 721 Empirical Social Work Practice. (3) S

Application of scientific principles to problem formulation, assessment, and intervention procedures with an emphasis on the direct use of scientific tools in the conduct and evaluation of practice at all levels.



**730 Families Across the Life-Span.** (3) F  
Policy and practice analysis of issues which affect families with a focus on the development of interventive strategies.

**731 Social Welfare Policy Analysis and Development.** (3) F  
Methods of policy analysis, critique of social welfare policies against proposed models, and case studies of policy development emphasizing southwestern populations. Prerequisite: SWG 730.

**732 Social Work Administration in a Systems Context.** (3) F  
Case studies of social work administration from initial conceptualization of policy through implementation at national, state, and local levels.

**740 Community Research in Social Work.** (3) F  
Substantive, value, and methodological issues in community-based research as applied to social work topics.

**741 Integrative Research Seminar.** (3) F  
Integration of theory, research methods, and statistics in community social work topics of specific interest to students.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Sociology

Robert P. Snow  
*Chair*  
(SS 321F) 602/965-6149

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### PROFESSORS

GORDON, LANER, NAGASAWA,  
SNOW, THOMAS,  
WEITZ, WHITAM

### ASSOCIATE PROFESSORS

BENIN, COBAS, HARDERT, KEITH,  
KULIS, MILLER-LOESSI, SULLIVAN

### ASSISTANT PROFESSORS

AGADJANIAN, BLAIR, ESPINOSA,  
JACOBSON, QIAN, ROLISON

### LECTURER

EVERTS

### INSTRUCTOR

WILLIAMS

### ACADEMIC PROFESSIONAL

WOLF

### PROFESSORS EMERITI

AXELROD, FARBER, GUILLOT,  
HOULT, LINDSTROM,  
PFUHL, SEBALD

The faculty in the Department of Sociology offer graduate programs with a major in Sociology leading to the Master of Arts and Doctor of Philosophy degrees.

## MASTER OF ARTS DEGREE

This degree program provides advanced training for those preparing for teaching, research, or applied careers in sociology, and may be taken either as a terminal program or as a step toward eventual fulfillment of requirements for the Ph.D. A detailed description of the graduate program (including opportunities in teaching and research assistantships) may be obtained from the department chair.

**Admission.** Admission to the program is determined by the following criteria: Graduate Record Examination scores (verbal, quantitative, and analytical), three letters of appraisal from persons familiar with the applicant's academic background, valid transcripts of the student's academic record, and a biographical narrative provided by the applicant. Application deadline is February 15. In addition to the general requirements of the Graduate College, the attainment of the master's degree in Sociology requires the following:

**Program of Study.** The successful completion of a minimum of 30 semester hours, including a 12-hour core curriculum, six hours of theory (SOC 585 and 586), and six hours of research methods (SOC 500 and 505), two hours of Sociology as a Profession (SOC 503, 504), with the balance to be drawn from substantive courses and six hours earned through the M.A. thesis (SOC 599).

**Foreign Language Requirements.** None.

**Thesis Requirements.** A thesis is required.

**Final Examinations.** A final oral examination in defense of the thesis is required. This oral examination also tests the student's comprehension of the area of sociology exemplified by the thesis.

## DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

This degree provides advanced training in theory, research methodology, and substantive fields to prepare sociologists for teaching and research with special emphasis on urbanism, urbanization, and related issues. A detailed description of this program (including opportunities in teaching and research

assistantships) may be obtained from the department chair.

**Admission.** Admission to the program is determined by the following criteria: Graduate Record Examination scores (verbal, quantitative, and analytical), three letters of appraisal from persons familiar with the applicant's academic background, valid transcripts of the student's academic record, and a biographical narrative provided by each applicant. Applicants should have an M.A. or its equivalent in Sociology or a related field. Application deadline is February 15. In addition, the attainment of the Doctor of Philosophy degree in Sociology requires the following:

**Program of Study.** The Ph.D. requires 54 semester hours beyond the master's degree. Three hours each of theory, methods, and statistics are required, and 24 hours are earned through dissertation and research. The remaining 21 hours are in substantive courses reflecting the student's specialization. First year Ph.D. students are required to take Sociology as a Profession (503, 504). A minimum of 30 semester hours of the approved Ph.D. program, exclusive of dissertation and research hours, must be completed after admission to the Ph.D. at ASU.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** Written comprehensive examinations focusing on two areas chosen by the student, and an oral defense of the dissertation proposal are required. After passing the comprehensive examinations and obtaining a formal approval of the dissertation proposal, the student is eligible to apply for candidacy.

**Dissertation Requirements.** A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required.

**Final Examinations.** A final oral examination in defense of the dissertation is required.

## Research Activity

The Department of Sociology is committed to teaching and research in the following six areas reflecting faculty expertise. Recent research is listed under each area heading.

**Demography/Urban Ecology.** Family and household demography; Hispanic fertility; Jewish populations; demographic determinants of adoptions; growth of Sunbelt retirement communities; mass media formats and urban life.

**Family.** Courtship; dating violence; dual earner families; families with handicapped children; kinship; family structure; marital stability; adolescence; parent-child bonds in later life; the Chicano family; the Jewish family; religious ethnic intermarriage; support networks of the poor.

**Medical.** Social psychological effects of AIDS; AIDS and high risk behavior; stigmatization of illness; alternative health care practitioners; technology and public health; medicalization in the media; mortality/morbidity of parents with handicapped children; stress and well-being.

**Political.** Nation-state expansion, authority, and expenditures; world polity/culture; comparative historical analyses; large-scale change and religious/political movements; the university and the state; race riots; environmental and nuclear power issues.

**Race/Ethnicity.** Sociology of Hispanics; minority communities; comparative historical analyses of ethnic/race relations; Mexican female immigrants; Cubans and minority traders; Asian-American scientists, engineers, and students; Mexican-Americans and phenotype; public policy; minority housing; ethnicity and health.

**Stratification.** Incorporation of women and minorities into academia; affirmative action issues; women and work; sexual harassment; work and personality; organizations; black student collegiate success; educational environments; learning and academic success; rise of the university; sexual minorities.

**Research Facilities.** Research facilities in the department consist of a survey research laboratory, small groups research laboratory, computer terminals and linkages to mainframe and the supercomputer, computational laboratory, and Gould Memorial Research Archive. The survey research laboratory conducts campus and community surveys. Among the topics studied are transportation, citizen attitudes, recreation, judicial evaluation, occupational destinies of graduate students, academic advisement, student, staff and

faculty attitudes, student living arrangements, changing sex roles, and student activism and political involvement.

## SOCIOLOGY

**SOC 501 Practicum in Survey Research.** (3) F, S

A research practicum in survey field work, analysis, and reporting in the Phoenix Area Study. Prerequisite: SOC 391 or equivalent.

**502 Practicum in Survey Research.** (3) F, S  
Continuation of SOC 501. Prerequisite: SOC 501.

**503 Sociology as a Profession I.** (1) F  
Becoming and working as a sociologist, including how to write a vita, choose a thesis topic, or find dissertation data. Prerequisite: graduate Sociology major.

**504 Sociology as a Profession II.** (1) S  
Becoming and working as a sociologist, including how to write a vita, choose a thesis topic, or find dissertation data. Prerequisite: graduate Sociology major.

**505 Social Statistics II: Multivariate Analysis.** (3) F, SS

Analysis of variance, multiple regression, dummy variable regression, path analysis, and related topics. Computer application to problem solving. Prerequisites: SOC 395 or equivalent; a proficiency examination.

**507 Social Statistics IIIA: Categorical Data Analysis.** (3) F

Logistic and log-linear models through computer applications. Social mobility, dynamic analysis, and discriminate analysis may also be included. Prerequisite: SOC 505 or instructor approval.

**508 Social Statistics IIIB: Structural Equation Analysis.** (3) S

Structural equation models are taught using LISREL and other computer packages. Topics include multiple group analyses and ordinal endogenous variable models. Prerequisite: SOC 505 or instructor approval.

**509 Social Statistics IIIC: Event History Analysis.** (3) F, S

Proportional hazards models and other methods for analyzing longitudinal data and establishing hazard rates of events for exploratory variables. Prerequisite: SOC 505 or equivalent.

**515 Studies of the Family.** (3) S

Current developments in the study of marriage and the family. Prerequisite: instructor approval.

**585 Development of Sociology.** (3) F

Major sociological theorists, including Durkheim, Weber, Marx, Parsons, Merton, Dahrendorf, Homans, and Mead. Prerequisite: instructor approval.

**586 Contemporary Sociological Theory.** (3) S

Analysis of major theories, including structural-functional, conflict, social exchange, symbolic interaction, and role theory. Prerequisite: instructor approval.

**587 Metasociology.** (3) S

Nature of sociological assumptions. Nature and form of sociological theories. Context of discovery-grounded theory. Context of justification. Prerequisite: instructor approval.

**588 Methodological Issues in Sociology.** (3) S

Basic methodological issues in the application of scientific methods to the study of human social life. Emphasis on limited number of major works, with contrasting approaches to issues. Prerequisite: SOC 391 or instructor approval.

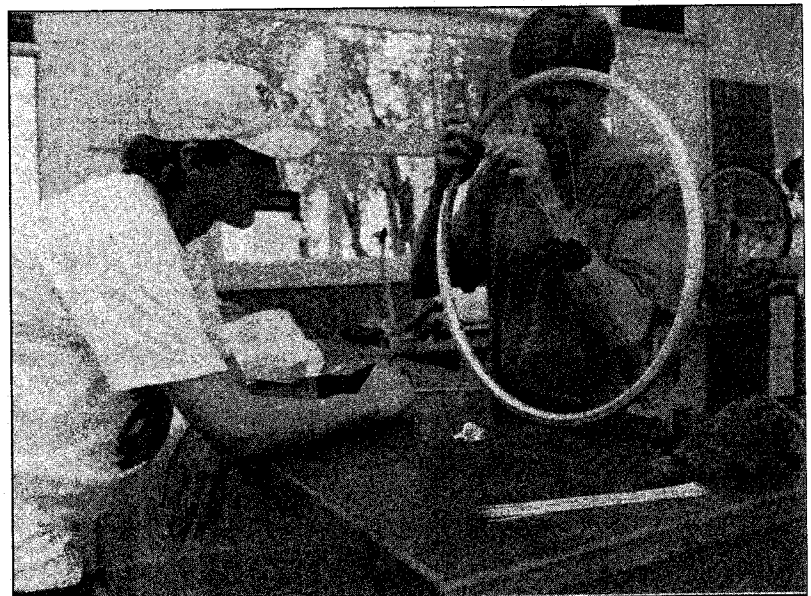
**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Spanish

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See "Languages and Literatures," pages 222-225.



## Special Education

Stanley Zucker  
Program Coordinator  
(ED 305) 602/965-6156

### PROFESSORS

FAAS, PRIETO,  
RUTHERFORD, ZUCKER

### ASSOCIATE PROFESSORS

COHN, Di GANGI, McCOY,  
NELSON, ROBERTS

The faculty in the Division of Curriculum and Instruction Special Education Program offer graduate programs leading to the Master of Arts and Master of Education. At the Ph.D. level, a concentration in special education is offered through the interdisciplinary Doctor of Philosophy degree program in Curriculum and Instruction. See pages 167-169 for more information about the Ph.D. in Curriculum and Instruction. M.Ed. degree concentrations are available in the education of gifted, mildly handicapped, the multicultural exceptional, and severely/multiply handicapped.

To be considered for admission, applicants must meet all Graduate College requirements. The applicant for master's degree program admission is required to provide the following:

1. Graduate Record Examination (GRE) test scores or Miller Analogies Test (MAT) scores;
2. three letters of recommendation;
3. a summary of professional experiences; and
4. evidence of certification in special education for applicants to the M.Ed. program. (The M.Ed. Initial Teacher Certification sequence must be pursued concurrently with the M.Ed. degree by applicants not meeting this requirement.)

The M.Ed. in Special Education requires a minimum of 36 hours of course work and a written comprehensive examination paper. The program structure includes a 12-hour methods core, a 12-hour knowledge core, and a 12-hour elective block which includes four content/theme areas: learning and instruction, diversity, foundations and values, and research and technology.

The Master of Arts program in Special Education requires at least 36 hours

of course work. A thesis is required for the M.A. degree. Candidates for the M.A. are required to take an oral examination in defense of the thesis. For students in the M.Ed. or M.A. program lacking prerequisite courses, additional course work is required.

M.Ed. Initial Teacher Certification sequences leading to standard certificates by the state of Arizona in mental retardation, learning and emotional disabilities, as well as endorsement in gifted education, are available.

Concurrent admission to the M.Ed. initial certification sequence and the M.Ed. degree is required. Students seeking initial certification by the state of Arizona in Special Education who have already completed a master's degree in another area may enroll for the M.Ed. initial certification sequence without enrolling in a second master's degree program. Contact the Office of Student Affairs for more information about specific admission requirements for the initial certification option. Further information is available in the Special Education Program Office.

### Research Activity

Faculty and student research and development activities focus on (1) improving instructional opportunities for exceptional individuals and (2) increasing the effectiveness of teachers of exceptional individuals. Recent research has included the following: academic precocity; instructional alternatives for preschool children; the cognitive development, linguistic proficiency, and academic achievement of minority students. Research focused on improving the preparation of teachers has included projects on field-based instruction, effects of practicums on skill acquisition, and evaluation of alternative forms of technology integration. Program research efforts receive support from federal, state, and private sources.

### SPECIAL EDUCATION

#### SPE 411 Parent Involvement and Regulatory Issues. (3) F, S

Emphasis on parent and school relations through effective communication and state and federal regulations impacting services for the handicapped. Prerequisites: SPE 311; majors only.

#### 455 Early Childhood and the Handicapped. (3) F

Early childhood education as it applies to the handicapped child.

**511 The Exceptional Child.** (3) F, S, SS  
Educational needs of exceptional children and adults. Not recommended for students who have completed SPE 311.

#### 512 Individuals with Mental Retardation. (3) F, SS

Etiology, diagnosis, and management of individuals with mental retardation. Current trends in prevention, programming, and teacher preparation. Not recommended for students who have completed SPE 312.

#### 514 Bilingual/Multicultural Aspects of Special Education. (3) S

Theories and issues related to the education of bilingual and culturally diverse exceptional children.

#### 515 Methods for the Remediation of Learning Problems of Exceptional Children. (3) S, SS

Methods and materials for remediating the basic academic problems of exceptional children. Prerequisites: SPE 511; a methods course in the teaching of reading and mathematics.

#### 522 Academic Assessment of Exceptional Children. (3) F

Normative and criterion referenced assessment of learning problems in exceptional children. Formative evaluation included. Practicum required. Lecture, practicum. Prerequisites: SPE 311 or 511; elementary methods courses; program approval.

#### 523 Prescriptive Teaching with Exceptional Children. (3) F

Language, reading, and arithmetic methods, techniques, and materials used in individualized instruction. Practicum required. Lecture, practicum. Prerequisites: elementary methods courses; SPE 311 (or 511), 522 (or concurrent and program approval).

#### 524 Effective Classroom Behavior Management. (3) S

Organization and delivery of instruction including formative evaluation and techniques of academic behavior management for exceptional children. Practicum required. Lecture, practicum. Prerequisites: SPE 311 (or 511), 522, 523 and program approval.

#### 525 Social Behavior Interventions. (3) S

Analysis and intervention into social behavior problems of exceptional students. Focus on strategies to change maladaptive social behavior. Practicum required. Prerequisites: SPE 311 or 511 or 522 or 523; program approval.

#### 531 Behavior Management Approaches with Exceptional Children. (3) F, SS

Behavior management approaches for classroom behavior of exceptional children. Prerequisite: SPE 511 or equivalent.

#### 536 Characteristics of Children with Behavioral Disorders. (3) F, SS

Variables contributing to behavior patterns of behaviorally disordered children.

#### 551 Teaching Young Children with Special Needs. (3) S

Methods, materials, and curriculum for preschool and primary-aged children with special needs. Prerequisites: SPE 455 and 511 or equivalents.

#### 552 Management of Individuals with Severe Handicaps. (3) S

Instruction and management of school-aged and adult individuals with severe, physical, or multiple handicaps. Prerequisites: SPE 511 or equivalent; instructor approval.

#### 553 Developmental/Functional Assessment. (3) F

Teacher-focused developmental/functional assessment of preschool and severely, physi-

cally, and multiply handicapped individuals. Field experience required. Prerequisites: SPE 511 and 512 and 574 or equivalents.

**554 The Parent/School Partnership.** (3) S Includes knowledge and procedures for involvement and training of parents and caregivers of preschool and severely handicapped individuals. Field experience required. Prerequisites: SPE 455 and 511 or equivalents.

**561 Characteristics/Diagnosis of Learning Disabilities.** (3) F, SS Theories related to learning disabilities, including identification and characteristics.

**562 Methods of Teaching Students with Learning Disabilities.** (3) N Various methods and intervention strategies for remediating learning disabilities of children and youth. Prerequisite: SPE 361 or 561.

**574 Educational Evaluation of Exceptional Children.** (3) F, SS Design and statistical considerations of normative and criterion-referenced tests. Collection, recording, and analysis of data from formative evaluation. Prerequisites: SPE 511 or equivalent; a methods course in the teaching of reading and mathematics.

**575 Current Issues in the Education of Exceptional Children.** (3) F, SS Mainstreaming, noncategorical, financing, legal diagnostic, labeling, legislative, and other critical and controversial issues related to the education of exceptional children.

**577 Mainstreaming Methods.** (3) S Successful mainstreaming methods, practical problem-solving sessions related to teacher's classroom needs, and individual contracts focusing on mainstreaming issues are addressed. General educators encouraged.

**578 Student Teaching in Special Education.** (9-15) F, S "Y" grade only. Prerequisites: completion of specified courses; approval by the special education program coordinator.

**582 Classroom Research with Exceptional Children.** (3) S Introduction to interpreting research. Specific research techniques with primary emphasis on classroom research, including applied behavior analysis.

**585 Creativity: Research and Development.** (3) S Nature of creativity explored in terms of philosophical underpinnings, empirical evidence, human development, self-actualization, and the ecology surrounding the creative event.

**586 Advising the Gifted Child.** (3) A Focus on educational planning and guidance, social and emotional development, and family problem solving regarding needs of gifted children.

**587 Controversies in Educating the Gifted.** (3) F In-depth analysis of major controversies in educating the gifted, including nature/nurture, the role of mental tests, and sex differences.

**588 The Gifted Child.** (3) F, SS Gifted children's characteristics, identification, needs, school and home environments, definitions, and misunderstandings. Research by Pressey, Stanley, Terman, and others.

**589 Methods in Teaching the Gifted.** (3) S, SS Methods in teaching elementary and secondary school gifted children, including individualized and computer-assisted instruction, team teaching. Prerequisite: SPE 588.

**774 Characteristics and Causation of Exceptionality.** (3) F In-depth analysis of literature pertaining to causes of exceptionality and learning, educational, personal-social, and cognitive characteristics. Lecture, discussion.

**775 Evaluation and Intervention in Special Education.** (3) S In-depth analysis of research and literature on evaluation procedures and intervention approaches for exceptional individuals at all age levels. Lecture, discussion.

**781 Research and Evaluation in Special Education.** (3) S Issues and problems in conducting research and/or evaluation programs involving exceptional children.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Speech and Hearing Science

### Interdisciplinary Faculty

Sid P. Bacon  
Director, Executive Committee  
(CMSC 273A) 602/965-8227

**ANTHROPOLOGY**  
Professor: Brandt

**CHEMICAL, BIO AND MATERIALS ENGINEERING**  
Assistant Professor: Kipke

**COMMUNICATION**  
Professor: Kastenbaum

**ENGLISH**  
Professors: Brink, Nilsen;  
Associate Professors: Adams, Wilkins

**FAMILY RESOURCES AND HUMAN DEVELOPMENT**  
Professor: Roosa

**NURSING**  
Professor: Melvin;  
Assistant Professor: Williams

**PSYCHOLOGY**  
Professors: Braun, Killeen, Okun,  
Parkinson, Somerville, Zautra;  
Associate Professor: Van Orden;  
Assistant Professor: Goldinger

**SPEECH AND HEARING SCIENCE**  
Professors: Bacon, Case, Dorman,  
LaPointe, Mowrer, Wilcox; Associate  
Professor: Sinex; Assistant Professors:  
Hadley, Liss, Rispoli, Sharma

The Committee on Speech and Hearing Science offers an interdisciplinary graduate program leading to the Doctor of Philosophy degree with a major in Speech and Hearing Science. Concentrations are available in developmental neurolinguistic disorders, neurogerontologic communication disorders, and

neuroauditory processes. The program is designed to prepare scholars for careers of basic and applied research in educational or health care delivery environments. The student pursues a program with the unifying theme of the influence of the neurologic system on human communication and its disorders. After a core curriculum, which may include aspects of neuroscience, methodology, or speech and hearing science, the student completes a program of study under the guidance of the program committee. As part of the interdisciplinary doctoral program, a programmatic research experience prepares the student for basic or applied research leading to the dissertation.

## DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

**Admission Requirements.** Admission to the program is competitive; therefore, applications are considered only for fall admission. Applicants typically have completed a master's degree or equivalent in speech and hearing sciences, psychology, linguistics, or a related discipline. Applicants with a bachelor's degree and a strong research background are also considered.

Applicants must submit the following materials for admission review:

1. application for Admission to the Graduate College and official transcripts of undergraduate and graduate study;
2. verbal, quantitative, and analytical scores of the Graduate Record Examination;
3. professional résumé;
4. a statement describing academic and professional goals, specifying the focus of study desired in the Ph.D. program; and
5. three letters of recommendation.

All applicants whose native language is not English must submit a score from the Test of English as a Foreign Language (TOEFL) and the Test of Spoken English (TSE). Expected minimum scores are 600 on the TOEFL and 230 on the TSE.

Application materials are reviewed beginning February 1. Applications are reviewed by a three-member interdisciplinary admissions committee. Recommendations for admission or denial are

forwarded to the dean of the Graduate College. Criteria for admission include the following:

1. evidence of high scholarship and research potential from GRE scores and previous academic record;
2. professional goals compatible with the degree program; and
3. scholarly interests compatible with one or more of the faculty active in the interdisciplinary degree program.

**Areas of Concentration.** Eighteen semester hours are taken in an area of concentration that focuses on the unifying theme of neurological or developmental/aging issues and human communication and its disorders. The student's program committee guides selection of these courses, which are concentrated in either developmental neurolinguistic disorders, neurogerontologic communication disorders, or neuroauditory processes.

**Program Committee.** The program committee consists of a chair and at least two other members appointed by the dean of the Graduate College upon recommendation of the director of the Committee on Speech and Hearing Science. Members of the program committee must represent more than one academic discipline. The purpose of the committee is to guide the student through the completion of the program of study, the initiation of programmatic research, and the comprehensive examination. Upon completion of the comprehensive examination, the student may initiate forming a dissertation committee.

**Dissertation Committee.** Upon completion of the comprehensive examination and based on the recommendation of the director of the Committee on Speech and Hearing Science, the dean of the Graduate College appoints the student's dissertation committee consisting of a chair and at least two other members. The dissertation committee must be interdisciplinary. This committee approves the design and implementation of the dissertation. Members of the program committee also may serve as members of the dissertation committee.

**Preliminary Examination.** The preliminary examination is composed minimally of the first-year research project. This project, to be completed by the end of the second semester of the first year, consists of an oral presentation and defense of the research, as well as a written manuscript. The program committee decides whether an optional written examination is necessary. The format of that examination is determined by the program committee and depends, in part, upon the background of the student. Results of the preliminary examination are used to determine shortcomings that should be offset by course electives, the level at which the student is capable of pursuing various topic areas, and whether deficiencies are of sufficient magnitude to preclude recommendation for continued doctoral study.

#### **Research Methods and Statistics.**

The student is required to demonstrate proficiency in research methods (research design, statistics, computer languages). Evidence of required proficiency may be demonstrated by examination or by successful completion of a sequence of courses designated by the program committee.

**Program of Study.** The program consists of a minimum of 54 semester hours of graduate work beyond the master's degree or 84 semester hours of graduate work beyond the bachelor's degree. Of the required semester hours, at least 24 must be research (SHS 792) and dissertation (SHS 799) credit completed at ASU. A minimum of 30 hours of the approved Ph.D. program, exclusive of dissertation and research hours, must be completed after admission to the Ph.D. at ASU.

**Comprehensive Examinations.** Near the completion of course work and before commencing dissertation research, the student is given a written examination covering the field of study. The written examination, when passed, may be followed by an oral examination.

**Programmatic Research.** Twelve semester hours of programmatic research (SHS 792) are required before the dissertation prospectus meeting. The student must conduct several studies, each representing a facet of a research problem or a step toward a progressive solution. Each component study must be

reviewed by the program committee and conducted in collaboration with a faculty member of the interdisciplinary degree program. This research program allows the doctoral student to use different methodologies in various component studies, to exercise progressively tighter experimental controls as determined by serial investigations, or to pursue significant or unexpected outcomes of a study.

This systematic or serial research program engages the student and faculty in an ongoing research activity, the components of which allow increasing discretion and independence of the student investigator. The program is designed to prepare students for careers in basic or applied research and enhance the quality of the dissertation research.

#### **Research and Dissertation Proposals.**

(1) Before conducting the programmatic research, the student is advised by the program committee on the appropriateness of the planned research. (2) Before conducting the research for the dissertation, each student must submit a dissertation proposal that is defended orally and approved by the dissertation committee.

**Dissertation Requirements.** The dissertation must consist of a fully documented written product of mature and original scholarship. It must be a significant contribution to knowledge that reflects the student's creativity and competence in independent research.

**Final Examinations.** A final oral examination in defense of the dissertation, conducted by the dissertation committee, is required.

#### **Research Activity**

Members of the Committee on Speech and Hearing Science are engaged in a variety of research activities. Current activity is in the following areas.

**Hearing.** Psychoacoustics; neurophysiology; physiological correlates of psychoacoustic phenomena; complex signal processing; effects of hearing loss on auditory perception; relationship between psychoacoustics and speech perception; speech perception in the normal and impaired auditory system; speech and auditory processing in persons with cochlear implants; amplification and hearing aids; auditory electrophysiology.



**Speech.** Phonetics and phonological theory; oral sensory perceptual physiology; speech motor control; neuromotor disorders of speech; oral-motor precursors to speech development; articulation; voice disorders; voice and speech characteristics associated with craniofacial anomalies; fluency disorders; phonological development and disorders.

**Language Science.** First and second language acquisition; language and gender; pragmatics; discourse analysis; languages in the U.S. Southwest; varieties of American English; psycholinguistics; linguistics; sociolinguistics; theoretical syntax and semantics; language and evolution; metaphor; humor; irony; metonymy; epistemology; double entendre and ambiguity; implication and inference; verbal learning and verbal behavior in nonhumans, nonverbal communication theory; psychology or reading.

**Language Disorders.** Language assessment and intervention in early childhood; language patterns in children with specific language impairment; relationships among phonological and language disorders in school-age children; language disorders in school-age children; prelinguistic interventions; acquired dyslexia and developmental dyslexia; aphasia and related neurogenic communication disorders.

**Basic and Applied Neurobehavioral Science.** Neocortex and adaptive behavior; neurophysiology; applied neural control; central sensory processes; human olfaction; neural prosthesis design and development; neuroelectric interfacing and stimulation; neural modeling and theories of timing; cortical mechanisms of learning and memory; brain mechanisms involved in chemical and mechanical senses; information processing; creative processes; cerebral lateralization.

**Developmental and Neurogenic Disabilities.** Behavioral recovery following brain damage; adaptive technology; augmentative communication programming; developmental outcomes of high-risk children; pediatric neurogenic disabilities; communication disorders associated with genetic and chromosomal abnormalities adult neurogenic disabilities; pediatric feeding interventions; communication intervention for infants and toddlers who are at-risk for or have disabilities; right hemisphere syndrome; attention and resource allocation deficits.

**Gerontology.** Aging and short-term memory; public health and social consequences of aging; life stress, emotion, and physical health; communication changes accompanying aging; geriatric communication disorders; psychosocial effects of aging; aging and intergenerational issues; effects of aging on hearing.

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## Statistics

### Interdisciplinary Faculty

Jeffrey R. Wilson  
 Director, Executive Committee  
 (BAC 570) 602/965-5628

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#### ECONOMICS

Professors: Burdick, Kirkwood, Mayer;  
 Associate Professors: Brooks, Carroll,  
 Reiser, St. Louis, Wilson

#### MATHEMATICS

Professor: Young;  
 Associate Professors: Driscoll, Lohr;  
 Assistant Professor: Prewitt

The Committee on Statistics offers a program leading to the Master of Science degree with a major in Statistics. The program is interdisciplinary in the sense that it draws upon faculty research and teaching interests from a number of academic units so that programs of study can be tailored to reflect individual needs and goals. The committee, which sets program requirements and supervises programs of study, is composed of faculty from the Department of Economics in the College of Business and the Department of Mathematics in the College of Liberal Arts and Sciences.

### MASTER OF SCIENCE DEGREE

The program for the Master of Science degree with a major in Statistics provides preparation for either a research-oriented or a practice-oriented career. Requirements specific to this program (see pages 53-55 for general requirements) ensure balanced attention to the theoretical and applied aspects of the discipline of statistics. Flexibility in the program reflects the fact that statistical analysis is one of the most widely used tools of modern scientific reasoning.

**Admission.** Applicants must satisfy the general requirements for admission to the Graduate College (see pages 44-46) and must, in addition, have three letters of academic recommendation submitted to the admissions subcommittee of the Committee on Statistics. Although most applicants earn the bachelor's degree in a quantitative area (such as statistics, quantitative business analysis, mathematics, engineering, or computer science), this is not required for admission to the program.

Applicants should have completed the following courses (equivalents at ASU are given in parentheses): calculus (MAT 270, 271, and 272), advanced calculus (MAT 371), linear algebra (MAT 342), computer programming (CSE 100 or 183), and introductory applied statistics (QBA 221 or STP 420). Applicants who lack more than two of these seven prerequisite courses should expect to be admitted with deficiencies or provisionally. The submission of the GMAT or GRE test scores is strongly recommended.

**Supervisory Committee.** Upon entering the program, the student should contact the program director for assistance in selecting a three-member supervisory committee. (Typically, the student progress subcommittee of the Committee on Statistics serves as the student's initial supervisory committee.) The faculty member who directs the student's work on the thesis or applied project must be a member of the Committee on Statistics and serves as the chair of the student's final supervisory committee.

**Program of Study.** The student's program of study must contain at least 30 semester hours of credit, none of which may be from the prerequisites and at least 18 of which must be at or above the 500 level. The program must include the nine hours from three required theory courses: theory of probability (STP 421 or QBA 560), mathematical statistics (STP 427), and theory of statistical linear models (STP 526). The program must also include either three hours of applied project (QBA 593 or STP 593) or six hours of thesis (QBA 599 or STP 599).

The remaining 15 or 18 hours may come from elective courses chosen by the student with the approval of supervising faculty. A maximum of six



hours may be chosen from a related field on which statistics relies (such as computer science) or in which statistics is an essential tool (e.g., biostatistics, quality control).

The required theory courses are fundamental to the education of statisticians and are necessary for more advanced graduate study. The elective courses allow the student to emphasize a particular area of statistical inference, culminating in an applied project report or a thesis on a topic in that area. The student has considerable flexibility in selecting an area of specialty. Possible areas of specialty include, among others, mathematical statistics, biostatistics, applied data analysis, statistical modeling, time series analysis, statistical process control, variance components analysis, statistical computing, and survey research. Sample programs of study for such areas of specialty may be obtained from the director of the program.

**Foreign Language Requirements.** None.

**Comprehensive Examinations.** None.

**Thesis Requirements.** Either an applied project or a thesis is required.

**Final Examinations.** An oral examination in defense of the applied project or thesis is required. The content of the applied project report or thesis must, in its final form, be suitable for submission to an academic journal or conference proceedings. The thesis must conform to Graduate College format requirements.

#### **Research Activity**

Research interests of the current members of the Committee on Statistics include the following: regression, variance components, generalized linear models; multivariate analysis, latent structure models, categorical data analysis; biostatistics, biomedical research; time series analysis, econometrics, statistical process control, statistical decision support systems; statistical computing, statistical graphics; panel data analysis, complex sampling designs; decision-theoretic methods, risk assessment. Students and faculty have access to excellent computing facilities, including mainframes, work stations, and personal computers running a broad selection of statistical software.

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## **Taxation**

**Philip Reckers**  
*Director*

(BA 223) 602/965-3631

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### **PROFESSORS**

BOYD, TIDWELL, WYNDELTS

### **ASSOCIATE PROFESSORS**

CHRISTIAN, O'DELL

### **ASSISTANT PROFESSOR**

GUPTA

The faculty in the School of Accountancy offer a professional program leading to the Master of Taxation degree. The M.Tax. degree is a specialized program providing persons with technical skills required to administer the tax laws in both the private and public sectors of the economy. For information concerning this degree program, refer to page 72. For research activity and courses, see pages 116-117.

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## **Teaching English as a Second Language**

**Karen L. Adams**  
*Director*

(LL C316) 602/965-3013

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### **PROFESSORS**

NEY, NILSEN

### **ASSOCIATE PROFESSORS**

ADAMS, BATES, MAJOR

### **ASSISTANT PROFESSOR**

VAN GELDEREN

The faculty in the Department of English offer a professional program leading to the Master of Teaching English as a Second Language degree (M.TESL). The M.TESL degree is a specialized program training students for the knowledge and the skills necessary to teach English as a second language. For information concerning this degree program, refer to page 72 of this catalog. For descriptions of the courses in the program, see pages 188-189.

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## **Technology**

The Master of Technology degree program is offered by the faculty in three technology departments in the School of Technology. Courses are offered at the ASU East site. The areas of concentration include aeronautical engineering technology, aeronautical management technology, electronics engineering technology, graphic communications technology, industrial management and supervision, manufacturing engineering technology, mechanical engineering technology, and welding engineering technology.

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### **Department of Aeronautical Technology**

**William H. Reed**  
*Program Coordinator*  
(EC A209) 602/965-7775

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**PROFESSOR**  
GESELL

**ASSOCIATE PROFESSORS**  
MCCURRY, REED

**ASSISTANT PROFESSOR**  
JACKSON

### **LECTURERS**

DOUGLAS, KARP, SPENCE

**PROFESSORS EMERITI**  
CARLSEN, COX, MATTHEWS,  
PEARCE, ROPER, SALMIRS,  
SCHOEN, THOMASON

**Admission.** Applicants are expected to satisfy all requirements for admission to the Graduate College. Industrial experience beyond completion of a baccalaureate degree is strongly recommended. Applicants having deficiencies or not meeting the prerequisites may be required to complete them before being admitted to the Master of Technology degree program.

**Program of Study.** All candidates for the Master of Technology degree program are required to complete 32 semester hours. Additional courses may be assigned by the supervisory committee depending on the background of the candidate.

Students must complete a minimum of 32 semester hours of approved courses. An applied project or research project is required. Upon completion of the approved course of study or during the last semester, an oral defense of the written applied or research project is required.

The program is designed for flexibility, permitting the student to select a combination of courses in a technical area and supporting area to meet individual goals.

**Final Examinations.** A final oral examination in defense of the applied or research project is required.

**Research Activity**

Aeronautical Technology faculty interests and facilities support applied research in testing aerodynamics, fixed wing and helicopter performance, reciprocating and gas turbine engine development, aviation safety, and aviation management. Research support facilities consist of reciprocating engine and jet propulsion laboratories, materials and fabrication laboratories, nondestructive inspection laboratory, and a subsonic wind tunnel. The research activities complement course work supporting Master of Technology degree program emphases in aeronautical engineering technology and aeronautical management technology. These emphases are individualized to accommodate each student's background and interests.

**AERONAUTICAL TECHNOLOGY**

*Flight instruction costs are not included in university tuition and fees.*

**AET 408 National Airspace System.** (2) F  
Airway facilities. Operations and communications, air route traffic control centers, and flight service stations. Navigation aids, airport environment, certification, and security. Prerequisites: AET 201 (or 222), 344.

**409 Nondestructive Testing and Quality Assurance.** (1) S  
Purpose of inspection and quality assurance. Theory and application of nondestructive inspection methods. Application of pertinent standards, specifications, and codes. Lecture, lab. Prerequisite: AET 280 or MET 230.

**410 Aviation Safety.** (3) F  
Aviation accident prevention, human factors, life support, fire prevention, accident investigation, and crash survivability. Development and analysis of aviation safety programs. Prerequisite: junior standing; completion of 1 semester of literacy and critical inquiry (L1) requirement.

**415 Gasdynamics and Propulsion.** (3) F  
Introduction to compressible flow, internal and external flow, and aerothermodynamic analy-

sis of propulsion systems. Prerequisites: ETC 340; MAT 262.

**417 Aerospace Structures.** (3) F  
Analysis and design of aircraft and aerospace structures. Shear flow. Semimonocoque structures. Effects of dynamic loading. Prerequisites: AET 300, 312, 320; MAT 262; MET 313.

**462 Ab Initio Theoretical Preparation VI.** (6) F, S, SS

Last of a series of six courses providing theoretical background for *ab initio* flight training. Available to *Ab Initio* Airline Pilot Flight Management majors only. Lecture, recitation. Prerequisites: AET 362, 363; senior standing. Corequisite: AET 463.

**463 Ab Initio Airline Pilot Flight Training IV.** (6) F, S, SS

Completion phase of *ab initio* airline pilot flight training. Student must demonstrate mastery of theoretical and regulatory background of flight activities and achieve a high level of competence as a pilot. Lab. Prerequisites: AET 362, 363; senior standing. Corequisite: AET 462.

**487 Aircraft Design II.** (3) S  
Basic aerodynamics and airplane performance analysis methods applied to practical design project. Prerequisite: AET 300.

**489 Airline Administration.** (2) S  
Administrative organizations, economics of airline administration, operational structure, and relationship with federal government agencies. Prerequisite: AET 308 or instructor approval.

**490 Advanced Applied Aerodynamics.** (3) S  
Study of fluid motion and aerodynamics. Essentials of incompressible aerodynamics and computational fluid dynamics. Elements of laminar and turbulent flows. Lecture, lab. Prerequisites: AET 312; ETC 100; MAT 262.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

**Department of  
Electronics and  
Computer Technology**

**Robert W. Nowlin**  
*Program Coordinator*  
(TC 301) 602/965-3137  
FAX 602/965-0723

**PROFESSORS**

MAISEL, MCHENRY, MUNUKUTLA

**ASSOCIATE PROFESSORS**

FORDEMWALT, McBRIEN,  
NOWLIN, WOOD

**ASSISTANT PROFESSORS**

LIPARI, MACIA, PETERSON, ZENG

**PROFESSORS EMERITI**

BAXTER, EDWARDS, STRAWN

The faculty in the Department of Electronics and Computer Technology offer a graduate program leading to the Master of Technology professional de-

gree with a major in Technology and a concentration in electronics engineering technology. The technical areas of study available within this concentration include electronic communication systems, digital/computer systems, systems control and instrumentation, microelectronics, and electronics engineering technology education.

**Admission and Proficiency Requirements.** General admission requirements are outlined on pages 44-46 and under the Master of Technology section on pages 72-73. Admission and proficiency requirements and course work specific to the electronics engineering technology concentration may be obtained from the department.

**Program of Study.** The minimum requirements for the Master of Technology degree offered by the Department of Electronics and Computer Technology are as follows:

Technical area of emphasis .....	17
Supporting area .....	9
Research methods course: EET 500 .....	3
Graduate seminar (EET 591) .....	1
Applied project (EET 593) .....	2
<b>Total minimum semester hours .....</b>	<b>32</b>

A minimum of 16 hours must be 500-level courses in the approved program. At least nine hours of 500-level course work must be included in the technical area of emphasis (17 hours minimum total). A maximum of two semester hours of Applied Project (EET 593) may be applied toward the 16 hour, 500-level minimum. The applied project requires a supporting technical report and is defended in a final oral examination. All course work applied toward the minimum 32 hour total must be at the 400 and 500 level, excluding courses taken to remove deficiencies.

**Research Activity**

Research activities in the Department of Electronics and Computer Technology emphasize, but are not limited to, systems and circuit applications, hardware design, fabrication and manufacturing in the technical areas of electronics engineering technology (with emphases in communication, digital or systems control and instrumentation), computer engineering technology, and microelectronics engineering technology. In addition, research activities in electrical/electronics, computer and microelectronics engineering technology

education emphasize programs and projects for students interested in post-secondary teaching in these areas.

Master of Technology degree candidates find a broad range of applied project activities of interest to students and faculty, as well as the user-public in industry and education. Faculty research interests are concentrated in, but not limited to, the general areas and topics listed below.

**Communication Systems and Circuits.** Analog and digital/data communication circuits and systems applications, antenna array systems, micro-strip techniques, MPSK signaling techniques in modern digital radio communications, coherent receivers and transponders, optoelectronic systems, microwave techniques, digital radio communications, digital signal processing and hardware design, and computer-aided design.

**Digital Circuits and Systems and Computers.** Digital systems logic design and applications, controller design and application, and programmed logic design and applications; digital IC switching circuits and logic design and applications; microcomputer and minicomputer hardware, programming, and interfacing and software systems application; computer-aided design and applications; automatic digital testing; computer process control hardware, techniques, and applications.

**Systems Control and Instrumentation.** Electrical power equipment and systems, control, and distribution; direct solar energy conversion; analog and digital process control components, instrumentation, systems, and process applications; electronic measurements and instrumentation circuits, systems, and applications; automatic test systems, test programming, and failure-tolerant design; computer-aided design; analog and digital simulation.

**Microelectronics.** Solid state device design, testing, and fabrication; monolithic bipolar and MOS and thin-film/thick-film hybrid circuit fabrication and manufacturing techniques; vacuum vapor deposition and sputtering techniques and applications; new photolithographic processes; new computer-aided interconnection techniques and imprinted circuit techniques; device and system packaging; computer-automated manufacturing techniques; new

hybrid materials and processing techniques; computer-aided design and manufacturing robotics applications.

**Engineering Technology Education.** Educational systems studies emphasizing curriculum and laboratory design and development in electronic/electrical, computer, and microelectronics engineering technology at the bachelor's and master's levels; studies involving faculty, student, administrative, and graduate characteristics; industry utilization and manpower needs; program curriculum and math science articulation requirements and characteristics; characteristics of excellence in engineering technology education; computer-aided educational design.

### ELECTRONICS ENGINEERING TECHNOLOGY

#### EET 401 Digital Filters and Applications. (3) S

Analysis and design of digital filters. Time frequency and Z-transform techniques and wave-form analysis. Computer applications. Prerequisites: EET 301; MAT 262.

**406 Control System Technology. (4) S** Control system components, analysis of feedback control systems, stability, performance, and application. Lecture, lab, computer simulations. Prerequisites: EET 301; MAT 262.

**407 Electrical Power Systems. (4) F** Electrical power systems analysis, generation, transmission, distribution, and utilization, including system protection. Lecture, lab. Prerequisite: EET 208.

**410 Linear Filters and Applications. (3) A** Frequency response and feedback design of multistage electronic circuits. Active and passive filter design. Computer analysis. Prerequisites: EET 301, 310.

**420 Operational Amplifier Theory and Application. (4) A** Differential and operational amplifiers, feedback configurations, op-amp errors and compensation, and linear and nonlinear applications. Lecture, lab. Prerequisites: EET 301, 310.

**422 Electronic Switching Circuits. (4) A** Analysis and design of electronic circuits operating in a switching mode. Waveshaping, timing, and logic. Computer simulation. Lecture, lab. Prerequisites: CET 350; EET 301, 310.

**430 Instrumentation Systems. (4) F** Measurement principles and instrumentation, techniques. Signal and error analysis. Lecture, lab. Prerequisites: EET 301, 310.

**440 Electrical Power Systems Technology. (4) S** Principles and analysis of rotating machines, transformers, and related control equipment. Lecture, lab. Prerequisite: EET 307.

**460 Power Electronics. (4) S** Analysis of circuits for control and conversion of electrical power and energy. Lecture, lab. Prerequisites: EET 301, 307, 310.

**470 Communication Circuits. (4) S** Analysis and design of passive and active communication circuits. Coupling networks, filters, and impedance matching. Modulation and demodulation techniques. Computer solutions. Lecture, lab. Prerequisites: EET 372; MAT 262.

**478 Digital Communication Systems. (3) S** Theory, design, and application of digital, data, and fiber optics communication systems. Prerequisites: EET 304, 372; MAT 262.

**501 Digital Signal Processing and Applications I. (3) F** Applications of discrete-time signals and systems, design of IIR and FIR filters using computer aided design techniques. Prerequisites: EET 401 or instructor approval; MAT 262.

**502 Digital Signal Processing and Applications II. (3) S** Application of FFT, fundamentals of probability theory and random processes, and quantization effects in digital filters. Prerequisite: EET 501.

**506 System Dynamics and Control. (3) S** Time, frequency, and transform domain analysis of physical systems. Transfer function analysis of feedback control systems performance and stability. Compensation. Prerequisites: EET 301, 501 (or MAT 262).

**508 Digital Real-Time Control. (3) A** Sample data control techniques and applications to process control. Prerequisites: CET 354; EET 406.

**510 Linear Integrated Circuits and Applications. (3) F** Analysis, design, and applications of linear integrated circuits and systems. Prerequisites: CET 350; EET 301, 310.

**522 Digital Integrated Circuits and Applications. (3) S** Analysis, design, and applications of integrated circuits and systems. Prerequisites: CET 350; EET 301, 310.

**530 Electronic Test Systems and Applications. (3) F** Analysis, design, and application of electronic test equipment, test systems, specifications, and documentation. Prerequisites: CET 354; EET 301, 310.

**540 Electrical Power Systems. (3) S** Electrical power system analysis, transmission, distribution, instrumentation, protection, and related system components. Prerequisites: EET 301, 307.

**560 Industrial Electronics and Applications. (3) A** Analysis, design, and application of special electronic devices and systems to industrial control, power, communications, and processes. Prerequisites: CET 350; EET 301, 307, 310.

**574 Microwave Amplifier-Circuits Design. (3) F** Analysis and design of microwave amplifier-circuits using s-parameter theory and computer aided design. Prerequisites: EET 304, 470.

**576 Modern Telecommunication Systems. (3) F** Applied design and integration of microwave and satellite communication systems. Prerequisites: CET 473; MAT 262; or instructor approval.

**578 Digital Filter Hardware Design.** (3) S Hardware design of FIR and IIR filters, including adaptive filters, based on DSP chips. Develop new applications using DSP microprocessor systems. Prerequisites: EET 401; CET 354.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### COMPUTER ENGINEERING TECHNOLOGY

**CET 452 Digital Logic Applications.** (4) S Design of sequential machines using system design techniques and complex MSI/LSI devices with lab. Prerequisite: CET 350.

**456 Assembly Language Applications.** (3) F Programming using BIOS and DOS routines. High level language interfacing. Disk operations, TSR routines, and device drivers. Prerequisite: CET 354.

**457 Microcomputer Systems Interfacing.** (4) S Applications of microcomputer hardware and software. Special purpose controllers, interface design. Lecture, lab. Prerequisites: CET 354; CSE 183; EET 310.

**458 Digital Computer Networks.** (3) A Network technology, topologies, protocols, control techniques, reliability and security. Prerequisite: CET 354.

**473 Digital/Data Communications.** (4) F, S Signals, distortion, noise, and error detection/correction. Transmission and systems design. Interface techniques and standards. Lecture, lab. Prerequisites: CET 354; EET 372.

**483 UNIX Utilities Using C Language.** (3) S Applications of C language to the development of practical programs for the UNIX operating system. Prerequisite: senior standing in technology or equivalent.

**485 Digital Testing Techniques I.** (3) A Hardware/software aspects of digital testing technology; systems, board and logic testing and equipment. Lecture, lab. Cross-listed as UET 485. Prerequisites: CET 350; EET 310.

**486 Electronics Computer Aided Design.** (3) F CAD/EHDL for digital logic simulations and electronic circuit designs. Various software packages will be used. Prerequisites: CET 350; EET 310.

**552 Digital Systems Design.** (3) S Digital system design techniques and applications. Prerequisite: CET 452 or instructor approval.

**556 Computer Software Technology.** (3) A Assembly language programming techniques and operations, operating system characteristics, and systems software applications. Prerequisite: CET 456.

**557 Microcomputers and Applications.** (3) F Applications of small computer systems, mini- and microcomputer hardware and software. Prerequisites: CET 354; CSE 100 or 183; EET 310.

**583 UNIX Utilities Using C Language II.** (3) S C language applications using the UNIX operating system. Also Fourth Generation languages and other UNIX utilities. Prerequisite: graduate standing in technology.

**585 Digital Testing Techniques II.** (3) F Testing technology as applied to digital systems, boards, and chips. Lecture, lab. Prerequisite: CET 354.

**586 Digital Modeling Techniques.** (3) S Digital system modeling and simulation using hardware description languages. Prerequisites: CET 350, 354.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### MICROELECTRONICS ENGINEERING TECHNOLOGY

**UET 415 Electronic Manufacturing Engineering Principles.** (3) F, S Electronic equipment design and fabrication principles and practice. Completion of electronics hardware design project and report. Lecture, lab. With lab fee. Prerequisite: EET senior standing (113 hours).

**416 Monolithic Integrated Circuit Devices.** (3) F Physics and electronics of bipolar and MOS devices used in integrated circuits. Prerequisite: UET 331. Corequisite: UET 417.

**417 Monolithic Integrated Circuit Laboratory.** (2) F Laboratory practice in the fabrication of integrated circuits. Lab. Prerequisite: UET 331. Corequisite: UET 416.

**418 Hybrid Integrated Circuit Technology.** (4) S Layout, fabrication, design, and manufacture of thin and thick film hybrid circuits. Lecture, lab. Prerequisites: EET 310; UET 331.

**432 Semiconductor Packaging and Heat Transfer.** (3) S Packaging theory and techniques; hermetic and plastic assembly; thermal management; electrical characteristics and reliability. Prerequisites: ETC 340; UET 331; or equivalents.

**437 Integrated Circuit Testing.** (3) S Principles, techniques, and strategies employed at wafer level and final product testing, both destructive and nondestructive. Prerequisite: UET 416.

**485 Digital Testing Techniques I.** (3) F Hardware/software aspects of digital testing technology systems, board and logic testing equipment. Lecture, lab. Cross-listed as CET 485. Prerequisite: CET 350; EET 310.

**513 Microelectronics Technology.** (3) S Special processes, techniques, and advances in monolithic and hybrid technology. Emphasis on manufacturing practice and product application for LSI and VLSI. Seminar. Prerequisite: UET 416.

**516 IC Processing Technology and Integration.** (3) F Monolithic IC process integration and fabrication technology. Lecture, lab. Prerequisite: UET 416.

**518 Hybrid IC Technology and Applications.** (3) S Theory, processing, fabrication, and manufacturing of hybrid microelectronics devices and products. Applications. Prerequisite: UET 331 or equivalent or instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## Department of Manufacturing and Industrial Technology

Thomas Schildgen  
Coordinator  
(TC 301T) 602/965-3781

### PROFESSORS

COLLINS, HILD,  
HOROWITZ, SCHILDGEN

### ASSOCIATE PROFESSORS

BARCHILON, DAHL, GROSSMAN,  
HIRATA, HUMBLE, KELLEY, MATSON,  
OLSON, PALMGREN, SCHMIDT

### LECTURERS

BIEKERT, OKONKWO

### PROFESSORS EMERITI

AUTORE, BROWN, BURDETTE,  
BURK, CAVALLIERE, KEITH,  
KIGIN, KISIELEWSKI, LAWLER,  
MINTER, PARDINI, PRUST, ROE,  
ROOK, SHELLER, STADMILLER,  
WATKINS, WILCOX

The Master of Technology degree program is offered by the faculty of the Department of Manufacturing and Industrial Technology through the School of Technology, in the College of Engineering and Applied Sciences. The student may select one of the five areas below to meet the concentration area requirement of 15-26 hours: graphic communications technology, industrial management and supervision (areas of study may be in safety management; hazardous materials and waste management; and interactive computer graphics), manufacturing engineering technology, mechanical engineering technology, and welding engineering technology.

**Admission.** Applicants are expected to satisfy all requirements for admission to the Graduate College. Industrial experience beyond completion of a baccalaureate degree is strongly recommended. Applicants with deficiencies or not meeting the prerequisites may be required to complete them before being admitted to the Master of Technology degree program.

**Program of Study.** All candidates for the Master of Technology degree program are required to complete a minimum of 32 semester hours of graduate credit. Additional courses may be assigned by the supervisory committee depending on the background of the candidate.

The program is designed for flexibility, permitting the student to select a combination of courses in a technical area and supporting area to meet individual goals.

**Final Examinations.** An applied project or research project is required. Upon completion of the approved course of study or during the last semester, an oral defense of the written applied or research project is required.

### Research Activity

Research interests of the faculty of the Department of Manufacturing and Industrial Technology include computer-assisted design (CAD), computer-assisted manufacturing (CAM), computer-integrated manufacturing (CIM), decision making, energy conservation system design and analysis, energy management, graphic communications, hazardous materials and waste management, interactive computer graphics, simulation and modelling of Industrial process, machinability, management, manufacturing processes, motivation, numerical control (N/C), quality control, robotics and automation, supervision, technical communications, weldability of metals, and welding-related metallurgy.

### GRAPHIC COMMUNICATIONS

**GRC 433 Production Techniques.** (3) N Systematic production planning experience. Lecture, lab. Prerequisites: GRC 333, 334.

**435 Plant Management.** (3) F Concepts, practices, and processes used by the commercial printing plant manager relating to the operation of the plant. Prerequisite: GRC 135 or instructor approval.

**436 Gravure Technology.** (3) S In-depth study of the market profile and production sequences related to the gravure method of printing. Prerequisite: GRC 336.

**437 Advanced Color Reproduction.** (3) F Scientific analysis for the engineering of color reproduction systems used in the graphic arts industry. Field trips. Prerequisite: GRC 336.

**438 Graphic Arts Techniques and Processes.** (3) F, S, SS Survey of production sequences and profile of the printing and publishing industry. Lecture, lab. Prerequisite: junior standing.

**439 Electronic Publishing Systems.** (3) S The study of electronic publishing systems and how text and graphics are integrated into a publication using desktop publishing technologies.

**537 Current Issues in Quality Assurance.** (3) N Directed group study of selected issues relating to quality assurance in the printing and publishing industry.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### INTERACTIVE COMPUTER GRAPHICS

**ICG 412 Computer Graphics Modeling.** (3) F Establishing and manipulating 3-dimensional computer models. Applications, including solids modeling concepts, design analysis, dynamic simulation, and graphic data exchange files. Lecture, lab, field trips. Prerequisite: ICG 312. *General Studies: N3.*

**413 MicroCADD Applications.** (3) F Student selected modules, including architectural, construction, civil utility, and electronic drawing; mechanical manufacturing, animation, computer graphics, and others. Lecture, lab, field trips. Prerequisite: ICG 212.

**417 Graphics Systems Management.** (3) S Planning, implementing, and managing computer graphics systems. Applications, needs assessment, analysis of components, system ergonomics, interfacing, maintenance, and human resources management. Lecture, lab, field trips. Prerequisite: instructor approval.

**461 Computer Animation.** (3) F Fundamental technology used in creating 2-dimensional and 3-dimensional animation through modeling, scripting, and rendering as related to engineering simulation. Lecture, lab, field trips. Prerequisite: ICG 310 or instructor approval.

**517 Graphics Systems Development.** (3) S Research and development in computer graphics systems. Applied project management, development, evaluation, and implementation. Lecture, lab, field trips. Prerequisite: ICG 412 or instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### INDUSTRIAL MANAGEMENT AND SUPERVISION

**IST 402 Industrial Laws, Contracts, and Regulations.** (3) F Review of city, state, county, and federal laws that affect industrial and construction operations, materials, supplies, and acquisition procedures.

**430 Ethical Issues in Technology.** (3) N Topics in social responsibility for industrial technology and engineering.

**445 Industrial Internship.** (1-10) F, S, SS Work experience assignment in industry commensurate with student's program. Specialized instruction by industry with university supervision. Prerequisites: advisor approval; junior status; 2.50 GPA.

**451 Materials Control.** (3) N Activities of material handling, including purchasing, receiving, warehousing, traffic, plant layout, inventory, and production control and shipping relating to technical procedures.

**452 Industrial Human Resource Management.** (3) F, S Concepts and practices of human resource management in a global industrial environment.

**453 Safety Management.** (3) N Development and management of safety programs, education and training, and relationships within an organization. Prerequisite: ITC 343 or instructor approval.

**454 Occupational Hygiene.** (3) S Offers an overview of occupational health hazards, their recognition, evaluation, and control. Discusses how industries are regulated and how occupational health standards are promulgated. Prerequisites: CHM 101 or 113 or 114; MAT 170.

**455 Industrial Sales and Demand.** (3) N Customer and sales strategies for industrial organizations, including current practice and future planning. Prerequisites: ECN 111; advisor and instructor approval; junior standing.

**461 Production Supervision Principles.** (3) F Introduction to supervisory principles as applied to production of goods and services. Prerequisite: ITC 444.

**480 Organizational Effectiveness.** (3) F, S Human aspects of supervisory behavior in the industrial setting and how they influence efficiency, morale, and organizational practice. Prerequisite: IST 346.

**491 Introduction to Labor Concerns.** (3) S Introduction to labor relations, organization of labor unions and federations, collective bargaining, grievances and arbitration, and applicable labor legislation.

**501 Principles of Hazardous Materials and Waste Management.** (3) F Foundation for courses in curriculum. Topics include definitions of toxic and hazardous substances and wastes, RCRA classification, and OSHA criteria. Pre- or corequisites: CHM 113 and 115; MAT 170.

**502 Regulatory Framework for Toxic and Hazardous Substances.** (3) F Provides an in-depth examination of federal, state, and local regulations and requirements for hazardous materials and wastes. Includes an overview of legislative history and trends, industry's role in regulatory development, and its impact. Prerequisite: IST 501.

**503 Principles of Toxicology.** (3) S Interaction of chemicals with life and environment. Mechanisms of toxic action, dose-response relationships, toxicity testing models, predictive toxicology, epidemiology. Prerequisite: CHM 113 and 115.

**504 Technology for Storage, Treatment, and Disposal of Hazardous Materials.** (3) F Current and state-of-the-art technologies, and future trends for storage, treatment, and disposal of hazardous materials and waste. Prerequisites: CHM 113 and 115; IST 501.

**505 Quantitative Analysis and Practical Laboratory Techniques.** (3) F, S Examines lab techniques for evaluation of hazardous materials, and discusses how to interpret data from analytical processes and



regulatory lab requirements like SW 846. Lab will be arranged off site. Prerequisites: CHM 101 or 113 or 114; MAT 170.

**506 Chemistry of Hazardous Materials.** (3) F

Chemical information needed for handling spilled hazardous substances. Response needs for oxidizers, organics and inorganics, and basic toxicology needs. Prerequisites: CHM 113 and 115; IST 501; MAT 170. Corequisite: CHM 231.

**522 Air Pollution and Toxic Chemicals.** (3) F

Examines issues in the measurement analysis and control of toxic chemicals in air pollution. Prerequisites: CHM 113 and 115; IST 501; MAT 170.

**523 Soils and Groundwater Contamination.** (3) N

Theoretical and practical hydrogeology as it applies to cleaning up contamination. Investigative techniques, monitoring, risk assumptions, and assessment methodology. Prerequisites: CHM 113 and 115; IST 501; MAT 170. Corequisite: CHM 231.

**524 Emergency Preparedness, Response, and Planning for Hazardous Materials.** (3) S

In-house or on-site emergency response contingency planning. Preemergency assessment, resources for cooperation, equipment requirements, and coordination with other agencies. Prerequisites: CHM 113 and 115; IST 501; MAT 170.

**525 Risk Assessment for Hazardous Materials.** (3) F

Examines the risk assessment process and its application in various situations ranging from citing hazardous facilities regulation to control of toxic substances in the environment. Prerequisites: CHM 101 or 113 or 114; IST 501; MAT 170.

**526 Current Issues: Radon, Asbestos.** (3) S

Deals with the latest up-to-date topics in toxics management. New subjects may be added and others deleted as issues of the day become apparent. Prerequisites: CHM 101 or 113 or 114; IST 501; MAT 170.

**527 Environmental/Resources Regulations Concepts.** (3) S

Covers development of environmental, natural resources and water law, from common law to modern statutory requirements. Specifics on Superfund, hazardous materials and toxics regulations and liability contracts. Prerequisites: CHM 101 or 113 or 114; IST 501.

**542 Global Management Philosophies.** (3) N

Analysis and comparison of significant supervision philosophies developed in various industrial nations and their potential application in the United States.

**549 Research Techniques and Applications.** (3) F, S

Selection of research problems, analysis of literature, individual investigations, preparing reports, and proposal writing.

**550 Industrial Training.** (3) N

Training techniques and learning processes. Planning, developing, and evaluating training programs in industry and governmental agencies. Prerequisite: advisor approval.

**570 Project Management.** (3) S

Planning, organizing, coordinating, and controlling staff and project groups to accomplish the project objective.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

### MANUFACTURING TECHNOLOGY

**MET 401 Statistical Process Control.** (3) S

Introduction to statistical quality control methods as applied to tolerances, process control, sampling, and reliability. Prerequisite: MAT 117 or 170.

**420 Welding Metallurgy I.** (4) N

Metallurgical principles applied to structural and alloy steel and aluminum weldments; laboratory emphasis on welding experiments, metallography, and mechanical testing. Lecture, lab. Prerequisites: MET 300, 302.

**421 Welding Metallurgy II.** (3) N

Metallurgical principles as applied to stainless steel, super alloy, titanium, and other refractory metal weldments and braze joints. Prerequisite: MET 300.





**432 Applied Thermodynamics and Heat Transfer.** (3) F, S

Thermodynamics of mixtures. Combustion process. Applications of thermodynamics to power and refrigeration cycles. Heat transfer, including steady state conduction, convection, and radiation. Prerequisite: ETC 340.

**433 Thermal Power Systems.** (4) N

Analysis of gas power, vapor power, and refrigeration cycles. Components of air conditioning systems. Direct energy conversion. Psychrometry. Analysis of internal combustion engines and fluid machines. Lecture, lab. Prerequisite: MET 432 or instructor approval.

**434 Applied Fluid Mechanics.** (3) N

Fluid statics. Basic fluid flow equations. Viscous flow in pipes and channels. Compressible flow. Applications to fluid measurement and flow in conduits. Prerequisite: ETC 340.

**436 Turbomachinery Design.** (3) N

The application of thermodynamics and fluid mechanics to the analysis of machinery design and power cycle performance predictions. Prerequisite: MET 432 or instructor approval.

**438 Design for Manufacturing II.** (4) F

Application of mechanics in design of machine elements and structures. Use of experimental stress analysis in design evaluation. Lecture, lab. Prerequisite: AET 312 or MET 331 or instructor approval.

**442 Specialized Production Processes.** (3) F

Nontraditional manufacturing processes, emphasizing EDM, ECM, ECG, CM, PM, HERF, EBW, and LBW. Prerequisite: MET 230.

**444 Production Tooling.** (3) F

Fabrication and design of jigs, fixtures, and special industrial tooling related to manufacturing methods. Lecture, lab. Prerequisite: MET 345.

**448 Expert Systems in Manufacturing.** (3) F

Introduction to expert systems through conceptual analysis, with an emphasis on manufacturing applications. Prerequisite: MET 231.

**452 Implementation of Robots in Manufacturing.** (3) N

Robotic workcell design, including end effectors, parts presenters, and optimum material flow. Prerequisite: MET 451 or instructor approval.

**453 Robotic Applications.** (3) S

Lab course utilizing robots and other automated manufacturing equipment to produce a part. Students are required to program robots, as well as interface the robots with other equipment. Prerequisite: MET 303 or 325 or instructor approval.

**461 Manufacturing Capstone Project II.** (3) S

Small-group projects applying manufacturing techniques, with an emphasis on demonstrating state-of-the-art technology. Lecture, lab. Prerequisite: MET 460 or instructor approval.

**462 Capstone Project/Weldment Design.** (3) S

Design of welded structures and machine elements in terms of allowable stresses, joint configurations, process capabilities, and cost analysis; welding procedures emphasized. Prerequisites: MET 302, 313.

**517 Applied Computer Integrated Manufacturing.** (3) F

Techniques and practices of Computer Integrated Manufacturing, with an emphasis on Computer-Aided Design and Computer-Aided Manufacturing. Prerequisite: MET 346 or instructor approval.

**542 N/C Computer Programming.** (3) F

Theory and application of computer-aided N/C languages with programming emphasis with APT and suitable postprocessors. Application case studies are included. Lecture, lab. Prerequisite: MET 346 or instructor approval.

**552 Introduction to Robotics.** (3) F

Introduction to industrial robots. Topics included are robot workspace, trajectory generation, robot actuators and sensors, design of end effectors, and economic justification. Application case studies. Prerequisite: MET 303 or instructor approval.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Theatre

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(GHALL 232) 602/965-5359

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**PROFESSORS**

AKINS, BARTZ, BEDARD, KNAPP,  
MASON, SALDAÑA, THOMSON,  
J.R. WILLS, WRIGHT

**ASSOCIATE PROFESSORS**

BARKER, EDWARDS, ENGEL,  
HOLLOWAY, RISKE, SAKREN, VINING

**ASSISTANT PROFESSORS**

ACKER, HOOD, THOMSEN

**ACADEMIC PROFESSIONAL**

B. WILLS

**PROFESSORS EMERITI**

DOYLE, YEATER

The faculty in the Department of Theatre offer graduate programs leading to the Master of Arts, the Master of Fine Arts and the Doctor of Philosophy degrees with a major in Theatre. Areas of concentration are acting, scenography and theatre for youth at the M.F.A. level (see pages 61-64) and theatre for youth at the Ph.D. level. Students may also pursue an interdisciplinary program leading to the Master of Fine Arts degree with a major in Creative Writing. This program is offered by the faculties in the Departments of English and Theatre. (See pages 186-189.)

**MASTER OF ARTS DEGREE**

See pages 53-55 for general requirements.

The Master of Arts degree with a major in Theatre is a flexible program of advanced theatre studies that provides preparation, for teaching in secondary schools and colleges, and for graduate study beyond the master's level. The program primarily emphasizes theoretical studies; however, the exceptional student may be allowed to choose the practical application of theatre skills in directing.

**Admission.** Applicants must meet all admission requirements of the Graduate College. In addition, the Department of Theatre requires comprehensive undergraduate preparation in theatre (at least a Theatre minor or its equivalent), acceptable scores on either the Graduate Record Examination (GRE) or Miller Analogies Test (MAT), and three letters of recommendation. Those seeking admission to specialize in directing must be interviewed by a representative from the directing faculty. Dates and times may be arranged through the Department of Theatre.

**Application Deadline.** The first deadline for receipt of applications and test scores is March 1. After that date, admission is subject to space availability.

**Deficiencies.** Deficiencies in undergraduate preparation (not to exceed 12 hours) may be removed while pursuing the M.A. degree; courses taken to remove deficiencies may not be counted toward the degree.

**Program of Study.** Normally, the core courses are THE 500, 504, 505, 520, and 521. Additional course work to complete the degree is selected by the student with the approval of the supervisory committee. Theatre courses must be completed with a grade of "B" or better. A thesis or equivalent is required.

**Foreign Language Requirements.** Optional, depending upon research area, and with the approval of the supervisory committee.

**Thesis or Equivalent Requirements.** For students electing to prepare a thesis, the program consists of a minimum of 24 semester hours of graduate work

and three hours each of thesis (599) and research (592) credit. Normally, 15 semester hours on the program of study are in 500-level courses and at least 20 semester hours must be in the major field. The thesis is especially recommended for students planning to continue graduate study beyond the master's degree and may be elected with the approval of the supervisory committee.

For students electing to prepare a thesis equivalent, the program consists of 36 semester hours of graduate work, of which six hours are research (592) credit, and three hours of THP 593 Applied Project. Each student develops an approved project and supports this project with a written document. The document (thesis equivalent) is bound and placed in the University Library. In addition, at least 18 semester hours of course work on the program of study must be 500-level courses and 20 semester hours must be in the major field.

**Final Examinations.** Both final written and oral examinations are required of all candidates. The written examination is comprehensive; the oral examination is a defense of the thesis or equivalent.

#### MASTER OF FINE ARTS

See pages 61-64 for program descriptions and requirements.

#### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

The Doctor of Philosophy degree is designed to give students a broad knowledge of theatre as well as special research, production and teaching skills in theatre for youth. A detailed description of the program may be obtained from the Department of Theatre.

**Admission.** Applicants must meet all admission requirements of the Graduate College. In addition, the Department of Theatre requires a master's degree in theatre or education; a minimum of 36 hours of undergraduate and graduate course work in theatre (to include courses in dramatic literature, acting, directing, stagecraft, improvisation with youth, theatre for children, children's literature, research methods, theatre history, and theatre theory/criticism); acceptable scores on the Gradu-

ate Record Examination, acceptable scores on the TOEFL (where applicable); and three letters of recommendation. Teaching certification at the elementary or secondary level is strongly recommended but not required.

**Application Deadline.** The first deadline for receipt of applications and test scores is March 1. After that date admission is subject to space availability.

**Program of Study.** A total of 90 semester hours is required for this degree, consisting of

1. a minimum of 66 hours of graduate course work (including a maximum of 30 semesters accepted from the first year of graduate study, a core of 15 semester hours of required courses, and 21 semester hours of elective and research credits);
2. a comprehensive examination; and
3. 24 semester hours of research and dissertation preparation.

A minimum of 30 semester hours of the approved Ph.D. program, exclusive of dissertation and research hours, must be completed after admission to the Ph.D. at ASU.

In meeting these requirements, students, with the advice of the supervisory committee, may select theatre courses in areas such as theatre education, directing, acting, design, playwriting, theatre history, and theatre theory/criticism, in addition to tutorial courses as well as courses offered by other departments in areas such as pertinent research methodologies, educational theory and methodology, aesthetic theory, the arts and arts education, oral interpretation, and children's literature. Students are encouraged to be involved in on- and off-campus production and teaching. All activities are selected to help students meet the goals of the program and develop the capability of becoming leaders in the field.

#### Research Technique Requirement.

Students must successfully complete a second graduate level course in qualitative or quantitative research, or they must successfully pass an examination in a foreign language approved by their committee.

**Preliminary Reviews.** Reviews of a student's performance in courses and development of research skills, artistic skills, and teaching competencies are

conducted by the supervisory committee at the end of each semester.

**Comprehensive Examinations.** This exam is comprised of written and oral components centering upon: theatre history, literature, and criticism; theatre for youth and theatre in education; and the research area.

**Dissertation Requirements.** A dissertation based on original work of high quality and demonstrating proficiency in the student's special field is required. (See dissertation requirements, pages 73-74.)

**Financial Assistance.** University scholarships, fellowships, grants, and other forms of financial assistance are available as outlined on pages 39-40 in this catalog. Graduate assistantships are granted by the Department of Theatre; application forms and information concerning graduate assistantships are available through the director of graduate studies, Department of Theatre. A current resume and a minimum of three letters of recommendation must accompany applications for graduate assistantships.

#### Research Activity

Recent and continued research by members of the Department of Theatre includes the following: workshops and production of new scripts for audiences of all ages and cultural backgrounds; voice production; study and performance of Shakespeare; history of American theatre; new production utilization in lighting, scene design and production; aesthetic education; implementation of national standards and assessment for theatre education K-12; teacher training; history; criticism; and theory of theatre for youth.

#### THEATRE

**THE 400 Focus on Film.** (3) N Specialized study of prominent film artists, techniques, and genres. Emphasis is on the creative process. May be repeated for credit. Prerequisite: ENG 101 or 105.

**401 Focus on Multiethnic Film.** (3) F, S, SS Specialized study of major ethnic films and prominent film artists. Emphasis is on the creative process. Lecture, film viewing, papers. Prerequisite: ENG 101. *General Studies: HU, C.*

**420 History of the American Theatre.** (3) F History of the plays, artists, and events in the development of American theatre from colonial to modern times. *General Studies: HU, H.*

**421 History of the English Theatre.** (3) S  
History of the plays, artists, and events in the development of the theatre in England since the Restoration. *General Studies: L2/HU.*

**424 Trends in Theatre for Youth.** (3) N  
A survey of the history, literature, and contemporary practices in theatre for youth.

**425 History of Asian Theatre.** (3) N  
History and production techniques of theatre forms in India, China, and Japan. Prerequisite: 6 hours of theatre history or instructor approval. *General Studies: L2/HU.*

**430 History of Costume: Western Tradition.** (3) N  
Study of major costume styles throughout history of Western civilization and how these fashions reflected society. Exploration of how styles can be used by theatrical costumers.

**431 History of Costume: Non-Western Tradition.** (3) N  
Study of major costume styles of India, Asia, Eastern Europe, and the Middle East and how these fashions reflected society. Exploration of how styles can be used by theatrical costumers.

**480 Methods of Teaching Theatre.** (4) F  
Methods of theatre instruction at the secondary school level.

**500 Research Methods.** (1-3) F  
Introduction to graduate study in theatre.

**504 Studies in Dramatic Theory and Criticism.** (3) F  
Dramatic theory, criticism, and aesthetics from the classical period to the 19th century. Related readings in dramatic literature. Prerequisite: Theatre major.

**505 Studies in Dramatic Theory and Criticism.** (3) S  
Dramatic theory, criticism, and aesthetics from the 19th century to the present. Related readings in dramatic literature. Prerequisite: Theatre major.

**510 Studies in Literature.** (1) F, S  
Assigned individual reading programs in standard sources and masterpieces in theatre literature. Topics may be selected from the following:

- (a) Acting-Directing
- (b) Design-Technical
- (c) History
- (d) Criticism

May be repeated for credit in different sections.

**520 Theatre History and Literature I.** (3) F  
A survey of historiographical issues, historical periods, and theatre literature, through the 17th century.

**521 Theatre History and Literature II.** (3) S  
A survey of historiographical issues, historical periods, and theatre literature, from the 17th century to present.

**524 Advanced Studies in Theatre for Youth.** (3) F  
An in-depth study of the history, literature, and contemporary practice of theatre for youth. Prerequisite: instructor approval.

**591 Seminar.** (3) A  
Selected topics in child drama, community theatre, and theatre history. Prerequisite: written instructor approval.

**700 Advanced Research Methods.** (3) F  
Critical review of research, development, and design of research in theatre and theatre for youth.

**791 Seminar.** (3) N  
Selected topics offered on a revolving basis. May be repeated for credit when topic changes.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

## THEATRE PERFORMANCE AND PRODUCTION

**THP 401 Theatre Practicum.** (1-3) F, S, SS  
Performance and production assignments for advanced students of acting, technical production, stage and business management, and design. May be repeated for credit. Prerequisite: instructor approval.

**406 Scenography.** (3) N  
The process of production collaboration. Taught in conjunction with THP 419. Prerequisites: THP 430, 440, and 445 or instructor approval.

**410 Acting: Advanced Classical Scene Study.** (3) S  
Rehearsal and performance of period, classical, and nonrealistic plays. Emphasis on delivery of poetic language. Prerequisites: THP 310 and acting emphasis or written instructor approval.

**411 Advanced Studies in Improvisation with Youth.** (3) S  
Application of theories, techniques, and materials. Regular participation with children. Prerequisite: THP 311 or instructor approval.

**414 Directing: The Production Concept.** (2) A  
Play analysis, development, and implementation of the director's concept. Studio. Prerequisites: THP 315 and instructor approval.

**415 Directing the Actor.** (3) A  
Practical applications of directing for the stage. Rehearsal and presentation of scenes and short plays. Prerequisites: THP 414 and instructor approval.

**419 Pre-production Workshop: Director/Designer Collaboration.** (3) A  
Study and practice of the collaborative process necessary for developing a production concept. Various styles (realism, nonrealism, theatre for youth). Taught in conjunction with THP 406/506; cannot be enrolled concurrently with THP 406 or 506. Prerequisite: THP 415 or written instructor approval.

**430 Costume Design.** (3) N  
Principles of costume design, with projects in both modern and period styles. Prerequisite: THP 330.

**431 Advanced Costume Construction.** (3) A  
Specialized training in costume construction problems and crafts with projects in tailoring, millinery, and period accessories. Prerequisites: THP 330 and 331 or instructor approval.

**435 Advanced Technical Theatre.** (3) A  
Selection of materials, drafting of working drawings, tool operation, and construction techniques. 2 hours lecture, 2 hours lab. Prerequisites: THP 340 and 345 or instructor approval.

**440 Advanced Scene Design.** (3) A  
Advanced studio projects in designing scenery for a variety of stage forms. Prerequisite: THP 340 or instructor approval.

**441 Scene Painting.** (3) N  
Studio projects in painting stage scenery. Prerequisite: THP 340 or instructor approval.

**442 Drawing.** (3) N  
Techniques in drawing and rendering for scenic, costume, and lighting design. Prerequisite: instructor approval.

**444 Drafting for the Stage.** (3) N  
Fundamentals of and practice in graphic techniques for the stage. Introduction to Computer Aided Design for the stage. 2 hours lecture, 3 hours studio. Prerequisites: THP 213; instructor approval.

**445 Advanced Lighting Design.** (3) N  
Specialized techniques in stage lighting, including Computer Aided Design. 2 hours lecture, 2 hours lab. Prerequisite: THP 345 or instructor approval.

**450 Theatre Organization and Management.** (3) N  
Box office, publicity, production budgeting, and house management procedures. Prerequisite: THE 104 with a grade of "C" or better.

**460 Playwrights Workshop.** (3) F, S  
Practice and study of creating characters, dialogue, scenes, plays, and monologues for the stage. May be repeated for credit. Studio, lecture. Prerequisite: written instructor approval.

**461 Scripts-in-Progress.** (3) F, S  
Studio work with the instructor, centered on revisions of original plays. Preparing the script for productions, and rewriting while in production. May be repeated for credit. Studio. Prerequisite: THP 460 or written instructor approval.

**472 Advanced Movement for the Stage.** (2) F  
Movement techniques for the classical and nonrealistic theatre. Prerequisites: THP 370; acting emphasis or instructor approval.

**477 Advanced Voice for the Stage.** (2) F  
Exercises to develop vocal flexibility and power; mastery of elevated American diction and language skills applied to classical and nonrealistic drama. Prerequisites: THP 370; acting emphasis or instructor approval.

**481 Secondary School Play Production.** (3) F  
Methods of directing, designing, and coordinating play production experiences at the secondary school. Off-campus practicum. Prerequisites: THP 315 and acceptance to the Professional Teacher Preparation Program or written instructor approval.

**494 Special Topics.** (1-4) A  
Topics may be selected from the following:

- (a) Advanced Acting Techniques
- (b) Curriculum and Supervision of Theatre in the School K-12
- (c) Puppetry in Performance
- (d) Storytelling
- (e) Advanced Scene Painting
- (f) Technical Theatre III
- (g) Properties and Dressings Design and Construction
- (h) Video and Industrial Scene Design
- (i) Advanced Stage Management

**498 Pro-Seminar.** (1-6) A  
Topics may be selected from the following:

- (a) Projects:
  - Scenery Design
  - Lighting Design
  - Costume Design
  - Properties Design
  - Technical Direction

- (b) Directing  
(c) Stage Management  
(d) Theatre in Education  
(e) Theatre for Youth Tour  
Prerequisite: written instructor approval.
- 501 Acting I.** (2) F  
Development of fundamental techniques of concentration, listening, action, imagination, emotional preparation, and a common vocabulary. Studio. Prerequisite: admission to M.F.A. Acting program or instructor approval.
- 502 Acting II.** (3) S  
Script analysis and performance techniques for 18th and 20th century realism and naturalism. Studio. Prerequisite: THP 501 or instructor approval.
- 503 Acting III.** (3) F  
Script analysis and performance techniques for style: Greek, Shakespearean, and Restoration. Studio. Prerequisite: THP 502 or instructor approval.
- 504 Acting IV.** (3) S  
Performance techniques for the latest developments in the field: new scripts, new theatres, performance art, and new vaudeville. Studio. Prerequisite: THP 503 or instructor approval.
- 506 Scenography.** (3) N  
The process of production collaboration. Taught in conjunction with THP 419. Prerequisite: theatre graduate standing or instructor approval.
- 507 Speech I.** (1) F  
Development of precision for intelligibility; phonetic studies introduced as basis for standard speech, classical texts, and dialects. Studio. Prerequisite: Admission to M.F.A. Acting program or instructor approval.
- 508 Multiethnic Workshop.** (3) F, S  
Advanced workshop for development and presentation of works originating out of American ethnic cultures. Lecture, lab.
- 509 Singing for Actors.** (1) F, S  
Introduction of the basics of singing technique. Breath control, resonance, articulation, exploration, and expansion of singing range. May be repeated for credit. Studio. Prerequisite: admission to M.F.A. Acting program or instructor approval.
- 510 Speech II.** (2) A  
Text analysis. Introduction to verse drama through the study of Shakespearean texts, including work on scansion, meaning, and structure of verse. Studio. Prerequisite: THP 507 or instructor approval.
- 511 Improvisation with Youth Workshop.** (3) S  
Readings in textual materials for creative drama, alternative methods and materials for drama with children, and special populations. Practicum included. Prerequisites: THP 311 or graduate standing and instructor approval.
- 512 Puppetry Workshop.** (3) A  
Survey of puppetry in education, puppetry as an art form in design, and performance. Lab fee required.
- 515 Problems in Directing.** (3) S  
Analysis of common directing problems. Topics include: creating the ensemble, conceptual unity, metaphor, nonliteral strategies, and organizational responsibilities of the director. Prerequisite: instructor approval.
- 517 Stage Management Practicum.** (3) F  
Readings and research in stage management and participation as a stage manager in a University Theatre production. Prerequisite: written instructor approval.
- 519 Directing: Works in Progress.** (3) F  
Advanced projects in directing concentrating on a collaborative process between director, playwright, actors, and designers. Focus is primarily on new scripts or adaptations of literature. May be repeated for credit. Studio, on-site practicum. Prerequisites: graduate standing; written instructor approval.
- 530 Advanced Costume Design.** (3) N  
Advanced studio projects in costume design for a variety of production forms. Prerequisite: instructor approval.
- 540 Scene Design Applications.** (3) N  
Conceptual and practical application of the design process including graphic and sculptural projects. Practical design problems investigated in laboratory. Lab fee. Prerequisite: instructor approval.
- 545 Lighting Design Applications.** (3) N  
Advanced studio projects in stage lighting design. Prerequisite: instructor approval.
- 570 Movement I.** (2) F  
Development of a relaxed, neutral instrument and an exercise program to increase strength, stamina, and flexibility. Studio. Prerequisite: admission to M.F.A. Acting program or instructor approval.
- 571 Movement II.** (2) A  
Development of the organic connection between the body and other primary actor tools: voice, imagination, emotions, and intellect. Studio. Prerequisite: THP 570 or instructor approval.
- 572 Movement III.** (3) F  
Development of physical skills necessary to perform roles from various periods, largely focusing on Restoration, 18th century comedy, and Moliere. Studio. Prerequisite: THP 571 or instructor approval.
- 573 Movement IV.** (3) S  
Development of special physical skills such as combat, tumbling, and prat falls, as well as movement demands to Shakespearean and Jacobean texts. Studio. Prerequisite: THP 572 or instructor approval.
- 575 Voice I.** (1) F  
Development of a clear, resonant voice free of breathiness or pressing, through exercises in alignment, relaxation, breathing, and shaping the vocal tract. Focus on linking vocal, emotional, and physical release and avoiding inefficient vocal/emotional imploding. Studio. Prerequisite: admission to M.F.A. Acting program or instructor approval.
- 576 Voice II.** (2) S  
Continued development of a resonant voice with a focus on tuning the resonator and energetic articulators. Introduction of vocal extension techniques in volume, pitch, and tonal coloration. Work on imagery and the emotive power of pure sounds in poetic and Greek texts. Studio. Prerequisite: THP 575 or instructor approval.
- 577 Voice III.** (2) F  
Introduction to character voices. Work on non-realistic texts, including Restoration, 18th century comedy, Moliere, and other style texts. Studio. Prerequisite: THP 576 or instructor approval.
- 578 Voice IV.** (2) S  
Introduction to the demands of verse drama through the study of scansion and to the meaning and structure of verse in Elizabethan and Jacobean texts. Continued work on vocal extension with focus on vocal variety. Studio. Prerequisite: THP 577 or instructor approval.
- 581 Speech III.** (1) F  
Continuation of studies in speech for improvement of intelligibility, diction, and dialects. Studio. Prerequisite: THP 510 or instructor approval.
- 582 Speech IV.** (1) S  
Advanced studies in speech, phonetics and poetic language, concentrating on the works of William Shakespeare. Studio. Prerequisite: THP 581 or instructor approval.
- 584 Internship.** (1-3) A  
Field research and on-site training in theatre for youth, community theatre, and production techniques. Prerequisite: written instructor approval.
- 593 Applied Projects.** (1-12) A  
Prerequisite: instructor approval.
- 594 Conference and Workshop in Child Drama.** (3) A  
Prerequisite: instructor approval.
- 598 Special Topics.** (1-4) A  
Topics may be selected from the following:  
(a) Acting;  
(b) Directing;  
(c) College Teaching: acting, movement, voice, dramatic analysis, puppetry, and improvisation with youth; or  
(d) Works in progress: playwright, actor. Lecture and studio.
- 611 Improvisation with Youth Seminar.** (3) A  
Examination of current theory and practices in the field. Prerequisite: instructor approval.
- 618 Directing Practicum.** (3) A  
Practical experience in directing and producing an entire play or musical for young audiences. Prerequisite: instructor approval.
- 649 Design Studio.** (3) F, S  
Projects include design of scenery, costume, lighting, or sound for laboratory or mainstage productions. May be repeated for credit. Prerequisite: instructor approval.
- 684 Internship.** (3-6) F, S, SS  
Field research in acting, improvisation with youth, theatre for youth, puppetry, and scenography. Prerequisite: instructor approval.
- 691 Seminar: Scenography.** (3) N  
Examination of and research into modern concepts and practices of scenography. Prerequisite: instructor approval.
- 693 Applied Project.** (1-12) F, S, SS  
Final projects for M.F.A. Theatre candidates in acting, scenography, and theatre for youth. Prerequisite: instructor approval.
- Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.

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## Theory and Composition

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See "Music," pages 239-241.

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### Zoology

James P. Collins  
*Chair*  
 (LS C226) 602/965-3571

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#### REGENTS' PROFESSORS

ALCOCK, MARKOW

#### PROFESSORS

ALVARADO, CAPCO, CHANDLER,  
 CHURCH, COLLINS, DOANE, FAETH,  
 FISHER, HAZEL, HEDRICK, LAWSON,  
 MAIENSCHIN, McGAUGHEY,  
 MINCKLEY, MOORE, OHMART,  
 RISSING, RUTOWSKI, SATTERLIE,  
 A. SMITH, WALSBURG

#### ASSOCIATE PROFESSORS

DOWLING, FOUQUETTE,  
 GOLDSTEIN, G. SMITH

#### ASSISTANT PROFESSORS

COOPER, ELSEY, FEWELL,  
 HARRISON, ORCHINIK

#### RESEARCH PROFESSOR

PEARSON

#### RESEARCH ASSOCIATE PROFESSOR

DAVIDSON

#### ACADEMIC PROFESSIONALS

DOUGLAS, GRIMM

#### PROFESSORS EMERITI

BENDER, CLOTHIER, COLE,  
 GERKING, HADLEY, HANSON,  
 JUSTUS, PATTERSON,  
 RASMUSSEN, WOOLF

The faculty in the Department of Zoology offer programs leading to the Master of Science and Doctor of Philosophy degrees with a major in Zoology. A concentration in ecology is available, among other areas of study. The faculty collaborate with the Departments of Botany and Microbiology in offering the program leading to the Master of Science degree with a major in Biological Sciences (see page 133) and also participate in offering the program leading to the Master of Natural Science degree when one of the concentrations is zoology (see page 67).

Students admitted to the Master of Education degree program with a major in Secondary Education may also elect zoology as the subject matter field.

These programs are designed to prepare students for careers in teaching and research in educational, medical, industrial, and governmental institutions.

**Graduate Record Examination.** Submission of scores on the verbal, quantitative, analytical, and advanced sections of the Graduate Record Examination is required for admission to the M.S. and Ph.D. degree programs.

**Application Deadline.** Completed college and departmental application materials should be received by January 15 for admission in the fall semester.

#### MASTER OF SCIENCE DEGREE

The program of each student is prepared in consultation with the supervisory committee, consisting of a major professor and two additional faculty members. A minimum of 30 semester hours is required. The program must include six hours of thesis, one hour of seminar, and may include a maximum of eight additional hours in various special graduate courses such as research and reading and conference. A final oral examination covering the thesis and related subject matter is administered by the supervisory committee.

#### DOCTOR OF PHILOSOPHY DEGREE

See pages 76-77 for general requirements.

The Ph.D. program in the Department of Zoology allows the student to acquire high research competency in one or more specialized areas while receiving a broad, solid grounding in biological sciences.

**Program of Study.** The program of study is planned by the student and the supervisory committee, consisting of a major professor and four additional faculty members. The program is tailored to the needs of the individual student.

#### Foreign Language Requirements.

None are required by the department. However, each student's supervisory committee may specify a reading proficiency in one or more foreign languages if appropriate to the student's educational objectives.

**Comprehensive Examinations.** The comprehensive examination consists of

a written and oral component. To advance to candidacy for the Ph.D., the student must successfully complete two graduate seminars in areas different from the major area of emphasis by the end of the third semester (see topics outlines under "Research Activity"). The seminars include evaluation of synthetic writing skills. A synthetic, detailed research proposal must be completed by the fourth semester for students holding a bachelor's degree and by the third semester for students holding a master's degree. The student must defend the proposal orally to the supervisory committee within three weeks after successful completion of the written research proposal.

**Dissertation Requirements.** A dissertation based on original research is required. (See dissertation requirements, pages 73-74.)

**Final Examinations.** A final defense of the dissertation is required (see page 74). The defense consists of a public seminar followed by an oral examination administered by the student's supervisory committee.

#### Research Activity

Research of faculty and graduate students includes a wide range of biological topics. Current research interests within the department include:

**Cell and Molecular Biology.** Protein synthesis; cytoskeleton assembly; localization of RNA in oocytes and embryos; regulation of exocytosis and endocytosis; cell division; cell-cell interaction; electron microscopy; recombinant DNA; gene mapping; analysis of cloned developmentally regulated genes; regulation of gene expression in eukaryotes; mechanisms of interferon action.

**Developmental Biology.** Cell and organ differentiation; regulation; development of synapses; developmental genetics; control of oogenesis; in vitro fertilization.

**Genetics.** Molecular and developmental genetics; genetic regulatory mechanisms of cellular differentiation; chromosomal ultrastructure and function; behavioral genetics; variation in natural populations; human population genetics; molecular evolutionary genetics.

**Physiology.** Membrane metabolism and function, thermal adaptation, regulation, and ion transport; tissue, epithelial, and cuticular function; compara-

tive endocrinology; neurophysiology; environmental physiology especially related to desert adaptations.

**Evolution.** Population genetics, molecular evolution, systematics, speciation, evolution of behavior, morphological diversification.

**Behavior.** Reproductive behavior; sexual selection; communication; neural and hormonal mechanisms of behavior; behavioral ecology; behavioral genetics.

**Ecology.** Life histories, dispersal, and foraging; plant-animal interactions; community structure; biogeography; physiological ecology; ecosystems structure and functioning; wildlife fisheries management. Research in terrestrial and aquatic desert habitats reflects the unique location of ASU.

**History and Philosophy of Biology.**

The nature of biological science and the way science changes; who does biology and why; what assumptions do biologists make and how they influence the research done; questions about funding, institutions, and the social context for biology.

**Biology Education.** Student reasoning patterns and alternative conceptual frameworks; the nature of scientific reasoning; learning styles, instructional techniques, and issues in curriculum development.

**Facilities.** The modern Life Science Center houses well-equipped research laboratories and teaching facilities. The Life Sciences Electron Microscopy Laboratory includes both scanning and transmission electron microscopes as well as a freeze-fracture unit. Housing of laboratory animals and maintenance of breeding colonies are provided by the Animal Research Center. Arizona fauna is well represented in departmental collections. Desert, montane, riparian, and lacustrine habitats are within driving distance; species diversity is high.

## BIOLOGY

For courses in biology, see "Biological Sciences," page 133.

## ZOOLOGY

**ZOL 410 Techniques in Wildlife Conservation Biology.** (3) F  
Field and analytical techniques used in evaluating population structure, viability and environmental impacts. Lecture, lab. Prerequisites: BIO 217 and 320 or instructor approval. *General Studies: L2.*

**411 Biology and Management of Terrestrial Wildlife.** (3) S

Principles, theories, and practices of managing terrestrial wildlife from habitat and population perspectives. Prerequisites: BIO 217 and 320 and ZOL 471 and 472 or instructor approval.

**413 Biology and Management of Aquatic Resources.** (3) F

Principles, theories, and practices of managing aquatic resources. Prerequisites: BIO 217 and 320 and ZOL 473 or instructor approval.

**423 Population and Community Ecology.** (3) N

Organization and dynamics of population and communities, emphasizing animals. Theoretical and empirical approaches. Prerequisite: BIO 320 or instructor approval.

**425 Animal Ecology.** (3) N

Physiological and behavioral adaptations of individual animals to both abiotic and biotic environments. Prerequisite: BIO 320.

**433 Animal Histology.** (4) S

Microscopic study of animal tissues. 3 hours lecture, 3 hours lab. Prerequisite: BIO 182 or instructor approval.

**441 Principles of Human Genetics.** (3) N

Genetics in human populations, including medical aspects. Prerequisite: BIO 340. *General Studies: L2.*

**454 Aquatic Insects.** (3) N

Systematics and ecology of aquatic insects. Prerequisite: ZOL 354.

**465 Neurophysiology.** (3) S '98

Detailed treatment of cellular and organismal neurophysiology and nervous system function. Prerequisite: ZOL 360.

**466 Neurophysiology Laboratory.** (2) S '98

Intracellular and extracellular electrophysiological recording techniques, histological preparations, and dye-filling techniques. 6 hours lab. Pre- or corequisite: ZOL 465.

**470 Systematic Zoology.** (3) S '97

Philosophy, theory, and practice in interpreting patterns of animal diversity, including species concepts and speciation, nomenclature and taxonomy, and evolutionary and phylogenetic classification. Prerequisites: junior standing; 18 hours in life science. *General Studies: L2.*

**471 Ornithology.** (3) S

The biology of birds. 2 hours lecture, 3 hours lab, weekend field trips. Prerequisite: ZOL 370 or instructor approval.

**472 Mammalogy.** (4) F '96

Classification, structure, habits, ecology, and distribution of mammals, emphasizing North American forms. 3 hours lecture, 3 hours lab or field trip, weekend field trips. Prerequisite: ZOL 370 or instructor approval.

**473 Ichthyology.** (3) S '97

Systematics and biology of recent and extinct fishes. 2 hours lecture, 3 hours lab or field trip, weekend field trips required. Prerequisites: ZOL 370 and 425 or instructor approval. *General Studies: L2.*

**474 Herpetology.** (3) S '98

Systematics and biology of recent and extinct reptiles and amphibians. 2 hours lecture, 3 hours lab or field trip. Prerequisite: ZOL 370.

**481 Research Techniques in Animal Behavior.** (3) S '98

Experimental and field studies of animal behavior; description and quantification of animal behavior and interpretation of behavior within

an evolutionary framework. 1 hour lecture, 6 hours lab. Prerequisite: ZOL 280. *General Studies: L2.*

**495 Undergraduate Thesis.** (3) F, S, SS  
Guided research culminating in the preparation of an undergraduate thesis based on supervised research done in this and previous semesters. Prerequisites: At least 3 hours of BIO 310 or 499 or ZOL 499; formal conference with instructor; instructor and department chair approval.

**508 Scientific Data Presentation.** (2) F

Techniques necessary for presentation of scientific data used in journal publications, grant proposals, and visual presentations. Lecture, lab. Prerequisite: instructor approval.

**515 Populations: Evolutionary Genetics.** (3) F

Mathematical models in the description and analysis of the genetics of populations. Prerequisites: BIO 320 and 415 and 445 or instructor approval.

**516 Populations: Evolutionary Ecology.** (3) S

Principles of population biology and community ecology within an evolutionary framework. 2 hours lecture, 2 hours recitation. Prerequisites: BIO 320, 415 (or MAT 210); ZOL 515.

**517 Techniques in Evolutionary Genetics.** (4) S

Practical experience in modern techniques for the study of evolution. Lecture, lab. Prerequisites: BIO 340, 445; instructor approval.

**532 Developmental Genetics.** (3) S '98

Genetic approaches to the analysis of development during the life cycle of eukaryotic organisms, and the role of genes in the unfolding of the differentiated phenotype. Prerequisite: BIO 443.

**560 Comparative Physiology.** (3) S '97

The analysis of function in invertebrates and vertebrates, emphasizing evolutionary trends in physiological systems. Prerequisite: ZOL 360 or equivalent.

**566 Environmental Physiology.** (3) S '98

Physiological responses and adaptations of animals to various aspects of the physical environment. Prerequisites: BIO 320; ZOL 360.

**568 Mammalian Physiology.** (3) F '97

Detailed treatment of mammalian organ system functions emphasizing integrative mechanisms. Prerequisite: ZOL 360 or equivalent.

**569 Cellular Physiology.** (3) F '96

Emphasizing the molecular basis for cell structure and function. Prerequisites: ZOL 360; organic chemistry.

**591 Seminar.** (1-3) F, S

Topics such as the following are offered:

- (a) Adaptations
- (b) Behavior
- (c) Cell Biology
- (d) Ecology
- (e) Evolution
- (f) Genetic Engineering
- (g) Genetics
- (h) Physiology

May be repeated for credit.

**Omnibus Graduate Courses:** See pages 41-42 for omnibus graduate courses that may be offered.



# Faculty and Academic Professionals

The faculty and academic professionals listed are involved in undergraduate and graduate instruction and research. The year of first appointment follows the name. Emeriti are included.

**Aannestad, Per** (1975), Associate Professor of Physics and Astronomy; B.S., University of Oslo (Norway); Ph.D., University of California, Berkeley

**Abbott, David R.** (1994), Adjunct Faculty of Anthropology; B.A., Adelphi University; M.S., University of Arizona; M.A., Ph.D., Arizona State University

**Abele, Deborah** (1990), Faculty Associate of Planning and Landscape Architecture; B.A., Vassar College

**Aberle, James T.** (1989), Associate Professor of Electrical Engineering; B.S., M.S., Polytechnic Institute of New York; Ph.D., University of Massachusetts, Amherst

**Abraham, Willard** (1953), Professor Emeritus of Special Education; B.S., Illinois Institute of Technology; M.Ed., Chicago Teachers College; Ph.D., Northwestern University

**Abston, Deborah** (1990), Assistant Librarian, Access Services; B.S., M.S.L.S., Wayne State University

**Acevedo, Roberto M.** (1964), Professor Emeritus of Foreign Languages; B.A., University of California, Berkeley; M.A., Ph.D., University of Arizona

**Acharya, Raghunath** (1976), Associate Professor of Physics and Astronomy; B.Sc., M.Sc., University of Delhi (India); Ph.D., University of Rochester

**Acker, Barbara** (1991), Assistant Professor of Theatre; B.F.A., University of Texas, Austin; M.A., Case Western Reserve University; Ph.D., Wayne State University

**Acker, William J.** (1970), Professor Emeritus of Geography; B.S., Purdue University; M.S., University of Kansas; M.A., Ph.D., Syracuse University

**Adams, Donna** (1983), Assistant Professor of Nursing; B.S.N., University of Missouri, Columbia; M.S., Arizona State University; D.N.Sc., University of San Diego

**Adams, Karen L.** (1984), Associate Professor of English; B.A., M.A., Ph.D., University of Michigan

**Adelson, Roger D.** (1974), Associate Professor of History; B.A., George Washington University; B.Litt., University of Oxford (England); M.A., Ph.D., Washington University

**Agadjanian, Victor** (1995), Assistant Professor of Sociology; B.A., Moscow State University; M.S., Ph.D., University of Southern California

**Aguilar, John L.** (1976), Associate Professor of Anthropology; B.A., University of California, Los Angeles; M.A., California State University, Los Angeles; Ph.D., University of California, San Diego

**Ahn, Seung C.** (1990), Assistant Professor of Economics; B.A., Sogang University; M.A., Ph.D., Michigan State University

**Aiken, Leona S.** (1985), Professor of Psychology; B.S., Virginia Commonwealth University; M.S., Ph.D., Purdue University

**Akers, Lex A.** (1980), Professor of Engineering; B.S.E.E., M.S.E.E., Ph.D., Texas Tech University

**Akins, William H.** (1975), Professor of Theatre; B.A., Duke University; M.A., Ph.D., University of Denver

**Aksentowitz, Gloria J.** (1987), Assistant Learning Resources Specialist, Video Resources; B.F.A., University of Nebraska; M.Ed., Arizona State University

**Alarcon, Justo** (1968), Professor of Languages and Literatures; B.A., M.A., Serafica (Spain); M.A., Laval University (Canada), Arizona State University; Ph.D., University of Arizona

**Alarcon, Ricardo O.** (1989), Associate Professor of Physics and Astronomy; B.S., M.S., University of Chile (Chile); Ph.D., Ohio University

- Alberts, Jess K.** (1989), Associate Professor of Communication; Chair, Department of Communication; B.S.Ed., M.A., Abilene Christian University; Ph.D., University of Texas, Austin
- Alcock, John** (1972), Regents' Professor of Zoology; B.A., Amherst College; Ph.D., Harvard University
- Alcorn, Marianne S.** (1981), Law Librarian, Reference; B.A., University of Washington; M.L.S., University of Southern California
- Aldrich, Frank T.** (1969), Associate Professor of Geography; B.A., University of Texas, Austin; M.S., Ph.D., Oregon State University
- Alexander, Robert J.** (1975), Professor of German; B.A., Macalester College; M.A., Ph.D., University of Wisconsin, Madison
- Alford, Terry L.** (1993), Assistant Professor of Engineering; B.S., M.S., North Carolina State University, Raleigh; Ph.D., Cornell University
- Alisky, Marvin** (1957), Professor Emeritus of Political Science; B.A., M.A., Ph.D., University of Texas, Austin
- Allee, David R.** (1991), Assistant Professor of Electrical Engineering; B.S.E.E., University of Cincinnati; M.S.E.E., Ph.D., Stanford University
- Allen, Craig M.** (1991), Associate Professor of Journalism and Telecommunication; B.A., Linfield College; M.S., University of Oregon; Ph.D., Ohio University
- Allen, James P.** (1989), Associate Professor of Chemistry and Biochemistry; B.S., Saint Joseph's University; M.S., Ph.D., University of Illinois
- Allen, Stephen G.** (1988), Adjunct Assistant Professor of Botany; B.S., M.S., Montana State University; Ph.D., University of Arizona
- Allison, Maria T.** (1984), Professor of Recreation Management and Tourism; B.S., M.S., University of New Mexico; Ph.D., University of Illinois
- Alozie, Nicholas O.** (1991), Associate Professor of Public Affairs; B.A., M.P.A., Texas Southern University; M.A., Ph.D., University of Texas, Dallas
- Alpers, Rojann** (1995), Assistant Professor of Nursing; B.S.N., M.S., Arizona State University; Ph.D., University of Iowa
- Alquist, Lewis R.** (1984), Professor of Art; B.F.A., Florida Atlantic University; M.F.A., Cranbrook Academy of Art
- Altheide, David L.** (1973), Regents' Professor of Justice Studies; B.A., Central Washington State College; M.A., University of Washington; Ph.D., University of California, San Diego
- Alvarado, Ronald H.** (1974), Professor of Zoology; Interim Associate Dean, College of Extended Education; B.A., University of California, Riverside; M.S., Ph.D., Washington State University
- Alvarez, Robert R. Jr.** (1989), Associate Professor of Anthropology; B.A., Northern Arizona University; M.A., San Diego State University; M.A., Ph.D., Stanford University
- Ames, James G.** (1985), Senior Research Associate, Computer Integrated Manufacturing Systems Research Center; B.S., San Diego State University
- Amin, Omar M.** (1994), Adjunct Faculty of Zoology; B.S., M.S., Cairo University (Egypt); Ph.D. Arizona State University
- Amundson, Susan D.** (1995), Assistant Professor of Operations Management; B.S., Moorhead State University; M.B.A., College of St. Thomas; Ph.D., University of Minnesota
- Anderson, Douglas A.** (1979), Cronkite Endowment Board of Trustees Professor of Journalism and Telecommunication; Director, Walter Cronkite School of Journalism and Telecommunication; B.A., Hastings College; M.S., Kearney State College; Ph.D., Southern Illinois University, Carbondale
- Anderson, Gary** (1975), Associate Professor of Reading and Library Science; B.S., M.Ed., Edinboro State College; Ph.D., University of Pittsburgh, Pittsburgh
- Anderson, James R.** (1984), Associate Research Scientist of Chemistry and Biochemistry; B.A., Williams College; Ph.D., California Institute of Technology
- Anderson, Karen** (1987), Faculty Associate of Nursing; B.S., M.S., Arizona State University
- Anderson, Marcia L.** (1986), Librarian; Head, Acquisitions/Bibliographic Records; A.B., University of Michigan; M.S., Wayne State University
- Anderson-Rowland, Mary R.** (1974), Associate Professor of Engineering; Associate Dean, Student Affairs and Special Programs; B.A., Hope College; M.S., Ph.D., University of Iowa
- Anderson, Melvin S.** (1967), Professor Emeritus of Finance; B.S., M.S., Oklahoma State University; Ed.D., University of Arkansas
- Andress, Barbara L.** (1972), Professor Emeritus of Music; B.A., M.A., Arizona State University
- Andrews, Johnester, SSG** (1996), Instructor of Military Science
- Angell, C. Austen** (1989), Professor of Chemistry and Biochemistry; B.S., M.S., Melbourne University (Australia); Ph.D., University of London (England)
- Appleton, Nicholas R.** (1972), Professor of Educational Policy Studies; Associate Dean for Teacher Preparation Program, College of Education; B.A., San Francisco State University; M.A., California State University, Northridge; Ed.D., University of Massachusetts, Amherst
- Aranda, Luis** (1975), Associate Professor of Legal and Ethical Studies; B.M., M.Ed., University of Arizona; J.D., Arizona State University
- Arciniega, G. Miguel** (1979), Associate Professor of Counselor Education; B.S., M.A., New Mexico State University; Ph.D., University of Arizona
- Arias, M. Beatriz** (1989), Associate Professor of Multicultural Education; Director, Center for Bilingual and Bicultural Education; B.A., M.A., Occidental College; Ph.D., Stanford University
- Armbruster, Dieter** (1989), Professor of Mathematics; Abitur, Zeppelin Gymnasium (West Germany); Diplom, Ph.D., University of Tübingen (West Germany)
- Armendt, Brad** (1989), Associate Professor of Philosophy; B.A., William Marsh Rice University; Ph.D., University of Illinois, Chicago
- Armstrong, Robert L.** (1967), Professor Emeritus of Secondary Education; B.A., State Teachers College of Iowa; M.S., University of Iowa; Ed.D., University of Arizona
- Arner, Douglas G.** (1959), Professor Emeritus of Philosophy; B.S., Creighton University; M.A., Ph.D., University of Michigan
- Arnold, William E.** (1973), Professor of Communication; B.S., M.A., Northern Illinois University; Ph.D., Pennsylvania State University
- Aronson, Jerome M.** (1966), Professor of Botany; Acting Chair, Department of Botany; B.A., Ph.D., University of California, Berkeley
- Arreola, Daniel** (1990), Professor of Geography; B.A., University of California, Los Angeles; M.A., California State University, Hayward; Ph.D., University of California, Los Angeles
- Arrowsmith, Ramon** (1995), Assistant Professor of Geology; B.A., Whittier College; Ph.D., Stanford University
- Arterian, Hannah** (1979), Professor of Law; Associate Dean, College of Law; B.A., Elmira College; J.D., University of Iowa

- Ashcraft, Robert F.** (1995), Assistant Professor of Recreation Management and Tourism; B.A., University of Arizona; M.A., Northern Arizona University; Ph.D., Arizona State University
- Ashcroft, Edward A.** (1988), Professor of Computer Science and Engineering; B.A., Cantab (England); Ph.D., Imperial College of London (England)
- Ashe, Robert W.** (1955), Professor Emeritus of Education; A.B., M.A., Arizona State University; Ed.D., University of Southern California
- Ashford, Jose B.** (1984), Professor of Social Work; B.A., Loyola University, New Orleans; M.S.W., Ohio State University; Ph.D., Bowling Green State University
- Ashley, Richard** (1981), Associate Professor of Political Science; B.A., University of California, Santa Barbara; M.A., Ph.D., Massachusetts Institute of Technology
- Ashur, Suleiman A.** (1994), Faculty Associate, Center for Environmental Studies; B.S., An-Najah National University, Israel; M.S.E., University of Michigan; Ph.D., Arizona State University
- Ater, Steven** (1992), Assistant Professor of Art; B.A., Central Washington University; M.F.A., University of Illinois
- Atsumi, Takayori P.** (1968), Professor of Music; B.F.A., Kunitachi Music College (Japan); M.M., New England Conservatory of Music
- Au, Chih-Chun** (1970), Law Librarian, Head, Technical Services; LL.B., National Taiwan University (Taiwan); M.A., University of Chicago
- Aulerich, Christopher E.** (1989), Faculty Associate, Del E. Webb School of Construction
- Autore, Donald D.** (1959), Professor Emeritus of Technology; B.S.E., University of Michigan; M.S.E., Arizona State University
- Ax, Leland S.** (1959), Professor Emeritus of Engineering; B.S.E., B.S.R.E., Tri-State College; M.S., Kansas State College
- Axelrod, Morris** (1972), Professor Emeritus of Sociology; B.A., Ph.D., University of Michigan
- Axford, Roger W.** (1975), Professor Emeritus of Secondary Education; B.A., Nebraska Wesleyan University; M.A., Ph.D., University of Chicago
- Ayres, James E.** (1982), Adjunct Professor of Anthropology; B.A., Fresno State University; M.A., University of Arizona
- Backhaus, Ralph A.** (1977), Professor of Botany; B.S., Rutgers, The State University; M.S., Ph.D., University of California, Davis
- Backus, Charles E.** (1968), Professor of Engineering; Associate Dean, Industrial and Professional Development, College of Engineering and Applied Sciences; B.S.M.E., Ohio University; M.S., Ph.D., University of Arizona
- Bacon, Sid P.** (1988), Professor of Speech and Hearing Science; B.G.S., M.A., University of Kansas; Ph.D., University of Minnesota, Twin Cities
- Bacon, Thomas** (1993), Professor of Music; B.S., Oakland University
- Badger, William W.** (1985), Professor of Construction; Director, Del E. Webb School of Construction; B.S.M.E., Auburn University; M.S.C.E., Oklahoma State University; Ph.D., Iowa State University
- Baer, Steven M.** (1988), Associate Professor of Mathematics; B.S., M.S., Ph.D., University of Illinois
- Bagwell, Marilyn** (1972), Associate Professor of Nursing; B.S.N., University of California, Los Angeles; M.A., Arizona State University; Ph.D., Texas Woman's University
- Bahr, Donald M.** (1967), Professor of Anthropology; A.B., M.A., Ph.D., Harvard University
- Baier, Leslie** (1990), Adjunct Professor, Microbiology; B.A., Lawrence University; Ph.D., University of Michigan
- Bailey, James E.** (1974), Professor of Engineering; B.S.I.E., M.S.I.E., Ph.D., Wayne State University
- Baker, Dale R.** (1989), Associate Professor of Secondary Education; B.A., University of Oklahoma; M.A.T., Trenton State College; Ed.D., Rutgers, The State University
- Baker, Georgianne R.** (1971), Professor Emeritus of Family Resources and Human Development; B.S., Marygrove College; M.S., Ohio State University; Ph.D., Michigan State University
- Baker, Lawrence A.** (1992), Assistant Professor of Civil Engineering; B.S., Pennsylvania State University; M.S., Utah State University; Ph.D., University of Florida
- Baker, Marc A.** (1988), Adjunct Assistant Professor of Botany; B.A., San Jose State University; M.A., Humboldt State University; Ph.D., Arizona State University
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- Wiley, Robert O.** (1995), Visiting Assistant Professor of Chemistry and Biochemistry; B.A., Temple University; Ph.D., Arizona State University
- Wilkins, Barry J.** (1992), Research Specialist, Center for Solid State Science; B.A., Columbia Union College; M.S., Rutgers, The State University
- Wilkins, Wendy K.** (1986), Associate Professor of English; Associate Dean for Administration and Personnel, College of Liberal Arts and Sciences; Chair, Department of English; B.A., M.A., Ph.D., University of California, Los Angeles
- Wilkinson, Christine K.** (1970), Associate Professor of Higher Education; Vice President for Student Affairs; B.A., Arizona State University; M.A., University of California, Berkeley; Ph.D., Arizona State University
- Wilkinson, Joseph W.** (1964), Professor of Accountancy; B.S., Carnegie Institute of Technology; M.B.A., Stanford University; D.B.A., University of Oregon; C.P.A., California
- Williams, Frank G.** (1975), Professor of Health Administration and Policy; Director, School of Health Administration and Policy; B.S., M.A., Oregon State University; M.A., Ph.D., University of Iowa
- Williams, Jenny L.** (1967), Associate Librarian, Original Cataloging; B.A., M.A., Indiana University
- Williams, Peter** (1981), Professor of Chemistry and Biochemistry; B.S., Ph.D., University of London (England)
- Williams, Philip F.C.** (1986), Associate Professor of Chinese; B.A., University of Arkansas; M.A., Ph.D., University of California, Los Angeles
- Williams, Robert C.** (1978), Professor of Anthropology; B.A., M.A., University of Cambridge (England); B.A., M.A., Ph.D., University of Michigan
- Williams, Stanley N.** (1991), Professor of Geology; B.S., Beloit College; M.A., Ph.D., Dartmouth College
- Williamson, Madeline J.** (1976), Professor of Music; Interim Associate Dean, Graduate College; B.A., Ohio Wesleyan University; M.M., Western Michigan University, D.M.A., Arizona State University
- Willis, Wayne T.** (1989), Associate Professor of Exercise Science and Physical Education; A.B., University of California, Berkeley; M.A., San Francisco State University; Ph.D., University of California, Berkeley
- Wills, Barbara Salisbury** (1994), Associate Instructional Professional; B.A., M.A., Ph.D., University of Washington
- Wills, J. Robert** (1994), Professor of Theatre; Dean, College of Fine Arts; B.A., College of Wooster; M.A., University of Illinois; Ph.D., Case Western Reserve University
- Willson, Loretta L.** (1947), Professor Emeritus of Communication; B.A., University of South Dakota; M.A., Northwestern University
- Wilson, Gail Eugene** (1972), Associate Professor of Music; B.S., Ohio State University; M.M., Arizona State University
- Wilson, Gloria N.** (1961), Associate Professor of Educational Media and Computers; B.A., Montclair State College; M.A., Ed.D., Columbia University
- Wilson, Jeffrey R.** (1985), Associate Professor of Statistics; B.A., University of the West Indies (Trinidad and Tobago); M.S., Ph.D., Iowa State University
- Wilson, Lorna A.** (1968), Instructor Emeritus of French; B.Ed., University of Saskatchewan (Canada); M.A., Arizona State University
- Wilson, Margo** (1993), Faculty Associate of Speech and Hearing Science; B.S., M.A., University of Nebraska, Lincoln; Ph.D., University of Kansas
- Wilson, Patricia M.** (1987), Associate Professor of Family Resources and Human Development; B.S., M.Ed., Iowa State University; Ph.D., Oklahoma State University
- Wilt, Glenn A. Jr.** (1963), Associate Professor of Finance; A.B., Occidental College; M.B.A., Miami University; Ph.D., University of Michigan; C.F.A.
- Windhorst, Rogier A.** (1987), Associate Professor of Physics and Astronomy; B.Sc., M.Sc., Ph.D., University of Leiden (Netherlands)
- Winer, Laurence H.** (1983), Professor of Law; B.A., M.A., Ph.D., Boston University; J.D., Yale University
- Winkelman, Michael** (1988), Lecturer of Anthropology; B.A., William Marsh Rice University; Ph.D., University of California, Irvine
- Winkelman, Richard D.** (1965), Associate Professor of Economics; B.A., Southern Illinois University; M.A., Ph.D., University of Illinois
- Wintergalen, Barbara A.** (1992), Faculty Associate of Nursing; B.S.N., Loretto Heights College; M.S., Arizona State University
- Wirtz, Dorothy** (1959), Professor Emeritus of French; B.A., University of Iowa; M.A., Ph.D., University of Wisconsin

- Wiseman, Douglas E.** (1976), Professor Emeritus of Special Education; B.S., M.A., Eastern Michigan University; Ph.D., University of Illinois
- Wiseman, Greta** (1984), Faculty Associate of Nursing; B.S.N., Hamline University; M.S., Arizona State University
- Wiseman, Robert M.** (1991), Assistant Professor of Management; B.B.A., University of Wisconsin, La Crosse; M.B.A., University of Wisconsin, Milwaukee; Ph.D., University of Minnesota
- Withey, Michael B.** (1993), Faculty Associate of Law; B.A., Western Michigan University; J.D., University of Arizona
- Witt, Tom** (1975), Associate Professor of Design; B.A., M.A., M.F.A., University of California, Los Angeles
- Wixted, J. Timothy** (1978), Professor of Asian Languages; B.A., University of Toronto (Canada); A.M., Stanford University; D.Phil., University of Oxford (England)
- Wochner, Raymond E.** (1952), Professor Emeritus of Education; B.S., York College; M.A., University of Nebraska, Lincoln; Ph.D., University of Wyoming
- Wolchik, Sharlene** (1980), Professor of Psychology; B.A., Vassar College; M.S., Ph.D., Rutgers, The State University
- Wolf, Donald J.** (1969), Professor Emeritus of Political Science; B.A., M.A., Gonzaga University; S.T.M., University of Santa Clara; Ph.D., Georgetown University
- Wolf, George H.** (1986), Associate Professor of Chemistry and Biochemistry; B.A., University of California, San Diego; M.S., Ph.D., University of California, Berkeley
- Wolf, Robert Lee** (1985), Professor of Design; Director, School of Design; B.S., Southern Illinois University, Carbondale; M.A., University of Missouri; Cert. Konstindustriskolan, Goteborg (Sweden)
- Wolf, W. Shapard Jr.** (1983), Associate Research Administrator, Sociology; Director, Survey Research Laboratory, Sociology; B.F.A., Florida State University; M.Ed., University of Georgia
- Wolfe, Philip M.** (1988), Professor of Industrial and Management Systems Engineering; B.S., University of Missouri; M.S.E., Ph.D., Arizona State University
- Wolffthal, Diane** (1995), Assistant Professor of Art; B.A., M.A., City University of New York; Ph.D., Institute of Fine Arts, New York University
- Wollam, Owen A.** (1964), Professor Emeritus of French; B.A., M.A., Montana State University; Ph.D., University of Washington
- Wolthering, Dianne, Capt.** (1992), Assistant Professor of Aerospace Studies
- Wong, Timothy.** (1995), Professor of Languages and Literatures; B.A., St. Mary's College; M.A., University of Hawaii; Ph.D., Stanford University
- Wood, Billy G.** (1977), Associate Professor of Technology; A.B., University of California; B.S., Eastern Illinois University; M.S., University of Arizona
- Wood, Byard D.** (1970), Professor of Mechanical and Aerospace Engineering; B.S.M.E., M.S.M.E., Utah State University; Ph.D., University of Minnesota, Twin Cities
- Wood, Patricia** (1994), Law Librarian, Reference; B.A., A.M.L.S., University of Michigan
- Wood, Steven D.** (1975), Professor of Decision and Information Systems; B.S., M.A., California State University, San Diego; Ph.D., University of Wisconsin, Madison
- Woodbury, Neal W.** (1987), Associate Professor of Chemistry and Biochemistry; B.S., University of California, Davis; Ph.D., University of Washington
- Woodfill, Marvin C.** (1966), Professor of Computer Science and Engineering; B.S., M.S., Ph.D., Iowa State University
- Wooding, Robert R.** (1971), Professor Emeritus of Construction; B.S., United States Naval Academy; B.C.E., M.C.E., Rensselaer Polytechnic Institute
- Woodman, Natalie J.** (1969), Professor Emeritus of Social Work; B.A., New York University; M.S.S., Smith College
- Woods, Roosevelt Jr.** (1965), Professor Emeritus of Art; B.S., M.A., Arizona State University
- Woodward, Mark R.** (1985), Associate Professor of Religious Studies; B.A., M.A., Ph.D., University of Illinois
- Wooldridge, Charles B.** (1959), Professor Emeritus of Engineering; A.B., B.S., University of Kentucky; M.S., Ph.D., Purdue University
- Wooldridge, Mary C.** (1959), Professor Emeritus of Family Resources and Human Development; B.S., M.S., University of Kentucky; Ph.D., Purdue University
- Wolf, Charles M.** (1961-63; 1964), Professor Emeritus of Zoology; Dean Emeritus, College of Liberal Arts and Sciences and Graduate College; B.S., M.S., University of Utah; Ph.D., University of California, Berkeley
- Woolsey, D. Kristine** (1988), Assistant Professor of Architecture; M.Arch., Arizona State University
- Wooten, William W.** (1959), Professor Emeritus of History; B.A., University of Chicago; M.A., University of Iowa; Ph.D., University of Minnesota, Twin Cities
- Wootton, Richard T.** (1964), Professor Emeritus of Education; B.S., M.S., Ed.D., University of Utah
- Wotring, Roxena A.** (1994), Faculty Associate of Nursing; B.S.N., M.S., Arizona State University
- Wrenn, C. Gilbert** (1965), Professor Emeritus of Counselor Education; A.B., Willamette University; M.A., Ph.D., Stanford University; LL.D., Willamette University
- Wright, Robert L.** (1991), Faculty Associate of Manufacturing and Industrial Technology; B.S., J.D., Arizona State University
- Wu, Ai-hwa** (1964), Librarian, Original Cataloging; B.A., National Taiwan University (Taiwan); M.L.S., University of Washington
- Wulk, Ned W.** (1957), Professor Emeritus of Physical Education; B.S., Wisconsin State University; M.Ed., Xavier University
- Wurzburger, Marilyn J.** (1960), Librarian; Head, Special Collections; B.A., MacMurray College
- Wurzell, Carol A.** (1965), Professor Emeritus of Nursing; B.S., California State College, Chico; M.S., University of Maryland, College Park
- Wyckoff, Susan** (1979), Professor of Physics and Astronomy; B.A., Mount Holyoke College; Ph.D., Case Western Reserve University
- Wyndelts, Robert W.** (1974), Professor of Accountancy; B.B.A., M.P.A., Georgia State University; Ph.D., University of Georgia; C.P.A., Arizona, Georgia
- Wytko, Joseph R.** (1975), Professor of Music; B.M.E., West Virginia University; M.M., D.M., Northwestern University
- Yabes, Ruth Ammerman** (1990), Assistant Professor of Planning and Landscape Architecture; B.S. (Planning), B.S. (Economics), University of California, Davis; M.C.P., University of Pennsylvania; Ph.D., Cornell University
- Yaghi, Omar M.** (1992), Assistant Professor of Chemistry and Biochemistry; B.S., State University of New York, Albany; Ph.D., University of Illinois



- Yale, Francis G.** (1952), Professor Emeritus of Physics and Astronomy/Science Education; A.B., M.A., University of Northern Colorado; Ed.D., Columbia University
- Yamaguchi, Gary T.** (1989), Associate Professor of Engineering; A.B., Occidental College; B.S., California Institute of Technology; S.M.M.E., Massachusetts Institute of Technology; Ph.D., Stanford University
- Yamamori, Tetsumao** (1989), Adjunct Professor of Sociology; B.A., Northwest Christian College; B.D., Texas Christian University; Ph.D., Duke University
- Yaniv, Daphna** (1992), Senior Research Professional, Chemistry and Biochemistry; B.S., Ph.D., Israel Institute of Technology (Israel)
- Yao, Lun-Shin** (1981), Professor of Engineering; B.S.E., Cheng Kung University; M.S., University of Texas; Ph.D., University of California, Berkeley
- Yao, Winberta M.** (1975), Associate Librarian, Reference Service; B.A., University of California; M.S., Columbia University
- Yates, Ann M.** (1978), Associate Research Professional, Chemistry and Biochemistry; B.S., St. Lawrence University; Ph.D., Arizona State University
- Yau, Stephen S.** (1994), Professor of Computer Science and Engineering; Chair, Department of Computer Science and Engineering; B.S., National Taiwan University (Taiwan); M.S., Ph.D., University of Illinois, Urbana
- Ybarra, Gloria** (1995), Faculty Associate, College of Law; B.A., Saint Mary's College of Notre Dame; J.D., Harvard University
- Yeater, James W.** (1958), Professor Emeritus of Theatre; B.A., Baker University; M.A., University of Washington; Ph.D., University of Illinois
- Yoshioka, Carlton F.** (1988), Professor of Recreation Management and Tourism; Chair, Department of Recreation Management and Tourism; B.A., University of California, Santa Barbara; M.A., California State University, Chico; Ph.D., University of Oregon
- Youn, Kyu Ho** (1991), Associate Professor of Journalism and Telecommunication; B.A., Konkuk University (South Korea); M.A., Ph.D., Southern Illinois University, Carbondale
- Young, Bernard** (1988), Associate Professor of Art; B.F.A., Temple University; M.F.A., Ph.D., Cornell University
- Young, Denise I.** (1990), Faculty Associate of Law; B.A., Stevens College; J.D., University of Arizona
- Young, Dennis L.** (1975), Professor of Mathematics; B.S., St. Louis University; M.S., Ph.D., Purdue University
- Young, Hewitt H.** (1967), Professor Emeritus of Engineering; B.S.M.E., M.S.I.E., Case Institute of Technology; Ph.D., Arizona State University
- Young, Joseph E.** (1979), Associate Professor of Art; B.A., California State University at Los Angeles; M.A., University of California, Los Angeles
- Young, Michael Cochise** (1990), Associate Administrative Professional, University Honors College; Associate Dean, University Honors College; B.A., St. Joseph's University; M.A., Ph.D., University of Pennsylvania
- Young, Otis E. Jr.** (1963), Professor Emeritus of History; A.B., A.M., Ph.D., Indiana University
- Youngblood, Robert L.** (1973), Professor of Political Science; B.A., Willamette University; M.A., University of Hawaii, Manoa; Ph.D., University of Michigan
- Zacher, Robert V.** (1947), Professor Emeritus of Advertising; B.S., M.S.B.A., University of Alabama
- Zaniewski, John** (1986), Associate Professor of Engineering; B.S.C.E., M.S.C.E., Ph.D., University of Texas, Austin
- Zaslow, Bertram** (1956), Professor Emeritus of Chemistry and Biochemistry; B.A., Cornell University; M.S., University of Minnesota, Twin Cities; Ph.D., Iowa State University
- Zatz, Marjorie S.** (1982), Professor of Justice Studies; B.A., University of Massachusetts, Amherst; M.A., Ph.D., Indiana University, Bloomington
- Zautra, Alex** (1976), Professor of Psychology; Director, Clinical Program in Psychology; B.A., Antioch College; M.S., Ph.D., University of Utah
- Zeitlin, Marilyn A.** (1992), Director, University Art Museum; A.B., M.A., Harvard University
- Zeng, Gualiang** (1991), Assistant Professor of Electronics and Computer Technology; B.S., Chengdu Telecommunication Institute (China); M.S., University of California, San Diego; M.N.S., Ph.D., Arizona State University
- Zettler, Hugo F.** (1977), Faculty Associate of Law; B.S., Arizona State University; J.D., University of Arizona
- Zimiles, Herbert** (1988), Professor of Early Childhood Education; B.A., New York University; Ph.D., University of Rochester
- Zimmer, Carl R.** (1959), Professor Emeritus of Engineering; B.S.E.E., Cornell University; M.S.E.E., Ph.D., Syracuse University
- Zimmerman, Allan D.** (1988), Adjunct Assistant Professor of Botany; B.S., University of Arizona; Ph.D., University of Texas, Austin
- Ziurys, Lucy M.** (1988), Associate Professor of Chemistry and Biochemistry; B.A., William Marsh Rice University; Ph.D., University of California, Berkeley
- Zorita, Paz Mendez-Bonito** (1993), Assistant Professor of Social Work; A.S., School of Social Work of Gijón (Spain); M.S.S.A., Ph.D., Case Western Reserve University
- Zucker, Stanley H.** (1975), Professor of Special Education; Academic Program Coordinator, Special Education; B.A., State University of New York, Stony Brook; M.S., Hofstra University; Ph.D., University of Missouri, Columbia
- Zuckerman, Howard S.** (1991), Professor of Health Administration and Policy; B.A., Hunter College; M.B.A., Xavier University; Ph.D., University of Michigan
- Zuo, Jian-Min** (1989), Assistant Research Scientist of Physics and Astronomy; B.S., Nanjing University; Ph.D., Arizona State University
- Zwiebel, Imre** (1979), Professor of Engineering; B.S., University of Michigan; M.S., Ph.D., Yale University
- Zygas, K. Paul** (1984), Associate Professor of Architecture; A.B., M.Arch., Harvard University; Ph.D., Cornell University
- Zylla, Julie** (1988), Lecturer of Family Resources and Human Development; B.S., South Dakota State University; M.S., Arizona State University

# Regents' Professors

The title "regents' professor" is conferred on selected members of the ASU tenured faculty who have achieved and are sustaining the highest level of distinction by their exceptional contributions to the mission of the university in research or other creative activity and in teaching or professional service.

**JOHN ALCOCK**  
*Regents' Professor of Zoology*

**DAVID L. ALTHEIDE**  
*Regents' Professor of Justice Studies*

**CONSTANTINE BALANIS**  
*Regents' Professor of Electrical Engineering*

**DAVID C. BERLINER**  
*Regents' Professor of Educational Leadership and Policy Studies and Psychology in Education*

**PETER R. BUSECK**  
*Regents' Professor of Chemistry and Biochemistry and Geology*

**ROBERT B. CIALDINI**  
*Regents' Professor of Psychology*

**JEFFREY COOK**  
*Regents' Professor of Architecture*

**JOHN M. COWLEY**  
*Regents' and Galvin Professor Emeritus of Physics and Astronomy*

**NORMAN DUBIE**  
*Regents' Professor of English*

**NANCY H. EISENBERG**  
*Regents' Professor of Psychology*

**LEROY EYRING**  
*Regents' Professor Emeritus of Chemistry and Biochemistry*

**MARTIN T. FARRIS**  
*Regents' Professor Emeritus of Purchasing and Logistics Management*

**DAVID K. FERRY**  
*Regents' Professor of Electrical Engineering*

**DAVID WILLIAM FOSTER**  
*Regents' Professor of Spanish*

**WILLIAM L. GRAF**  
*Regents' Professor of Geography*

**RONALD GREELEY**  
*Regents' Professor of Geology*

**DAVID R. HICKMAN**  
*Regents' Professor of Music*

**DAVID H. KAYE**  
*Regents' Professor of Law*

**GARY D. KELLER**  
*Regents' Professor of Spanish*

**RAYMOND W. KULHAVY**  
*Regents' Professor of Psychology in Education*

**DANIEL M. LANDERS**  
*Regents' Professor of Exercise Science and Physical Education*

**SHENG H. LIN**  
*Regents' Professor of Chemistry and Biochemistry*

**THERESE ANN MARKOW**  
*Regents' Professor of Zoology*

**JAMES W. MAYER**  
*Regents' Professor of Chemical, Bio and Materials Engineering*

**LEE MEYERSON**  
*Regents' Professor Emeritus of Psychology*

**WARREN MILLER**  
*Regents' Professor of Political Science*

**CARLETON B. MOORE**  
*Regents' Professor of Chemistry and Biochemistry and Geology*

**JEFFRIE G. MURPHY**  
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**MICHAEL O'KEEFFE**  
*Regents' Professor of Chemistry and Biochemistry*

**DENNIS J. PALUMBO**  
*Regents' Professor of Justice Studies*

**GEORGE R. PETTIT**  
*Regents' Professor of Chemistry and Biochemistry*

**ALBERTO ALVARO RIOS**  
*Regents' Professor of English*

**JOHN C.H. SPENCE**  
*Regents' Professor of Physics and Astronomy*

**MARYBETH STEARNS**  
*Regents' Professor Emeritus of Physics and Astronomy*

**WILLIAM T. TROTTER**  
*Regents' Professor of Mathematics*

**CHRISTY G. TURNER II**  
*Regents' Professor of Anthropology*

**J. BRUCE WAGNER JR.**  
*Regents' Professor Emeritus, Center for Solid State Science and Chemistry and Biochemistry*

# Administrative and Academic Personnel

## Arizona Board of Regents

### Ex Officio

Fife Symington, B.A., *Governor of Arizona*

Lisa Graham Keegan, B.A., M.S., *Superintendent of Public Instruction*

### Appointed

#### To July 1997

Jonathan Schmitt, *Student Regent*

#### To January 1998

Eddie Basha, B.A.

Arthur Chapa, B.A., M.A., J.D.

#### To January 2000

Rudy E. Campbell, CLU

John F. Munger, B.A., J.D.

#### To January 2002

George H. Amos III, B.S.

Judith Gignac

#### To January 2004

Kurt R. Davis, B.S.

Donald J. Ulrich, B.A.

#### Counsel to the Board

Joel Sideman, J.D.

## President's Office

President ..... Lattie F. Coor  
 Senior Executive Assistant  
 to the President ..... Ben R. Forsyth  
 Special Assistant to the President  
 for Administration ..... Lawrence D. Mankin  
 Manager of Operations ..... C. Vinette Cowart  
 Business Operations Manager ..... Teresa Bales  
 Director, Athletics ..... Kevin White  
 Director, Equal Opportunity/  
 Affirmative Action ..... Barbara A. Mawhiney  
 General Counsel ..... Paul J. Ward  
 ICA Faculty Representative ..... Jerry L. Kingston

## ASU Main

### Academic Affairs

Senior Vice President and Provost ..... Milton D. Glick  
 Vice Provost ..... Charles R. Bantz  
 Vice Provost ..... Kathleen Church  
 Vice Provost ..... Walter Harris Jr.  
 Vice Provost for Information  
 Technology ..... William E. Lewis  
 Assistant Vice President for  
 Academic Affairs ..... Louis Olivas  
 Assistant to the Senior Vice President  
 and Provost ..... Linda Van Scoy  
 Fiscal Operations Administrator ..... Lynn Carpenter  
 Interim Executive Director, Undergraduate  
 Academic Services ..... William S. Johnson  
 Director, Academic and Administrative  
 Documents ..... Tabb Forster  
 Interim Director, Academic Facilities ..... Paul Fiedler  
 Director, Institutional Analysis ..... John Porter  
 Director, International Programs ..... Donald McTaggart  
 Director, Strategic Planning and  
 Policy Analysis ..... Douglas Vinzant  
 Director, Summer Sessions ..... Carol Switzer  
 Director, University Evaluation ..... William S. Johnson  
 Director, University Program for  
 Faculty Development ..... George Watson  
 Associate Director, Development ..... Patrick Burkhardt  
 Manager, Campus Facilities ..... Susan Lowry  
 Coordinator, Articulation ..... Zoila Gamero de Tovar

### College of Architecture and Environmental Design

Dean, College of Architecture and  
 Environmental Design ..... John Meunier  
 Associate Dean, College of Architecture  
 and Environmental Design ..... James R. Rapp  
 Associate Dean, College of Architecture  
 and Environmental Design ..... Mary Kihl  
 Director, School of Architecture ..... Ron McCoy  
 Director, School of Design ..... Robert Lee Wolf  
 Director, School of Planning  
 and Landscape Architecture ..... Frederick Steiner  
 Director, Herberger Center for  
 Design Excellence ..... Mary Kihl  
 Director, Joint Urban Design Program ..... John McIntosh  
 Director, Ph.D. Program in Environmental  
 Design and Planning ..... Michael D. Kroelinger

**College of Business**

Dean, College of Business ..... Larry E. Penley  
 Associate Dean, Professional Programs ..... Lee R. McPheters  
 Associate Dean, Undergraduate Programs ..... Steve Happel  
 Associate Dean, Administration .....  
 Director, School of Accountancy ..... Philip M.J. Reckers  
 Chair, Department of Business  
     Administration ..... Larry R. Smeltzer  
 Chair, Department of Decision and  
     Information Systems .....  
 Chair, Department of Economics ..... Arthur E. Blakemore  
 Chair, Department of Finance ..... Herbert M. Kaufman  
 Director, School of Health  
     Administration and Policy ..... Frank G. Williams  
 Chair, Department of  
     Management ..... William H. Glick  
 Chair, Department of Marketing ..... Michael P. Mokwa  
 Director, Center for Advanced  
     Purchasing Studies ..... Phillip L. Carter  
 Director, Arizona Real Estate Center ..... Jay Q. Butler  
 Director, Center for Business  
     Research ..... Timothy D. Hogan  
 Executive Director, Center for  
     Financial System Research ..... Herbert M. Kaufman  
 Director, First Interstate Center  
     for Services Marketing ..... Stephen W. Brown  
 Director, Economic Outlook Center ..... Lee R. McPheters  
 Director, Joan and David Lincoln  
     Center for Ethics ..... Marianne M. Jennings  
 Director, L. William Seidman  
     Research Institute ..... Timothy D. Hogan

**College of Education**

Dean, College of Education ..... Leonard A. Valverde  
 Associate Dean, Teacher Preparation  
     Program ..... Nicholas R. Appleton  
 Director, Division of  
     Curriculum and Instruction ..... Sheryl L. Santos  
 Assistant Director, Division of  
     Curriculum and Instruction ..... Larry A. Faas  
 Academic Program Coordinator, Early  
     Childhood Education ..... Rey Gomez  
 Academic Program Coordinator, Educational  
     Media and Computers ..... Gary Bitter  
 Academic Program Coordinator,  
     Elementary Education ..... Herbert Cohen  
 Academic Program Coordinator,  
     Multicultural Education ..... Alfredo Benavides  
 Academic Program Coordinator,  
     Reading and Library Science ..... Lyndon W. Searfoss  
 Academic Program Coordinator,  
     Secondary Education ..... Robert Gryder  
 Academic Program Coordinator,  
     Special Education ..... Stanley H. Zucker  
 Director, Division of Psychology  
     in Education ..... Gail Hackett  
 Academic Program Coordinator,  
     Counseling Psychology ..... Charles D. Claiborn  
 Academic Program Coordinator,  
     Counselor Education ..... William A. Cabianca  
 Academic Program Coordinator,  
     Learning and Instructional  
     Technology ..... Donald J. Freeman

Academic Program Coordinator, Lifespan  
     Developmental Psychology ..... Elsie G. Moore  
 Academic Program Coordinator, Measurement,  
     Statistics, and Methodological  
     Studies ..... John Behrens  
 Academic Program Coordinator,  
     School Psychology ..... Andres Barona  
 Director, Division of Educational  
     Leadership and Policy Studies ..... Thomas H. Metos  
 Academic Program Coordinator,  
     Educational Administration  
     and Supervision ..... Thomas H. Metos  
 Academic Program Coordinator,  
     Educational Policy Studies ..... Mary Lee Smith  
 Academic Program Coordinator,  
     Higher Education ..... Ray Padilla  
 Director, Center for Bilingual and  
     Bicultural Education ..... M. Beatriz Arias  
 Director, Bureau of Educational  
     Research and Services ..... Margaret Mangini  
 Interim Director, Diversity, Recruitment,  
     and Support Programs ..... Carlos Vallejo  
 Director, Center for Indian Education ..... Karen Swisher  
 Director, Mountain States Multifunctional  
     Resource Center ..... Phyllis Garcia  
 Director, Professional Field Experiences ..... Billie Enz  
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     Planning ..... Alan R. Brown  
 Director, Student Affairs ..... Richard Daniel

**College of Engineering and Applied Sciences**

Dean, College of Engineering  
     and Applied Sciences ..... Peter E. Crouch  
 Associate Dean, Academic Affairs ..... Daniel F. Jankowski  
 Associate Dean, Student  
     Affairs and Special  
     Programs ..... Mary R. Anderson-Rowland  
 Interim Associate Dean,  
     Research ..... E. Daniel Hirleman  
 Director, School of Agribusiness and  
     Resource Management ..... Eric P. Thor  
 Director, Del E. Webb School of  
     Construction ..... William W. Badger  
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 Chair, Department of Aeronautical  
     Technology .....  
 Chair, Department of Electronics  
     and Computer Technology .....  
 Chair, Department of Manufacturing  
     and Industrial Technology .....  
 Director, School of Engineering ..... Daniel F. Jankowski  
 Chair, Department of Chemical,  
     Bio and Materials Engineering ..... Eric J. Guilbeau  
 Chair, Department of Civil and  
     Environmental Engineering ..... Larry W. Mays  
 Chair, Department of Computer  
     Science and Engineering ..... Stephen S. Yau  
 Chair, Department of Electrical  
     Engineering .....  
 Chair, Department of Industrial and  
     Management Systems Engineering ..... Gary L. Hogg  
 Chair, Department of Mechanical and  
     Aerospace Engineering ..... Don L. Boyer

Director, Engineering Core and Special Studies .....	Daniel F. Jankowski
Director, Center for Advanced Transportation Systems Research .....	Elizabeth Burns
Director, Aerospace Research Center .....	Helen Reed
Director, Center for Agribusiness Policy Studies .....	Eric P. Thor
Interim Director, Computer-Integrated Manufacturing Systems Research Center .....	Mark R. Henderson
Interim Director, Center for Energy Systems Research .....	Timothy Tong
Director, Center for Innovation in Engineering Education .....	Donovan L. Evans
Director, Center for Research in Engineering and Applied Sciences .....	E. Daniel Hirleman
Director, Center for Professional Development .....	Charles S. Elliott
Interim Director, Center for Solid State Electronics Research .....	Timothy S. Cale
Director, Systems Science and Engineering Research Center .....	Frank Hoppensteadt
Director, Telecommunications Research Center .....	Constantine A. Balanis

#### College of Extended Education

Dean, College of Extended Education .....	Bette F. DeGraw
Associate Dean .....	Ron Alvarado
Director, American Language and Culture Program .....	Gailynn Valdés
Director, Arizona Prevention Resource Center .....	Gail S. Chadwick
Director, Correspondence Study .....	Patricia A. Feldman
Director, Distance Learning Technology .....	Elizabeth H. Craft
Director, Downtown Center .....	Geneva Duarte
Director, East Valley Center .....	Jim Patzer
Director, Instructional Programs .....	Patricia A. Feldman
Director, Communications and Marketing .....	_____
Director, Community Outreach .....	Geneva Duarte
Director, Operations and Finance .....	Cathie M. Fox
Director, Professional and Continuing Education .....	Regina L. R. Edwards

#### College of Fine Arts

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Associate Dean .....	Toni-Marie Montgomery
Sr. Business Operations Manager .....	Suzanne Bias
Director, School of Art .....	Julie F. Codell
Acting Chair, Department of Dance .....	_____
Director, School of Music .....	_____
Chair, Department of Theatre .....	_____
Director, Institute for Studies in the Arts .....	Richard L. Loveless
Director, University Art Museum .....	Marilyn Zeitlin

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Associate Dean .....	Hannah Arterian
Assistant Dean .....	Christine Smith
Director, Center for the Study of Law, Science and Technology .....	Daniel S. Strouse
Director, Indian Legal Programs .....	Siera T. Russell
Acting Director, Legal Research and Writing and Academic Support Group .....	Daria Roithmayr
Director, Law School Clinic .....	Gary T. Lowenthal

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Associate Dean, Academic Programs .....	Leonard Gordon
Associate Dean, Administration and Personnel .....	Wendy Wilkins
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Chair, Department of Anthropology .....	Barbara Stark
Chair, Department of Botany .....	J. Kenneth Hooper
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Director, Chicana and Chicano Studies .....	Edward J. Escobar
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Chair, Department of Microbiology .....	Edward A. Birge
Chair, Department of Military Science .....	Lt. Col. Stephen J. Heynen
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Director, Center for Asian Studies .....	Timothy Wong
Director, Cancer Research Institute .....	G. Robert Pettit
Acting Director, Child Laboratory Program .....	Mary Lamparski
Director, Climatology Laboratory .....	Robert C. Balling
Director, Hispanic Research Center .....	Felipe G. Castro

Director, Interdisciplinary Humanities  
Program ..... Michael Vanden Heuval  
Director, Center for Latin  
American Studies ..... K. Lynn Stoner  
Director, Arizona Center for Medieval  
and Renaissance Studies ..... Robert E. Bjork  
Director, Center for Meteorite  
Studies ..... Carleton B. Moore  
Director, Center for Solid  
State Science ..... James W. Mayer  
Director, Women's Studies  
Program ..... Mary Logan Rothschild

### College of Nursing

Dean, College of Nursing ..... Barbara A. Durand  
Associate Dean for Graduate  
Programs and Research ..... Nancy Melvin  
Associate Dean for Undergraduate  
Programs and Extended Education ..... Mary L. Killeen

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Associate Dean, College of  
Public Programs ..... Thomas V. Schade  
Chair, Department of Communication ..... Jess K. Alberts  
Director, Walter Cronkite School  
of Journalism and  
Telecommunication ..... Douglas A. Anderson  
Director, School of Justice Studies ..... David Goldberg  
Chair, Department of Recreation  
Management and Tourism ..... Carlton F. Yoshioka  
Director, School of Public Affairs ..... Dickinson McGaw  
Director, Advanced Public  
Executive Program ..... Montgomery Van Wart  
Director, Morrison Institute for  
Public Policy ..... Robert Melnick

### Division of Undergraduate Academic Services

Interim Director ..... William S. Johnson  
Associate Director ..... Gay W. Brack  
Advising Outreach Coordinator ..... Amy C. Boylan  
Campus Match Coordinator ..... Brian Richardson  
General Studies Program Coordinator ..... James R. Mettler  
Administrative Associate ..... Faye Verska

### Graduate College

Dean, Graduate College ..... Bianca L. Bernstein  
Associate Dean ..... Deborah N. Losse  
Associate Dean .....  
Assistant Dean ..... Sandra L. Luehrsen

### School of Social Work

Dean, School of  
Social Work ..... Emilia E. Martinez-Brawley  
Associate Dean ..... Don Fausel  
Director, Faculty and Student  
Support Services ..... Sybil M. Delevan

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### University Libraries

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Associate Dean for Library Services ..... Jane Conrow  
Associate Dean, TQS/CI ..... Dora Biblarz  
Associate Dean, Video Resources ..... Warren Fry  
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Head, Acquisitions and  
Bibliographic Records ..... Marcia Anderson  
Head, Government Documents ..... Rebecca Burke  
Acting Head, Conservation/  
Preservation ..... Marilyn Wurzburger  
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Systems, and Technology (LIST) ..... Scott Herrington  
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Head, Map Collection ..... Rosanna Miller  
Head, Architecture and Environmental  
Design Library ..... Berna Neal  
Head, Department of Archives  
and Manuscripts ..... Ed Oetting  
Head, Science Reference  
Service ..... Mary-Margaret Pinckard  
Head, Original Cataloging ..... Lois Schneberger  
Head, Access Services ..... Virginia Sylvester  
Head, Interlibrary Loan ..... Sheila Walters  
Head, Special Collections ..... Marilyn Wurzburger

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Vice Provost and Chief Administrative  
Services Officer, ASU West ..... Gebeyehu Ejigu  
Assistant Vice President,  
Administrative Services ..... LeEtta Overmyer  
Assistant to the Vice President,  
Administrative Services ..... Sheila Woods Stokes  
Comptroller and Treasurer ..... Gerald E. Snyder  
Associate Comptroller ..... Kevin Walker  
Assistant Comptroller,  
Business Services ..... Henry Spomer  
Assistant Comptroller,  
Treasury Services ..... Joanne Wamsley  
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Director, Facilities Planning and  
Construction ..... Henry Mortarotti  
Manager, Administrative Support ..... Wayne Derox  
Manager, Design Management  
and Construction Administration ..... Vance Linden  
Campus Planner ..... Richard Collins  
Assistant Vice President, Human  
Resources ..... Susan M. Malaga  
Associate Director, Human Resources ..... Connie Wood



Assistant Director, Employment, Compensation, and Classification Services .....	Christine Cervantes
Assistant Director, Records, Payroll, and HRMS .....	Sue Madden
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Director, Purchasing .....	Ray Jensen
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Director, ASU Bookstore .....	Val Ross
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Assistant Vice President for Special Programs .....	Frank B. Hidalgo
Executive Director, Alumni Association .....	Susan Clouse Dolbert
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 President's Office Director ..... Allan Price, '82, '83 M.S.W.

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 Education ..... Denise Menchaca '77, '83 M.C.  
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 Outside Maricopa County ..... Steve Primrose '89  
 Non-geographic area ..... David Carrera '85

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 Devil's Advocates President ..... Amy Greenbank  
 Student Alumni President ..... Patrick Anderson  
 Student Foundation President ..... Roxie Forsythe  
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 Kathryn Gammage, Emeritus Ex Officio  
 Patricia Korrick, Emeritus Ex Officio  
 Kathy Zatz, Emeritus Ex Officio  
 Cheryl Goldstein, Chair, Friends of Channel 8  
 Addie Kinsinger, Friends of Channel 8  
 Judy C. Knudson, Friends of Channel 8  
 Lucia Madrid, Friends of Channel 8

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 Director, Student Health ..... Dale Bowen  
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 Registrar ..... Lou Ann Denny

**ASU West**

See page 360 for a list of ASU West administrators.

**ASU East**

Interim Provost ..... Ben R. Forsyth  
 Director, Academic Planning ..... David Schwalm  
 Director, Academic Programs ..... Charles E. Backus  
 Director, Administrative Services ..... Terry Isaacson  
 Director, Planning and Budget ..... Sheila Ainlay  
 Interim Director, Information Technology ..... Willa Cree  
 Director, Institutional Advancement ..... Ann Bergin  
 Director, School of Agribusiness and Resource Management ..... Eric Thor  
 Director, School of Technology ..... Albert McHenry  
 ASU East Student Affairs Liaison ..... Leon Shell

# ASU West

**Ben R. Forsyth, M.D.**  
*Vice President and Provost*

Arizona State University West was established in 1984 to meet the higher education needs of residents of western Maricopa County. It is a nonresidential campus of ASU that offers upper-division and graduate courses. ASU West offers baccalaureate degrees in 21 academic majors in the arts and sciences and selected professional fields. The campus also offers four certificate programs and master's degree programs in Business Administration, Educational Administration and Supervision, Elementary Education, and Secondary Education.

ASU West prepares students to be successful in the global society of the 21st century by engendering a responsiveness to change and an appreciation of intellectual, cultural, gender, and generational diversity. The campus is committed to encouraging the educational, economic, cultural, and social development of the metropolitan area.

Academic programs and support services are designed to meet the needs of working adults and traditional students pursuing degrees, seeking career growth, or furthering their knowledge. The graduate programs are designed primarily for persons employed full-time in businesses and schools. Most graduate courses, as well as undergraduate courses, are offered in the evening.

With an enrollment of about 5,000 students, ASU West has a small college atmosphere, yet students have access to the resources of a major research university. The ASU West campus, consisting of seven buildings totaling about 600,000 square feet, provides state-of-the-art facilities in a beautifully landscaped environment. The 300-acre campus is easily accessible via major interstate routes.

## Accreditation

ASU West is accredited by the North Central Association of Colleges and Schools. Professional programs in various academic areas are also accredited by the following agencies.

All Business and Accountancy degree programs in the School of Management are accredited by the American Assembly of Collegiate Schools of Business (AACSB), the official accrediting agency in the field of business administration.

In the College of Human Services, the Recreation and Tourism baccalaureate program is accredited by the National Recreation and Park Association/American Association for Leisure and Recreation (NRPA/AALR), and the undergraduate Social Work program is accredited by the Council on Social Work Education (CSWE).

## Academic Organization and Administration

The chief administrative and academic officer of ASU West is the vice president and provost for ASU West. There are four schools and colleges at ASU West administered by deans. In addition, there is a Division of Collaborative Programs. These academic units develop and implement the teaching, research, and service programs of the institution, aided by the ASU West Library and other services.

## Degree Programs

ASU West offers the following degree or certificate programs at the graduate or postbaccalaureate level:

### *College of Education*

- M.Ed. .... Educational Administration and Supervision
- M.Ed. .... Elementary Education
- M.Ed. .... Secondary Education
- Postbaccalaureate Programs for Teacher Certification
  - Elementary Education
  - Secondary Education

For specific information on requirements, refer to "College of Education" on pages 347-348 of this catalog.

### *School of Management*

- M.B.A. .... Master of Business Administration
- Postbaccalaureate Certificate in Accountancy

For specific information on requirements, refer to "School of Management" on pages 348-350 in this catalog.

## Admission

Students applying for admission to an ASU West degree or certificate program must complete an application and have transcripts sent directly to the following addresses.

*Degree program and readmission applicants should call 602/543-4567 or write*

GRADUATE STUDIES  
ARIZONA STATE UNIVERSITY WEST  
PO Box 37100  
PHOENIX AZ 85069-7100

*Nondegree and certificate program applicants should call 602/543-8123 or write*

ADMISSIONS AND RECORDS  
ARIZONA STATE UNIVERSITY WEST  
PO Box 37100  
PHOENIX AZ 85069-7100

**College of Education**

**MASTER OF EDUCATION DEGREE PROGRAMS**

**Nature of Programs**

The College of Education offers Master of Education degrees in three program areas: Educational Administration and Supervision, Elementary Education, and Secondary Education. In addition to master's degree course work, the Educational Administration and Supervision program also offers courses that meet the state certification requirements for supervision, principalship, and superintendency.

The College of Education faculty also offers course work to meet the personal and professional development needs of West Valley teachers. For more specific information about graduate programs in education, call the College of Education at 602/543-6378 or write

COLLEGE OF EDUCATION GRADUATE ADVISOR  
ARIZONA STATE UNIVERSITY WEST  
PO Box 37100  
PHOENIX AZ 85069-7100

**Admission Requirements**

Students applying to any of the Master of Education programs must apply to Graduate Studies at ASU West and to the specific program area to which they seek admission. Admission to a degree program is based on undergraduate and/or graduate grade point averages. Also considered are three letters of recommendation, letter of intent, work and academic experiences, and the availability of faculty to supervise academic areas of interest. Applicants to the elementary or secondary programs must hold valid Arizona teaching certificates for that grade

level. Admission to graduate programs is selective. Meeting minimum requirements does not ensure admittance to the program.

**Program Requirements for the Master of Education in Educational Administration and Supervision**

EDA 501	Competency/Performance in Educational Administration .....	3
Core Requirements .....		12
COE 501	Introduction to Research and Evaluation in Education (3)	
COE 504	Learning and Instruction (3)	
COE 505	American Education System (3)	
EDA 593	Applied Project (3)	
Electives .....		18
EDA 507	Computers in Educational Administration (3)	
EDA 510	Introduction to Organization and Administration of American Public Schools (3)	
EDA 511	School Law (3)	
EDA 521	Evaluation of Teaching Performance (3)	
EDA 524	Theory and Application of Educational Administration (3)	
EDA 525	Human Relations and Societal Factors in Education (3)	
EDA 526	Instructional Supervision (3)	
EDA 527	Managerial Functions in School Administration (3)	
EDA 544	Public School Finance (3)	
EDA 548	Community Relations in Education (3)	
EDA 571	School Business Management (3)	
EDA 573	School Personnel Administration (3)	
EDA 576	The School Principalsip (3)	
EDA 675	Politics of Education (3)	
EDA 676	The School Superintendency (3)	
Other approved EDA course		
Curriculum elective .....		3
Total .....		36

EDA 501 is the recommended prerequisite to all other course work in the M.Ed. program of study. EDA 501 requires a personal self-assessment of administrative competencies. This self-assessment is necessary to the student and the advisor in selecting elective course work within the program.

Omnibus graduate courses in educational administration include research methods, practicum, field work, internship, reading and conference, seminar, research, applied project, conference and workshop, continuing registration, and special topics.

**Program Requirements for the Master of Education in Elementary Education**

Core Requirements .....		12
COE 501	Introduction to Research and Evaluation in Education (3)	
COE 504	Learning and Instruction (3)	
COE 505	American Education System (3)	
EED 593	Applied Project (3)	
Electives in Elementary Education .....		12
ECD 555	Modern Practices in Early Childhood Education (3) or EED 511 Principles of Curriculum Development (3)	
Three EED courses* (9)		
Electives* .....		9
Total .....		33

\* Elective courses must be selected in consultation with an advisor.

**Program Requirements for the Master of Education in Secondary Education**

Core Requirements .....		12
COE 501	Introduction to Research and Evaluation in Education (3)	
COE 504	Learning and Instruction (3)	
COE 505	American Education System (3)	
SED 593	Applied Project (3)	
Required Secondary Education courses .....		6
SED 522	Secondary School Curriculum Development (3)	
SED 533	Improving Instruction in Secondary Schools (3)	
Electives in Secondary Education .....		9
SED 577	Issues and Trends in Secondary Education (3)	
SED 588	Human Relations in the Secondary School (3)	
SED 590	Reading and Conference (3)	
SED 591	Seminar (3)	
SED 594	Conference and Workshop (3)	
Other SED electives*		
Electives* .....		6
Total .....		33

\* Elective courses must be selected in consultation with an advisor.

## POSTBACCALAUREATE PROGRAMS FOR TEACHER CERTIFICATION

### Nature of Program

Postbaccalaureate programs that lead to initial teaching certification are designed for people who hold bachelor's degrees in areas other than education. Postbaccalaureate programs are available in elementary education and secondary education. Students who complete an approved program, including student teaching, in one of these areas are recommended for certification to the Arizona Department of Education.

### Admission Requirements

To be considered for admission to postbaccalaureate programs in education, students must

1. submit transcripts indicating an earned bachelor's degree from an accredited institution;
2. have a cumulative GPA of 2.50 or higher in the last 60 semester hours earned;
3. be admitted to ASU West as a nondegree graduate student; and
4. submit a completed application form for the Postbaccalaureate Programs for Teacher Certification to the College of Education Advising Office by the appropriate deadline dates.

*Note:* Students are not allowed to take course work before admittance to the program.

Students are admitted to the postbaccalaureate programs in education in the fall of each year for the following spring semester and in the spring of each year for the following fall semester. Applicants should contact the College of Education Advising Office for specific deadline dates, which are determined yearly.

Admission to postbaccalaureate programs is selective. Meeting minimum requirements does not ensure admittance to the program.

### Curriculum

Secondary postbaccalaureate education students majoring in areas other than history or social studies may be required to take their major methods course at ASU Main.

The curriculum in each postbaccalaureate program contains specified courses that must be taken before student teaching. Information about these

courses is available from the General Advising Center, UCB 220 (602/543-8122).

### Student Teaching

Student teaching is the last course in the sequence taken by postbaccalaureate students. Students must file applications for student teaching early in the semester prior to the student teaching term. The Office of Field Experiences provides information about the deadlines for student teaching applications.

To be accepted for student teaching, students must

1. be admitted to the Postbaccalaureate Program for Teacher Certification;
2. have a cumulative GPA of 2.50 or higher in required professional education course work;
3. complete all required professional teacher education course work;
4. remove all academic deficiencies such as grades of "D," "E," or "I" before placement;
5. demonstrate appropriate professional conduct during the field experiences before student teaching; and
6. complete the application procedure and secure approval to student teach from the Office of Field Experiences and Academic Advising before the deadline date.

## School of Management

### MASTER OF BUSINESS ADMINISTRATION

#### Nature of Program

The Master of Business Administration degree at ASU West is designed to meet the educational needs of working professionals who wish to assume higher levels of responsibility within their organizations. The program serves junior and midlevel business professionals who desire additional knowledge and skill to manage organizational resources more effectively.

Highlights of the M.B.A. for professionals are

1. high-quality program accredited by the American Assembly of Collegiate Schools of Business;
2. faculty who are nationally known researchers, sought-after consultants, and dedicated teachers;

3. comprehensive and challenging curriculum that blends theory and practice;
4. scheduling flexibility; students proceed through the program at their own pace; and
5. small classes of 15 to 30 students per class.

### Admission

The M.B.A. program looks for students with outstanding potential for leadership as well as the intellectual and interpersonal skills to succeed in the program. The program seeks men and women from various economic sectors and encourages applications from individuals with bachelor's degrees in engineering, liberal arts, sciences, and other undergraduate fields. The goal of admissions is to admit students who are academically prepared to meet the challenges of the M.B.A. curriculum and who possess strong personal and professional qualifications.

1. Candidates should have a baccalaureate degree from an accredited institution.
2. Graduate Management Admission Test (GMAT) scores serve as a predictor of academic success in graduate management education. A GMAT score and undergraduate GPA provide data to determine the student's academic abilities. Thus a high GMAT score can compensate for a low GPA and vice versa. Valid GRE scores may be used in lieu of GMAT scores. GMAT scores are not required for individuals who have completed a master's or higher degree.
3. Two to three years of postbaccalaureate work experience are highly desirable.

**Application.** Transcripts of all undergraduate and graduate work and, where applicable, TOEFL scores, must be received by Graduate Studies at ASU West before an application can be considered. Letters of recommendation, a résumé, GMAT scores, and a personal statement must be sent to the M.B.A. Program Office.

The application, application fee, and transcripts should be sent to

GRADUATE STUDIES  
ARIZONA STATE UNIVERSITY WEST  
PO Box 37100  
PHOENIX AZ 85069-7100

The application deadlines are July 1, November 1, and April 1 for the fall and spring semesters, and summer sessions respectively.

All other information for admission processing should be sent to

M.B.A. PROGRAM OFFICE  
SCHOOL OF MANAGEMENT  
ARIZONA STATE UNIVERSITY WEST  
PO Box 37100  
PHOENIX AZ 85069-7100

The office, located in FAB N150, may be phoned at 602/543-6201.

**International Students.** Students whose native language is not English and who have not completed a degree in a country where the native language is English are required to submit Test of English as a Foreign Language (TOEFL) scores before admission. For more information, call 609/771-7330 or write

EDUCATIONAL TESTING SERVICE  
PO Box CN6108  
PRINCETON NJ 08541-6108

Enrollment in graduate (500 and 600) level courses in the School of Management is limited to admitted M.B.A. students. Prospective M.B.A. students may wish to begin their M.B.A. course work by enrolling in one 400-level business course that will count toward the M.B.A. program upon admission. Contact the M.B.A. Program Office at 602/543-6201 for information about the Pre-M.B.A. option.

**PROGRAM REQUIREMENTS**

**Prerequisites.** There are no academic prerequisites for the program. Strong quantitative skills and computer literacy are needed.

**Course Requirements.** The M.B.A. program of study includes courses designed to provide a foundation in business knowledge and skills.

Students also take 12 hours of electives selected in consultation with the M.B.A. advisor.

The courses that make up the M.B.A. program are as follows:

ACC 502	Corporate Financial Reporting .....	3
ACC 503	Managerial Accounting and Cost Control .....	3
CIS 502	Information Systems Concepts in Practice .....	3
ECN 502	Business Economics .....	3
FIN 502	Financial Decision Analysis ..	3

LES 579	Managerial and Global Implications of the Social and Regulatory Environments .....	3
MGT 502	Managing People and Organizations .....	3
MGT 589	Global Strategic Management .....	3
MKT 502	Strategic Marketing .....	3
OPM 502	Management of Operations Technology .....	3
QBA 502	Managerial Decision Making .....	3
	Electives (four courses) .....	12
	<b>Total .....</b>	<b>45</b>

**Waiver/Transfer Policy.** A core course (numbered 502) may be waived on the basis of a transcript evaluation if the student has completed equivalent undergraduate courses within the last five years with a grade of "B" or better at an American Assembly of Collegiate Schools of Business (AACSB)-accredited institution. If waived, students would then take advanced courses in the subject area to maintain the total 45 semester hours. In addition, nine hours of graduate credit may be transferred from another AACSB accredited program or, for dual degree students, the 12 hours of electives are taken at the American Graduate School of International Management as transfer credit. Dual degree students cannot transfer credits from any other program. Every student must complete a minimum of 45 semester hours, 36 of which must be completed on the ASU West campus except for dual degree students who must complete 33 hours on the ASU West campus.

**POSTBACCALAUREATE CERTIFICATE IN ACCOUNTANCY**

**Nature of Program**

The Postbaccalaureate Certificate in Accountancy is designed for students already possessing an undergraduate degree. The undergraduate degree may be in any major, business-related or otherwise. The Postbaccalaureate Certificate program is available only at ASU West and is not available at ASU Main.

The certificate program is particularly useful for persons seeking a career change to accounting or upgrading existing accounting skills. The program involves undergraduate course work in accounting and related fields that pre-

pare a student to sit for the Certified Public Accountant (CPA) examination or other professional accounting certifications such as the Certified Management Accountant (CMA) or Certified Internal Auditor (CIA).

**Admission**

To be admitted to the Postbaccalaureate Certificate in Accountancy Program, an individual must

1. possess a four-year baccalaureate degree from an accredited college or university;
2. be admitted as a nondegree graduate student;
3. have completed the prerequisite business core with a minimum GPA of 2.50 and a grade of "C" or better in each course:
  - a. elementary accounting (financial and managerial), six semester hours
  - b. economics (macro and micro), six semester hours
  - c. finite mathematics, three semester hours
  - d. probability and statistics, three semester hours
  - e. management information systems, three semester hours; and
4. attain an acceptable score on the Accounting Program Admissions Test.

The Accounting Program Admissions Test (APAT) is a nationally standardized test of elementary accounting. It is designed to verify that a student has a strong (and up-to-date) foundation in basic accounting upon which to build the professional level program of study. The APAT Exam is administered on a by-appointment basis at the Testing Center on the campus of Glendale Community College. Call 602/435-3133 for an appointment and fee information. The test requires approximately two hours. Official notification of results takes about four weeks.

**Program Requirements**

Required upper-division core .....	18
ACC 321, 322 Intermediate Accounting (6)	
ACC 331 Cost Accounting (3)	
ACC 347 Accounting Information Systems (3)	
ACC 351 Income Tax Accounting (3)	
ACC 481 Auditing Theory and Practice (3)	



Group A electives (select two) .....	6
ACC 394 ST: Internal Auditing (3)	
ACC 432 Advanced Cost Management (3)	
ACC 452 Advanced Taxation (3)	
ACC 475 Accounting in Public Sector Organizations (3)	
ACC 483 Advanced Accounting (3)	
ACC 484 Clinical Internship (3)	
Group B electives (select two) .....	6
FIN 301 Fundamentals of Finance (3)	
LES 306 Business Law (3)	
MGT 301 Principles of Management (3)	
MKT 301 Fundamentals of Marketing (3)	
Total upper-division hours .....	30

Students admitted to the Postbaccalaureate Certificate in Accountancy program are permitted to enroll in courses other than those listed above only with the written permission of the ASU West Accountancy program director.

At least 21 of the upper-division semester hours for the certificate and at least 18 of the upper-division semester hours in accounting must be taken in residence at ASU West. Candidates must achieve a grade of "C" or better in each course presented for the certificate.

For more information, call the office, located in FAB N103, at 602/543-6115 or write

SCHOOL OF MANAGEMENT  
ADVISING OFFICE  
ARIZONA STATE UNIVERSITY WEST  
PO BOX 37100  
PHOENIX ARIZONA 85069-7100

## Campus Facilities and Services

The campus of ASU West is located between 43rd and 51st Avenues on West Thunderbird Road in Phoenix. Immediately west of the campus is the city of Glendale. The core campus was completed in March 1991 and includes the following facilities: the Fletcher Library, Sands Classroom Building, Classroom Laboratory/Computer Building, Faculty and Administration Building, Kiva Lecture Hall, and University Center Building.

**Fletcher Library.** With a seating capacity of 900 and space for 300,000 volumes, the 106,000-square-foot facil-

ity is a state-of-the-art information access center designed to take full advantage of electronic technology.

**Sands Classroom Building.** Containing 44 class and seminar rooms, the building provides an intimate atmosphere in which to exchange ideas.

**Kiva Lecture Hall.** The Kiva seats 200 and serves as an auditorium for a variety of programs, faculty lectures, and public forums.

**Classroom Laboratory/Computer Building.** This building contains laboratories for science, engineering, the behavioral sciences, art, dance, and music studios, computer classrooms, and an astronomy platform located on the roof.

**Faculty and Administration Building.** Most faculty and administrative offices are located in this building. Classrooms are located in the basement of the east wing.

**University Center.** This facility houses admissions and records, general academic advising, financial assistance, disability resources, multicultural student services, tutorial services, veterans services, student employment, career services, personal counseling, health services, and student life. Other building facilities include food service, a bookstore, cashier and fee payment services, student lounges, an art gallery, child care services, a wellness/fitness facility, a black box theater, meeting rooms, a large, divisible, multipurpose auditorium, and a branch office of the Arizona State Savings and Credit Union.

**Library Services.** The Fletcher Library collection includes 250,000 volumes, 1 million microforms, and more than 3,200 serial subscriptions. Additionally, students have access to the 2.8 million-volume collection on the main campus, which is provided through the ASU Library Online System and a document delivery service.

The library is open seven days a week. Library staff members are on duty when the library is open to provide instruction in using the online catalog, the CD-ROM databases, and other library resources. Individual consultations by appointment are also available.

**Computing Facilities and Services.** Information Technology at ASU West

offers a full range of computing facilities for use by students, faculty, and staff through a combination of local microcomputer facilities and a pervasive high-speed communications network that provides access to mainframe computer facilities located at ASU Main and to national and international computer networks. Dial-in access to university mainframes and the Internet is available.

Technopolis, a student computing access center located on the lower level of Fletcher Library, contains networked IBM-compatible and Macintosh microcomputers, and high-quality peripherals such as laser printers and scanners. A full range of software is provided on the network, which is connected to the overall ASU communications network. A high-speed printer provides local availability of mainframe output. Information and help for computer users, computer accounts services, adaptive technology for students with disabilities, and manuals for equipment and software are available at the center.

ASU West also has four electronic classrooms and a multimedia presentation facility that enhances the use of computers and audiovisual equipment during instruction. They are located in the Classroom Laboratory/Computer Building.

## Student Affairs

The mission of Student Affairs is to identify and respond to the support and student development needs of ASU West's culturally diverse student population for the purpose of enhancing each student's personal, intellectual, and professional growth. Student Affairs also assists in the enrollment and articulation of students to ASU West. Collaborative relationships with faculty, other university constituencies, and the community at large facilitate and enhance program offerings.

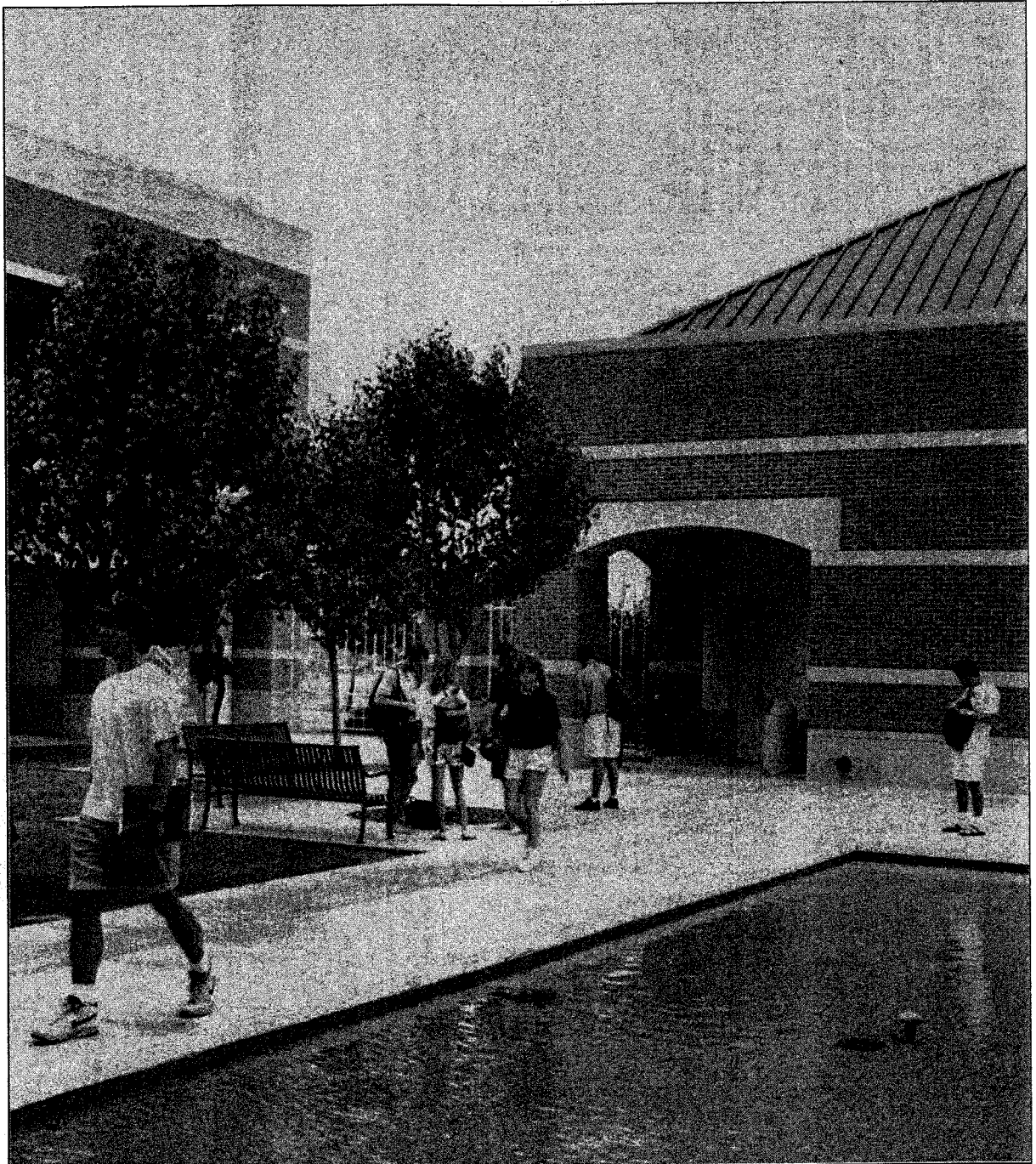
Student Affairs at ASU West ensures that the college experience is positive and productive for students by offering programs and services that augment and support academic programs. The focus of Student Affairs is on the quality of nonresidential campus life for all students and, in particular, working adults, transfer students, ethnic and racial minorities, commuters, and the physically challenged. The offices of Student Affairs are located in the Uni-

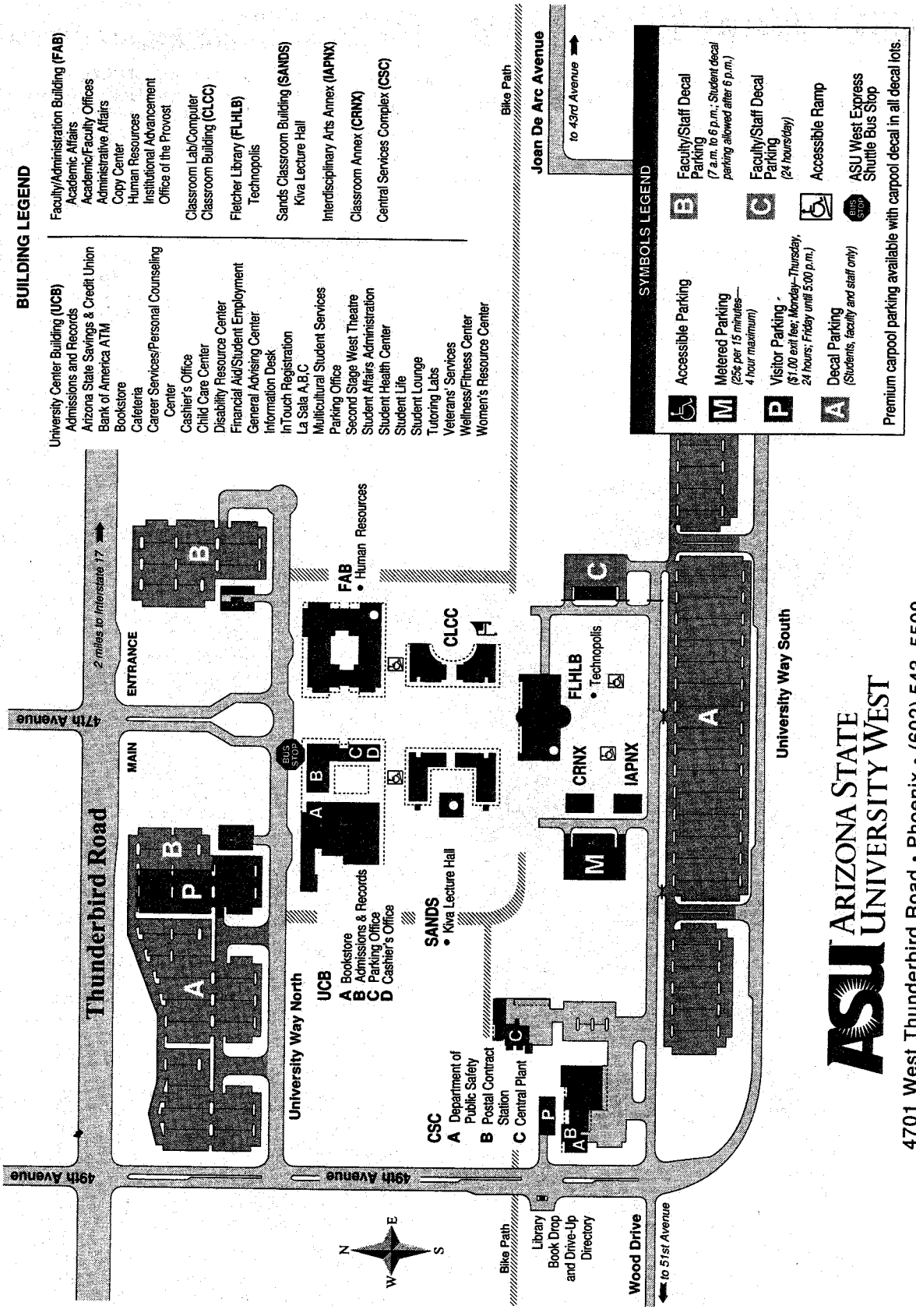
versity Center Building and currently offer programs for

1. general advising;
2. admissions information and services;
3. career services and personal counseling;
4. disability support services;
5. financial aid;
6. learning enrichment/tutorial;
7. multicultural student services;
8. registration services;
9. student employment;
10. student health services;
11. student life; and
12. veterans services.

For more information, call 602/543-8122, visit the University Center Building, or write

STUDENT AFFAIRS  
ARIZONA STATE UNIVERSITY WEST  
PO Box 37100  
PHOENIX AZ 85069-7100





**BUILDING LEGEND**

- |  |   |
|--|---|
| <p><b>University Center Building (UCB)</b><br/>Admissions and Records<br/>Arizona State Savings &amp; Credit Union<br/>Bank of America ATM<br/>Bookstore<br/>Cafeteria<br/>Career Services/Personal Counseling Center<br/>Cashier's Office<br/>Child Care Center<br/>Disability Resource Center<br/>Financial Aid/Student Employment<br/>General Advising Center<br/>Information Desk<br/>InTouch Registration<br/>La Sala A,B,C<br/>Multicultural Student Services<br/>Parking Office<br/>Second Stage West Theatre<br/>Student Affairs Administration<br/>Student Health Center<br/>Student Life<br/>Student Lounge<br/>Tutoring Labs<br/>Veterans' Services<br/>Wellness/Fitness Center<br/>Women's Resource Center</p> | <p><b>Faculty/Administration Building (FAB)</b><br/>Academic Affairs<br/>Administrative Offices<br/>Copy Center<br/>Human Resources<br/>Institutional Advancement<br/>Office of the Provost<br/>Classroom Lab/Computer<br/>Classroom Building (CLCC)<br/>Fletcher Library (FLHLB)<br/>Technopolis<br/>Sands Classroom Building (SANDS)<br/>Kiva Lecture Hall<br/>Interdisciplinary Arts Annex (IAPNX)<br/>Classroom Annex (CRNX)<br/>Central Services Complex (CSC)</p> |
|--|---|

**SYMBOLS LEGEND**

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|--|--|--|--|
|  | <b>Accessible Parking</b>  |  | <b>Faculty/Staff Decal Parking</b><br>(7 a.m. to 6 p.m.; Student decal parking allowed after 6 p.m.) |
|  | <b>Metered Parking</b><br>(25¢ per 15 minutes—4 hour maximum)                                  |  | <b>Faculty/Staff Decal Parking</b><br>(24 hours/day)   |
|  | <b>Visitor Parking</b><br>(\$1.00 exit fee; Monday–Thursday, 24 hours; Friday until 5:00 p.m.) |  | <b>Accessible Ramp</b>   |
|  | <b>Decal Parking</b><br>(Students, faculty and staff only)                                     |  | <b>ASU West Express Shuttle Bus Stop</b>   |
- Premium carpool parking available with carpool decal in all decal lots.

**ASU** ARIZONA STATE  
UNIVERSITY WEST

4701 West Thunderbird Road • Phoenix • (602) 543-5500

# ASU West Directory

For the ASU Main "Academic Directory," see page 366.

## Academic Units (Administrative and Faculty Offices)

Arts and Sciences, College of .....	FAB N200L-3 ..	543-6000
American Studies, Department of ...	FAB N210-1 ....	543-6090
Integrative Studies, Department of ..	FAB N279 .....	543-6003
Interdisciplinary Arts and Performance, Department of .....	FAB N230F .....	543-6057
Life Sciences, Department of .....	CLCC 210B .....	543-6059
Social and Behavioral Sciences, Department of .....	FAB N250 .....	543-6058
Collaborative Programs, Division of Adult Development and Aging/ Gerontology .....	FAB S116-2 ....	543-6400
Nursing (ASU Main Program) .....	FAB S110-2 ....	543-6605
Research Consulting Center .....	FAB S131 .....	543-3410
University Honors College .....	FAB S124 .....	543-4503
Women's Studies .....	FAB S115A .....	543-3300
Writing Across the Curriculum, Center for .....	UCB 202 .....	543-6151
Education, College of .....	FAB S200L-1 ..	543-6300
Human Services, College of .....	FAB N290 .....	543-6600
Administration of Justice, Department of .....	FAB S270D ....	543-6607
Communication Studies, Department of .....	FAB S270-1 ....	543-6606
Recreation and Tourism Management, Department of .....	FAB S277 .....	543-6617
Social Work, Department of .....	FAB S270F .....	543-6614
Library, Fletcher .....	FLHLB .....	543-8501
Circulation, Hours, Renewal .....		543-8520
Information Desk .....		543-8501
Management, School of .....	FAB N101 .....	543-6200
Accountancy Program .....	FAB S178 .....	543-6275
Master of Business Administration Program .....	FAB N151 .....	543-6201
Undergraduate Global Business Program .....	FAB N106C ....	543-6200

## Other

Admissions (Admissions and Records) .....	UCB 120 .....	543-8123
Advisement (General Advising Center) .....	UCB 220 .....	543-8122
Associated Students .....	UCB 221 .....	543-8186
		543-8166
Career Services and Personal Counseling Center .....	UCB 320 .....	543-8124
Disability Resource Center .....	UCB 130 .....	543-8145
Financial Aid Services .....	UCB 120 .....	543-8178
Graduate Studies .....	FAB S301 .....	543-4567
Information Desk .....	FAB Lobby .....	543-5500
Multicultural Student Services .....	UCB 201 .....	543-8148
Parking Administration (Decals, Appeals) .....	UCB 105 .....	543-7275
Registration Services (Admissions and Records) .....	UCB 120 .....	543-8123
Residency Classification .....	UCB 120 .....	543-8123
Student Employment .....	UCB 120 .....	543-8178
Student Health Services .....	UCB 170 .....	543-8019
Student Life .....	UCB 221 .....	543-8187
Student Records (Admissions and Records) .....	UCB 120 .....	543-8123
Veterans Services .....	UCB 120 .....	543-8167
Vice President/Provost .....	FAB 303 .....	543-7000
Vice Provost, Academic Affairs .....	FAB 301 .....	543-4500
Vice Provost, Academic Programs .....	FAB 301 .....	543-4500
Women's Resource Center .....	UCB 323 .....	543-3421

# ASU West Faculty and Academic Professionals

**Achilles, Elayne R.** (1986), Associate Professor of Education; B.M.Ed., Temple University; M.M., Ed.D., Arizona State University

**Ackroyd, William S.** (1995), Instructor of Social and Behavioral Sciences; B.A., M.A., Portland State University; Ph.D., University of Arizona

**Alarcón, Justo S.** (1968), Visiting Professor of Spanish; B.A., M.A., Seráfica (Spain); M.A., Laval University (Canada), Arizona State University; Ph.D., University of Arizona

**Alemán, Sara** (1992), Assistant Professor of Social Work; B.A., Corpus Christi State University; M.S.W., Arizona State University; Ph.D., Brandeis University

**Aleshire, Peter** (1993), Lecturer of Professional Writing; B.A., M.A., Stanford University

**Allison, Jeanette** (1994), Assistant Professor of Early Childhood Education; B.S., Warner Pacific College; M.A., California State University, Fresno; Ph.D., University of Illinois

**Alvarez, Celia** (1992), Assistant Professor of Women's Studies; B.A., Hampshire College; M.S., Ph.D., University of Pennsylvania

**Andereck, Kathleen L.** (1993), Assistant Professor of Recreation and Tourism; B.S., University of Wisconsin, Stevens Point; M.S., Texas A & M University; Ph.D., Clemson University

**Anders, Gary C.** (1989), Professor of Economics; B.S., West Texas State University; M.A., Ph.D., University of Notre Dame

**Anderson, Laurel A.** (1989), Associate Professor of Marketing; Director, Institute for International Business; B.S.N., University of Minnesota, Twin Cities; M.N., University of Washington; Ph.D., Arizona State University

**Atwater, Leanne E.** (1993), Associate Professor of Management; B.A., M.A., San Diego State University; Ph.D., Claremont Graduate School

**Ávalos, Manuel** (1990), Assistant Professor of Political Science; B.A., M.A., University of Arizona; Ph.D., University of New Mexico

**Baldwin, Bruce A.** (1989), Professor of Accountancy; B.A., M.B.A., Michigan State University; Ph.D., Arizona State University

**Bellizzi, Joseph A.** (1988), Professor of Marketing; B.S., M.A., Ph.D., University of Nebraska, Lincoln

**Berezowski, Marc** (1995), Visiting Assistant Professor of Dance; B.A., Simon Fraser University; M.F.A., Arizona State University

**Berman, Tressa** (1995), Assistant Professor of Anthropology; B.A., San Francisco State University; M.A., University of Colorado, Boulder; Ph.D., University of California, Los Angeles

**Bernat, Frances P.** (1993), Associate Professor of Administration of Justice; B.S., State University of New York College at Buffalo; M.A., J.D., State University of New York at Buffalo

**Bettis, Carr** (1991), Assistant Professor of Accountancy; B.B.A., University of Guam; Ph.D., Indiana University, Bloomington

**Bluhm, Carla** (1995), Instructor of Social and Behavioral Sciences; B.A., University of Massachusetts; M.A., M.A.Ed., M.Phil., Ph.D., Columbia University

**Bowen, David E.** (1991), Professor of Management; M.B.A., Ph.D., Michigan State University

**Braithwaite, Charles A.** (1992), Assistant Professor of Communication Studies; B.A., University of California, Santa Barbara; M.A., Ph.D., University of Washington

**Braithwaite, Dawn O.** (1992), Assistant Professor of Communication Studies; B.A., California State University, Fullerton; M.A., California State University, Long Beach; Ph.D., University of Minnesota

- Brawley, E. Allan** (1992), Professor of Social Work; Certificate of Social Work, University of Strathclyde (Scotland); D.S.W., University of Pennsylvania
- Bredbenner, Candice D.** (1990), Assistant Professor of American History; B.A., Russell Sage College; M.A., Ph.D., University of Virginia
- Broadus, Dorothy C.** (1990), Assistant Professor of English; B.A., Eastern Kentucky University; M.Ed., Ph.D., University of Louisville
- Bryn, Sandra L.** (1994), Assistant Professor of Curriculum and Instruction; B.S., Minot State College; M.A., Ed.D., Northern Arizona University
- Buchanan, Lauranne** (1992), Assistant Professor of Marketing; B.A., University of Georgia; M.S., University of Illinois; Ph.D., Stanford University
- Buss, Ray R.** (1990), Associate Professor of Educational Psychology; Assistant Dean, College of Education; B.S., M.S., Ph.D., University of Wisconsin, Madison
- Cardelle-Elawar, Maria** (1987), Associate Professor of Educational Psychology; B.A., Universidad Experimental Libertador (Venezuela); M.S., University of Southern California; Ph.D., Stanford University
- Cárdenas, Lupe** (1986), Associate Professor of Spanish; B.A., M.A., Ph.D., Arizona State University
- Carey, Jane M.** (1988), Associate Professor of Management Information Systems; B.S., M.B.A., Eastern Illinois University; Ph.D., University of Mississippi
- Carlile, Barbara J.** (1993), Lecturer; Coordinator, Field Placement for Education; B.A., Immaculate Heart College; M.Ed., Arizona State University; Ed.D., Northern Arizona University
- Cerveris, Michael E.** (1990), Professor of Music; Chair, Department of Interdisciplinary Arts and Performance; B.S., The Juilliard School; M.A., Catholic University; D.M.A., West Virginia University
- Chaffin, Nancy** (1994), Assistant Librarian; B.A., M.L.S., University of Arizona
- Chang, Stanley Y.** (1992), Associate Professor of Accountancy; B.B.A., National Taiwan University (Taiwan); M.A., University of Missouri; Ph.D., Texas Tech University
- Chisholm, Inés M.** (1991), Assistant Professor of Bilingual Education; B.A., M.Ed., University of Puerto Rico; Ph.D., University of Florida
- Christie, Alice A.** (1995), Assistant Professor of Technology and Education; B.A., Denison University; M.Ed., Boston University; Ph.D., Arizona State University
- Cleland, Jo Ann V.** (1991), Assistant Professor of Reading/Language Arts; B.A., St. Olaf College; M.A., Ed.D., Northern Arizona University
- Coburn, William W.** (1989), Associate Professor of Science Education; B.A., University of California, San Diego; M.A., San Diego State University; Ph.D., University of Colorado
- Coles, Jerilyn W.** (1994), Assistant Professor of Management; B.S., Brigham Young University; Ph.D., University of Utah
- Collins, Shari C.** (1994), Assistant Professor of Philosophy; B.A., Colorado State University; M.A., Ph.D., Washington University
- Comprone, Joseph J.** (1992), Professor of English and American Studies; Dean, College of Arts and Sciences; B.A., Springfield College; M.A., Ph.D., University of Massachusetts, Amherst
- Corrigan, John A.** (1992), Associate Professor of Religion; Chair, Department of American Studies; B.A., University of Dayton; M.A., Miami University; Ph.D., University of Chicago
- Craig, Timothy P.** (1990), Associate Professor of Ecology; B.S., Kansas State University; M.S., Ph.D., Northern Arizona University
- Cuádriz, Gloria H.** (1994), Assistant Professor of American Studies; B.A., University of California, Santa Cruz; M.A., Ph.D., University of California, Berkeley
- Cutrer, Emily F.** (1990), Associate Professor of American Studies; B.A., M.A., Ph.D., University of Texas, Austin
- Cutrer, Thomas W.** (1992), Associate Professor of American Studies; B.A., M.A., Louisiana State University; Ph.D., University of Texas, Austin
- Delgado, Fernando** (1994), Assistant Professor of Communication Studies; B.A., San Jose State University; M.A., Ph.D., University of Iowa
- Di Mare, Lesley** (1992), Associate Professor of Communication Studies; Chair, Department of Communication Studies; B.A., California State University, Chico; M.A., California State University, Hayward; Ph.D., Indiana University, Bloomington
- Dix, Clarence L.** (1979), Senior Lecturer of Social Work; B.S., Buena Vista College; M.S.W., University of Chicago
- Dixon, Kevin A.** (1995), Associate Research Scientist of Botany; B.S., Brock University, St. Catharines, Ontario (Canada); M.S., University of Oklahoma; M.S., Ph.D., University of Chicago
- Easter, Susan Beardsley** (1995), Visiting Librarian; B.A., State University of New York, Stony Brook; M.L.I.S., University of North Carolina, Greensboro
- Elenes, C. Alejandra** (1992), Assistant Professor of Women's Studies; Licenciada en Ciencias de la Información, University of Monterrey (Mexico); M.A., Ph.D., University of Wisconsin, Madison
- Erfani, Julie A.** (1989), Associate Professor of Political Science; B.A., Knox College; M.A., Ph.D., University of Minnesota, Twin Cities
- Farest, Cynthia A.** (1994), Assistant Professor of Reading Education; B.S., University of Texas, Austin; M.Ed., Houston Baptist University; Ph.D., University of Texas, Austin
- farrelly, deg** (1991), Associate Librarian; B.A., Illinois State University; M.L.S., Rutgers, The State University
- Fedock, Patricia** (1993), Assistant Professor of Science Education; B.A., M.A., Ph.D., Arizona State University
- Feezor-Stewart, Barbara** (1995), Visiting Assistant Professor of American Studies; B.A., University of California, Berkeley; M.A., Ph.D., University of California, Los Angeles
- Ferguson, Janice A.** (1995), Senior Lecturer/Coordinator of Interdisciplinary Internships and Fieldwork; B.A., Michigan State University; M.A., Siena Heights College; Ph.D., Michigan State University
- Finn, Jerry** (1990), Associate Professor of Social Work; Chair, Department of Social Work; Interim Chair, Department of Administration of Justice; B.A., University of California, Los Angeles; M.S.W., University of Hawaii, Honolulu; Ph.D., University of Wisconsin, Madison
- Firat, A. Fuat** (1990), Professor of Marketing; Licencié en Economie, Istanbul University (Turkey); Ph.D., Northwestern University
- Forney, Craig A.** (1995), Instructor of American Studies; B.A., Fresno Pacific College; M.A., Ph.D., University of Chicago



- Gallegos, Bee** (1984), Associate Librarian; B.S., University of North Alabama; M.L.S., Vanderbilt University
- Garverick, Michael L.** (1995), Instructor of Accountancy; B.S., Carnegie-Mellon University
- Gater, Helen L.** (1970), Associate Librarian; Dean, ASU West Library; B.A., Fort Hays State University; M.A., University of Denver
- Georges-Abeyie, Daniel** (1992), Professor of Administration of Justice; B.A., Hope College; M.A., University of Connecticut; Ph.D., Syracuse University
- Gilkeson, John S.** (1991), Associate Professor of History; A.B., Amherst College; M.A., University of Oklahoma; Ph.D., Brown University
- Gitelson, Richard** (1994), Associate Professor of Recreation and Tourism; Chair, Department of Recreation and Tourism Management; B.A., M.A.T., M.S., University of North Carolina, Chapel Hill; Ph.D., Texas A & M University
- Glomb, Nancy** (1994), Assistant Professor of Special Education; B.A., State University of New York, Binghamton; M.S., Ph.D., Utah State University
- González, Edward L.F.** (1991), Assistant Librarian; B.A., University of San Diego; M.L.S., San Jose State University
- Gonzalez-Jensen, Margaret** (1994), Associate Professor of Bilingual Education; B.A., Our Lady of the Lake University; M.A., Ed.D., Texas A & I University
- Goonis, Patricia M.** (1995), Visiting Librarian; A.B., M.I.L.S., University of Michigan
- Graves, Joseph L.** (1994), Associate Professor of Evolutionary Biology; A.B., Oberlin College; Ph.D., Wayne State University
- Greenhut, John G.** (1989), Associate Professor of Finance and Economics; B.A., Ph.D., Texas A & M University
- Grober, Matthew S.** (1995), Assistant Professor of Endocrinology; B.S., California State, Long Beach; Ph.D., University of California, Los Angeles
- Gruber, Diane** (1995), Assistant to the Director, Center for Writing Across the Curriculum; B.A., Rutgers University; M.A., Purdue University
- Gutierrez, Sara E.** (1990), Assistant Professor of Psychology; B.S., M.A., Ph.D., Arizona State University
- Haarr, Robin N.** (1994), Assistant Professor of Administration of Justice; B.S., State University of New York, Brockport; M.S., Ph.D., Michigan State University
- Haas, Nancy S.** (1986), Associate Professor of Curriculum and Instruction; B.A., M.Ed., Ph.D., Arizona State University
- Haladyna, Thomas M.** (1986), Professor of Educational Research and Measurement; B.S., Illinois State University; M.A., San Jose State University; Ph.D., Arizona State University
- Harken, Henry R. Jr.** (1986), Associate Librarian; B.A., Hofstra University; M.S.L.S., Long Island University
- Harmon, W. Ken** (1990), Associate Professor of Accountancy; Director, Accountancy Program; B.S., M.Acc., D.B.A., University of Tennessee, Knoxville
- Harris, Kathleen C.** (1990), Professor of Special Education; B.A., M.Ed., Rutgers, The State University; Ph.D., Temple University
- Hattenhauer, Darryl** (1988), Associate Professor of American Literature; B.A., M.A., California State University; Ph.D., University of Minnesota, Twin Cities
- Hay, Victoria** (1993), Lecturer of Arts and Sciences; B.A., University of Arizona; M.A., Ph.D., Arizona State University
- Hayne, Stephen C.** (1994), Assistant Professor of Management Information Systems; B.Com., University of Alberta; Ph.D., University of Arizona
- Hernández, Anthony C.R.** (1992), Assistant Professor of Psychology; B.A., University of California, Riverside; M.A., Ph.D., University of California, Los Angeles
- Hess, Robert K.** (1990), Assistant Professor of Education; B.A., M.Ed., University of Georgia; Ph.D., University of South Carolina
- Howard, Elizabeth C.** (1994), Assistant Professor of Curriculum and Instruction; B.A., University of Texas, Austin; M.A.T., New Mexico State University; Ph.D., University of Texas, Austin
- Hughes, Kimberly** (1994), Assistant Professor of Genetics; B.A., Rice University; M.S., Ph.D., University of Chicago
- Hultsman, John T.** (1990), Associate Professor of Recreation and Tourism; B.G.S., University of Kansas; M.S., University of Missouri; Re.D., Indiana University, Bloomington
- Hultsman, Wendy Z.** (1990), Associate Professor of Recreation and Tourism; B.S.E., State University of New York, Cortland; M.S., Indiana University, Bloomington; Ph.D., Pennsylvania State University
- Hurwitz, Sally C.** (1994), Field Placement Liaison, College of Education; B.A.E., M.Ed., Arizona State University
- Hutt, Roger W.** (1975), Associate Professor of Management; Director, Undergraduate Global Business Programs, School of Management; B.S., M.B.A., Ohio State University; Ph.D., Michigan State University
- Hyman, Batya** (1995), Assistant Professor of Social Work; B.A., Barnard College; M.S.W., Boston University; Ph.D., Brandeis University
- Irwin, Leslie H.** (1995), Lecturer of Professional Education; B.S., University of Wisconsin, Superior; B.Ed., M.Ed., University of Ottawa; Ed.D., Brigham Young University
- Isbell, Dennis** (1991), Assistant Librarian; B.S., M.A., Northern Arizona University; M.L.S., University of Arizona
- Itami, Joanne** (1995), Associate Research Scientist in Life Sciences; B.S., College of Idaho; M.S., Ph.D., Northern Arizona University
- Jacquette, Barbara L.** (1990), Lecturer of Curriculum and Instruction; B.S., Cornell University; M.A., Adelphi University; Ph.D., Arizona State University
- Jarrell, Ranald H.** (1994), Assistant Professor of Early Childhood Education; A.B., Marshall University; J.D., University of Baltimore School of Law; Ed.D., Columbia University, Teachers College
- Jeffers, George J.** (1995), Assistant Professor of Educational Leadership; B.A., St. John's University; M.S., Fordham University; Ed.D., St. John's University
- Johnson, Carolyn R.** (1995), Visiting Librarian; B.A., Montclair State College; M.S.L.S. University of Illinois; M.B.A., University of Minnesota
- Jones, Robert W.** (1994), Associate Professor of Collaborative Programs; Director, Center for Writing Across the Curriculum; B.S., M.A., Middle Tennessee State University; Ph.D., Miami University
- Kammerlocher, Lisa** (1988), Associate Librarian; B.S., M.L.S., University of Oklahoma
- Kelley, Douglas L.** (1994), Assistant Professor of Communication Studies; B.A., Westmont College; M.C., Arizona State University; Ph.D., University of Arizona

- Kelley, Michael F.** (1990), Assistant Professor of Early Childhood Education; B.S., M.S., Arizona State University; Ed.D., University of Georgia
- Kirby, Andrew** (1995), Professor of Social and Behavioral Sciences and Geography; Chair, Department of Social and Behavioral Sciences; B.A., Ph.D., University of Newcastle (England)
- Kline, Elliot** (1993), Visiting Professor of Management; B.A., M.B.A., Ph.D., University of Colorado
- Knopf, Richard C.** (1986), Professor of Recreation and Tourism; Associate Vice Provost for Research; B.S., M.S., Ph.D., University of Michigan
- Koptiuch, Kristin** (1992), Assistant Professor of Anthropology; B.A., State University of New York, Binghamton; M.A., Ph.D., University of Texas, Austin
- Kuhn, Laura D.** (1991), Assistant Professor of Cultural History; B.A., Dominican College; M.A., University of California, Los Angeles
- Lachey, Larry L.** (1995), Instructor of Accountancy; B.S., Butler University
- Lavitt, Melissa R.** (1991), Assistant Professor of Social Work; B.A., University of Chicago; M.S.W., D.S.W., Tulane University
- Lentz, Daniel** (1991), Associate Professor of Music Theory and Composition; B.A., St. Vincent College; M.F.A., Ohio University
- Lerman, Richard** (1995), Associate Professor of Media Arts; B.A., M.F.A., Brandeis University
- Levy, Emanuel** (1990), Professor of Sociology; B.A., M.A., Tel Aviv University (Israel); M.Ph., Ph.D., Columbia University
- Luken, Paul C.** (1993), Lecturer of Sociology; B.A., Quincy College; M.A., Ph.D., Ohio State University
- Makele, Ben-And B.** (1994), Visiting Assistant Professor of American Studies; B.A., Universite Nationale du Zaire; M.A., Ph.D., Arizona State University
- Malekzadeh, Ali R.** (1987), Associate Professor of Management; Associate Vice Provost for Graduate Studies; B.S., M.B.A., University of Denver; Ph.D., University of Utah
- Malian, Ida M.** (1990), Associate Professor of Special Education; Associate Vice Provost for Faculty Development; B.A., Oakland University; M.A., Ph.D., University of Michigan
- McGovern, Thomas V.** (1990), Professor of Psychology; Chair, Department of Integrative Studies; A.B., Fordham University; M.A., Ph.D., Southern Illinois University, Carbondale
- McLean, S. Vianne** (1992), Associate Professor of Early Childhood Education; B.Ed., University of Queensland (Australia); M.Ed., Ph.D., Arizona State University
- McWilliams, Abigail** (1993), Associate Professor of Management; B.S., M.A., Ph.D., Ohio State University
- McWilliams, Thomas P.** (1990), Associate Professor of Production and Quantitative Business Analysis; B.S., Gonzaga University; M.S., Ph.D., Stanford University
- McWilliams, Victoria B.** (1990), Associate Professor of Finance; B.S., B.A., M.B.A., University of Denver; Ph.D., University of Oregon
- Medville, Karen K.** (1995), Assistant Research Scientist in Life Sciences; B.A., Colorado College; M.S., Colorado State University
- Mengesha, Astair Gebre Mariam** (1991), Assistant Professor of Women's Studies; B.A., Purdue University; M.A., Michigan State University; Ph.D., Iowa State University
- Meznar, Martin** (1994), Assistant Professor of International Business; B.A., B.S., Bryan College; M.S., University of Texas, Dallas; Ph.D., University of South Carolina
- Miller, Paul A.** (1988), Associate Professor of Psychology; B.S., St. Vincent College; M.S., North Carolina State University, Raleigh; M.A., Ph.D., University of Texas, Austin
- Mizzi, Philip J.** (1988), Associate Professor of Economics; B.A., Rockford College; Ph.D., Texas A&M University
- Moore, David W.** (1989), Professor of Reading; B.A., M.Ed., University of Arizona; Ph.D., University of Georgia
- Moore, Harold E. Jr.** (1993), Lecturer of Administration of Justice; B.A., J.D., University of Denver
- Moore, Sharon A.** (1989), Associate Professor of Elementary Reading; B.S.Ed., M.S.Ed., Ohio University; Ph.D., University of Georgia
- Moulton, Ian F.** (1995), Assistant Professor of British Literature; B.A., University of Manitoba, Winnipeg (Canada); M.A., University of Western Ontario (Canada); Ph.D., Columbia University
- Mueller, Carol M.** (1988), Associate Professor of Sociology; B.A., University of California, Berkeley; M.A., Rutgers, The State University; Ph.D., Cornell University
- Muller, Barbara J.** (1991), Senior Lecturer of Accountancy; B.S., M.B.A., Arizona State University
- Muñiz, Miriam** (1991), Assistant Professor of Bilingual Education; B.A., M.Ed., Sam Houston State University; Ph.D., Texas A & M University
- Myers, Marilyn** (1987), Associate Librarian; Head, Collection Development and Bibliographic Services; B.A., Kansas State University; M.S., University of Illinois; M.A., Kansas State University
- Nadesan, Majia H.** (1994), Assistant Professor of Communication Studies; B.A., M.A., San Diego State University; Ph.D., Purdue University
- Nadir, P. Aneesah** (1994), Lecturer of Social Work; B.S.W., Adelphi University; M.S.W., Arizona State University
- Nahavandi, Afsaneh** (1987), Associate Professor of Management; Director, Master of Business Administration Program; B.A., University of Denver; M.A., Ph.D., University of Utah
- Náñez, José E. Sr.** (1988), Associate Professor of Psychology; B.A., M.A., California State University; Ph.D., University of Minnesota, Twin Cities
- Nevin, Ann** (1991), Professor of Education in Special Education; B.A., Westminster College; M.Ed., University of Vermont; Ph.D., University of Minnesota, Twin Cities
- Nicolaides, Becky M.** (1994), Assistant Professor of American Studies; B.A., University of Southern California; M.A., Ph.D., Columbia University in the City of New York
- Nilan, Kathleen M.** (1994), Assistant Professor of European Studies; B.A., Yale University; M.A., Sarah Lawrence College; M.A., M.Phil., Ph.D., Yale University
- Nil, Alexander** (1996), Visiting Assistant Professor of Marketing; Diplom, Ludwig-Maximilian-University, Munich (Germany); M.I.M., American Graduate School of International Management; Ph.D., University of Innsbruck (Austria)
- Noronha, Gregory M.** (1995), Assistant Professor of Finance; B.S.E., University of Michigan; M.B.A., Ph.D., Virginia Polytechnic Institute and State University
- Novak, Gayle J.** (1986), Associate Professor of Art and Painting; B.F.A., M.F.A., Arizona State University

- O'Hara, F. Michael III** (1995), Visiting Librarian; B.A., Pomona College; M.A.L.I.S., University of Arizona
- Ohta, Russell J.** (1994), Lecturer of Psychology; B.A., University of Hawaii; M.A., Ph.D., University of Southern California
- Ostroff, Cheri** (1995), Associate Professor of Management; B.A., University of Texas, Austin; M.A., Ph.D., Michigan State University
- Painter, Suzanne R.** (1995), Instructor of Educational Leadership; B.S., Eastern Oregon State College; M.Ed., Ph.D., University of Oregon
- Pambuccian, Victor V.** (1994), Assistant Professor of Mathematics; Baccalaureat, German Lyceum (Rumania); M.S., University of Bucharest (Rumania); Ph.D., University of Michigan
- Pecuch-Herrero, Marta** (1994), Assistant Professor of Mathematics; M.S., Ph.D., University of Chicago
- Portillo, Gregory R.** (1995), Assistant Professor of Political Science; B.A., California State University, Hayward; M.A., University of California, Los Angeles; Ph.D., University of California, Berkeley
- Poston, Kay M.** (1990), Associate Professor of Accountancy; B.A., M.Acc., D.B.A., University of Tennessee, Knoxville
- Pough, F. Harvey** (1993), Professor of Systems Ecology; Chair, Department of Life Sciences; B.A., Amherst College; M.A., Ph.D., University of California, Los Angeles
- Pulido, Alberto L.** (1993), Assistant Professor of American Studies; B.A., University of California, San Diego; M.A., Ph.D., University of Notre Dame
- Pyne, Stephen J.** (1986), Professor of History; B.A., Stanford University; M.A., Ph.D., University of Texas, Austin
- Ragle, Gael L.** (1988), Lecturer of Educational Psychology; B.S.Ed., M.A.Ed., Northern Arizona University; Ed.D., Arizona State University
- Ramsey, Ramsey Eric** (1994), Assistant Professor of Communication Studies; B.A., Rutgers University; M.A., Ph.D., Purdue University
- Reese, Ruth** (1988), Lecturer of Educational Psychology; B.S., University of Wisconsin, Madison; M.S., Ph.D., University of Wisconsin, Milwaukee
- Ridley, Dale Scott** (1990), Assistant Professor of Educational Psychology; B.S., New Mexico State University; M.A., Ph.D., University of Texas, Austin
- Rillero, Peter** (1994), Assistant Professor of Science Education; B.A., State University of New York, Buffalo; M.A., Columbia University; Ph.D., Ohio State University
- Ryan, Joseph M.** (1995), Professor of Education and Collaborative Programs; Director, Research Consulting Center; B.A., M.Ed., Boston College; Ph.D., University of Chicago
- Sabatini, Arthur J.** (1991), Assistant Professor of Performance Studies; B.A., M.A., Ohio University; Ph.D., New York University
- Saffo, Mary Beth** (1994), Associate Professor of Physiology; B.A., University of California, Santa Cruz; Ph.D., Stanford University
- Scheiner, Samuel M.** (1994), Associate Professor of Biometry; B.A., M.S., Ph.D., University of Chicago
- Schuett, Gordon W.** (1995), Instructor of Life Sciences; B.A., University of Toledo; M.S., Central Michigan University; Ph.D., University of Wyoming
- Searle, Mark S.** (1995), Professor of Recreation and Tourism; Dean, College of Human Services; B.A., University of Winnipeg (Canada) M.S., University of North Dakota; Ph.D., University of Maryland
- Sen, Nilanjan** (1992), Assistant Professor of Finance; B.A., Jadavpur University (India); M.A., Ph.D., Virginia Polytechnic Institute
- Shirreffs, Janet H.** (1977), Professor of Gerontology; B.S., Ithaca College; M.S., Syracuse University; Ph.D., Texas Woman's University
- Shultz, Clifford J.** (1992), Assistant Professor of Marketing; B.A., DePauw University; M.A., Ph.D., Columbia University
- Siegel, Donald** (1994), Associate Professor of Economics; B.A., Columbia College; M.Phil., Ph.D., Columbia University
- Silberman, Jonathan** (1992), Professor of Economics; Dean, School of Management; B.S., Bowling Green State University; M.S., Ph.D., Florida State University
- Smith, Ellen M.** (1995), Assistant Research Scientist in Life Sciences; B.A., Cornell University
- Sowell, Evelyn J.** (1990), Professor of Education; B.A., Howard Payne College; M.Ed., Wichita State University; Ed.D., Northern Illinois University
- Spakes, Patricia A.** (1990), Professor of Women's Studies; Vice Provost, Academic Affairs; B.A., Winthrop College; M.S.W., University of South Carolina; Ph.D., University of Wisconsin, Madison
- Spencer, John S.** (1992), Assistant Librarian; B.A., Wheaton College; M.A., Kent State University; M.L.S., Southern Connecticut State University
- St. Clair, Charles E.** (1991), Fine Arts Specialist; B.F.A. Fairmount Center for Creative and Performing Arts
- Stage, Sarah J.** (1994), Professor of Women's Studies; Chair, Women's Studies; B.A., University of Iowa; M.A., University of Massachusetts; M.Phil., Ph.D., Yale University
- Stewart, Albert A.** (1994), Lecturer of Visual Arts; B.F.A., University of Texas, Austin; M.F.A., University of Washington
- Stryker, Linda L.** (1987), Associate Professor of Astronomy; B.A., Whittier College; B.A., M.S., San Diego State University; M.A., California State University, Los Angeles; Ph.D., Yale University
- Sullivan, Brian K.** (1989), Associate Professor of Evolutionary Biology; B.A., University of California, Berkeley; Ph.D., Arizona State University
- Sutton, Steve G.** (1992), Associate Professor of Accountancy; B.S.A., M.A., Ph.D., University of Missouri, Columbia
- Svoboda, William S.** (1969), Professor of Education; Dean, College of Education; B.S., M.S., Ed.D., University of Kansas
- Thomson, Ernie** (1992), Assistant Professor of Administration of Justice; B.A., M.A., University of Texas, El Paso; Ph.D., University of California, Santa Barbara
- Tompkins, Cynthia M.** (1992), Assistant Professor of Women's Studies; Licenciada en Letras Modernas, National University of Cordoba (Argentina); M.A., Ph.D., Pennsylvania State University
- Van Fleet, David D.** (1989), Professor of Management Strategy Policy; B.S., Ph.D., University of Tennessee, Knoxville
- Vaughan, Suzanne** (1987), Associate Professor of Sociology; B.A., Roanoke College; M.A., University of New Mexico; Ph.D., Ohio State University
- Vicedo, Marga** (1992), Assistant Professor of Philosophy; B.A., M.A., Ph.D., University of Valencia (Spain)

**Vickrey, Don W.** (1992), Professor of Accountancy; Director, Faculty Development, School of Management; B.B.A., University of Houston; M.B.A., Ph.D., University of Texas, Austin

**Waldman, David A.** (1995), Associate Professor of Management; B.A., University of Kentucky; M.S., Ph.D., Colorado State University

**Waldron, Vincent R.** (1992) Associate Professor of Communication Studies; B.A., M.A., University of Arizona; Ph.D., Ohio State University

**Wertheimer, Eric H. R.** (1995), Assistant Professor of American Literature; B.A., Haverford College; M.A., Ph.D., University of Pennsylvania

**Weston, Kath** (1990), Associate Professor of Anthropology; A.B., A.M., University of Chicago; A.M., Ph.D., Stanford University

**Wetzel, Keith** (1991), Assistant Professor of Educational Technology; B.A., Greenville College; M.A., Goddard College; M.A., Ph.D., University of Oregon

**Wilson, Daniel** (1986), Senior Lecturer of Engineering; B.S., Drexel University; M.S.E., Ph.D., Arizona State University

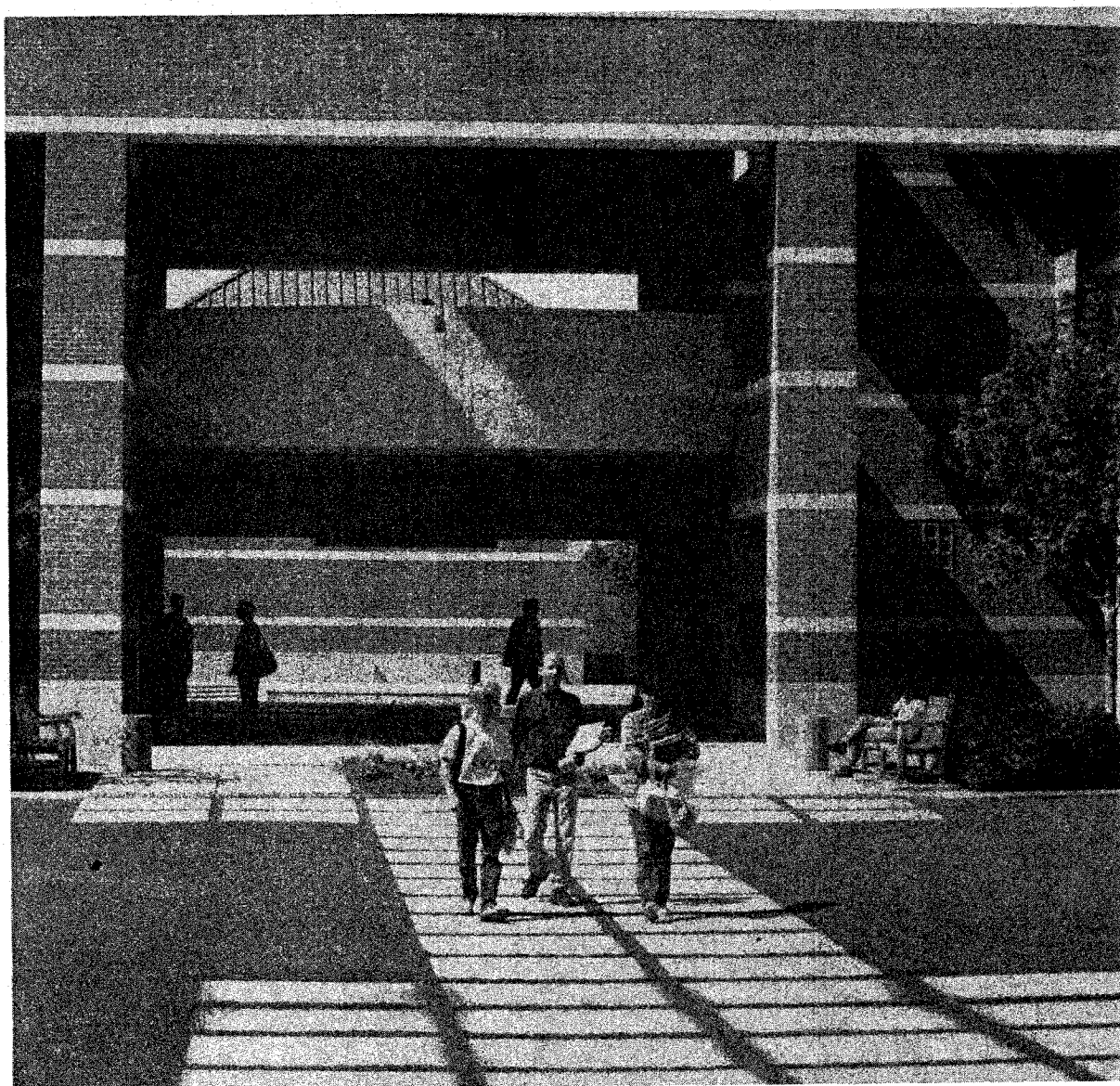
**Wilson, Denward J.** (1989), Lecturer of Philosophy; B.A., Arizona State University

**Wosinska, Wilhelmina** (1994), Lecturer of Social Psychology; B.A., University of Warsaw (Poland); M.A., Ph.D., Jagiellonian University in Krakow (Poland)

**Wu, Jianguo** (1995), Assistant Professor of Ecosystem Ecology; B.S., University of Inner Mongolia; M.S., Ph.D., Miami University

**Youngdahl, William E.** (1992), Assistant Professor of Management Information Systems; B.S., California State Polytechnic University, Pomona; M.S., Ph.D., University of Southern California

**Zambo, Ronald W.** (1991), Assistant Professor of Mathematics Education; B.S., Indiana University, Bloomington; M.A., Ph.D., University of South Florida



# ASU West Administrative and Academic Personnel

## Academic Administration

Vice President and Provost .....	Ben R. Forsyth
Vice Provost for Academic Programs .....	David E. Schwalm
Vice Provost for Academic Affairs .....	Patricia A. Spakes
Vice Provost for Planning and Budget .....	Barry R. Bruns
Vice Provost for Administrative Affairs .....	Gebeyehu Ejigu
Vice Provost for Institutional Advancement .....	Judy C. Knudson
Associate Vice Provost, Extended Instruction .....	Christine C. Hall
Associate Vice Provost, Faculty Development .....	Ida M. Malian
Associate Vice Provost, Graduate Studies .....	Ali R. Malekzadeh
Associate Vice Provost, Research .....	Richard C. Knopf
Associate Vice Provost and Dean, Student Affairs .....	Sylvia A. Silva
Dean, ASU West Library .....	Helen L. Gater

## University Offices

Vice President for Research and Strategic Initiatives .....	Robert Barnhill
Dean, Graduate College .....	Bianca L. Bernstein
Dean, College of Extended Education .....	Bette F. DeGraw
Dean, University Honors College .....	Ted Humphrey

## College of Arts and Sciences

Dean, College of Arts and Sciences .....	Joseph J. Comprone
Chair, American Studies .....	John A. Corrigan

Chair, Integrative Studies .....	Thomas V. McGovern
Chair, Interdisciplinary Arts and Performance .....	Michael E. Cerveris
Chair, Life Sciences .....	Harvey Pough
Chair, Social and Behavior Sciences .....	Andrew Kirby

## College of Education

Dean, College of Education .....	William S. Svoboda
Assistant Dean, College of Education .....	Ray R. Buss

## College of Human Services

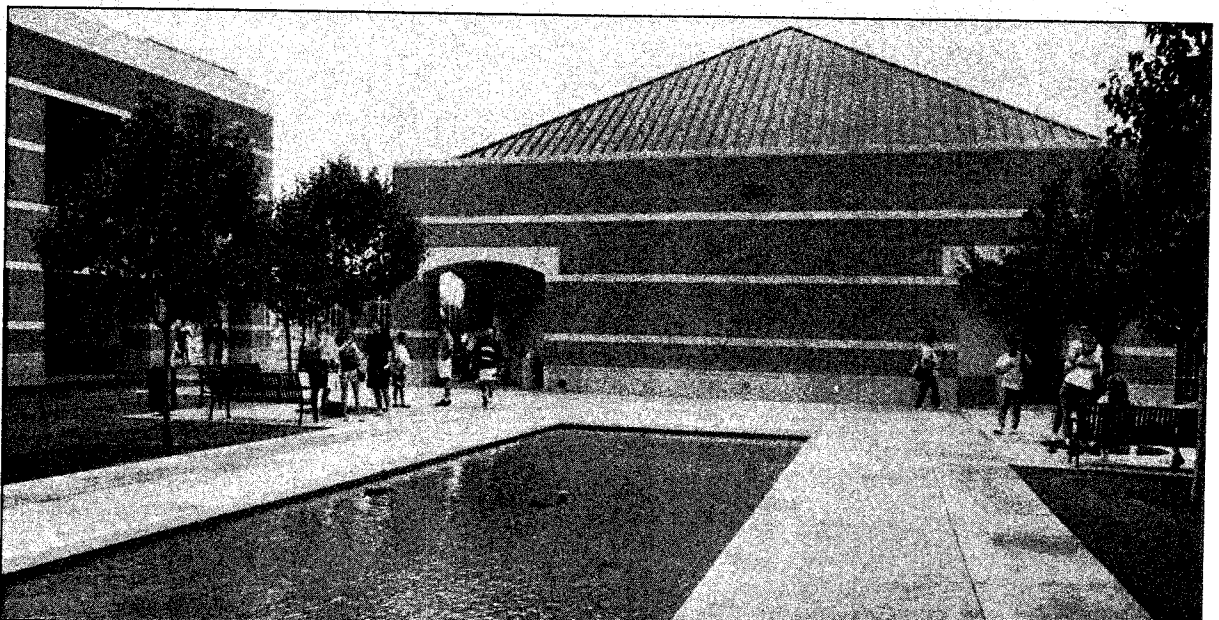
Dean, College of Human Services .....	Mark S. Searle
Interim Chair, Administration of Justice .....	Jerry Finn
Chair, Communication Studies .....	Lesley Di Mare
Chair, Recreation and Tourism Management .....	Richard Gitelson
Chair, Social Work .....	Jerry Finn

## Division of Collaborative Programs

Interim Director, Division of Collaborative Programs .....	David E. Schwalm
Liaison, Nursing (ASU Main Program) .....	Lasca Beck
Director, Research Consulting Center .....	Joseph M. Ryan
Chair, Women's Studies .....	Sarah J. Stage
Director, Writing Across the Curriculum Program .....	Robert W. Jones

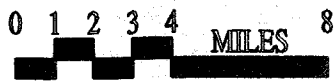
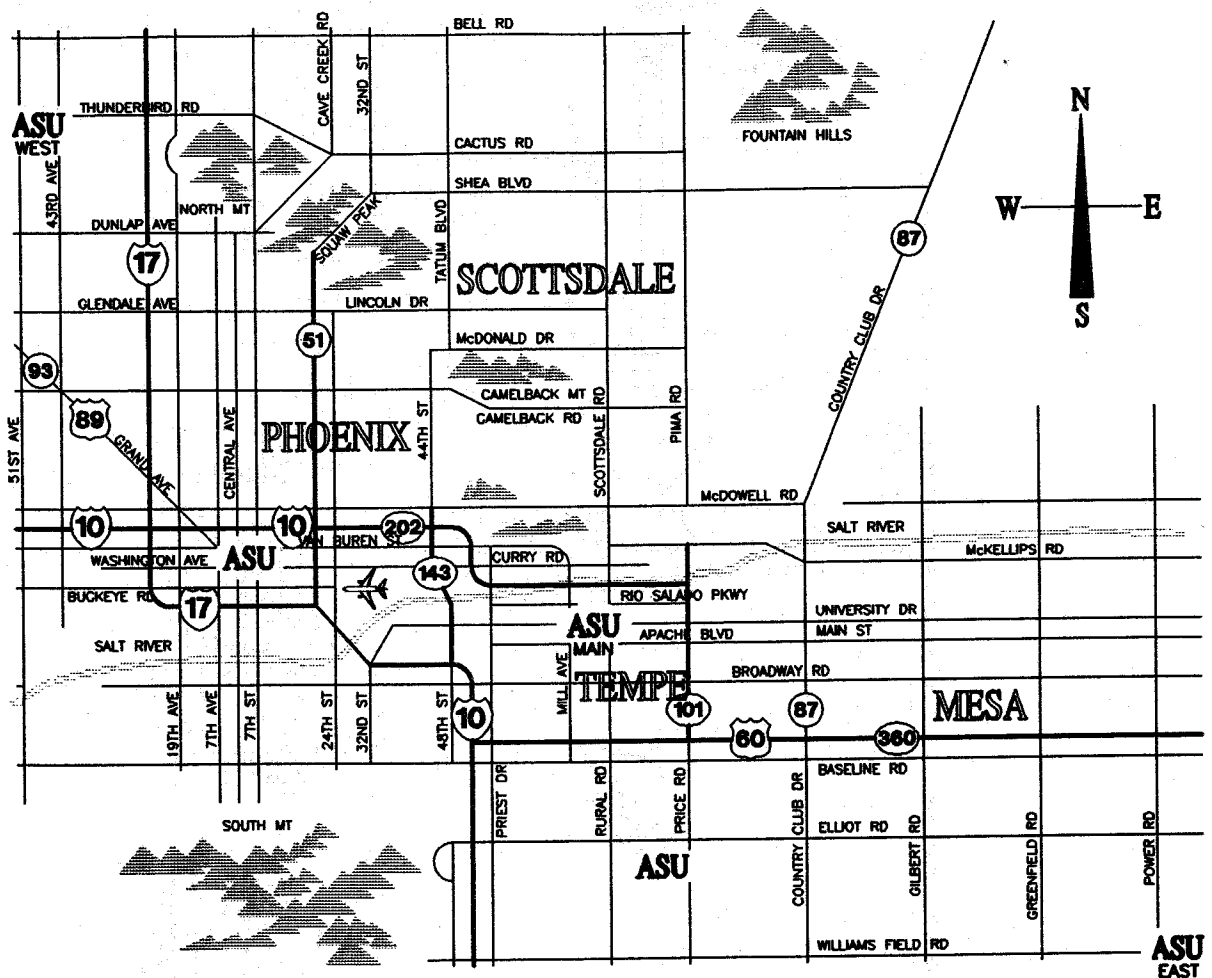
## School of Management

Dean, School of Management .....	Jonathan Silberman
Director, Accountancy Program .....	W. Ken Harmon
Director, Faculty Development .....	Don Vickrey
Director, Master of Business Administration Program .....	Afsaneh Nahavandi
Director, Undergraduate Global Business Programs .....	Roger W. Hutt





# ASU VICINITY MAP



ASU - ASU MAIN CAMPUS - Downtown Tempe  
MAIN

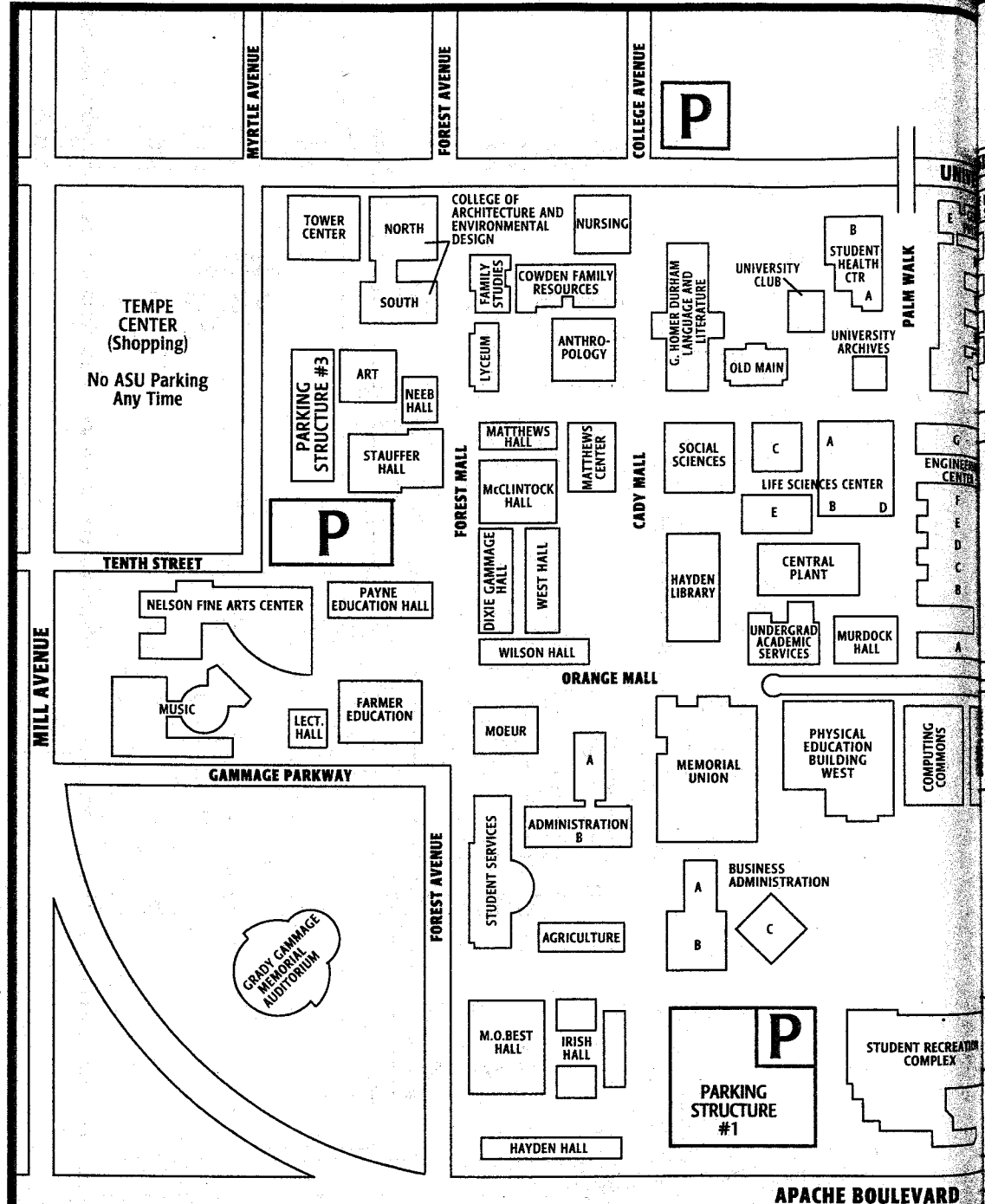
ASU - ASU WEST - 43rd. Avenue & Thunderbird Road  
WEST

ASU - ASU EAST - Power Road & Williams Field Road  
EAST

ASU - ASU RESEARCH PARK - Price Road & Elliot Road

ASU - ASU DOWNTOWN CENTER - Monroe Street & Fifth Street

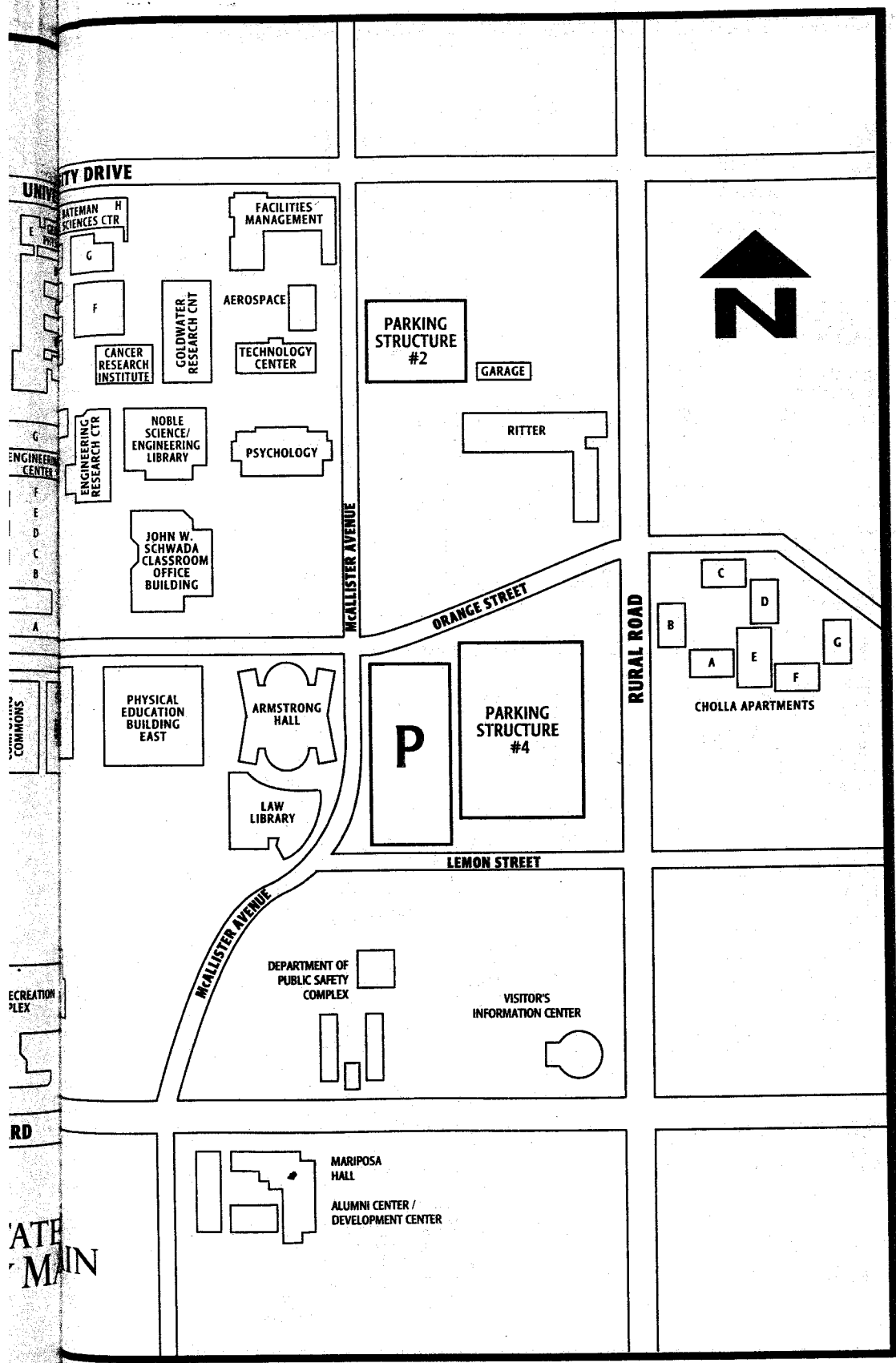


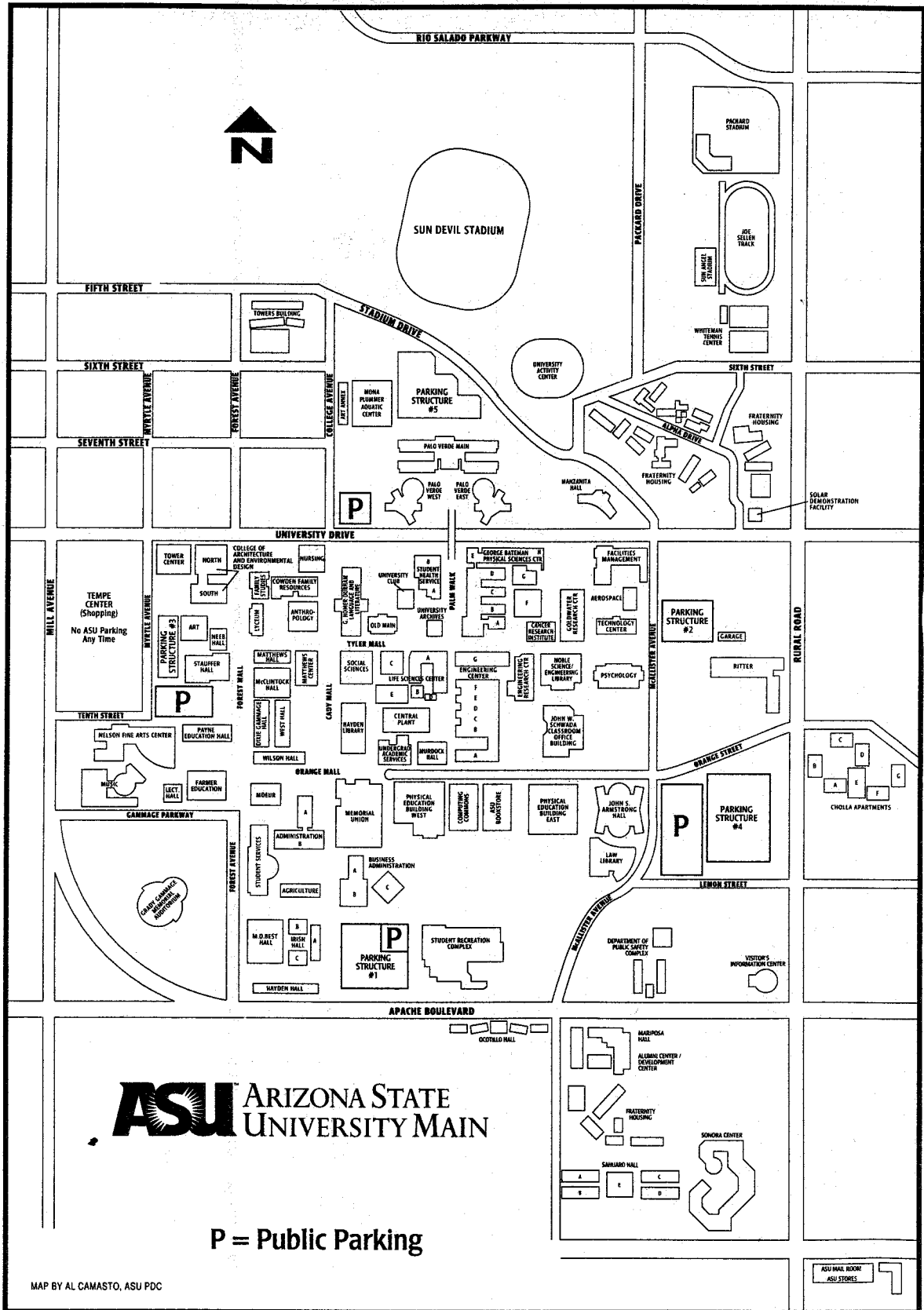


P = Public Parking

**ASU** ARIZONA STATE UNIVERSITY

MAP BY AL CAMASTO, ASU PDC





**ASU** ARIZONA STATE UNIVERSITY MAIN

P = Public Parking

MAP BY AL CAMASTO, ASU PDC

ASU MAIL ROOM AND STORES

## Answers to Frequently Asked Questions about ASU Main

### Admission Information?

Requests for applications or information regarding the progress of your file through the admission process should be directed to Graduate Admissions at 602/965-6113.

### Advising?

The Graduate College Advising Office is open to all prospective and admitted graduate students. To make an appointment, call 602/965-3521 or stop by the center lobby, Wilson Hall. Students admitted to degree programs should first seek advising within their programs.

### Application Fee Waiver?

ASU cannot waive, defer, or refund the fee. Your application will be processed and sent to the academic unit to which you are applying only after you have paid the fee.

### Campus Map?

The Graduate College (Wilson Hall, center lobby) distributes maps of the campus and parking facilities. Maps are also available at the ASU Bookstore, 602/965-3191.

### Catalog?

Once admitted, you will receive a free copy. This copy is mailed to you if your address is in the United States, or you may present your letter of admission at the Graduate College to receive your free copy. Catalogs are also available in the ASU Bookstore, 602/965-3191, for a fee of \$4.00.

### Corresponding With ASU?

Address letters to: Department or Office Name (if known), Arizona State University, Tempe, AZ 85287. If you are not sure how to address your letter, send it to Graduate Admissions, and the staff will forward it to the proper office.

### Degree Programs and Departments?

For specific information about faculty, programs, application requirements, and deadlines, contact the academic unit directly, by mail or by phone. Unsure? Contact the Graduate College Advising Office, 602/965-3521.

### Employment on Campus?

The Student Financial Assistance Office, 602/965-5186, maintains and posts up-to-date employment information for jobs on campus.

### Financial Assistance? Loans? Assistantships? Scholarships?

First: Your best source of information is the academic unit to which you are applying; its director of graduate study can provide information, guidance, and application forms for scholarships, assistantships, and fellowships specific to that program. Most units set early deadlines and require special forms or procedures.

Second: Ask for the Graduate College's financial assistance information sheet. The college also has scholarship information available in the center lobby of Wilson Hall.

Third: Concerning need-based aid, grants, loans, and work-study, contact the Student Financial Assistance Office, 602/965-3355, even if deadlines have passed. Inquire early and send completed forms promptly; processing requires at least six weeks. ASU uses the College Scholarship Service Financial Aid Form (FAF) available from the financial aid office at high schools, community colleges, or other four-year colleges and universities.

Fourth: Visit a college or public library. Ask a reference librarian for publications that will help you locate scholarships and fellowships.

Fifth: If you currently attend school, ask your advisor for guidance in finding information about financial assistance in your discipline.

### Financial Guarantee?

International applicants must provide explicit verification from their banks that funds equal to the amount specified on the Financial Guarantee Form are available to them. (A general assurance of good credit will not be accepted.)

### Housing?

Stop by the Graduate College to pick up a copy of our Housing Information Sheet.

### On Campus:

Mariposa Hall houses graduate students and should be specifically requested on applications for campus housing instead of other facilities; contact the Housing Office, 602/965-3515. No campus housing is available for married students or families.

### Off-Campus:

Information is available from the ASASU Tenants/Commuter Students Association, 602/965-6246. Tempe, Mesa, Scottsdale, and Phoenix newspapers advertise many rentals.

### I-20/IAP-66 Forms?

ASU issues forms to be used for a visa permitting attendance only at ASU. ASU issues the I-20 or IAP-66 only after receiving an acceptable Financial Guarantee Form and admitting the student.

### International Student Association?

Contact the International Student Office, 602/965-7451, after arriving on campus.

### Letters of Recommendation?

Send these letters to the director of graduate study in the academic unit you are applying to.

### Phone Numbers?

Call the campus operator Monday through Friday, 8:00 to 5:00, at 602/965-9011. Unsure about who to call? Contact a Graduate College advisor, 602/965-3521.

### Registration?

Contact the Office of the Registrar, 602/965-3171, or the academic unit to which you are applying.

### Release of Information to Friends?

By law, staff members can give personal information only to the applicant. If you want us to release information to another person, you must authorize us to do so. Send a letter to Graduate Admissions naming the person who may represent you. Please sign the letter with your name as it appears on your application form.

### Research and Support Facilities?

The academic unit to which you are applying is your best source of information about library resources, computing facilities, and research laboratories in your field. Contact the program's director of graduate study.

### Teacher Certification?

Both nondegree and degree graduate programs at ASU lead to Arizona teacher's certification. Contact the Certification Office at 602/965-3877, the Elementary Education program at 602/965-3711, or the Secondary Education program at 602/965-4601.

### TOEFL Scores?

ASU accepts score reports from *only* the Educational Testing Service, Princeton, New Jersey, or from a sponsor organization such as LASPAU or the Institute of International Education.

### Transcripts?

For a full description of the ASU policy on transcripts, see page 36 of this catalog.

# Academic Directory

Area Code (602)

## Graduate College

Admissions Office .....	965-6113
Advising Office .....	965-3521
Format Office .....	965-3521
General Office .....	965-3521

## College of Architecture and Environmental Design

Architecture, School of .....	965-3536
Design, School of .....	965-4135
Planning and Landscape Architecture, School of ..	965-7167

## College of Business

Accountancy, School of .....	965-3631
Business Administration, Department of .....	965-3231
Decision and Information Systems, Department of .....	965-6350
Economics, Department of .....	965-3531
Finance, Department of .....	965-3131
Health Administration and Policy, School of .....	965-7778
Inquiries regarding the Ph.D. in Business Administration and M.B.A. ....	965-3332
Management, Department of .....	965-7586
Marketing, Department of .....	965-3261

## College of Education

Curriculum and Instruction, Division of .....	965-1644
Educational Leadership and Policy Studies, Division of .....	965-6248
Psychology in Education, Division of .....	965-3384

## College of Engineering and Applied Sciences

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## ASU West

See page 353.

# Building Abbreviations

ADM A .....	Administration A-Wing	LAWLB .....	John J. Ross-William C. Blakley Law Library
ADM B .....	Administration B-Wing	LIB .....	Charles T. Hayden Library
AED .....	College of Architecture and Environmental Design/North	LL (Wings A-C) .....	G. Homer Durham Language and Literature Building
AG .....	Agriculture Building	LS (Wings A-C) .....	Life Sciences Center
ANTH (Wings A-C) .....	Anthropology Building	LSE .....	Life Sciences E-Wing
AQUAT (Wings A and B) .....	Mona Plummer Aquatics Center	LYC .....	Lyceum Theatre
ARCH .....	College of Architecture and Environmental Design/South	MAIN .....	Old Main
ARCV .....	University Archives	MCENT .....	A.J. Matthews Center
ART .....	Art Building	MCL .....	James H. McClintock Hall
ARWH .....	Art Warehouse	MHALL .....	Carrie Matthews Hall
ASUDC .....	Downtown Center	MOEUR .....	B.B. Moeur Administration
BA .....	Business Administration Building	MTCHL .....	Mitchell School (Tempe)
BAC .....	Business Administration C-Wing	MU .....	Memorial Union
BKSTR .....	ASU Bookstore	MUR .....	John Murdock Lecture Hall
CERA (Wings A and B) .....	Ceramics Annex	MUSIC .....	Music Building
CFS .....	Center for Family Studies	NEEB .....	L.S. Neeb Hall
CHAPL .....	Danforth Chapel	NOBLE .....	Daniel E. Noble Science and Engineering Library
CLCC .....	Classroom Laboratory/Computer Building*	NUR .....	Nursing Building
CMPIN .....	Campus Inn	PBS .....	Packard Baseball Stadium
CMSC .....	Community Services Center Building	PEBE .....	Physical Education Building East
COB (Wings A and B) .....	John W. Schwada Classroom Office Building	PEBW .....	Physical Education Building West
CP .....	Central Plant	PPS .....	Facilities Management
CPCOM .....	Computing Commons Building	PS (Wings A-H) .....	George M. Bateman Physical Sciences Center
CRNSN .....	Cornerstone Mall	PSY .....	Psychology Building
CRNX .....	Classroom Annex*	RITT (Wings A and B) .....	Ritter Building
CTRSV .....	Central Services Complex*	SANDS .....	Sands Classroom Building*
EC (Wings A-G) .....	Engineering Center	SDF .....	Solar Demonstration Facility
ECANX .....	Engineering Center Annex	SHS (Wings A and B) .....	Student Health Service
ED .....	Hiram B. Farmer Education Building	SRC .....	Student Recreation Complex
EDB .....	Ira D. Payne Education Hall	SS .....	Social Sciences Building
EDC .....	G.D. McGrath Education Lecture Hall	SSV .....	Student Services Building
ENGRC .....	Engineering Research Center	STAD .....	Sun Devil Stadium
FAB .....	Faculty and Administration Building*	STAUF (Wings A and B) .....	Charles Stauffer Communication Arts Building
FAC .....	Nelson Fine Arts Center	TC .....	Technology Center
FIELD .....	University Field Lab	TCB .....	Aeronautics Building
FLHLB .....	Fletcher Library*	TCC .....	Technology Center Annex
FSL .....	Forestry Services Lab	TCM .....	Technology Modulars
GGMA .....	Grady Gammage Memorial Auditorium	THWH .....	Theatre Warehouse
GHALL .....	Dixie Gammage Hall	TOWER (Wings A and B) .....	University Tower Center
GWC .....	Barry M. Goldwater Center for Science and Engineering Research	TRACK .....	Joe Selleh Track
HEC (Wings A and B) .....	Cowden Family Resources Building	UAC .....	University Activity Center
IAPNX .....	Interdisciplinary Arts and Performance Annex*	UCB .....	University Center Building*
ICA .....	Intercollegiate Athletics	UCLUB .....	University Club
IRISH .....	Frederick M. Irish Hall	VISIT .....	ASU Visitor's Information Center
LAW .....	John S. Armstrong Hall	WH .....	Warehouse
		WHALL .....	West Hall
		WILSN .....	George W. Wilson Hall
		WTC .....	Whiteman Tennis Center

\* Located at ASU West.



## Special Class Fees and Deposits (continued from page 39)

## Special Fees (continued)

ART 473	Advanced Metalworking	15.00
ART 474	Advanced Wood	25.00
ART 476	Advanced Fibers	25.00
ART 477	Printed Textiles	30.00
ART 494	ST: Advanced Sculpture	20.00
ART 494	ST: Color for Jewelry	15.00
ART 494	ST: Computer Animation II	40.00
ART 494	ST: Computer Animation III	40.00
ART 494	ST: Experimental Paper	25.00
ART 494	ST: Fibers and Surface	25.00
ART 494	ST: Forging Techniques	15.00
ART 494	ST: Foundry	40.00
ART 494	ST: Mold Making and Casting	15.00
ART 494	ST: Neon Workshop	40.00
ART 494	ST: Photo Design	25.00
ART 494	ST: Portraitive Photography	25.00
ART 494	ST: Print Textiles	25.00
ART 494	ST: Relief Printmaking	35.00
ART 494	ST: Vapor Glazes	15.00
ART 494	ST: View Camera	35.00
ART 494	ST: Watercolor	40.00
ART 494	ST: Wood Carving	30.00
ART 498	PS: Landscape Photography: Theory	25.00
ART 551	Intaglio	40.00
ART 598	ST: Advanced Color Photography	35.00
ART 598	ST: Advanced Furniture	30.00
ART 598	ST: Advanced Photography Processes for Printmaking	25.00
ART 598	ST: Advanced Photo Processes and Printmaking	25.00
ART 598	ST: Advanced Screenprinting	30.00
ART 598	ST: Art Anatomy	20.00
ART 598	ST: Ceramic Clay	25.00
ART 598	ST: Ceramic Glaze	25.00
ART 598	ST: Experimental Paper	25.00
ART 598	ST: Fibers and Surface	25.00
ART 598	ST: Figure Painting (ASU Main only)	25.00
ART 598	ST: Figure Painting (ASU West only)	20.00
ART 598	ST: Forging Techniques	15.00
ART 598	ST: Foundry	40.00
ART 598	ST: Jewelry Metalworking	15.00
ART 598	ST: Life Drawing	25.00
ART 598	ST: Lithography	40.00
ART 598	ST: Mold Making and Casting	15.00
ART 598	ST: Neon Workshop	40.00
ART 598	ST: Non-Silver Photography	30.00
ART 598	ST: Portraitive Photography	25.00
ART 598	ST: Print Textiles	25.00
ART 598	ST: Printed Textiles	30.00
ART 598	ST: Relief Printmaking	35.00
ART 598	ST: Screenprinting I	30.00
ART 598	ST: Special Problems in Ceramics	25.00
ART 598	ST: View Camera	35.00
ART 598	ST: Watercolor	40.00
ART 598	SF: Wood	25.00
ART 598	ST: Wood Carving	30.00
ART 621	SP: Ceramics	25.00
ART 621	SP: Jewelry Metalworking	15.00
ART 621	SP: Printmaking	25.00
BIO 512	Transmission Electron Microscopy	20.00
BIO 515	Scanning Electron Microscopy	20.00
BLE 578	Student Teaching	25.00
CHM 424	Separation Methods and Quantitative Organic Analysis	15.00
CHM 431	Qualitative Organic Analysis	15.00
CHM 444	General Physical Chemistry Laboratory	15.00
CHM 452	Inorganic Chemistry Laboratory	15.00
CHM 467	General Biochemistry Laboratory	15.00
CHM 480	Methods of Teaching Chemistry	15.00
COM 584	Internship	20.00
EDP 560	Individual Intellectual Assessment	12.50
EED 578	Student Teaching	25.00
EED 598	ST: Using Math Manipulative/ Elementary School	5.00
EED 598	ST: Using Math Manipulative/Middle School	5.00
EPE 505	Applied Exercise Physiology Techniques	15.00
FON 442	Experimental Foods	15.00
FON 445	Quantity Food Production	15.00
FON 446	Nutrition Assessment Laboratory	25.00
FON 545	Recent Development of Institutional Feeding	15.00
FON 546	Techniques of Nutrition Research	25.00
GLG 405	Geology of the Moon	10.00
GLG 406	Geology of Mars	10.00
GLG 420	Volcanology	35.00
GLG 424	Petrology-Petrography	5.00
GLG 435	Sedimentology	15.00
GLG 436	Principles of Stratigraphy	20.00
GLG 441	Ore Deposits	20.00
GLG 455	Advanced Field Geology	35.00
GLG 456	Cordilleran Regional Geology	10.00
GLG 490	Applied Arizona Geology	20.00
GLG 490	Clastic Sedimentology and Petrology	20.00
GLG 490	Moon	10.00
GLG 490	Pyroclastic Rocks	25.00
GLG 490	Volcano	25.00
GLG 490	Remote Sensing	10.00
GLG 510	Advanced Structural Geology	10.00
GLG 520	Advanced Physical Volcanology	35.00
GLG 524	Advanced Igneous Petrology	20.00
GLG 525	Advanced Metamorphic Petrology	5.00
GLG 591	Volcanology	35.00
GLG 598	ST: Advanced Field Geology	35.00
GLG 598	ST: Clastic Sedimentology and Petrology	20.00
GLG 598	ST: Cordilleran Regional Geology	10.00
GLG 598	ST: Geology of Mars	10.00
GLG 598	ST: Ore Deposits	20.00
GLG 598	ST: Petrology-Petrography	5.00
GLG 598	ST: Principles of Stratigraphy	20.00
GLG 598	ST: Sedimentology	15.00
GLG 598	ST: Volcanology	35.00
GPH 418	Landforms of the Western United States	20.00
GPH 491	Geographic Field Methods	20.00
JUS 584	Internship (ASU Main only)	20.00
MIC 421	Experimental Immunology	20.00
MIC 470	Systematic Bacteriology	25.00
MUP 511	Studio Instruction	60.00
MUP 521	Studio Instruction	40.00
MUP 527	Studio Instruction	60.00
MUP 727	Studio Instruction	60.00
REC 484	Senior Internships (ASU West only)	20.00
REC 498	PS: Canoeing	50.00
SED 578	Student Teaching	25.00
SED 598	Using Math Manipulative/Middle School	5.00
SPE 578	Student Teaching	25.00
THP 440	Advanced Scene Design	5.00
THP 441	Scene Painting	20.00
THP 444	Drafting for the Stage	5.00
THP 445	Advanced Lighting Design	5.00
THP 506	Scenography	5.00
THP 512	Puppetry Workshop	5.00
UET 415	Manufacturing Engineering Principles	10.00

## Special Class Fees and Deposits (continued)

**Deposits**

ADE 521	Advanced Architectural Studio I	25.00	CHM 527	Electrical Methods of Chemical Analysis*	25.00
ADE 522	Advanced Architectural Studio II	25.00	DSC 460	Design Project I	25.00
ADE 621	Advanced Architectural Studio III	25.00	DSC 461	Design Project II	25.00
ADE 622	Advanced Architectural Studio IV	25.00	DSC 466	Interior Design Studio V	25.00
CHM 424	Separation Methods and Quantitative		DSC 467	Interior Design Studio VI	25.00
CHM 431	Qualitative Organic Analysis*	20.00	PLA 461	Landscape Architecture V	25.00
CHM 452	Inorganic Chemistry Analysis*	20.00	PLA 462	Landscape Architecture VI	25.00
CHM 467	General Biochemistry Laboratory*	20.00	PUP 461	Urban Planning V	25.00
	Organic Analysis*	25.00	PUP 572	Planning Studio I: Data Inventory and Analysis	25.00
CHM 525	Spectrochemical Methods of Analysis*	25.00	PUP 574	Planning Studio II: Options and Implementation	25.00
CHM 526	X-Ray Methods of Analysis*	25.00			

\* Chemistry classes may also carry a nonrefundable special class fee. See "Special Fees."

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**Attention**  
**Students New to ASU:**  
For answers to frequently asked  
questions, see page 365.