systems applications; systems simulation. Prerequisite: OPM 331. Restricted to professional program business students.

475 Operations Strategies. (3) F, S
Integrates operations management into strategic planning, implementation, and control. Prerequisites: OPM 331, PUR 432, OPM 435, and OPM 440. Restricted to professional program business students.

581 Management of Production. (3) A
Analysis of the production function from a managerial point of view. Conceptual foundations, analysis of major problems and decision processes.

591 Seminar. (3) N
Topics such as the following will be offered:
(a) Production Systems Research
(b) High-Tech Operations
(c) Operations Strategy
(d) Service Operations
(e) Productivity
(f) Quality

791-A Doctoral Seminar in Production/Operations Management. (3) A

791-B Doctoral Seminar in Logistics Systems. (3) A

See page 38 for special courses which may be offered by this academic unit.

PURCHASING/MATERIALS MANAGEMENT

PUR 355 Purchasing. (3) F, S,SS
Management of the purchasing function, including organization, procedures, supplier selection, quality, inventory decisions, and price determination. Prerequisite: OPM 301. Restricted to professional program business students.

432 Materials Management. (3) F, S
Analysis and managerial integration of the material flow process within an organization, including purchasing, production and inventory control, and MRP. Restricted to professional program business students.

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, OPM 331, PUR 355. Restricted to professional program business students.

479 Purchasing and Materials Management Strategy. (3) F, S
Synthesis of purchasing, production, transportation to provide a systems perspective of materials management. Development of strategies. Prerequisites: OPM 331; PUR 355, 432, 455; TRA 345. Restricted to professional program business students.

532 Materials and Purchasing Management. (3) A
Analysis of the incoming flow of materials and the economic environment in which the materials acquisition and allocation functions operate.

591 Seminar. (3) N
Topics such as the following will be offered:
(a) Contracting
(b) Systems Acquisitions
(c) Purchasing Research

791 Doctoral Seminar in Purchasing and Materials Management. (3) A

See page 38 for special courses which may be offered by this academic unit.

TRANSPORTATION

TRA 301 Principles of Transportation. (3) F, S, SS
Economic characteristics, regulation, and public policy implications of rail, motor, air, water and pipeline transportation. Managing the shipper's transportation needs.

345 Traffic and Distribution Management. (3) F, S
Managing transportation requirements in business enterprises: analysis of shipper-carrier relationships and the legal environment with respect to rates and services. Restricted to professional program business students.

405 Urban Transportation. (3) A
Economic, social, political and business aspects of passenger transportation. Public policy and government aid to urban transportation development. Prerequisite: upper-division standing or approval of instructor.

445 Logistics Systems. (3) F, S
Managing the firm's logistics activities: integrating transportation, inventory, warehousing, facility location, customer service and related activities in a systems context. Restricted to professional program business students.

460 Carrier Management. (3) F, S
Analysis of carrier economics, regulation, management and rate-making practice; evaluation of public policy issues related to carrier transportation. Restricted to professional program business students.

462 Problems in Transportation. (3) A
Current problems of transportation operation, physical distribution and logistics, carrier management, and public transportation policy. Prerequisite: TRA 301. Restricted to professional program business students.

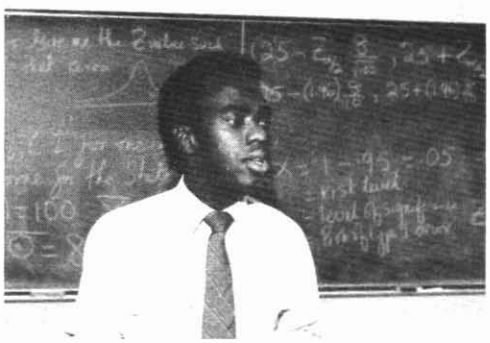
463 International Transportation. (3) F, S
Role of transportation in international business; economic and legal environment; carrier operations and practices; managing the firm's international transportation needs. Restricted to professional program business students.

541 National Transportation Policy. (3) F
Policy alternatives and problems in transportation; interrelationships of competing transportation modes; relationships of public investment to private operations.

545 Business Logistics. (3) S
Systems management concepts approach to logistics requirements of the business enterprise; analysis of goods and information flows and coordinating activities.

791 Doctoral Seminar in Transportation and Physical Distribution Management. (3) A

See page 38 for special courses which may be offered by this academic unit.



College of Education

Gladys Styles Johnston, Ph.D.
Dean

Purpose

For students, choosing a professional college is a major decision. It represents the choice of a profession within which a career will be built. The College of Education provides a stimulating, challenging forum wherein scholars and practitioners interact in the discovery and mastery of the science and art of educational endeavors. This balanced approach, in which research and practice are viewed as essential and complementary, enables the College to produce superior educators.

The purposes of the faculty of the College of Education are 1) the scholarly, scientific, and professional study of education, including its problems, structures, and processes and 2) the education of students in such study. The College of Education is also dedicated to the design, development, implementation and evaluation of innovative educational programs. In accord with these purposes, the College of Education is committed to producing quality scholarship and research and to excellence in teaching.

Organization

The College of Education is organized into three divisions. These divisions and their academic program areas are listed below:

- Division of Curriculum and Instruction
  - Elementary Education
  - Early Childhood Education
  - Reading and Library Science
  - Multicultural Education
  - Educational Media and Computers
  - Special Education
  - Secondary Education
  - Adult Education
- Division of Educational Leadership and Policy Studies
  - Higher Education
  - Social and Philosophical Foundations
  - Educational Administration
- Division of Psychology in Education
  - Counseling and Counseling Psychology
  - Educational Psychology
  - Educational Technology

Services to students and the community are provided through two centers. *The Center for Bilingual Bicultural Education* conducts interdisciplinary research on classroom interaction, language development, and cognitive development. The focus of these research efforts is bilingual and bicultural students in Arizona. *The Center for Indian Education* serves as a service agency to Indian communities, school districts, and Indian students attending Arizona State University. The Center also conducts research on Indian education in Arizona and other states with Native American populations.

In addition to the two centers established by the Board of Regents, other administrative units and College centers provide services to students and the community. These include:

Office of Educational Services. Advises students in preparing their programs of study and assists with all other related matters; places students in school districts for all field experiences in the teacher preparation programs.

Center for Academic Precocity. Provides academic services to intellectually able students in grades 2-11. These services include individual assessment, talent identification, and a variety of courses.

Counselor Training Center. Counsels members of Arizona State University and the community at large for stress, depression, marriage and family problems, career goals, and other personal issues.

Psychological Assessment Laboratory. Provides psychological assessment and consultation services to individuals referred by participating

school districts and the University s Disabled Student Services unit

Spec ial Educ ation Evaluati on Clinic Deter mines the level of academic competence and areas of remediation in handicapped students referred to the Clinic.

Reading Clinic Diagnoses causes of reading problems and offers one to one tutoring by experienced teachers to students referred by parents and recommended by school districts.

Other units with the College offering special ized research and educational services include the Math Clinic; School Personnel, Evaluation and Learning Laboratory, Arizona Educational Information System; University Testing Serv ice; Microcomputer Research Clinic; Center for Economic Education; Parent Development Inter national; University Council for Educational Administration, and, the National Center n Postsecondary Governance and Finance Research Center at ASU.

Degrees

Bachelor of Arts in Education
Master of Arts
Master of Education
Education Specialist
Doctor of Education
Doctor of Philosophy

Undergraduate programs leading to the Bach elor of Arts Degree are described below Descriptions of graduate degree programs can be found in the *Graduate Catalog*

Bachelor of Arts in Education

Candidates for the Bachelor of Arts in Educa tion degree must complete the Professional Teacher Preparation Program offered by the College of Education. Students completing the program will be able to demonstrate proficien cy in specified knowledge areas or skills includ ing:

1. principles and application of effective instruction;
2. classroom organization and manage ment;
3. content or subject matter;
4. specific curriculum and teaching strategies,
5. interrelationship of culture and schooling in a multicultural society;
6. human development,
7. communication skills;
8. theories of learning and motivation,
9. assessment and evaluation;
10. computer literacy.

Each student in the Professiona Teacher Prep aration Program selects one of four options which provides specialized instruction and prep aration These program options are (a) Elemen tary Education, (b Early Childhood Education, (c) Secondary Education, and d Special Edu cation.

The Elementary Education program option prepares students to teach in grades K 8 Stu dents in this option develop the knowledge and skills needed to teach children with a variety of language, cultural and developmental back grounds The Early Childhood program option prepares students to work in infant programs and pre schools, as we l as become eligible for cert fication in grades K 8. The Special Educa tion program option prepares students to teach in special education settings in grades K 12 Students selecting any of the above options must also complete requirements for an aca demic, liberal arts minor and specialization in human deve opment. Careful planning and early advisement in developing an approved pro gram of study is essential for students if they are to complete graduation requirements within the typical 126 semester hour program

The Secondary Education program option pro vides preparation for teaching subjects in grades 7 12. Major and minor teaching fields ap proved by the College of Education are offered in departments of the Colleges of Liberal Arts and Sciences, Business, and Engineering and Applied Sciences A student in one of these colleges may earn a bachelor s degree from that college while concurrently fulfilling certifica tion requirements n the College of Education. Students with teaching majors in the College of Fine Arts will earn the appropriate bachelor's degree from the College of Fine Arts.

Advisement

For any program option in the teacher prepara tion program, students should seek early ad visement in the Office of Educational Services (Payne Hall, B 7 and become familiar with specific program and College of Educat on requirements Students in Secondary Education must also consult an advisor in departments offering major fields of study in Liberal Arts and Sciences, Business, Engineer ng and Applied Sciences, or Fine Arts

Admission

Students wishing to enroll in the College of Education may declare their Pre Professional Status during their freshman or sophomore year. At that time, students should seek advise

ment within the College of Education through its Office of Educational Services, Payne Hall, Room B 7. Advisors will assist students in planning their general studies course sequence. Admission to the Professional Teacher Preparation Program requires that students:

1. Complete a minimum of 56 semester hours of appropriate University course work with a cumulative grade point average of 2.50 or higher;
2. Achieve passing scores on the *Preprofessional Skills Test (PPST)* which assesses basic skills in reading, writing, and mathematics;
3. Receive approval by the Office of Educational Services that all admissions requirements have been met

Transfer students must meet all Professional Teacher Preparation Program admission requirements and should contact the Office of Educational Services for admission procedures and advisement.

Program of Study

Students entering the Professional Teacher Preparation Program must file a program of study during the first semester of the program. A program of study for the four-semester professional program will include core courses for *all* students, regardless of program option selected. Additional courses are required to meet degree requirements in the specific program areas of Early Childhood Education, Elementary Education, Secondary Education, and Special Education. To complete a program of study in four semesters, full time study is required. Students should contact the Office of Educational Services for specific program and course listings.

General Studies

Students must meet all University General Studies and College graduation requirements in order to earn the Bachelor of Arts in Education degree. Many of these requirements are usually met before formal admission to the Professional Teacher Preparation Program. Students should consult an advisor early in their college course work in order to carefully select General Studies courses. The University General Studies guidelines are on pages 43-46 of this *Catalog*.

Core courses are regularly reviewed. To determine whether a course meets one or more General Studies Core course credit requirements, see the *General Studies Course Guide* available prior to registration for courses.

Key to General Studies Core Credit Abbreviations

L1	Literacy and Critical Inquiry Core Courses (Intermediate level)
L2	Literacy and Critical Inquiry Core Courses (Upper division)
N1	Numeracy Core Courses (Mathematics)
N2	Numeracy Core Courses (Statistics and Quantitative Reasoning)
N3	Numeracy Core Courses (Computer Applications)
HU	Humanities and Fine Arts Core Courses
SB	Social and Behavioral Science Core Courses
S1	Natural Science Core Courses (Introductory)
S2	Natural Science Core Courses (Additional Courses)
G	Global Awareness Courses
H	Historical Awareness Courses

Retention and Disqualification

Students admitted to the College of Education on *Pre Professional Status* are subject to the general standards of academic good standing of the University. Admission to Pre Professional Status does not guarantee admission to any teacher preparation program offered by the College of Education.

Students admitted to the Professional Teacher Preparation Program within the College of Education must maintain academic standards and demonstrate qualifications for the teaching profession including sound physical and mental health, interpersonal skills, basic communication skills, positive attitude, and satisfactory performance in field experiences.

To be considered in good standing, students must maintain an overall, cumulative grade point average *and* a grade point average in Professional Teacher Preparation Program course work of 2.50 or higher. Any student whose cumulative *and* teacher preparation course work grade point averages fall below 2.50 is placed on academic probation and may not enroll in any courses within the College of Education. Students whose cumulative or teacher preparation course work grade point average falls below a 2.50 are placed on conditional retention. Any Professional Teacher Preparation Program course in which a grade of 'D' or lower is earned must be repeated and a grade of 'C' or higher earned prior to the final or student teaching semester of a student's program of study.

Students on academic probation or condition al retention must seek advice from the Office of Educational Services prior to registering for additional course work.

Probation and cond t onal retention status for academic reasons begin on the first day of classes of the semester following the probation or conditional retention action. Students placed on probation for any reason are subject to dis qualification by the College of Education at the end of the follow ng semester if the cond tions imposed for probation are not met. Students placed on conditional retention for any reason will have their status reviewed at the end of the following semester by the Undergraduate Standards Committee and a recommendation will be made regarding reinstatement, place ment on probation, or disqualification.

Students demonstrat ng behaviors or char acteristics that make it questionable whether they can succeed in the teaching profession are reviewed by the Undergraduate Standards Com mittee of the College of Education. The Com mittee s review may result in a decision to dis qualify the student or the specification of condi tions under which continued participation is per mitted (conditiona retent on

Students who wish to appeal decis ons of the Undergraduate Standards Committee of the College of Education may do so in writing to the Dean of the College or the University Un dergraduate Admissions Board or both Any ex ceptions to the above retention and d squalifica tion policies and procedures must be approved by the Undergraduate Standards Committee of the College of Education and the Dean of the Co lege of Education.

Field Experience Requirements

In addition to course work students admitted to the Professional Teacher Preparat on Pro gram are required to participate in directed field experiences during each semester of the pro gram. The field experiences will vary from short term observat on and participat on, to long term supervised practice teacl ing Stu dents should expect these field experiences to be above and beyond the class times isted in the course schedule for each semester. Such field experiences wi l typica ly take place in public schools throughout the Greater Phoen x area. Regular attendance is required during all field experiences. Students should plan extra travel time and expect to confer w th cooperat ing teachers and supervisors before or after scheduled field experiences. To meet field ex perience requirements students must plan to have their own transportation and be available during regular school hours

A major field experience, called *student teaching*, occurs in the fourth semester of the professional sequence. To be admitted to stu dent teaching, students must make application and have successfully completed prerequisite professiona course work. Normally, student teaching is only possible during fall and spring semesters. Students must also adhere to the calendar rules, regulations, and the philosophy of the school in which they are placed Students are encouraged to avoid extra activities which might interfere with the heavy time commit ments required during student teaching

App ications for student teaching will be ac cepted during the semester prior to the student teaching semester Students admitted to stu dent teaching must have a cumulative grade point average of 2 50 or better and have met all other requirements. The Office of Educational Services should be contacted for application forms and for requ rements of specific teacher preparation program options.

Graduation and Degree Requirements

Candidates for the degree of Bachelor of Arts in Education are required to complete an ap proved program of study of at least 126 semes ter hours. The College of Education expects its degree candidates to meet individual course assessment standards, field experience observa tion criteria, and other proficiency standards and performance criteria equired to demon strate knowledge and skill in the areas listed under the Bachelor of Arts description on page 203 of this *Catalog* Candidates must file for graduation through the Office of Educational Services Payne Hall, B 7) in order to be recom mended by the Faculty of the College of Edu cation for graduation

Certification for Teaching

The College of Education is accredited by the National Council for Accreditation of Teacher Education and approved by the Arizona De partment of Education for the preparation of elementary, secondary, and special education teachers Students who complete an approved program of study and meet all graduation re quirements of the University and the Co lege are recommended for certification to the Ari zona Department of Education The Office of Educational Services (Payne Hall, B 7 main tains information about current certification re quirements in Arizona and other states

Special Programs

Post-baccalaureate Certification Programs

Post-baccalaureate programs which lead to teaching certification are designed for those currently in careers in business or industry and other areas and who hold a bachelor's degree. The College offers post-baccalaureate programs in elementary, early childhood, secondary, and special education. Students who wish to qualify for teacher certification must meet the College of Education admission requirements for post-baccalaureate programs. Students who also wish to pursue a master's degree must meet the admission requirements of the Graduate College. A program of study must be filed within the first semester after admission to any post-baccalaureate program. Post-baccalaureate students are subject to the College of Education retention and disqualification standards on pages 204-205 of this *Catalog*. The Office of Educational Services should be contacted for advisement and admission requirements and procedures.

Of special interest is the Military Education and Training Program offered by the College for recently retired military personnel or those in their last few years of active service. This on-campus program is carefully designed to meet College of Education program standards and leads to teacher certification. The Office of the Dean of the College of Education should be contacted for further information regarding this program.

Multicultural Teaching Concentrations

Several areas of concentration are available at the undergraduate level. These include Indian Education, Multicultural Education, and Bilingual Education and are offered through the Division of Curriculum and Instruction. Courses taken in any area of concentration are usually in addition to regular program requirements.

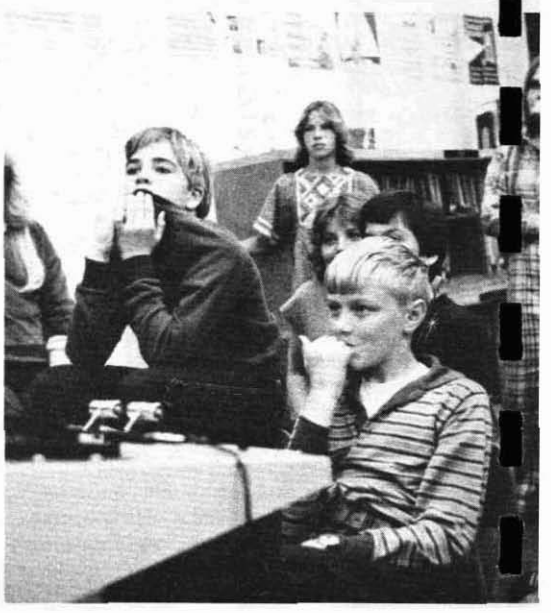
The College of Education also offers programs of study leading to special endorsements by the Arizona Department of Education. Of special interest are endorsements in the areas of bilingual education and English as a second language (ESL). The bilingual education endorsement is required of all teachers specifically responsible for providing bilingual instruction. The English as a second language (ESL) endorsement is required of all teachers specifically responsible for providing ESL instruction. Students should contact the Office of Educational Services for information and advisement regarding teaching concentrations or special teaching endorsements.

Library Science

Students desiring State of Arizona endorsement as a school librarian (K-12) must complete graduate courses approved by the reading and library science faculty. Undergraduates accepted for this program under a previous catalog will be permitted to complete the librarian endorsement. Applications for undergraduate school librarian endorsement are no longer accepted.

Selected Studies in Education

An undergraduate student who is interested in a career in education other than public school teaching can elect to develop an individualized degree program. Education-related careers include a variety of positions in government agencies, hospitals, foundations, religious organizations, and businesses such as child care. A student who wants to develop a program of selected studies must fulfill College of Education admissions requirements and should contact the Office of Educational Services for program advisement. A program of study must be filed during the first semester of a student's program and be approved by the Undergraduate Standards Committee and the Dean of the College. This degree is not designed to lead to teacher certification.



Division of Curriculum and Instruction

PROFESSORS:
ARMSTRONG, JAMES BELL JOHN BELL, B TTER, EDWARDS, ENGELHARDT, FAAS GARC A, HAGGERSON H GGINS,HOOVER HOWELL, LAMM MALONE MOORE MOYER, NILSEN, PRIETO, RAY,RED HORSE RUTHERFORD,SATTERTHWAITE SCHON SEARFOSS,SILVAROL STROM WALLEN, ZUCKER

ASSOCIATE PROFESSORS:
GREATHOUSE ED B 225 ANDERSON, AXFORD COHEN, CHR STINE, COHN, EDELSKY, EEDS, F NER, FRAZ ER HARDT, JACOBS KAM NS, KNAUPP, KNIEP, MANERA McCOY, McISAAC, NELSON, PETERSON, ROBERTS, SCHALL, STAHL, STALEY THOMAS, TIPPECONN C VALLEJO, WAMACKS WISEMAN WURSTER

ASSISTANT PROFESSORS:
FLORES GOMEZ, SW SHER

Curriculum and Instruction

DCI 301 Human Development. 3 F S
Se ected aspects of ch d and ado escent deve opment w th fespan mp cat ons Empha s on poss'b t es for n fluence by teachers and parents For majors on y Pre requ s te CDE 232 or equ va ent

302 Principles and Applicat ons of Effective Instruction. 3 F, S SS
Pr nc pa s of teach ng dent f ed by research on teach ng effect veness App cat on of prnc p es to c assroom pra ct ce For majors on y Prerequ s te DC 301

303 Classroom Organization and Management. 2 F, S SS
Deve ops understand ng and app cat n of c assroom organ zat on and management pr nc p es trateg es and procedures For majors on y Prerequ s te DC 301

See page 38 for special courses which may be offered by this academic unit.

Educational Media and Computers

COMPUTER-BASED EDUCATION

CBE 300 Computers in Education. 1 F S SS
An ntroduct on to word process ng databases, spread sheets, teacher ut ty programs and eva uat on of educa t ona software. Requ red for a educat on majors

421 Computer Literacy. 3 F S SS
Survey of the ro e of computers n K 12 schoo s nfus on of computer concepts nto curr cu um and nstruct on. *[Sat sf es Genera Stud es Requ rement· N3]*

423 Computer Programming. 3 F S SS
ntroduct on to use of BAS C for nstruct on App cat on of computer programm ng pr nc p es to effect ve nstruc t ona programs

522 Evaluating Computer Materials. 3 F S, SS
Se ect on ut zat on and eva uat on of computer hard ware and software for use n schoo s

523 Computer Programming for Instruction. 3 F, S, SS
Computer programm ng n BAS C for nstruct ona pur poses Students deve op computer cont o ed nstruct on a programs Prerequ s te CBE 423 or approva of n structor

637 Computers in Elementary School Curriculum. 3 F S SS
ntroductory expenences w th educat ona uses of com puter computer awareness, fam y soc eta mpact c assroom app cat ons software curriculum develop ment BAS C LOGO anguages m crocomputers

See page 38 for special courses which may be offered by this academic unit.

EDUCATIONAL MEDIA

IME 411 Audiovisual Materials and Procedures in Education. 3 F S SS
Preparat on and ut zat on of aud ov sua mater a s and equ pment in teach ng Lecture and aboratory

455 Cinema and Telev sion. 3 N
Structure deve opment and behav ora effects of theatr ca mot on p ctures

521 Instructional Media Design. 3 F S
Prepar ng spec f cat ons for nst uct ona te ev s on, f m s de tape programs and computer based nstruct on

522 Audiovisual Production Techniques in Education. 3 SS
Product on and use of aud otapes v deo tapes s de pro grams and graph c mater a s. Lecture and aboratory

523 Audiovisual Resources for Instruction. 3 N
S rvey and eva uat on of commerc a y ava ab e aud o v sua mater a s for nstruct on

524 Instructional Photography. 3 F S
The camera f m exposure compos t on and ght ng Dark room exper ences n deve op ng and pr nt ng b ack and wh te f m. Lecture and aboratory

525 Instructional Graphics. 3 S
Pr nc p es of des gn, product on and ut zat on of graph c med a n nstruct ona materia s Lecture and aboratory. Prerequ te ME 521 or approva of nstructor.

527 Instructional Television. 3 F S
Design and product on of nstruct ona programs for te e v s on. Lecture and aboratory Prerequ s te· ME 521 or approva of nstructor

528 Advanced Photographic Media Production. 3 S
Des gn and product on of mu t med a nstruct ona pro grams Emphas s on s de tape format Lecture and abo ratory Prerequ s te ME 521 or approva of nstructor

560 Current Issues and Problems in Audiovisual Education. 3 N
Cr t ca ana y of current pract ces n nstruct ona med a. Prerequ s te s x hours n ME or approva of n structor.

584 Instructional Media Internship. 1 6 F S SS
Prerequ s tes: EDT 502 IME 521 and perm ss on of n structor

See page 38 for special courses which may be of fered by this academic unit

Elementary Education

EARLY CHILDHOOD EDUCATION

ECD 308 Introduction to Early Childhood Education. (3) F S
An overview of the ear y ch dhood educat on fie d nc ud· ng profess ona opt ons h stor ca roots and current theories and po cy deve opments at nat ona , state and oca leve s

310 Educational Environments: Infants/Toddlers. (3) F, S
Organ z ng, p ann ng and mp ement ng educat ona prac t ces based on deve opmenta theories wh ch w enab e early ch ldhood educators to prov de opt ma earn ng en v ronments for nfants and todd ers Prerequ s te· ECD 314.

311 Social Studies in Early Childhood Education. (3 F, S SS
Deve opment of democrat c living n a areas of the cur ncu um Objectives prob em so v ng select on of con tent scope and sequence construction of nstructiona mater al and resources Exper ences w th ch ldren

312 Educational Environments. Nursery-Kindergarten. 3 F, S SS
Cons ders a l aspects of curr cu um Ph osophy pr nc p es pract ces prob ems and eva uat on n the nte grated experience program

314 The Developing Child. 3 F S SS
Prov des a base for understand ng and work ng with young chi dren Exam nes a aspects of deve opment of chi dren ages 0 8 w th mp cations for teachers and parents Prerequ s te: CDE 232 or equ va ent

322 Communication Arts in Early Childhood Education. 3 F, S SS
Factors affect ng anguage deve opment Sett ng condit ions for earn ng n sten ng, speak ng, read ng and wr t ng Prerequ s te. ENG 213 or equ va ent

378 Practicum in ECD. 3 F S
Prov des a f e d based experience n se ected ear y ch d hood sett ngs outs de the publ c schoo s prior to student teach ng Prerequis tes ECD 314

401 Instructional Strategies: Social Studies, Creative Arts 3 F S
Presents mater a s techn ques and resources for a ba anced program of soc a stud es and esthet c express on appropr ate for ch dren preschoo through 3rd grade w th emphas s on the ntegrated curr cu um

402 Instruct onal Strategies: Math, Sc ence 3 F S
Emphas zes deve opmenta y appropr ate educat ona strateg es and nstruct ona techn ques n teach ng math emat cs and sc ence to ch dren preschoo through 3rd grade w th n an ntegrated curr cu um approach Pre requ s tes MTE 180 B O 100 PHS 110 or equ va ent

403 Field Experience. 1 F S, SS
App cat on of course content n a K 8 schoo c ass room Emphas s on observat on pup management p an n ng and de very of nstruct on and assessment Pre requ s te Concurrent reg strat on w th ECD 401, 402 RDG 401, 402.

411 Early Childhood Education: Programs and Mater als. 3 F S, SS
Pr nc p es exper ments research stud es and recent trends as factors re ated to the educat on of ch dren through e ght years of age Prerequ s te ECD 312 or equiva ent

522 Developmental Social Experiences in Early Childhood Education. 3 S
Mater a s techn ques, esthetic express on creat ve ac t vit es and va ues n the ntegrated curriculum Prerequ s te ECD 311 or equ va ent.

525 Communication Arts in Early Childhood Education. (3) F
Prob ems and trends of current programs and oral an guage deve opment Effort to bring together anguage ac qu s t on findings w th educat ona practices Opportunity for self d rected earn ng/study. Prerequ site. ECD 322 or equ va ent

527 Mathematics in Early Childhood Education. (3) F
Theory and pract ce n the use of man pulat ve materia s for teaching mathemat cs to preschool and pr mary grade chi dren Prerequisite EED 380 or equ valent.

544 Play Education. (3) S SS
Theor es of play and the educat onal mplicat ons of each Pract ca app cations at the early chi dhood level

555 Modern Practices in Early Childhood Education. (3) F S
Trends and pract ces, nstruct ona and resource mate ria s, methods and techn ques n early ch dhood educa t on Prerequ s te· ECD 312 or equ va ent

733 Social and Emotional Development. (3) A nqu ry nto the soc al and emot ona deve opment dynam cs in ch dren such as peer re at onsh ps se f concept parenting processes w th mp cat ons for teachers

744 Evaluative Procedures: Young Children. (3) S
A cr t ca exam nation and use of deve opmentally appro pr ate eva uat ve procedures for ch ldren b rth through e ght

See page 38 for special courses which may be of fered by this academic unit.

ELEMENTARY EDUCATION

EED 313 Child Development. 3 F S SS
Pr nc p es under y ng tota deve opment of pre and ear y ado escent ch dren. Emphas s n phys ca nte ectua soc a and emot ona deve opme t w th pract ca m p cat ons for teachers grades 5 9

320 Teaching Sc ence to Children 3 F S SS
Deve ops students persona ph osoph es of the nature of e ementary sch o sc ence why teach c ence a d how ch dren earn sc ence Know edge and sk s n p an n ng nst uct on us ng nstruct ona mode s ntegrat ng the curr cu um emp oy ng cur e t sc ence programs and mater a s and eva uat g ch dren earn ng

333 Communication Arts in the Elementary School. 3 F, S SS
Factors affect ng anguage growth Sett ng cond t ons for teach ng ora and wr tten anguage deve opment Prereq u s te ENG 213 or equ va ent

344 Elementary School Organization and Management. 3 F, S SS
Overal program of the e ementary schoo . Pract ca ap proaches to d sc p ne and to p ann ng, organ z ng and managing the c assroom

355 Social Studies in the Elementary School. 3 F S SS
Methods and mater a s for teach ng Soc a Stud es n the e ementary grade

366 Observat'on and Participation. 1 3) F S SS
Students observe and work d rect y w th e ementary ch dren n a classroom s tuat on nc udes a cr t ca eva ua t on of the student's exper ences. Y' grade on y

380 The Teaching of Mathematics in the Elementary School. 3) F S, SS
A beg nn ng course n methods and mater a s used Lab oratory exper ences and computer app cat ons w th curr cu um materia s C assroom observat on req red Prerequ s te MAT 180 or ts equ va ent.

401 Teaching Science and Social Studies to Children. (4) F S
Examines core funct ons, processes, concepts mate r als goa s, object ves scope and sequence un t and esson p anning and mode s of nstruct'on Prerequ s te· Concurrent reg strat on w th EED 402 403 RDG 401, 402.

402 Teaching Strategies in Mathematics. 2 F S
Strateg es and methodo og es of teach ng elementary mathemat cs ntegrat ng modern techno og'es, problem so v ng, man pu ative current research and earn ng the ories Prerequ s te MAT 180 or ts equ va ent Concur rent reg strat on w th EED 401, 403, RDG 401 402

403 Field Exper'ence. 1 F S, SS
App cat on of course content in a K 8 schoo c a s· room Emphas s on observat on, pup management p an n ng and de very of instruct on and assessment Prerequ s te Concurrent reg strat on w th EED 401 402 RDG 401, 402

478 Student Teaching in the Elementary School. 3 15 F S SS
Superv sed teach ng n the area of spec a zat on A syn thes'zed exper ence n curr cu um nstruct on and c ass room management Prerequ tes 2 50 GPA comp et on of profess ona c u se seque ce and approva of Off ce of Educat ona Serv ces

511 Principles of Curriculum Development. 3 F S SS
Contemporary curr cu um the r es Curr cu um as an in terre ated e t ty Pr nc p es of conce v ng and effect ng cha ge

513 Child Development. 3 F S SS
n depth exam nat on of prob em and ach evements ex pe en ed by ch dren grow ng up n a techno og ca so c ety Empha s on d scover ng the ch d's perspect ve

526 Communication Arts in the Elementary School. 3 S, SS
A cr t ca exam nat on of choo anguage arts teach ng, focus ng on theoret ca assumpt ons regard ng ora and wr tten anguage deve opment

528 Social Studies n the Elementary School. 3) F
Prob ems and trends of current programs Deve opment of a ba anced and art c ated program of soc a stud es Prerequ s te EED 355 or equ va ent

529 Science in the Elementary School. 3) F, S
Pr b ems and trends of current programs Deve opment of a ba anced and art culated sc ence program. Prerequ' s te EED 320 or equ va ent

530 Outdoor Education. 3 S SS
Use of var ous outdoor sett ngs as aborator es for c ass room re ated exper ence study observat on nqu ry, research, and recreat on

537 Mathematics in the Elementary School. 3) F S, SS
Contemporary mathemat cs teach ng Content, materia s, and approaches to nstruct on Prerequ s te. EED 380 or equ valent

578 Student Teaching in the Elementary School. 9 15 F S, SS
Superv sed teach ng for postbacca aureate students, synthes'zed experience in curriculum, instruct on and c assroom management Prerequ s te Comp et on of 21 hours of dent f ed course work from an approved pro gram of study a GPA of 2 50 postbac nondegree or 3 00 postbac degree) and approva of Off ce of Educa t ona Serv ces

581 Diagnostic Practices in Mathematics. (3) S SS
Specif c sk s in d agnos ng treat ng ch dren's earn ng d ff cu t es n mathemat cs. Inc udes pract cum exper ences n dent fy ng strengths weaknesses and n t a remed at on Prerequ s te. EED 380 or approva of nstruc tor

585 Contemporary Issues in Elementary Education. 3 S SS
A sem nar wh ch deve ops an understand ng of a broad range of contemporary ssues Ass sts n establishing an nformed profess ona v ew Prerequ s te EED 511 or equ va ent

See page 38 for special courses which may be offered by this academic unit.

Multicultural Education

MULTICULTURAL EDUCATION

MCE 446 Understanding the Cultura ly Diverse Child. 3 F S SS
Phys ca , so ia psycho og ca and ed cat a needs of ch ldren from cu tura y and ngu st ca y d fferent popu a t ons Mu t d sc p nary approach w be presented

447 Methods of Teaching the Culturally Diverse Child. 3 A
Techn ques for organ z ng and prov d ng spec a educa t ona exper ences for students from cu tura y and ngu s tica y d fferent popu at ons P erequ s te· MCE 446

See page 38 for special courses which may be of fered by this academic unit

BILINGUAL EDUCATION

BLE 498 Introduction to B lingual Education. 3 F S
Prov des an overv ew of mode s of b ngua educat on and focuses on genera teach ng strateg es for b ngua c assrooms Pr mar y Span sh Eng sh cons derat ons

535 Sociolinguistic Issues in Bilingual Education 3 F
Survey of major theoret ca ssues e g anguage s tua t ons commun cat ve competence anguage att tudes nterre at ng anguage soc a processes and b ngua educat on

543 Bilingual Education Models. 3 F
B ngua educat on programs n other countr es ana ys s of po t ca soc a econom c and educat ona mp ca t ons pract ce n p ann ng b ngua educat on curr cu a See a so offer ngs under MCE SED and SPE on pages 209, 211 212 213 214

See page 38 for special courses which may be of fered by this academic unit.

INDIAN EDUCATION

IED 411 Foundations of Indian Education. 3 F S
H stor ca deve opment of Ind an affa rs and nd an educa t on, nc ud ng contemporary educat ona ssues trad t ona nd an oncepts of educat on and nd an cu tures

422 Methods of Teaching Indian Students. 3 F
Ph osoph es, method g es and mater a s sed n In d an educat on Exam nat on of oca and tr ba c as ro m mater a s Exper me tat on w th new teach ng concepts Prerequ s te IED 411

424 Curriculum and Pract ces for Indian Education. 3 S
Curr cu a ph osoph es and researc n d an edu a t on Techn ques for curr cu um deve opment change and mprovement Prerequ s te ED 411

433 Counseling the Indian Student. 3 A
Techn ques and methods u ed ounse ng w th empha s s on understand ng d an cu tures and va ues Exper mentat on w th new coun e ng oncepts Prereq u s te ED 411

490 Problems of Teachers of Indian Students. 3 S
Current ssues, trends and prob ems encountered by teachers V ab e so ut ons d scussed Research re v ewed and eva uated Pre equ s te ED 411

500 PS: Admin stration and Management of Indian Education Programs. 3 A
Exam nat on of adm n strat ve and programmat c prac ces re ated to the schoo ng of Amer can Ind an popu at on

502 PS: Development of Indian Cultural and Language Materials. 3 A
Prov des a cu t ra anguage approach t urr cu um de ve opment Exam nat on of n truct ona mater a s used n Amer can nd an B ngua B u tura Educat on Programs

511 Community Schools in Indian Education. 3 A
Deve opment mp ementat on, and adm n strat on of In d an commun ty schoo s Techn ques and methods for ef fect ve schoo commun ty re at ons

522 Family Literacy in Language Minority Communities. 3 F S SS
Exam ne theor es and pract ces re ated to teracy deve opment n adu ts Spec a emp as s s g ven to Nat ve Amer can Fam es

544 Role of Tribal, State and Federal Government in Indian Education. 3 A
Exam nes respons b t es and re at onsh ps of each agen cy n the operat on of nd an educat on pr grams A a yzes eg s at f nanc a resource , and tr ba con tro

594 Workshop in Indian Education 6 SS
Pract ca approaches to teach ng nd an students Cur c u um and mater a s deve opment commun ty nvo ve ment cu rent ssues and research exam ed

See page 38 for special courses which may be of fered by this academic unit.

Reading and Library Science

READING

RDG 301 Content Area Read ng. Decoding. 1 F S
Requ red course for a sec ndary educat o cand dates ntroduce t eo y and n truct ona st ateg es for earn g from text across academ c d c p es

302 Content Area Reading: Practicum. 1 F S
Superv sed f e d exper ences app y ng nst u t ona strat eg es ntrodu ed RDG 301 Requ red rse for a secondary educat on cand dates Prerequ s te RDG 301

314 The Teaching of Reading. 3 F S SS
For e ementary teachers n tra n ng, a med at mprov ng a sr om read g program a d pract ces. Course pro v des bas c tea her k eva at on assroom env ron ments and ead g meth ds D scu s n sess o s m ght be nc uded Prerequ s te ENG 21 or equ va ent

315 Decoding in Read ng. 3 F S SS
Emphas ze ngu st c a d psycho gu st c aspects of read ng nc ude tea h ng ou d symbo corre pon dences through ph n s methods D s uss on sess on m ght be nc uded Prerequ te RDG 314

401 Decoding, Reading and Language Arts. 2 F S
Requ red course for elementary ear y ch dhood and spe c a education cand dates Decod ng (phon cs) vocab u ary, comprehens on and eva uat on concepts are ntroduced Prerequ s te ENG 213 or equ va ent

402 Reading Practicum. 2) F, S
A superv sed schoo based pract cum ut zing d agnos t c and treatment procedures w th ch dren exper enc ng reading d ff cu ty. Requ red for e ementary ear y ch d hood and spec a education and dates Prerequ site RDG 401

467 Reading in the Content Areas: Secondary. 2) F, S SS
Introduces read g procedures n subject matter f e ds Emphas s content read ng pr nc p es and methodo ogy nc ud ng decod ng To be taken consecut ve y w th RDG 480.

480 Practicum: Secondary Reading. 1) F S
Provides for pract ca app cat on of content read ng prin c p es n an on site secondary school sett ng To be taken consecut ve y w th RDG 467

481 Practicum: Elementary Reading. 3 F S, SS
Preserv ce students test and tutor ch dren who are ex per enc ng d ff cu ty w th read ng. Th s pract cum s sched u ed n oca schoo s under d rect co ege superv s on Prerequ s te RDG 314

505 Developmental Reading 3 F S SS
For c assroom and spec a read ng teachers Spec f c profess onal sk s n decod ng comprehens on and eva uat on Requ red for spec a read ng endorsement stamp Prerequ s te. Teach ng cert f cate

507 Content Area Reading. 2) F S SS
Theory, rat ona e and teach ng strateg es concern ng earn ng from text across subject matter d sc p nes To be taken consecut ve y w th RDG 508

508 Practicum: Content Area Read ng. 1 F, S SS
Pract ca app cat on of content area read ng pr nc p es n fie d s tes or through on campus s mu at ons To be tak en consecut ve y with RDG 507 Prerequ s te Teach ng Certif cate

533 Reading-Teaching Bilingual Students. 3) F S
Acqua nts teachers w th theory and pract ce n second anguage acqu s tion and w th strateg es for deve op ng word recogn t on and comprehens on n nat ve anguage and second anguage read ng (Span sh Eng sh empha s s)

544 Comprehensive Secondary Reading Methods and Programs. 3 S
Teach ng methods program deve opment/eva uat on and resource work as carr ed out by the contemporary secondary read ng spec a t Prerequ s te RDG 507 and 508

550 Directed Experiences in Reading. 3 F S SS
Pract cum experience ut z ng d agnost c and nstruct on techn ques of the c assroom for correct ve read ng re med at on Part c pant tutor ass gned students tw ce a week Laboratory sect on Prerequ s te RDG 505 or n structor s approva Requ red for Spec a Read ng En dorsement Stamp

556 Diagnostic and Treatment Procedures in Reading (3 F, S SS
Bas c and spec a zed d agnost c and nstruct on tech n ques for correct ve and c n ca read ng remed at on Re qu red for spec a read ng endorsement stamp Prereq u s te RDG 505

557 Reading Clinic Experience. 3 F
Pract cum exper ence ut zing spec al zed diagnost c and nstruct on techn ques for c n ca reading remed a t on Part c pants tutor ass gned students twice a week Recommended for spec a read ng endorsement stamp Laboratory sect ons Prerequ site RDG 556 or approva of instructor

581 Learning to Read with Literature. (3 F S, SS
For c assroom and spec a read ng teachers. The ro e of terature n the acqu s t on and development of teracy Spec f c suggestions for help ng chi dren earn to read us ng terature as the med um of instruction Prerequ s te Teach ng Cert f cate

629 Seminar: History of Reading Instruction and Research. 3 S
Recurrent themes prominent authorit es and s gn f cant research and pub cat ons n the h story of read ng edu cat on and re ated curr cu a Prerequisite Approva of n structor

630 Research in Reading. (3) F
For advanced graduate students nterested n app ed research prob ems, terature of reading nstruction and major ssues re ated to read ng research. Prerequ site Approva of nstructor

See page 38 for special courses which may be offered by this academic unit.

LIBRARY SCIENCE

LIS 410 Children's Literature. 3 F S SS
Se ect ng, ana yzing, and us ng modern and class c tera ture w th young readers

510 Library Automation. 3 S
L brary uses of computers Fundamental concepts and ssues n the f e d of brary automat on Prerequ s tes L S 471 and 481 or approva of nstructor

533 Current Library Prob ems. 3) F
Cr t cal ana ys s of current pract ces and prob ems n schoo brar ansh p Prerequ s tes LIS 481 or approva of nstructor

534 Evaluation of Literature for Young Readers. (3) S
App y ng standards of terary critic sm to terature for young readers Prerequ site LIS 410 or approva of n structor

540 Classification and Cataloging. (3 F
Descr pt ve cata og ng and Dewey Dec ma C ass f cat on of pr nt and nonpr nt l brary materia s

561 Selection of Library Materials. 3) F
Pr nc p es and procedures used n the se ect on of mate r a s for the school brary

563 Library Materials for Children. (3 F
Se ect ng and us ng pr nt and nonpr nt mater a s to sup port the e ementary schoo curr cu um

564 Library Materials for Adolescents. 3) F
Se ect ng and us ng pr nt and nonpr nt mater a s to sup port the secondary schoo curr cu um

565 Literature for Hispanic Youth Literatura para Jóvenes Hispanoparlantes. 3 S
Se ect ng ana yz ng, and uti z ng terature for H span c and Span sh speak ng ch dren and ado escents

571 Basic Reference Resources. 3 S
Prov d ng reference serv ce n the schoo l brary Content and use of bas c resources

581 School Library Administration. 3 S
Prerequ s tes N ne hours from among the fol ow ng LIS 540, 561 563 or 564 571

584 School Library Internship. 1 6 F, S
Prerequ s tes LIS 440 461 463 or 464 471 481 Con current enro ment n LIS 481 s perm tted

See page 38 for special courses which may be of fered by this academic unit.

Secondary Education

SECONDARY EDUCATION

SED 403 Principles, Curricula and Methods. 4 F S
Advanced leve of deve opment of knowledge and sk s of nstruct onal p ann ng and methods of teach ng and eva uating in the secondary schoo Observat on part c pat on requ red

478 Student Teaching in the Secondary Schools. 3 12 F S SS
The pract ce of teach ng The re at onsh p of theory and pract ce n teach ng Prerequ s tes· SED 403, or equ va ent and Spec a Methods

480 Special Methods of Teaching Social Studies. 3 F, S
Interd sc p nary approaches, product on and col ect on of materia s

522 Secondary School Curriculum Development. (3) F, S SS
Soc a processes ssues pr nc p es patterns and proce dures n curricu um deve opment

533 Improving Instruct on in Secondary Schools. (3) F, S, SS
Ana yses of procedures, methods techn ques, and ex periments n teach ng n secondary schoo s Prerequ site Student Teach ng

566 Evaluating Secondary School Programs. (3) N
Deve opment of eva uat ve cr ter a for secondary schoo programs Prerequ s te Student Teach ng

577 Issues and Trends in Secondary Education. 3 N
Ana yses of ay and profess'ona reports; prob ems and ssues in Amer can secondary educat on. Prerequ s'te Student Teach ng

578 Student Teaching in the Secondary Schools. (3 12) F S
The pract ce of teaching The re ationship of theory and practice in teach'ng. Post Bacca aureate students on y. Prerequ s te· Spec a Methods.

588 Human Relations in the Secondary Schools. (3 A
Prob ems n human re at ons nherent n the nteract on of pupi s, teachers adm n strators non profess ona staff and aymen. Prerequ s te Student Teaching

711 Secondary Curriculum Development. (3) S SS
Theories and processes of deve op ng curricu um eva u ation of research. Prerequ sites. Student Teach ng 522 or equ va ent

722 Improvement of Instruction in the Secondary School. (3) F
Eva uat on of the research; ssues and theor es re ated to the mprovement of nstruction Prerequ s tes: SED 533.

See page 38 for special courses which may be of fered by this academic unit

HUMANITIES EDUCATION

HUE 101, 102 Ideas and Values in the Humanities. (4 4) F, S
nterre at on of art, architecture terature, mus c ph'loso phy religions theatre and other perform ng arts n the modern world Two ectures two discussion meet ngs per week *[Satisfies General Stud es Requirement. HU]*

118 Encountering the Arts. (3) F, S
Introductory course emphasiz ng persona contacts with the fine and perform ng arts Attendance of a wide range of events w th ana ys s and eva uat on

130 Introduction to Popular Culture. (3) F S
Ref ect ons of Amencan values n 20th century popu ar arts Mus c print art telev s on rad o mov es the es thet cs of popu ar culture *[Satisf es General Studies Re quirement HU]*

401 Humanities in World Cultures. 3 6 F, S SS
A human t es study program of foreign travel F ne and perform ng arts of the var ous wor d cu tures May be re peated for cred t. Prerequ s te approva of nstructor.

480 Methods of Teaching the Humanities. 3 N
Methods of nstruct on organ zat on discuss'on and pre sentat on of the courses n the interd sc p nary hu man t es Prerequ s tes HUE 101 102 or approval of in structor

530 Popular Culture in America. 3 F
The uses of e sure t me from a h stonca perspect ve. Areas of concern nc ude televis on and radio, f lm and stage, mus c art and paperbacks

585 Philosophical Foundations of the Humanities. (3 S
ssues in nte ectua trad t ons of the Western world that are bas c to the nterdiscipi nary human ties Prerequ s te· Human t es educat on graduate status or approval of instructor

See page 38 for special courses which may be of fered by this academic unit.

SAFETY EDUCATION

SAE 466 Safety Education. 3) N
Safety educat on n home, schoo and p ace of employ ment.

See page 38 for special courses which may be of fered by this academic unit.

ADULT EDUCATION

AED 500 Educational Research. (3) F S
Introductory course n the ana ys s product on, and use of educationa research n the f e d

510 Introduction to Adult Education. (3 F, S, SS
Historica deve opment, core content and pr nc pa areas of adult educat on

511 Program Development in Adult Education. 3) F S
An andrigog ca approach to plann ng programs for adu ts Emphas s on agenc es.

512 Characteristics of Adult Learners. 3 F, S, SS
Character st cs of the adu t earner throughout the fe span.

514 Instructing Adults. (1) A
Theory and pract ce for instruct ng adu ts

522 Introduction to Educational Gerontology. 3 A
Educat ona cons derat ons and methods used n teach ng older adults from the perspectives of psychology and educationa geronto ogy

555 Adult Basic Developmental Education. (3 A
Ro es of teacher student and program n Adu t Bas c/ De ve opmental Educat on H gh schoo equ valency and related areas

566 International Adult Education. 3 A
Rev ew and compar son of adu t educat on programs and fac l t es n selected countr es

See page 38 for special courses which may be offered by this academic unit.

Special Education

SPE 311 Orientation to Education of Exceptional Children. 3 F S SS
nc udes g fted, m d y hand capped severe y handicapped and t e b ngua mu t cu tural except ona ch d

312 Mental Retardation. 3 F, S SS
Character st cs and assessment specif c to menta re tardation Term no ogy, educationa programm ng and therapeut c procedures are emphas zed

314 Introduction to Bilingual Multicultural Special Educat'on. 3 F, S SS
Theoret cal background and pract ca app cation of gen era ssues regard ng the educat on of b ngua mult cu tural hand capped ch dren.

336 Behavioral and Emotional Problems in Children. (3) F S, SS
Character stics and assessment spec f c to emot ona y and behav ora y d sturbed ch dren Term no ogy and educat ona programm ng emphas zed

361 Introduction to Learning Disab'lities. 3 F, SS
Character stics and assessment spec f c to earn ng d s ab t es Term no ogy and educat ona programm ng emphasized

411 Severely Handicapped, Gifted, and Regulatory Issues. *3} F S SS*
Presented n three modu es· Parent schoo a d commu nity re at ons teach ng the g fted and teach ng the se verely hand capped

412 Evaluating Exceptional Children. 3 F S SS
Normat ve and cr ter on referenced d agnost c tech niques nc ud ng format ve eva uat on Emphas s upon ap p cat on. Concurrent w th SPE 413 Practicum nc uded

413 Methods n Language, Read'ng and Arithmetic for Exceptional Children. 3 F S SS
Methods techn ques and mater a s for use n prescr p t ve teach ng Practicum nc uded Concurrent w th SPE 412

414 Methods and Strategies 'n Behavior Management. (3) F S, SS
The organ zat on and de very of instruct on, nc ud ng for mat ve eva uat on techn ques Techn ques of behav or management Pract cum nc uded Prerequ site SPE 412 and 413 Concurrent w th SPE 415

415 Social Behavior Problems of Exceptional Children. 3 F, S, SS
Analys s and ntervent on nto soc a behav or prob ems of exceptional popu at ons Pract cum nc uded Prereq uis te SPE 412 and 413 concurrent w th SPE 414

455 Early Childhood and the Handicapped. 3) S
Ear y ch dhood educat on as t app es to the hand cap ped ch d

478 Student Teaching in Special Education. 3 15 F, S
Y" grade on y. Prerequis tes 1) Approva of Spec a Educat on Department 2 complet on of SPE 311, 412 413 414 415 and bas c ntroductory course in area of student teach ng, and 3 comp et on of other spec f ed prerequ s tes

511 The Exceptional Child. 3) F, S SS
Educat ona needs of hand capped and g fted chi dren (Not ava lab e to students who have completed SPE 311)

512 The Mentally Retarded Child. (3 F, SS
Et ology, d agnos s and management of menta y retarded ch dren Current trends n prevent on programming, and teacher preparat on Not ava able to students who have completed SPE 312

514 Bilingual Multicultural Aspects of Special Education. 3 S
Theor es a d ssues re ated to the educat on of b ngua *and cu tura y d verse except onal ch dren*

515 Methods for the Remediation of Learning Problems of Exceptional Children. 3 S SS
Methods and mater als for remedat ng the bas c academ c prob ems of g fted and m d y hand capped ch ldren Prerequ s tes SPE 511 a methods course n the teach ng of read ng and mathematics.

531 Behavior Management Approaches with Exceptional Children. 3 S, SS
Behav or management approaches for c assroom be hav or of except ona ch dren Prerequ s te SPE 511 or equ va ent

536 Characteristics of Behaviorally Disordered Children. 3 F SS
Var ab es contribut ng to behav or patterns of behav or d sordered ch dren.

538 Methods of Teaching Behav orally Disordered Students. 3 S, SS
Deve opment of methods for managing the academ c and soc a behav or of behav oral y d sordered ch ldren and youth n educat onal sett ngs Prerequ sites. SPE 336 or 536

551 Teaching Young Children with Special Needs. 3 S
Methods, mater a s and curr cu um for preschoo and pr mary aged ch ldren with spec a needs Prerequisite SPE 511 and 455 or equ va ent

552 Management of Individuals with Severe Handicaps. (3) F
Instruct on and management of school aged and adu t nd v dua s w th severe, physical, and/or mu t p e handi caps Prerequ site SPE 511 or equ va ent and approval *of nstructor*

561 Characteristics Diagnosis of Learning Disabilities. 3 F SS
Theor es re ated to earn ng d sab t es nc ud ng dentif cat on and characterist cs

562 Methods of Teaching Learning Disabled Students. 3 S, SS
Var ous methods and ntervent on strategies for reme d at ng earn ng d sab it es of ch dren and youth Prereq u sites SPE 361 or 561

563 Methods Teaching the Mildly Handicapped Adolescent. 3 A
dent f cat on remed at on and a ternat ve curr cu ums for except ona students at the secondary schoo eve Soc a and academ c var ab es

574 Educat onal Evaluation of Exceptional Ch ldren. (3) F SS
Des gn and stat st ca cons derat ons of normat ve and cnter on referenced tests Co ect on record ng and ana ys s of data from format ve eva uat on Prerequ s te SPE 511, or equiva ent and a methods course n the teach ng of read ng and mathemat cs

575 Current Issues in the Education of Exceptional Children. 3 F SS
Ma nstream ng, noncategor ca f nanc ng ega d agnos t c, abe ng, eg s at ve and other cr t ca and controver s a ssues re ated to the educat on of except onal ch dren

576 Precision Teaching. 3 S
Theory and techn ques wh ch app y to systems of forma t ve eva uat on Emphas s on prec on teach ng

578 Methods of Teaching Mentally Retarded Students. 3 S SS
Specif c methods, mater a s of nstruct on and curr cu um development n teach ng educab e and tra nab e ch dren Prerequ s te SPE 312 or 512

579 Vocational Programs for the Mentally Retarded. (3 F
Curricu um plann ng and methods of teach ng n second ary schoo and post school programs Work eva uat on work study she tered emp oyment Prerequ s te SPE 312 or 512

582 Classroom Research with Exceptional Children. (3) S
Introduct on to conduct ng research Spec f c research techn ques w th primary emphas s on c assroom re search nc ud ng app ed behav or ana ys s

585 Creativity: Research and Development. 3 S
Nature of creat v ty exp ored n terms of phi osoph ca underp nn ngs, emp rical ev dence human deve opment, se f actua zat on and the eco ogy surround ng the crea tive event

588 The Gifted Child. 3) F SS
G fted chi dren s character st cs dent f cat on needs schoo and home env ronments def n t ons and m sun derstand ngs Research by Pressey Stan ey Terman and others.

589 Methods in Teaching the Gifted. (3 S SS
Methods n teach ng e ementary and secondary schoo g fted ch dren nc ud ng nd v dua zed and compute ass sted nstruct on team teach ng Prerequ s te SPE 588

674 Identification, Evaluation and Classification of Exceptional Children. 3 F
Analys s of the research and theoret ca terature fo cused on the dent f cat on eva uat on and c ass fication of except ona ch dren

675 Causation of Handicapping Conditions. 3 F
Ana ys s of the phys o og ca and env ronmental factors wh ch ead to hand capp ng cond t ons Emphas s g ven to the deve oment of pr mary prevent on

681 Instructional Program Development in Special Education. 3 S
nstruct ona program p ann ng mp ementat on and eva uat on for p ann ng presentat on and eva uat on of both co ege un vers ty and nserv ce teacher tra n ng

774 Characteristics of Exceptionality. 3 F
Ana ys s of the terature descr b ng earn ng educat on a persona soc a and cogn t ve character st cs of ex cept ona ch dren

775 Intervention Program in Special Education. 3 S
Ana ys s of the research terature focused on nterven t on program for preschoo schoo aged and ado es cent/adu t except ona persons.

781 Research and Evaluation in Special Education. 3 S
ssues and prob ems n conduct ng research and or eva uat on programs nvo v ng except ona ch dren

See page 38 for special courses which may be offered by this academic unit

Division of Educational Leadership and Policy Studies

Member Univers ty Counc l for Educational Adm nistration)

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Educational Administration and Supervision

EDA 501 Competency Performance in Educational Administration. 6 F S SS
Nature of educat ona adm n trat on, foundat ona know edge of competency n adm n strat on

511 School Law. 3 F S SS
Const tut ona , statutory and ca e aw that re ates to a schoo personne pup s the schoo d str ct and other governmental un ts Contracts d sm ssa s tenure ret re ment pup njur es ab ty of personne and d str ct schoo d str ct boundary changes bo d ng.

521 Evaluation of Teaching Performance. 3 N
n depth ana ys s of ega bas s of teacher appra sa teacher competency measurement of teacher perfor mance a d app cat on of performance appra sa sys tems

524 Theory and Application of Educational Administration. 3 F S SS
H story and development of pub c schoo adm n strat on n the United States, current organ zat onal patterns for publ c educat on at oca ntermed ate, state, and nat on

a evels current theoret ca pos t ons n educat ona ad m n strat on

525 Human Relations and Societa Factors in Education. 3 F, SS
nterre at ons between prob ems of educat ona adm n s trat on and nterd sc p nary soc a sc ences Commun ca t ons sk s mora e author ty and percept on Concepts from po t ca sc ence eco om cs and soc a psycho ogy usefu to the adm n strator Act v t es nc ude computer s mu at on aboratory and off camp s ass gnment

526 Instructional Supervision. 3 F S SS
Adm n ster ng curr cu um mprovement n serv ce educa t on eva uat ng and mprov ng teach ng competence adm n strat ve nstruct ona respon b t es

527 Managerial Functions 'n School Administration. 3 S, SS
Re ates to the work of the centra d str ct off ce staff and the schoo pr nc pa U e of huma resources property management and organ zat on and management of t me

538 Administrat on of the Community School. 3 F S SS
Ph osophy h tory, organ zat on and operat on of the commun ty centered schoo ntroduct on of the commu n ty educat on concept nto a schoo system and mak ng t operat ona

544 Pub ic School Finance. 3 F SS
Measures of ab ty efforts, and educat ona need cap ta out ay fund ng tax revenues federa , state and oca f nanc ng a ternat ves and, major ssues and trends n the f nanc ng of pub c educat on

548 Community Relations in Education. 3 F S SS
Adm n strat ve factors of pr mary mportance n deve op ng commun ty nvo vement n pub c schoo s Emphas s on theory and sk of schoo system and nd v d a com mun cat on

549 Programm ng and Financing Community Education. 3 N
n depth nvest gat on of component programs effect ve as a veh c e for commun ty educat on n area schoo s p ans wh ch he p schoo s change, mode s for fund ng commun ty educat on Prerequ s te EDA 538 or approv a of nstructor

555 Educational Facil ty Planning. 3 S, SS
Schoo bu id ng needs, educat ona p ann ng for fac t es respons b t es of arch tects dut es of contractors, equ p p ng and furn sh ng of school bu d ngs

568 Role and Responsibility of Supervising Teacher. 3 N
Exper ences and content for those p ann ng to become superv sors of student teach ng n teacher educat on programs n serv ce tra n ng for those n student teach ng

571 Schoo Business Management. 2 3 A
Purchas ng, budget ng account ng payro management aud t ng f nanc a rep rt ng, nsurance and adm n strat on of nonteach ng personne and serv ces

573 School Personnel Administration. 3 S SS
Organ zat on for personne serv ces, deve opment of po cy to govern se ect on or entat n p acement remunera t on, transfers, separat ons and deve opment of mora e among nstruct ona and non nstruct ona personne .

576 The School Principalship. 3 F S SS
Problem and aboratory approaches used to prov de ap plicat on of adm n strat ve act v t es of e ementary and secondary schoo s

634 Instructional Leadership. 3 N
C rr cu ar pract ces and processes used by nstruct on a eaders who p an organ ze and coord nate the profes s ona act v t es n e ementary and secondary schoo s Prerequ s te EDA 526

658 Problems and Issues in Adm'nistering Community Education. 3 N
Prov des commun ty educators w th an understand ng and sk n schoo aw p ant management, personne admin trat on, bus ne s pract ce, schoo eg s ation, commun ty educat on h story, research and ut zat on of oca resources Prerequ sites EDA 548 and 549

675 Politics of Educat on. 3 N
Soc al sc ence theory and research are used to con s der the po t ca context of educat ona po cy mak ng

676 The School Superintendency. 3 S
Cr t ca exam nat on of the schoo super ntendency and the pr mary funct ons of th s educat ona pos tion The du t es, respons b t es act v t es and prob ems of the schoo super ntendent are nc uded The unique eader sh p ro e of the schoo super ntendent s exam ned Pre requ s te approva of nstructor

679 Administration of Special Programs in Education. 3 N
For perso ne admin ster ng spec a educat ona serv ces re pons b 't es of super ntendents, pr nc pa s, su perv sors, and d rectors for spec a educat on student personne aud ov sua l brary sc ence and others

711 Administrative Leadership. 3) A
Emphas s on research n leadersh p app cat on of re search f nd ngs to adm n strat ve and superv sory func t ons n educat ona endeavors Prerequ s tes: 30 semes ter hours n Educat o a Admin strat on adm ss on to doctorate

722 Administration of Instructional Improvement. 3 F
Recent research re at ng to adm n strat ve and supervi sory respons b t es for the improvement of the educa t ona program Effect ve processes by adm n strators su perv sors consu tants and coord nators Prerequ s tes 30 semester hours n Educat onal Adm n strat on; adm ss on to doctorate

733 Administrative Management. 3 A
Recent research re at ng to school management Schoo f nance law bu d ngs, transportat on food serv ces and supp y management Prerequ s tes· 30 semester hours in Educat ona Administrat on adm ss o to doctorate

See page 38 for special courses which may be of fered by this academic unit.

Higher Education

HED 510 Introduction to Higher Education. 3 F, S
An h stonca and structura exam nat on of American h gher educat on nc ud ng ph losoph ca , pol t ca and so c a aspects

511 Program Development. 2 F, S
Methods f curr cu um deve opment in h gher and adult educat on

513 Minorities in Higher Education. 1) F S
Ana ys's of po c es and ssues affect ng the part c pation of racia and ethno ngu stic m nont es n post secondary educat on

515 Instructional Personnel. (3) F, S
Professional roles and responsibilities of instructional personnel in higher education.

516 Management Concepts in Higher Education. (1) F, S
Introduction to concepts of management theory and practice.

517 Student Support Services in Higher Education. (1) F, S
Theory, organization, and operation of support services for students.

533 The Community-Junior College. (3) F, S
History, functions, organization and current issues. Meets Arizona community college course requirement for certification.

611 Curriculum and Education. (3) S
Curriculum development, instructional organization and improvement of instruction in higher education. Prerequisite: HED 510.

633 Research in Higher Education. (1) F, S
Comparative analysis of methods in study of higher education. Prerequisite: EDP 454 or equivalent.

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.

664 Community Service, Extension and Continuing Education. (3) S
Objectives, organization and practices of higher education programs offered through the continuing education mode. Prerequisite: HED 510.

689 Administration. (3) F
Theory and practice of administration in higher education institutions. Prerequisite: HED 510.

See page 38 for special courses which may be offered by this academic unit.

Social and Philosophical Foundations

SPF 111 Exploration of Education. (3) F, S
Education as an instrument in the development of the individual and society; its significance as an American institution. *[Satisfies General Studies Requirement: SB]*

301 Culture and Schooling. (2) F, S
For the Professional Teacher Preparation Program: An overview of the cultural, social, and political milieus in which formal schooling takes place in the United States. For Education majors only.

333 Basic Issues in Education. (3) F, S
Important contemporary socio-philosophical issues educators face; analysis and problem-solving.

401 Theory and Practice in Education. (1-2) F, S
For the Professional Teacher Preparation Program: The analysis and interpretation of classroom behavior from perspectives derived from philosophy, social science, and law. For Education majors only.

411 History of American Education. (3) F
Social conditions, ideas and institutions which formed American education. *[Satisfies General Studies Requirement: SB]*

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) F, S
Analysis of roles and status of women; educational practices and alternatives.

520 Cultural Pluralism and Education. (3) N
Philosophic analysis of the concept of cultural pluralism and its social implications for American education.

533 Comparative Education in the Western World. (3) F
Educational practices and traditions in the leading nations of Europe and the Soviet Union.

534 Education and Change: Developing Nations. (3) S
Education as economic and socio-political change agent in Africa, Asia, the Middle East and Latin America.

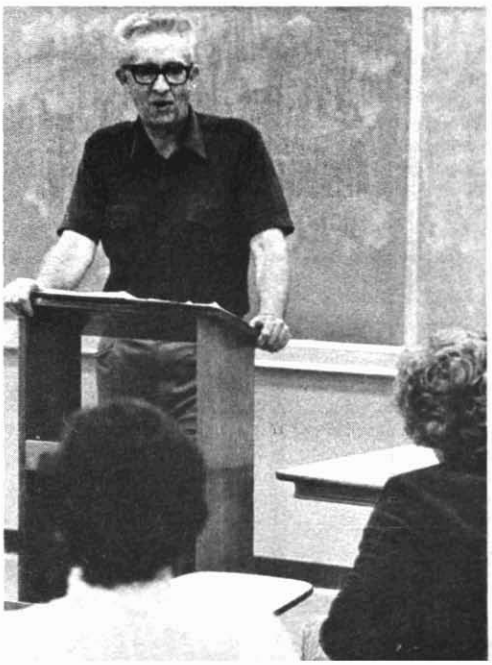
543 Bilingual Education Models. (3) F
Bilingual education programs in other countries; analysis of political, social, economic, and educational implications; practice in planning bilingual education curricula.

544 Philosophical Foundations of Education. (3) F, S, SS
Theories of education in ancient, medieval, and modern classical and contemporary philosophies.

566 History of Education. (3) F, S, SS
Development of educational institutions and ideas in the Western World, from ancient times to the 20th century.

711 Social and Historical Foundations of Education. (3) S, SS
Problems of American education and their socio-historical context.

See page 38 for special courses which may be offered by this academic unit.



Division of Psychology in Education

The Division of Psychology in Education is composed of three program areas: Counseling and Counseling Psychology; Educational Psychology; and Educational Technology. All degree programs are offered at the graduate level.

PROFESSORS:
STOCK (ED B 325A), BLACKHAM, CABIANCA, CARROLL, FRY, GERLACH, GLASS, GRINDER, GUINOUARD, HARRIS, HELMSTADTER, HORAN, KERR, KRUS KULHAVY, McWHIRTER, MOULTON, NELSEN, NOBLE, OKUN, SATTLER, SMITH, SNYDER, SULLIVAN, VAN WAGENEN, YAMAMOTO

ASSOCIATE PROFESSORS:
ARCINEGA, ASHER, BETZ, BROWN, BURKE, CHRISTIANSEN, CUMMINGS, GROSS, MAZEN, METHA, MOORE, ROBINSON, SHELL

ASSISTANT PROFESSORS:
BARONA, KINNIER

Counseling and Counseling Psychology

The doctoral program in Counseling Psychology is accredited by the American Psychological Association

COUNSELING

CED 422 Group Dynamics and Education. 3) A
Theory and use of group processes to facilitate human interaction and learning

512 Introduction to the Helping Relationship. 3 F, S, SS
Introduction to the skills used in the helping professions and 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: 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 study ing the individual. Observational methods, diagnostic interviews, structured and semi-structured methods for assessing personality. Prerequisite or corequisite: CED 522

567 Group Procedures. (3) F, S, SS
Factors determining interactiveness 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, 523, 534, 545, 567, and admission to M.C. or CED doctoral degree 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/social psychological learning tasks of post secondary environmental influences including faculty expectations, 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 co-counseling. Prerequisites: CED 577, CPY 622, CED 680 and approval of instructor

673 Marriage and Family Counseling II. (3) S
Advanced analysis and application of systems communication counseling. Focus on marital and sexual counseling. Practicum recommended. Prerequisites: CED 672 and approval of instructor

See page 38 for special courses which may be offered by this academic unit.

COUNSELING PSYCHOLOGY

CPY 613 Child Counseling. (3 N
Applications of counseling theory in working with children in clinics and elementary schools. Practicum integrated with didactic instruction. Prerequisite or corequisite: CED 680 and approval of instructor.

622 Group Counseling. (3) F, S, SS
Theories and methodologies used in group counseling. Prerequisite: CED 577

634 Organizational Development and Planned Change. (3) S
Organizational/individual dynamics: theory, analysis, techniques, and consultation intervention strategies used in organizational development. Field consultation projects. Prerequisite: CED 567 and 577

644 Psychology of Careers (3 S
Structural and developmental theories of occupational choice. The role of counseling in the development of a career. Prerequisite or corequisite: CED 577

645 Professional Issues and Ethics. 3 F, S, SS
Ethical, legal, and professional issues of concern to the practicing counselor, including confidentiality, family concepts, rights, certification, malpractice, and use of client information. Prerequisite: CED 577

666 Comparative Theories of Personality. 3 F
Comparative analysis of personality theories in relation to counseling practices. Prerequisites: CED 522, 577

667 Patterns of Behavior Disorders. 3 A
Etiology, dynamics and treatment of a variety of psychological problems, including traumatic reactions, anxiety,

somatoform d ssoc at ve persona ty affect ve, psycho sexua and psychot c d sorders. Prerequ s te CED 577

670 Behavioral Counseling. 3 A
Theory procedures and app cations of behav or mod f cat on and therapy n work ng w th ch dren parents and adu t c ents n schoo c n c and nst tut ona sett ngs D dact c nstruction ana ys s of nd v dua and group prob ems and d rected experiences Prerequ s tes CED 680 and approva of nstructor

671 Multicultural Counse ing. 3 A
Prov des awareness of the nf uence of soc o cu tura variab es on human deve opment and exp ores mp ca t ons for counse ng m nor ty popu at ons Prerequ s te CED 577

674 Women: Sense of Identity. 3 F
Exam nes counse ng techn ques and deve opmenta s sues for exp orat on of women's sense of dent ty and fac tors contr but ng to t nc ud ng soc a psycho og ca and cu tura nf uences wh ch part cu ar y mpact on the deve opment of women

675 Counsel ng Interventions in Stress Management. 3 S
Theory procedures and app cat on of stress manage ment techn ques nc ud ng b ofeedback med tat on, re axat on a togen c therapy v sua zat on and magery Concurrent pract um CED 680 Prerequ s te CED 577 680 and approva of nstructor

677 Advanced Counseling. 3 N
Counse ng systems and theor es and the r pract ca ap p cat on n case management comparat ve case ana y s s Prerequ s te. CED 577

681 Supervised Practice. 3 F, S
Superv sed exper ences n schoo s or commun ty agen c es. Prerequ s tes CED 680 and approva of nstructor

See page 38 for special courses which may be offered by this academic unit.

Educational Psychology

The doctora program in School of Psychology is accredited by the American Psycholog cal Associat on

EDP 301 Learning and Motivation in Education. 2 F S
Us ng a case format, earn ng and mot vat on pr nc p es are app ed to educat on contexts Educat on majors on y

302 Assessment and Evaluation in Education. 1 F S
s ng a case format, assessment and eva uat on pr nci ples are app ed to educat n contexts Educat on majors on y

310 Educational Psychology. 1 6 F, S SS
Human behav or n educat ona s tuat ons presented through nstruct ona modu es Students may re enro for cred t to a tota of s x hours *[Satisf es General Stud es Requirement SB]*

454 Introduction to Descriptive Data Analysis and Measurement. 1 3 F S SS
The nature of measurements and data Frequency d s tributions the r descr ptors and probab t es der ved from them. Derived scores, correlat on and regress on Qua t es of tests *[Sat sf es Genera Stud es Requ re ment N2]*

510 Essentia s of Classroom Learning. 3 F S SS
Theo et ca and emp r ca foundat ons of earn ng n the c assroom m eu C t ca exposure to research and meth od n nstruct ona psycho ogy

514 Psychology of the Adolescent 3 F S SS
Cogn t ve, phys ca and soc al deve opment of ado es cents n contemporary soc ety mpact of fam y schoo and work p ace on ado escent development Prerequ s tes PGS 100 or EDP 310 or equ va ents

530 Theoretical Issues and Research in Human Development 3 F
Psycho og ca theor es research and methods re evant to human deve opment emphas z g the re at ons be tween ear y deve opment and ater performance

532 Psychology of Exceptionality. 3 S
Genera psycho og ca theory and exper menta research re evant to except ona ty emphas z ng mp cat ons for educat ona programs wh ch recogn ze un que earner character st cs F e d work

534 Principles of Behavior Modification. 3 F
Pr nc p es of cond t on ng as app ed to behav or mod f ca t on current esearch on the exper menta ana ys s of behav or n educat ona psycho ogy

540 Theoretica Views of Learning 3 F S
C ass ca and cogn t ve theor es of earn ng p us recent or entat ons I ustrat ve exper menta and rat ona founda t ons mp cat ons for educat ona pract ce

542 The Psychology of Learning and Instruction. 3 S
Crit ca rev ew and eva uat on of research on earn ng var ab es re evant to acqu s t on and retent on of nstruc t ona mater a s Laboratory exper ence

543 Psychological Research on Life-Span Development. 3 S
Cr t ca rev ew and eva uat on of contemporary research on cogn t ve and affect ve deve opment across the fe span Prereq s te. EDP 530 or equ va ent

544 Psychology of Reading. 3 N
A ternate ana yses of the read ng process des gns and procedures for nvest gat ng nstruct ona and non nstruc t ona var ab es re ated to read ng ach evement

550 Theories of Educational Measurement. 3 S
Methodo ogy of educat o a measurement w th emphas s on test re ab ty va d ty homogene ty and structure Prerequ s te EDP 454

551 Expository Writing and Research Heurist cs. 3 F
Week y wr t g pract ce mak ng use of heur st c concepts and expos tory p nc p es The construct on of rat ona es for research prob ems Log c and coherence n rhetor c Wr t ng sty e appropr ate to expos t on

552 Inferential Techniques of Data Analysis. 1 3 F S SS
Inferent a procedures n educat ona research, prob ab ty, samp ng des gn, stat st ca nference hypothes s test ng and bas c exper menta des g Prerequ s te EDP 454 or pass ng score on qua fy ng exam

554 Multivariate Procedures in Data Analysis I. 3 F S, SS
Contrasts mu t p e c ass f cat on ana ys s of var ance and covar ance mu t var ate ana ys s of variance and mu tp e near regress on Prerequ s te EDP 552 or pass ng score on qua fy ng exam

555 Multivariate Procedures in Data Analysis II. (3) S
Application of multivariate analysis of variance, factor analysis, and multivariate categorical analysis. Prerequisite: EDP 554 or passing score on 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. (1-5) 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. Laboratory experience. Prerequisite: EDP 454 and admission to a program in professional psychology, or approval of the instructor.

562 School Psychology: Theory and Practice. (3) F
Development and present status of school psychology: overview of assessment and intervention strategies and professional issues.

563 Interventions in School Psychology. (3) S
Examination of interventions and intervention research relevant to school psychology practice. Field experience. Prerequisite: school psychology program or approval of instructor.

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 and permission of instructor.

754 Advanced Multivariate Analysis. (3) S
Multivariate experimental design, multivariate multiple comparison procedures, confidence intervals, covariance structure analysis, and analysis of qualitative data. Prerequisite: EDP 554.

See page 38 for special courses which may be offered by this academic unit.

Educational Technology

EDT 405 Competency-Based Instruction. (3) F, S, SS
Students develop instructional objectives, select learning activities, and design assessment procedures for competency-based instructional programs.

501 Foundations of Educational Technology. (3) F
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) S
Procedures for analyzing the effects of alternative instructional practices.

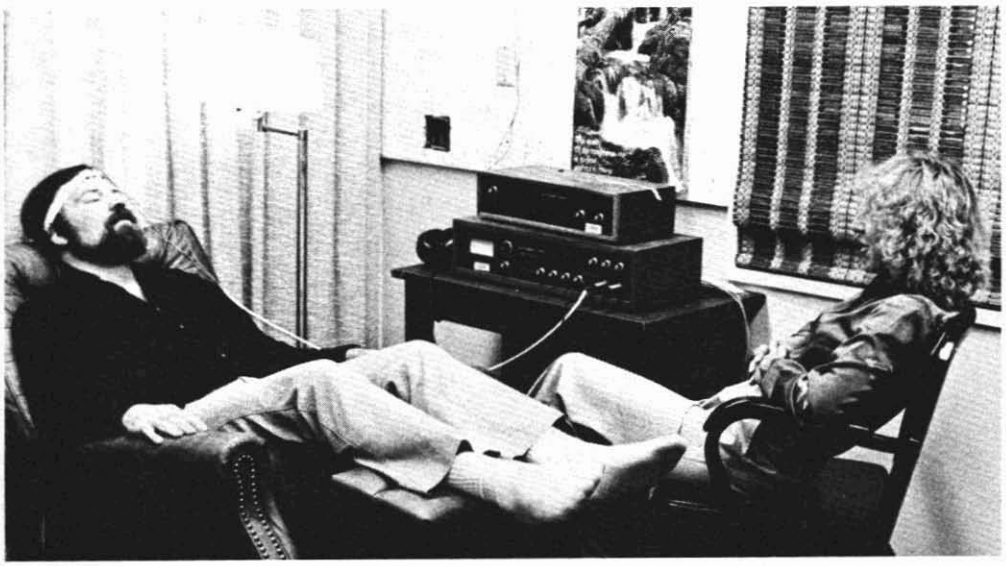
504 Educational Evaluation. (3) S
Evaluation procedures in instruction and training.

584 Educational Technology Internship. (1-6) F, S, SS
Prerequisites: EDT 501, EDT 502, IME 521 (or concurrent enrollment) and approval of instructor.

780 Advanced Instructional Development. (1-3) S
Conducting and documenting selected instructional development activities. Prerequisites: EDT 502 and approval of instructor.

792 Advanced Instructional Research. (3) F
Design and execution of instructional research on selected topics. Prerequisite: EDT 503 and approval of instructor.

See page 38 for special courses which may be offered by this academic unit.



College of Engineering and Applied Sciences

C. R. Haden, Ph.D.
Dean

Purpose

The purpose of the College of Engineering and Applied Sciences is to provide a university education of such fundamental background and scope that a student may achieve competency in engineering, agriculture, technology, computer science, or construction. Every effort is made to carry on well rounded, well integrated programs which will not only give the student proficiency for a professional career but also will develop character, judgment, ideals, breadth of view, and appropriate cultural attitudes. Students are taught to recognize the fact that their professional efforts will cause change and that they must accept responsibility for the social consequences of those efforts.

Organization

The material for the College of Engineering and Applied Sciences is presented as follows:

Division of Agriculture

- Agribusiness
- Environmental Resources in Agriculture

Department of Computer Science

- Computer Science
- Computer Systems Engineering

Division of Construction

Options
- General Building Construction
- Heavy Construction
- Military Construction
- Specialty Construction

School of Engineering

- Department of Chemical and Bio Engineering
  - Chemical Engineering
  - Materials Science and Engineering
- Department of Civil Engineering
- Department of Electrical and Computer Engineering
- Department of Industrial and Management Systems Engineering
  - Industrial Engineering
  - Manufacturing Engineering
- Department of Mechanical and Aerospace Engineering
  - Aerospace Engineering
  - Energy Systems Engineering
  - Engineering Science
  - Mechanical Engineering
- Engineering Special Studies
  - Bioengineering
  - Nuclear Sciences
  - Systems Engineering
- Engineering Interdisciplinary Studies
  - Business and Pre Law
  - Geological Engineering
  - Premedical Engineering
- Analysis and Systems
- Engineering Core
- Society, Values, and Technology

Division of Technology

- Department of Aeronautical Technology
  - Aeronautical Engineering Technology
    - *Options*
      - Aeronautical Technology
      - Helicopter Technology
  - Aeronautical Management Technology
    - *Options*
      - Airway Science Management
      - Aircraft Flight Management
- Department of Electronics and Computer Technology
  - Electronic Engineering Technology
    - *Options*
      - Computer Systems
      - Electronic Systems
      - Microelectronics
      - Telecommunications Systems

Department of Industrial Technology
Industrial Technology
Options Graphic Communications
Industrial Supervision
Interactive Computer Graphics
Industrial/Technology Education
Department of Manufacturing Technology
Manufacturing Engineering Technology
Options Computer Integrated Manufacturing
Manufacturing
Mechanical
Robotics and Automation
Welding

Research

The College is committed to becoming one of national prominence for research at the graduate level. In addition, it is the policy of the College to encourage exceptional upper division undergraduate students, as well as graduate students, to participate with faculty members in research activity. Most faculty members are conducting research on government or industry sponsored programs. Research activities include computer science and applications, computer integrated manufacturing, materials science, solar energy, thermosciences, transportation systems, signal processing, computer design, turbine design, structural systems, CAD/CAM, solid state electronic devices, power systems, telecommunications, environmental, nuclear radiation, biomedical, and land agriculture, and many others. These activities are carried out under the academic divisions or departments listed in the following *Catalog* material and also through the interdisciplinary research centers listed below:

Center for Advanced Research in Transportation
Center for Arid and Tropical New Crop Applied Science and Technology (NEWCAST)
Center for Automated Engineering and Robotics
Center for Energy Systems Research
Center for Environmental Studies
Center for Research in Engineering and Applied Sciences
Center for Solid State Electronics Research

Center for Professional Development

As the professional 'half life' for engineers and scientists decreases continually in most technical fields, the need for continuing education or 'life long' learning increases with each passing day. In response to this need, the College's Center for Professional Development provides continuing education services to the local and national technical communities. The Center offers a wide variety of technical conferences, institutes, seminars, and short courses for professionals engaged in the rapidly changing areas of science and technology.

Degrees

Baccalaureate Degrees. The completion of a four year program of study in agriculture, computer science, construction, or technology leads to the degree of Bachelor of Science (B.S.). The completion of a four year program of study in engineering or engineering based interdisciplinary programs leads to the degree of Bachelor of Science in Engineering (B.S.E.) or Bachelor of Science (B.S.). The B.S.E. programs are offered through the engineering departments and the Engineering Special Studies. Course requirements comprising these majors are drawn primarily from the various engineering disciplines. The B.S. programs are offered through the Engineering Interdisciplinary Studies, for which a portion of the specialization course requirements are drawn primarily from non engineering disciplines.

Integrated B.S.E.-M.S.E. Program. (For School of Engineering students only.) To provide greater program flexibility, qualified students may undertake a program which provides an integrated fourth and fifth year sequence of study in one of several fields of specialization in engineering. This gives the student an opportunity to meet the increasing demands of the profession for graduates who can begin their engineering careers at an advanced level.

Students admitted to this program are assigned a faculty committee which will supervise a program of study in which there is a progression in the course work and in which earlier work is given application in the later engineering courses for both the bachelor's and master's degrees. Entry into the integrated program will require an application submitted to the Dean through the faculty advisor and the department chair. Applications will be reviewed by a School committee which will recommend the appropriate action to the Dean. The application may be submitted in the fifth semester.

Graduate Degrees

Deficiencies for admission to the graduate degree programs will be specified at the time of

admission. The Graduate Record Examination (V,Q,A) is recommended but not required un less specified by the respective academic unit. TOEFL scores must be submitted by foreign stu dent applicants before admission is considered. The minimum required score is determined by each academic unit.

Master of Science Degree (M.S.)

Agriculture. This program provides competent students with opportunities to complete ad vanced studies with emphasis on research in Agribusiness and Environmental Resources in Agriculture Areas of concentration in Agribus- iness are management, marketing, finance, inter national agriculture, and food industry Areas of concentration in Environmental Resources in Agriculture are natural resource management, range ecology, and urban horticulture. Admis sion requires completion of 18 semester hours in agriculture, environmental sciences or closely related course work. Scores from the GRE or MAT are required (GMAT accepted for Agribusiness students only.) A minimum of 30 semester hours of approved graduate course work is required, including a thesis. An oral examination in defense of thesis is re quired.

Computer Science. This graduate program provides an opportunity for qualified students holding a baccalaureate degree in computer sci ence or related fields to complete advanced stu dies with emphasis on research A minimum of 30 semester hours of approved course work is required, including a thesis. An oral examination in defense of the thesis is required.

Engineering. This program is a research oriented graduate degree program, providing an op portunity to highly competent students to ma jor in Chemical, Civil, Electrical, Industrial or Mechanical Engineering, or Engineering Science. Admission normally requires an appropriate un dergraduate engineering degree and satisfying all Graduate College admission requirements, as well as special department requirements. A minimum of 30 semester hours of approved gra duate course work is required, which must in clude a thesis and an oral examination at com pletion of the program. Students writing a the sis must enroll in a combination of both re search 592 and thesis 599 totaling 6 semester hours.

Master of Science in Engineering Degree (M.S.E.)

Engineering. This program is a professionally oriented graduate degree program and is intend ed as a preparation for a career in professional practice. Two options are available: the first is a thesis (engineering report or research paper); the second is a no thesis, no report degree pro gram Both options require a minimum of 36 semester hours of approved graduate level course work. Entry into this program requires the satisfying of all Graduate College admis- sion requirements, special department require ments, and a baccalaureate degree with a major in engineering or other closely related degree program

Option 1. Designed primarily for full time students. The M S E. degree Option 1 is awarded upon successful completion of graduate course work, engineering projects and research endeavor resulting in a thesis (engineering report or research project) A final oral exami nation is required in defense of the thesis.

Option 2 Designed primarily for students who hold full time jobs and must attend uni versity classes on a part time basis The M.S.E. degree Option 2 is awarded upon successful completion of graduate course work. A final written comprehensive examination of the grad uate course work taken for the degree and over the respective undergraduate prerequisites is re quired Students selecting this option should check with their respective department for for mat of the final examination.

Master of Technology Degree (M.Tech.)

Technology. This degree program is designed for flexibility which permits the student to se lect a combination of courses in technology and supporting areas to meet individual career goals. Selected areas of concentration are de signed to provide graduates with technical and professional skills for use in preparation for and advancement in leadership positions found in industry and education. The Master of Tech nology with a major in Technology is offered by the Departments of Aeronautical Technolo gy, Electronics and Computer Technology, In- dustrial Technology, and Manufacturing Tech nology. Admission requires an appropriate bacca laureate degree with a minimum of 30 semester hours in technology or equivalent. Scores from the GRE are required. A minimum of 32 se mester hours of approved course work is re quired, including a practicum or applied project.

An oral examination in defense of the practi cum or applied project is required.

Doctor of Philosophy Degree

Engineering. The degree Doctor of Philoso phy is awarded in engineering and computer sci ence upon the satisfactory completion of an ap proved program of graduate study, research and dissertation. For specific reference to this de gree, see the Graduate College section of this *Catalog* or the *Graduate Catalog*

ASU-Grand Canyon College 3-2 Program

Students desiring to earn a baccalaureate degree in mathematics, chemistry, or physics from Grand Canyon College and a baccalaureate de gree in engineering or construction from Ari zona State Univers ty can take advantage of a 3 2 program that has been approved by both insti tutions. Such students will complete the first three years of study at Grand Canyon College and the last two years of study at Arizona State Un versity. At the end of the fourth year, assuming a degree requirements have been met, the baccalaureate degree from Grand Canyon College will be awarded. After the fifth year, assuming all degree requirements have been m et, the appropriate engineer ng or construction baccalaureate degree will be award ed by Arizona State University More infor mation can be obtained by writing to either of the following offices

Office of the Adm inistrative Vice President
Grand Canyon College
3300 West Camelback Road
Phoenix, AZ 85017 1097

or

Office of the Dean
College of Engineer ng and Applied Sciences
Arizona State U r iversity
Tempe, AZ 85287

General Information

Definition of Terms. The terms used in this Co ege to describe offe ngs are defined below for purposes of clarity.

Program of Study A broad term describ ng the complete array of c urses included in the study leading to a degree. Example, engineer ing, technology construct on, agriculture, com puter science.

Major A spec alized group of courses con tained within the program of study. Example program of study–engineering, major–civil en gineering. Example program of study agricul ture; major agribusiness.

Area of Emphasis (technical elec tives , Op tion or Concentration is a selection of courses within a major or among one or more majors. The number of technical electives varies from curriculum to curriculum. In a number of the majors the technical electives must be chosen from pre selected groups. For this reason the choice of specific technical electives for an area of emphasis should be done with the advice and counsel of an advisor Example major mechan ical engineering; area of emphasis thermoscien ces.

Admission. Students who wish to be admitted to freshman standing in the College of Engineer ng and Applied Sciences should present certain secondary units which are specified in the requirements of the Department, Divisions and the School of Engineering Studen ts who have omissions or defic encies in secondary school subject matter preparation may be required to complete additional university course work which may not be applied toward their degree

Entrance requirements of th s Co lege may differ from those of other academic units on campus. Students may be admitted to this Col lege under two different c assifications as fol lows:

For admission to a *professional program* in one of the departments, schools, or divisions of the College. Students m ust m eet the following requirements:

	Minimum Scores			
	H S Rank	ACT	SAT	TOEFL*
Ag culture	Upper 50%			500
Com puter Science				
all degrees	Upper 2)%	24	1100	550
Construction	Upper 50	23	1050	550
Engineer ng	Upper 25%	25	1050	550
Technology	Upper 50	**		500

* *For international students*
** *Same as university requirements (see page 23*

For admiss on as a *pre professional* student to one of the departments, schools, or divisions of the College Students not admissible to a professional program within the College but who are otherwise admissible to Arizona State University, may be admitted as a pre profes s onal student for the selected ma or Students admitted into this classif cat on w l follow the freshman sophomore sequence of courses as required by their chosen major Courses will be selected with the assistance of an academic advi sor. After completing a minimum of 30 semes ter hours of required or approved elective cours

es *with a cumulative GPA equivalent to that required of transfer students and corresponding to the chosen major.* students may apply for admission to the regular program *International students must also submit a* TOEFL *score equivalent to that required for admission to the professional programs.* Students who are admitted as pre professional students will not be permitted to register for 300 400 level courses in the College of Engineering and Applied Sciences until their status is changed to the professional classification.

Students admitted to the University by the GED (General Education Development) are required to take either the ACT or the SAT in order to meet the above requirements.

Students not admissible to programs in this college who enroll in another college at ASU may not register for any 300 or 400 level courses in this college, unless such courses are required in their degree programs and students have the proper course prerequisites.

Advisement. For assistance and counseling in planning a program of study, each student in this College will be assigned a faculty advisor who is familiar with the chosen field of specialization and who must be consulted before registering each semester.

Readmission. Students applying for readmission to professional status for any program in this College must have a cumulative GPA for all college course work equal to that of the transfer admission requirements shown below. If a student does not meet these requirements, he/she may request admission to the pre professional program, subject to the restrictions shown under 'Admissions' (above).

Transfer Into and Within College. Students transferring into or between departments or divisions within the College or other colleges within the University must have at least a cumulative GPA of 2 00 and meet the *Catalog* requirements of the new department or division in effect at the time of transfer.

Transfer Students. Students who contemplate transferring into this College from other institutions, whether they be community colleges or four-year institutions, should study carefully the pertinent sections under this College pertaining to their particular program and, if possible, consult an advisor in this College prior to enrolling in that other institution. This will assure a smooth transition at the time of transfer. Transfer students may request admission to either pre professional or professional status in any of the programs offered by this College. The restrictions with regard to pre professional status are shown under 'Admissions (above). The Department, Divisions, and School may impose additional admission and graduation requirements to those minimums specified by the College.

No grades lower than 'C' will be accepted as transfer credit to meet the graduation requirements of this college

The minimum requirements for admission of transfer students are as follows.

	Transfer GPA*
Agriculture	2.00
Computer Sciences (all degrees)	2.75
Construction	2.25
Engineering	2.50
Technology	2.25

* The cumulative GPA will be calculated using all credits from ASU and from other colleges and universities

Credit is granted for transferred courses which are adjudged to be equivalent to corresponding courses in the selected program of study, subject to grade and senior residence requirements. Credits transferred from a community college will be applied only as lower division credits. Prospective Arizona community college transfer students should consult their advisor and refer to the annual *Arizona Higher Education Course Equivalency Guide* for a listing of the acceptable courses transferable to the various College degree programs.

It should be noted that some courses taken in other colleges of this University or other universities may be acceptable for general university credit but may not be acceptable toward the degree requirements of this College. Determination of those particular courses acceptable to a specific degree program will be made within the appropriate department, division or school with the approval of the Dean.

Course Work Currency. Courses taken more than five years before admission to degree programs in this College will not normally be accepted for transfer credit at the option of the department or division in which the applicant wishes to enroll. Courses completed within the five years preceding admission will be judged as to their applicability to the student's curriculum.

English Proficiency Requirement. English proficiency is required As a minimum each student must complete ENG 101 and ENG 102, or ENG 105, but any student whose written or spoken English in any course is unsatisfactory

may be required to take additional course work by the appropriate division director or department chair See statement on English Proficiency, page 34.

Pass-Fail Grades. Students enrolled in the College of Engineering and Applied Sciences will not receive degree credit for pass fail courses taken at this institution. In addition, no courses in this college are offered for pass fail credit. Students requesting credit for pass fail courses taken at another institution must file a Petition for Variance form. Each request will be judged on its particular merits

Course Prerequisites. It is expected that students will consult the *Schedule of Classes* with regard to course prerequisites Students who register for courses without the designated prerequisites may be withdrawn without the student's consent at any time prior to the final examination. Such withdrawal may be effected by the instructor, the chair of the department offering the course, the Director of the College Academic Services, or the Dean of the College In such cases, there will be no monetary reimbursement to the student. However, such withdrawal will be considered to be unrestricted as described on page 40 and will not count against the number of restricted withdrawals allowed

Entry into Upper-Division Courses. Prior to enrolling in courses at the 300 level and above, all students in good academic standing must secure the approval of their advisor. Students who are not in good academic standing must secure the approval of their advisor and division director or department chair Students whose grades in 300 level courses are unsatisfactory may be required to retake one or more courses for which credit has previously been granted.

The Department, Divisions and School have certain additional requirements that must be met in addition to the above College requirements Consult the department or division offering your chosen major.

Academic Honors. Students who maintain a 3.50 or above cumulative grade point average are awarded, at the College Honors Convocation, a Certificate of Scholastic Excellence, and or are listed in the Honors Convocation program Students completing baccalaureate degree requirements will receive the appropriate Honors designations on their diplomas consistent with the requirements specified by the University.

Students in the College of Engineering and Applied Sciences are encouraged to seek information concerning entry into these honor societies for which they may qualify Membership in such organizations enhances the student's professional stature The following honor societies are active with in the College 1 Alpha Pi Mu Industrial Engineering Honor Society, (2 Alpha Zeta Agriculture Honor Society, (3) Eta Kappa Nu Electrical Engineering Honor Society, (4) Pi Tau Sigma Mechanical Engineering Honor Society, (5) Sigma Lambda Chi–Construction Honor Society, (6) Tau Alpha Pi National Honor Society, Engineering Technologies, and (7) Tau Beta Pi National Engineering Honor Society. Information on any of these organizations may be obtained from the respective Department, Division or School offices, or the Office of the Student Academic Services Coordinator

ROTC Students. Students pursuing a commission through either the Air Force or Army ROTC programs will be required to take from 12 to 20 hours in the Department of Aerospace Studies or Department of Military Science To preclude excessive overloads, these students should plan on at least one additional semester to complete degree requirements ROTC students must also meet all other degree requirements of this College.

A military construction option is available in the Division of Construction.

Cooperative Education

The co op program is a study work plan of education which alternates periods of full time academic study with periods of full time employment in business, industry, and government directly related to a student's major Students who choose this program ideally complete 12 months of employment and graduate with both the academic background and practical experience gained from working with professionals in their chosen field Besides the invaluable practical experience gained, co op can bridge the gap between theory and practice, validate career goals, increase self confidence; and provide professional contacts.

A student is eligible to apply upon completion of 45 or more hours of classes in a selected engineering or applied sciences major Certain positions may require completion of specific courses of study. Transfer students are required to complete at least 12 hours at ASU before beginning work All student applicants must have a minimum cumulative grade point average of 2.50 and not be on academic probation.

To maintain continuous full time student sta tus in the University, co op students must be enrolled in ASE 399, 'Co op Work Experi ence, during each work session. The course is required to obtain the co op education certifi cate upon graduation, but does not count to ward graduation requirements. Interested stu dents should contact the Coordinator of Cooper ative Education in the Engineering Center G Wing.

Student Academic Services

The Dean s Office in the College of Eng neering and Applied Sciences maintains a special office staffed to assist students in the following mat ters:

Advisement and Counseling. The Associate Director of Student Academic Services is avai able to all students for counseling and assis tance. he office of the Student Academic Ser vices coordinates the work of the College Stan dards Committee and administers the probation, disqua ification, and readmission processes for those students who are academically deficient.

Student Recruitment and Minority Relations. The Assistant Director of Student Re cruitment and Minority Relations is available *to assist prospective and newly admitted stu* dents with a variety of services related to aca demic and personal concerns. Advisement and assistance is provided in the procurement of fi nancial aid and scholarships, particularly for top scholars. A concentrated outreach effort is placed in the recruitment of qualified minority students.

Scholarships. Academic scholarships for con tinuing students in this college may be applied for by contacting the Student Academic Services Office or the various division offices Other scholarships may be available through the Uni versity Student Financial Assistance Office.

Retention. A student is expected to make satis factory progress toward completion of degree requirements in order to continue enrollment in the College of Engineering and Applied Sci ences. Any one of the following conditions will be considered unsatisfactory progress and will result in the student being placed on pro visional (probationary) status·

1. A deficiency of 15 grade points.
2. A semester or summer session with grade point average less than 1.50.
3. Two successive semesters with grade point average less than 1.50.
4. Grades of 'E, 'W,' or 'I' in half the semester hours appearing on the official enrollment record for any semester.

Students on probation will be subject to dis qualification 1) if they do not attain a 2 25 se mester GPA and if their cumu ative GPA is be low 2.00 at the end of the probationary semes ter (items 1, 2 and 3 above · or ? if they are placed on probation for two consecutive semes ters, (3) if they receive any I s, E s, or W's dur ing the provisional semester for item 4 above) Courses comp eted during the summer sessions may not be used to reevaluate a student s fal probationary status.

Provisional and probationary students may not register for the next semester without a spe c al permit from the Student Academic Services office They may not part cipate in early regis tration

Disqualification. During a semester on provi sional status, a student who fails to meet the retention standards specified above will be dis qualified. Any d squalified student who is ac cepted by another college at ASU may not regis ter for courses in this College un ess the courses are required for the new major. If a dis qualified student does register for courses in this College, he she may be withdrawn from these courses any time during that semester Further students at the University who have been disqualified academically by this College are not eligible to enrol in Summer Session courses in this College until the disqualifica tion period has expired and they have been rein stated.

Reinstatement. The College of Engineering and Applied Sciences will not accept an applica tion for reinstatement until the disqualified stu dent has remained out of this College for at *least a 12 month period. Merely having re* mained in a disqualified status for the above per iod of time does not, in itself, constitute a basis for reinstatement Proof of ability to do satisfactory college work in the chosen disci pline will be required.

General Studies

Higher education should provide the student not only with competency in the chosen subject field, but also with experiences which facilitate the student s growth in ability to perceive signi ficant relationships, to make intelligent value judgments, to express ideas with ease, clarity and good taste, and to develop the qualities of character and personality requisite for a success ful career. The development of moral, ethical

and social concepts, along with a sound professional attitude, is required. It is expected that the attainment of an interest and pleasure in the above pursuits will be an inspiration to continued study. Courses are selected with the aid of an advisor to provide planned sequences and to place emphasis on the interrelationships that exist among fields of knowledge.

Specific attention should be directed to the University General Studies requirements shown on page 43-46. Additional requirements and/or recommended course selections are shown in appropriate *Catalog* sections for the school, divisions, and departments of this College.

Core courses are regularly reviewed. To determine whether a course meets one or more General Studies Core course credit requirements, see the *General Studies Course Guide* available prior to registration for courses.

Key to General Studies Core Credit Abbreviations

L1	Literacy and Critical Inquiry Core Courses (Intermediate level)
L2	Literacy and Critical Inquiry Core Courses (Upper division)
N1	Numeracy Core Courses (Mathematics)
N2	Numeracy Core Courses (Statistics and Quantitative Reasoning)
N3	Numeracy Core Courses (Computer Applications)
HU	Humanities and Fine Arts Core Courses
SB	Social and Behavioral Science Core Courses
S1	Natural Science Core Courses (Introductory)
S2	Natural Science Core Courses (Additional Courses)
G	Global Awareness Courses
H	Historical Awareness Courses

Division of Agriculture

G. J. Seperich, Ph.D., Director

PROFESSORS:
ASHOOR, CHALQUEST, GORDON, METCALF, STILES

ASSOCIATE PROFESSORS:
SEPERICH (AG 281), BACKHAUS, BRADY, BROCK, EDWARDS, MADDY, RACCACH, STUTZ, WHYSONG, WOOLVERTON

ASSISTANT PROFESSORS:
BAXTER, DIAZ, HATZELL, MILLER, NIEMIERA

PROFESSORS EMERITI
BARRETT, JUDD, LYTLE, MILLER, MOODY, RASMUSSEN, RICHARDSON, ROBINSON, TAYSOM

Purpose

The Division of Agriculture provides academic programs directed toward the agribusiness and environmental aspects of agriculture. Agribusiness is a dynamic industry which provides employment to about 23 percent of the U.S. labor force. Courses in the Division of Agriculture are designed to prepare students for the wide range of job opportunities which exist in the agricultural industries and governmental agencies. The academic programs are especially designed to meet the needs of the urban student who has had little or no previous agriculture experience. An interest in plants, animals or foods can be the starting point for career development in agricultural industries or natural resource management. The undergraduate programs also provide the necessary training for students preparing to enter graduate degree programs.

General Information

Admission. See pages 22-25, 41-42, 223-224, and 226 for information regarding requirements for admission, transfer, retention, disqualification, and reinstatement.

In addition, students who are beginning their initial college work in the Division of Agriculture should present secondary school units in accordance with the minimum University requirements. There are no secondary school agricultural course requirements.

Organization

The Division of Agriculture is comprised of students, faculty, administrators, staff and physical facilities. The academic programs are organized into two separate majors: agribusiness and environmental resources in agriculture Options for specialization within these majors are as follows:

Agribusiness

Concentration	*Option*
Agribusiness	General Agribusiness
	International Agribusiness
	Food Industry
Pre Veterinary Medicine	

Environmental Resources in Agriculture

Concentration	*Option*
Natural Resource Management	Resource Agribusiness
	Range Ecology
	Water and Soil Management
Urban Horticulture	

Center for Arid and Tropical New Crop Applied Science and Technology (NEWCAST)

The NEWCAST Center carries out research and development leading to commercialization of biotechnologies important to agribusiness. As an interdisciplinary center it draws on collaborators from the entire Arizona State University faculty and both private firms and public agencies. While it specializes in new crops and products derived therefrom, it will act as a resource and/or manage programs developing new technologies and inventions not directly related to agriculture

Degrees

Bachelor of Science (B.S.). The Division of Agriculture offers the Bachelor of Science degree in Agribusiness and in Environmental Resources in Agriculture. A minimum of 126 hours of credit, including University General Studies*, the Division and major cores, and option courses lead to the Bachelor of Science degree. Forty percent of the semester hours required for graduation must be upper division

Master of Science (M.S.). The Division of Agriculture offers the Master of Science degree in Agribusiness and in Environmental Resources in Agriculture. The program includes research and the preparation of a thesis A minimum of 30 semester hours of graduate level course work is required for the degree. Additional details for this degree are given in the *Graduate Catalog*.

Curricula in Agriculture

Curricula in Agriculture include the General Studies* requirement, the Division of Agriculture core requirement, a proficiency core requirement, the major core requirement, together with the option courses and elective courses to complete the graduation requirement of 126 semester hours Prior to entering the junior year each student, with the aid of an advisor, is expected to select a concentration and an option.

The Agribusiness major is an applied, industry oriented curriculum. The study of animals, plants and their utilization in the food and fiber system forms the base of the program Students then learn to analyze firms involved in input supply activities, commodity processing, food manufacturing and food distribution Students also study government agricultural programs and national policy activities which affect agribusiness Because of the United States' role in supplying commodity and food products to the world markets, international aspects of agribusiness development and trade are emphasized.

Two concentrations exist within the Environmental Resources in Agriculture major. The natural resource management concentration emphasizes the study of wildland ecosystem management. Application of the systems approach in a wide variety of resource management situations is emphasized Students may pursue an ecological emphasis by choosing the range ecology option or they may pursue a business emphasis by choosing the resource agribusiness option. Students with particular interest in water and soil resources should pursue the water and soil management option. The urban horticulture concentration emphasizes the production, care and marketing of plant materials for urban environments. Students may focus on special interest areas such as commercial horticulture, landscape horticulture or horticultural science.

All students pursuing a Bachelor of Science degree in the Division of Agriculture must satisfy English Proficiency and General Studies requirements as follows:

* See General Studies Booklet for specific requirements and approved list

	Semester Hours
English Proficiency	
† ENG 101 First Year Composition	3
† ENG 102 First Year Composition or ENG 105 Advanced First Year Composition	3
General Studies	
*Literacy and Critical Inquiry**	
(6 semester hours minimum	
One course, generally at the sophomore level, that includes a series of formal, graded, written or spoken assignments in composing critical literature	3
A second course, upper division, that involves critical writing in a specialized discipline	3
Numeracy	
6 semester hours minimum)	
† MAT 115 College Alegbra and Trigonometry	4
† ERA 350 Applied Quantitative Methods	3
*Humanities and Social Sciences**	
15 semester hours minimum	
At least one course must be upper division level two courses must be from same department and two departments or more must be represented in total selection	
Humanities and Fine Arts	9 to 6
Social Sciences	6 to 9
Required: ECN 111 Macroeconomic Principles (3	
Natural Sciences	
8 semester hours minimum	
* CHM 101 Introductory Chemistry	4
At least one additional course satisfying the Natural Sciences requirement*	4
Total General Studies	36

NOTE One course in the area of Global Awareness* and one course in Historical Awareness* must appear in the final list of courses offered in the student's graduation program of study. These can be included in the Humanities and Fine Arts and Social Sciences course selections.

* See General Studies booklet for acceptable courses in these categories

† Required for graduation

Agriculture Core

All students pursuing a Bachelor of Science degree in the Division will complete the following general core courses.

		Semester Hour
AGB 300	Livestock Management	3
AGB 302	Introduction to Agribusiness	3
AGB 310	Crop Management	3
ERA 346	Environmental Conservation	3
Total		12

The following proficiency core courses are required of all students:

		Semester Hour
AGB 130	Plant Science and	
AGB 150	Animal Science	6
	or BIO 181, 182 General Biology (8)	
* CHM 101	Introductory Chemistry	4
	or CHM 113 General Chemistry 4) and CHM 115 General Chemistry with Qualitative Analysis (5)	
* ECN 111	Macroeconomic Principles	3
* ERA 350	Applied Quantitative Methods	3
MAT 115	College Algebra and Trigonometry	4
	or MAT 117 College Algebra 3) and MAT 118 Plane Trigonometry 2	
	or MAT 210 Brief Calculus (3)	
A minimum of one computer course (Acceptable list in Division of Agriculture Office)		3
Total		22 31

* These courses are a part of the General Studies requirements.

Agribusiness

The agribusiness major combines business and technical agriculture as they relate to the management, marketing and financial objectives of agribusiness firms. Topics of interest include the supplying of resources and services to agricultural producers, the management of crop and livestock enterprises, the processing of raw agricultural products and the management and quality assurance of food manufacturing. Food distribution is examined from the points of view of food wholesalers and retailers as well as food service firms which include restaurants and specialized food firms. The study of agribusiness also includes analysis of the critical roles of government in regulating certain aspects of agribusiness and promoting international trade in agribusiness products.

Students selecting agribusiness as a major are required to take the following courses.

		Semester Hour
ECN 112	Microeconomic Principles	3
ACC 211	and ACC 212 Elementary Accounting	6
	or ACC 300 Survey of Accounting	3
AGB 312	Agricultural Marketing	3
AGB 332	Agribusiness Finance	3
AGB 342	Agribusiness Management I	3
AGB 364	Agribusiness Technology	3
AGB 412	Agricultural Commodities	3
AGB 443	Agribusiness Management II	3
AGB 444	Agribusiness Analysis	3
AGB 455	Agricultural Marketing Channels	3
AGB 458	International Agribusiness	3
AGB 474	Agribusiness Policy	3
AGB 490	Recent Advances in Agribusiness	1
Total		40

Agribusiness, as a concentration, contains the following options.

General Agribusiness integrates the knowledge and skills needed to successfully manage people, products and services in agribusiness enterprises. Agribusiness management combines the agricultural sciences, behavioral science and common sense. Functional, institutional and behavioral aspects of marketing are examined while studying the flows of products and services through the various market channels for agricultural inputs, commodities and food. Emphasis is placed on up to date management marketing methods that will allow graduates to successfully meet challenges in the food and fiber industries. Graduates are qualified to make significant contributions in a broad range of career opportunities which exist in agribusiness. Many start career paths which will lead to upper level agribusiness management/marketing positions.

International Agribusiness relates worldwide agricultural resources to the requirements and potentials of the various nations. Particular emphasis is given to economic development and to the international trade of food and fiber products. Special courses are offered to form a unique curriculum which is designed to train either the U.S. or foreign student to work in the enhancement of agricultural programs of foreign countries. Provided is a basic knowledge of U.S. agricultural techniques which is extended to the global aspects of agriculture. Graduates in this area are particularly qualified to aid in the development of the world's agricultural potential to provide food and fiber to meet the expanding populations. Jobs exist in commercial industries and in government agencies United States, international and foreign. A language capability in addition to English is recommended.

Food Industry focuses on the scientific and technical competence required for employment in this field. Strong emphasis is given to basics such as food chemistry, food processing and food safety. This unique program offers employment opportunities for graduates in food industries, regulatory agencies and consumer organizations

Pre-Veterinary Medicine is primarily designed to meet the entrance requirements of professional veterinary medical schools in the United States and Canada. Selection of this area will permit students to complete the preveterinary requirements for entrance to professional veterinary school. The curriculum permits the student to obtain some course work in agribusiness, especially as it relates to professional practice and industry. This background also provides an important alternative for the student who does not actually enter veterinary school. Completion of all requirements for a Bachelor of Science degree in agribusiness at ASU is provided by completing additional credits, if desired. A pre veterinary medicine student who has been accepted to a school of veterinary medicine and who also elects to earn a Bachelor of Science degree in the Division of Agriculture may do so by completing a minimum of 30 semester hours at ASU and by completing the agriculture and General Studies requirements. The student may then receive a written statement from the Dean of the College of Engineering and Applied Sciences giving senior in absentia privileges. The student will be eligible to receive the B.S. degree after the Registrar's Office receives a recommendation from the Dean of the professional school and a transcript of credit indicating the student has completed a total of 126 semester hours with a cumulative grade point average of 2.00 or better.

Although this concentration is primarily intended for the student preparing to enter professional veterinary medicine as a career, it is also an excellent basis for future graduate degree programs or many of the scientifically related jobs in agribusiness and government.

Typical Curriculum for Agribusiness

First Year

		Semester Hours
AGB 130	Plant Science	3
AGB 150	Animal Science	3
CHM 101	Introductory Chemistry	4
MAT 115	College Algebra and Trigonometry	4
ENG 101	and 102 Freshman Composition	6
Social and Behavioral Sciences Courses		6
General Electives Courses		6
Total		32

Second Year

ECN 111	and 112 Macroeconomic Principles and Microeconomic Principles	6
ACC 211	and 212 Elementary Accounting	6
AGB 302	Introduction to Agribusiness	3
Agribusiness Electives Courses		9
Humanities and Fine Arts Courses		6
General Electives Courses		3
Total		33

Third Year

AGB 312	Agricultural Marketing	3
AGB 332	Agribusiness Finance	3
AGB 342	Agribusiness Management I	3
AGB 364	Agribusiness Technology	3
AGB 300	Livestock Management	3
AGB 310	Crop Management	3
ERA 346	Environmental Conservation	3
ERA 350	Applied Quantitative Methods	3
Option Courses		6
Total		30

Fourth Year

AGB 412	Agricultural Commodities	3
AGB 443	Agribusiness Management II	3
AGB 444	Agribusiness Analysis	3
AGB 455	Agricultural Marketing Channels	3
AGB 458	International Agribusiness	3
AGB 474	Agribusiness Policy	3
AGB 490	Recent Advances in Agribusiness	1
Option Courses		9
General Electives Courses		3
Total		31

Environmental Resources in Agriculture

The environmental resources in agriculture major emphasizes the application of principles drawn from basic biology, ecology and soil science. Students in the natural resource management concentration will study application of these principles to wildland ecosystems. Students in the urban horticulture concentration will study the application of these principles in garden, landscape and greenhouse environments.

Natural Resource Management, as a concentration, includes the following options:

Resource Agribusiness combines the technical aspects of the resource ecology area with solid background in agribusiness. An emphasis is placed on the combination of a technical background with the knowledge of business concepts and skills which will provide the background for managing people, products and services associated with resource related agribusiness. Employment opportunities for students following this option will be primarily with these industries.

Range Ecology emphasizes the study of renewable rangeland resources based on a firm background of agricultural and biological sciences. The specific areas of plant, animal and soil sciences with ecology comprises primary training in range ecology. Students completing this option may choose careers as professional range conservationists for federal and state agencies or in private industry. Range conservationists perform work concerned with inventorying, analyzing, improving, protecting and managing the natural resources of rangelands and related grazing lands.

Water and Soil Management deals with the wise use of these important resources. Wise use is essential if environmental quality and productivity are to be maintained in view of the hazards posed by erosion, pollution, and sedimentation. Course work in this option emphasizes soil science; however, a strong foundation in the biological and agricultural sciences is required. Students choosing this option can pursue employment with government agencies or private industries which are concerned with managing, wisely utilizing and protecting these resources.

Students selecting the natural resource management concentration are required to take the following courses:

		Semester Hours
ERA 325	Soils	3
ERA 326	Soils Laboratory	1
ERA 333	Water Resources	3
ERA 360	Range Ecosystems	4
ERA 440	Crop Growth and Development	3
ERA 460	Applied Systems Ecology	3
ERA 490	Recent Advances in Environmental Resources	1
ENG 412	Professional Writing	3
Total		21

Urban Horticulture, as a concentration, is designed to provide a solid foundation in horticultural practice while providing sufficient flexibility for students to emphasize areas of particular interest. For example, students may choose to emphasize the commercial aspects of horticulture by including agribusiness courses in the curriculum to insure financial as well as horticultural knowledge. Students may also choose to emphasize landscape horticulture by concentrating on courses in design and landscape horticulture; horticultural science by directing their program of study to include courses in botany, genetics and chemistry, or to concentrate on horticultural management of pests, soils and water by including course work in plant diseases, pests, nutrition and water management. Graduates find employment in the nursery industry, landscape management (e.g., park or golf course management), commercial or government laboratories, the agricultural chemistry industry, or may begin their own businesses.

Students selecting the urban horticulture concentration are required to take the following courses

		Semester Hours
AGB 130	Plant Science	3
ERA 301	Arboriculture	3
ERA 325	Soils	3
ERA 326	Soils Laboratory	1
ERA 380	Environmental Horticulture	3
ERA 381	Plant Propagation	3
ERA 440	Crop Growth and Development	3
ERA 450	Horticultural Plant Problems	3
ERA 498	PS: Pest Management	3
CHM 231	Elementary Organic Chemistry	4
Total		29

Typical Curriculum for Environmental Resources in Agriculture

First Year

	Semester Hours
ENG 101 and 102 First Year Composition	6
MAT 115 College Algebra and Trigonometry	4
CHM 101 Introductory Chemistry	4
Computer Course	3
Social and Behavioral Sciences Courses	8
General Electives Courses	6
Total	31

Second Year

BIO 181 and 182 General Biology	8
ERA 325 Soils	3
ERA 326 Soils Laboratory	1
Humanities and Fine Arts Courses	8
* Option Requirements	10
Total	30

Third Year

AGB 310 Crop Management	3
AGB 300 Livestock Management	3
ERA 350 Applied Quantitative Methods	3
ERA 346 Environmental Conservation	3
AGB 380 Government Regulations in Agriculture	3
* Option Requirements	18
Total	33

Fourth Year

ERA 490 Recent Advances in Environmental Resources	1
General Electives Courses	5
* Option Requirements	26
Total	32

* *Option Requirements as Listed for Individual Programs*

Agriculture

AGRIBUSINESS

AGB 101 Food Chain. 2 F
Dependence of the qua ty, quant ty and c st of nat ona food supp es on techno ogy, market ng and wor d agr cu tura po c es *[Sat sfies Genera Stud es Requirement G]*

130 Plant Sc ence. 3) S
P ant growth and deve opment n the rura and urban en v ronment Two ectures 3 hours aboratory

150 Animal Science. 3 S
Comparat ve growth deve opment and propagat on of farm anima s. Two ectures, 3 hours aboratory.

160 Veterinary Medicine Today. 2 N
Introduct on to the ro e of the veter nar an as re ated to the f e ds of food supply and veterinary med c ne.

300 Livestock Management. 3) F
Methods of manag ng vestock enterprises econom cs, loss prevent on and market ng. Prerequ s te AGB 150

302 Introduction to Agribusiness. (3) F
mpact of nat ona po icy and wor d agricu ture on the cost, quant ty and qua ty of the U S food resources

305 Nutritional Science. (3) N
Energy and nutrients n v ng systems Corequ s te CHM 101 or equ va ent.

306 Nutritional Science Laboratory. (1 N
Experimenta tria s nvolv ng the princ p es of nutrit on and the phys o og ca roles of nutr ents n metabol sm. Three hours aboratory. Corequ s te: AGB 305

310 Crop Management. 3) F
Crop product on and management pr nc p es and the r ap plicat on to crop growth and deve opment Prerequ s te AGB 130

312 Agricultural Marketing. 3 F
Market ng arrangements for agr cu tura products

332 Agribusiness Finance. 3 S
Agribus ness nvestment management and f nanc a nst tut ons that serve agr cu ture. Prerequ site ECN 111

335 Establishing an Agribusiness 3 F
Estab sh ng entrepreneursh p n agr cu ture, nc ud ng e ga status financ ng p ann ng, market ng and manage ment Prerequ s te jun or stand ng

342 Agribusiness Management I. 3 S
Pr nc p es of management p ann ng organ zing, ntegrat ng, measur g and deve op ng peop e n agr bus ness organizations

353 Applied Animal Nutrition. 3 S
Feedstuffs feed ng standards and the r app cat on n meeting nutrit ona needs of anima s producing food and f ber

364 Agribusiness Technology. 3 S
Processing and preservat on of food products Pre requ s tes CHM 101 or 113 MAT 115 or 210

365 Food Technology Laboratory. 1 F
Experiments and procedures in process ng and pack ag ng foods Three hours aboratory. Corequisite. AGB 364

368 Food Processing. 3 F
An ntroduct on to processed food qua ty assurance, sta t st ca samp ng and nspect on procedures Prereq u s tes AGB 364, ERA 350

369 Food Analysis. 3 F
Proce s ng contro and sc ent f c nstrumentat on used n food qua ty as urance aborator es Two ecture 3 hours aboratory Prerequ s tes: CHM 225 226

370 Companion Animals to Man. 3 N
Se ect on breed ng hea th and care of pets nc udes the r soc a and econom c mpact on urban v ng

371 Pet Nutrition. 3 N
Rev ew and app cation of nutr t on pr nc p es n feed ng man s compan on an ma s Prerequ s te: CHM 101 or B O 100

380 Government Regulations in Agr culture. 3 F
The deve opment and mp ementat on of government regu at ons that affect the management of agr bus ness Prerequ s te jun or standing

390 Agricultural Accounting. (3) N
Bas c account ng app cat ons common y used by agr cu tura ndustr es nc ud ng tax and management nfor mat on systems

402 Agricultural Cooperatives. 3) N
Organ zat on operat on and management of agricu tura cooperat ves

403 Agribusiness Public Relations. (3 N
The mage of agricu ture nc ud ng cons derat on of the agricultura press Prerequ s te: AGB 312

404 Sales and Merchandising in Agribusiness. 3 N
The princ ples and techn ques of se ng and commodity merchandis ng n the agricu tura ndustries Two ec tures 3 hours aboratory

405 Future Food Supply. 3) N
Food and agricu tura supp y forecast ng scenar o deve opment and ana ys s and a ternat ve response strat eg es

412 Agricultural Commodities. 3 F
Trad ng on futures markets Emphasis on the hedg ng pract ces w th gra ns and meats Prerequ s te AGB 312 or one market ng or f nance course

413 Financial Commodities. 3 S
Trad ng on futures markets Emphas s on the hedg ng pract ces w th f nancia and currency instruments Pre requ s te AGB 332 or FIN 300

414 Advanced Commodity Trading. 3 N
Advanced ana ys s of trad ng techn ques w th emphas s on hedg ng n the futures markets Prerequ s te AGB 412 or AGB 413

425 Food Safety. 3 S
Food hazards prevent on, detect on assessment and neutra zation Regu atory agency enforcement programs are emphas zed Prerequis te. AGB 364

426 Food Chemistry. 4 S
The b ochem ca and chem ca interact ons that occur n raw and processed foods Three ectures 3 hours abora tory Prerequ sites CHM 115 and CHM 231

428 Comparative Nutrition. 3 N
Effects of nutr t on on an ma systems and metabo c func t ons Prerequ s tes AGB 305 CHM 231

433 Diseases of Domestic An mals. 3 N
Contro and prevent on of nfect ous and non nfect ous d seases of domest c an ma s Prerequ s te M C 201 or 210

435 Animal Phys ology I. 4 N
Contro and funct on of the nervous, muscu ar, card ovas cu ar, resp ratory, and rena systems of domest c an ma s Three ectures, 3 hours aboratory A so sted as BME 435 Prerequis tes CHM 113 BIO 181

436 Animal Physiology II. 3 N
Contro and funct on of the endocr ne, d gest ve and re product ve systems of domest c an mals Prnc p es of adaptat on of an ma s to the r environment. Prerequ s te· AGB 435 or ZOL 360

437 Animal Physiology Laboratory. 1 N
Se ected phys o og ca exper ments to accompany AGB 436 Three hours aboratory

439 Veterinary Practices. 3 F S
Observat on of and part c pat on n veterinary med c ne and surgery superv sed by oca veter nar ans Open to advanced pre veter nary students on y

440 Food Marketing. 3 S
Food process ng packag ng d str but on market re search, new food R&D and soc a mp ications Prerequi s te AGB 364

443 Agribusiness Management II. 3) F
Pr nc p es of human resource management w th empha s s on the spec a prob ems of agr bus ness systems Prerequ s te AGB 342

444 Agribusiness Analysis. (3 S
Identifies the s ze scope and organizat on of the var ous agricu tural y or ented ndustries

445 World Crop Management. 3) N
Latest techn ques n produc ng and harvesting major rri gated fie d crops Inc udes crop p anning Two ectures, 3 hours laboratory Prerequ s te AGB 310.

450 International Agricultural Development. (3) F
Trans tion of develop ng countries from subs stence to modern agriculture. Techno ogy transfer and food im provement programs are emphasized. Prerequ s te AGB 312 *[Satisf es General Stud es Requirements SB, G]*

451 International Food Resources. (3) N
Methods of mproving agr cu ture and food evels in de ve oping reg ons of the wor d. Emphas s on actua case stud es. Prerequ site· AGB 312

452 World Food Dynamics. (3) N
Trans t on and deve opment of raw agricultura commod· t es into nutrit ona food products Emphas s g ven to food expansion n develop ng countr es Prerequ s te AGB 302 or AGB 364

453 World Agricultural Resources. 3 S
Wor d production and consumpt on of agricultural prod ucts, nternat ona re at onsh ps and agenc es concerned w th world agr cu tura deve opment problems Prerequ s te AGB 101

454 International Agricultural Trade. (3 N
D mens ons, ocat ons m x, methods and changes of n ternat ona trade n agr cu tura products Prerequ s te AGB 312

455 Agricultural Marketing Channels. 3 S
Operat ona tages of agr cu tural commod t es n norma d str but on system and mp ementat on of market ng strateg es Prerequ s te AGB 312

458 International Agribusiness. 3 N
Ident f cat on and ana ys s of methods prob ems and fu ture of nternat ona agr bus ness operat ons Empha s zes spec a prob ems assoc ated w th ternat ona ag r bus ness systems Prerequ s te AGB 312 *[Sat sf es Genera Stud es Requ rements SB G]*

460 Agribusiness Management System 4 S
The deve opment and u e of dec s on support systems for agribus ness management and market ng Three ec tures, 3 hours aboratory Prerequ s tes ECE 105; AGB 332 and 342

470 Advanced Government Regulations. (3 N
Implications of current federa regulat ons on agribus ness management Prerequ s te AGB 380

474 Agribusiness Policy. 3 F
Deve opment mplementat on and prof tab ty of agribus ness strategy Prerequ s te AGB 312

490 Recent Advances in Agribusiness. 1 F, S
Reports and d scuss ons of current top cs and prob ems assoc ated w th agribus ness May be repeated for cred t

505 Commodity Analysis. 3 N
Analys s of comm d ty markets Prerequ s te one year of econom cs or market ng

508 Advanced Agricultural Marketing. 3 F
Theory and ana ysis of market ng farm commod ties r sks and effect of future trad ng on cash prices

509 Advanced Agribusiness Marketing Channels. 3 S
Ana ys s of agribus ness market channe systems Formu at on of market ng strateg es

510 Advanced Agribusiness Management I. (3 F
Assessment and current prob ems n managing human and financ a resources n agr bus ness Case stud es and ana ys s of spec a agr bus ness prob ems Prerequ s te: AGB 342

511 Advanced Agribusiness Management II. (3) S
Analys s of organ zat on behav or, change and resource requ rements w thin agribus ness systems Prerequ s te AGB 342

512 Food Industry Management. 3) S
Operat ons and management of food process ng facto ries food d strbut on centers and reta food hand ing f rms

516 International Agricultural Techniques. (3) N
Coordinat on of product on and market ng techn ques to consumpt on objectives with agr cultural products in foreign countries

518 World Agricultural Development. (3) N
Factors that nf uence production, process ng and mar· ket ng of agr cu tura products n deve op ng countr es

520 Advanced Agribusiness Analysis I. (4) S
Vert ca ntegrat on and d fferent at on in food and agri cu tura ndustr es Four hours ecture recitation Pre requ s tes AGB 508 510 and 532 or equ va ents

521 Agribusiness Coordination. 4 N
Organ zat ona a ternat ves for agr bus ness w th empha s s on cooperat ves and trad ng compan es Four hours lecture rec tat on Prerequ sites AGB 508, 510 and 532 or equ va ents

525 Advanced Agribusiness Management Systems. 3 N
App ication of computer systems to agr cu tura manage ment prob ems and p ocesses Emphas s on parametnc near programm ng Prerequ s te AGB 460

527 Agribusiness Research Methods. 3 N
The use of mode bu d g, hypothes s test ng and emp ri ca ana ys s n so v ng agr bus ness prob ems

530 Advanced Agribusiness Policy. 3 N
Po cymak ng h story, structure and p ocess Prerequi s te AGB 508

532 Advanced Agr bus ness Finance. 3 F
F nanc a management of agr b s ness f rms agr bus ness f nanc a ana ys nvestment ana ys s agr cu tura risk management and ntroduct on to agr cu tura f nan c a intermed ar es

535 Advanced Food Science. 3 N
Chem ca and phys cal nature of processed foods Em phas s on food product deve opment Prerequ s te AGB 364

536 Advanced Food Quality Instrumentation. 3 S
Food ana ys s us ng sens t ve aboratory nstrumentat on and methodo ogy Two ectures 3 hours aboratory Prerequ s tes AGB 369 and 426

See page 38 for special courses which may be of tered by this academic unit.

ENVIRONMENTAL RESOURCES IN AGRICULTURE

ERA 301 Arbor culture. 3 S
The estab shment care and ma ntenance of ornamenta trees and shrub Prerequ s te· AGB 130

310 Bioeconomics of Natural Resources. 3 N
Econom c pr nc p es and methods as app ed to natura resource eva uat on and management nvest gat on of alternat ve strateg es of resource use Prerequ s tes ECN 111 ERA 346

325 Soils. 3 F
Fundamenta propert es of so s the r re at on to p ant growth and the nutr t on of man and an ma s Re at on of so s to env ronmenta qua ty Prerequ s te CHM 101 or 113 or equ va ent

326 Soils Laboratory. 1 F
Se ected exerc ses to broaden the background and un derstand ng of bas c so pr nc p es Three hours abora tory Corequ s te ERA 325

332 Agricultural Chemicals. 3 S
Compos t on propert es and use of agr cu tura commer c al fert zers and pest c des and the r effects on so a r and water qua ty

333 Water Resources. 3 F
Sources the r deve opment and conservat on n ar d re g ons for agr cu tura and urban uses Prerequ s te CHM 101 or 113

346 Environmenta Conservation 3 F
A g oba perspect ve on the conservat on of w d and and agr cu t ra resources Deve opment resource con servat on nterre at onsh ps *[Sat sf es Genera Stud es Requ rement G]*

350 Appl ed Quantitative Methods. 3 F
Stat st ca method w th app cat ons n natura resource management and the agr cu tura c ences Use of d g ta computer Prerequ s te MAT 115 or equ va ent *[Sat s f es Genera Stud es Requ rement N2]*

360 Range Ecosystems. 4 F
The nterre at ons of vegetat on so s and graz ng an ma s Eva uat on and s mu at on of graz ng an ma mpact Four hours ecture rec tat on Prerequ s tes ERA 346 B O 320 or equ va ents

365 Watershed Management. 3 N
Hydro og c phys ca b o og ca and eco og ca pr nc p es app ed to water hed management mpact of ecosystem man pu at ons on water y e d and qua ty. One weekend f e d tr p Prerequ s tes ERA 325 346

370 Forest Silvics and Management. 3 N
S v cu tura pr nc p es under y ng the pract ce of forestry Growth of trees and stands forest s te eva uat on, man p u at on of stands to d rect success on and forest mea surements Two ectures 3 hours aboratory Pre requ s tes ERA 346 350 B O 320

375 Soil Fertility. 3 S
Overv ew of hab tat s tuat ons requ r ng rehab tat on fo ow ng man s use and rehab tat on techn ques F e d tr ps Prerequ s tes: ERA 325, 326 and 346

380 Environmental Horticulture. 3 F
P ant cu ture and use n urban agr cu ture Prerequ s te AGB 130

381 P ant Propagation. 3 S
Pr c p e and sk s n propagat ng andscape trees and shrubs by sem na and vegetat ve means nc ud ng fru t p ants Two ectures 3 hour aboratory Prerequ s tes AGB 130 BIO 182

382 Lawns and Greens. 3 N
Se ect on estab shment and ma ntenance of turf grasses for awn park and sports areas Two ectures 3 hours aboratory Prerequ s te AGB 130

386 Indoor Landscape Plants. 3 S
Se ect on and care of conta ner grown house p ants

400 Range Ecogeography. 3 N
Structure funct on and p ant compos t on of range eco ystems S mu at on of change resu t ng from man s use of resources Prerequ s te ERA 360

402 Methods in Range Ecology. 4 F
Vegetat on samp ng and nventory as re ated to an ma hab tat re at ons Three ecture 3 hours aboratory weekend f e d tr p Prerequ s tes ERA 350 and 360.

407 Range Plants. 4 F
The d str but on eco og ca character st cs dent f cat on and va ues of p ants on western range ands Laboratory emphas zes taxonomy and dent f cat on f grasses Three ectures 3 hours aboratory Prerequ s te BOT 370 or equ va e t

410 Popular on Habitat Re at ons. 3 N
Interact ons among an ma popu at ons and the r hab tat. Systems s mu at on of popu at on dynam cs as nf uenced by compet t on and management strateg es Three ec tures one weekend f e d tr p Prerequ s te ERA 360

420 Range Improvement Practices. 3 S
Brush and weed contro revegetat on burn ng fert za t on fenc ng graz ng systems and water deve opment Emphas s on pr nc p e and current mprovement prac t es Three ecture one weekend f e d tr p Prerequ s te ERA 36

425 Soil Taxonomy. 3 N
Fundamenta pr nc p es of so genes s morpho ogy and c ass f cat on, nc ud ng propert es of s gn f cance n map p ng a d nterpret ng so survey nformat on Prereq u s te ERA 325.

430 Landscaping Principles. 3 N
P ann ng and p ant ng for max mum beauty and ut ty n c ud ng energy conservat on Prerequ s te ERA 380 or equ va ent

438 Nursery Management. 3 N
Product on of trees and shrubs for who e a e and reta market ng Two ectures 3 hours aboratory Prerequ s tes ERA 380 381

440 Crop Growth and Development. 3 F
Env ronmenta factors affect ng the adaptat on d str bu t on, growth and deve opment of crops Prerequ s tes B O 182 CHM 231 ERA 381.

448 Soil Ecology. 3 N
So s v ewed n an ecosystem context so p ant re at on sh ps nutr ent budgets and ab ot c factors that nf uence so processes Prerequ s tes ERA 325 326 B O 320 or approva of nstructor

450 Horticultural Plant Problems. 3 F
dent f cat on and contro of b ot c and ab ot c factors wh ch cause common problems to hort cu tural p ants Prerequ s tes ZOL 354 and a p ant patho ogy course

452 Soil, Water and Irrigation. 3 S
Water measurement conveyance and conservat on w th emphas s on crop production and soi plant water re a t ons Prerequ s te ERA 325

460 Applied Systems Ecology. 3 S
The systems approach app ed to analys s and man agement of natura resource ecosystems Use of s mu at on models Prerequ s tes ERA 350 or equ va ent one course n eco ogy.

463 Greenhouse Systems. 3 F
Funct onal des gn and integrated management of green house and hydropon c systems Two lectures 3 hours aboratory Prerequ s tes. AGB 130, ERA 325

470 Land Reclamation. (3 N
Prob ems of re estab sh ng vegetat on on d sturbed s tes Spec a revegetat on techn ques surface mod f cat ons and government regu at ons One weekend f e d tr p Prerequ s tes ERA 375 407, 420, 448, or approva of nstructor

475 Range Livestock Management. 3 N
Operat on and management of beef catt e and sheep em phas z ng range cond t ons Weekend f e d tr ps Prereq u s tes· AGB 300 and 353 Corequ site ERA 480

480 Natural Resource Planning. 3 N
Pr nc p es and techn ques of p ann ng for management and conservation of natura ecosystems Use of opt m za t on mode s and dec s on theory Preparat on of man agement plan Three ectures, one weekend f e d tr p Prerequ s tes ERA 402 and sen or stand ng

490 Recent Advances in Environmental Resources. 1 N
Current terature and s gn'f cant deve opments nvo v ng env ronmenta resources May be repeated for cred t

540 Plant Responses to Environmental Stresses. 3 N
React on of p ants to env ronmenta stresses herb vores f re pest c des, mechan ca treatments, aer a pol lutants and so amendments One weekend f e d tr p Pre requ s tes BOT 360 ERA 420 or approva of nstructor

548 Plants, Soi s and Environmental Quality. 3 N
Effects of a r qua ty on p ants and so s and the r ro e n remov ng contam nants from the atmosphere Prerequ s te· ERA 325

550 Vegetation Dynamics. 3 N
Success on concept and ts use n s te eva uat on Hab tat type concept Herb vory as an eco og ca process Prerequ s tes ERA 364 BOT 420 or approva of nstruc tor

560 Systems Ecology 3 N
Quant tat ve descript on and mathematica mode ng of ecosystem stru ture and funct on Techn ques for mode construction and s mu at on wo ectures 3 hours abo ratory Prerequ s tes s x hours n eco ogica stud es computer programm ng ERA 350 or equ va ent

570 Reclamat on of Critical Habitats. 3 N
Character st cs of hab tats that pose prob ems for vegeta t o re estab shment growth and deve opment Ma nta n ng the ntegr ty and esthet c va ue of hab tats sens t ve to human act v ty Two ecture 3 hour aboratory F e d tr ps Prerequ s tes ERA 448 470 540 550 or approva of nstructor.

581 Plant Tissue and Cell Culture. 3 F
Ascept c c ona propagat on of p ants v a so ated ce s t ss es and organs. Two ectures 3 hours aboratory Prerequ site BOT 360 ERA 381 or 440

See page 38 for special courses which may be of fered by this academic unit.

Department of Computer Science

PROFESSORS:
BARNH LL (EC G 252), BLACKLEDGE, F NDLER, LEW S, NIELSON, WOODF LL

ASSOCIATE PROFESSORS:
CARTER, COLLOFELLO FALTZ, HUEY, L NDQUIST MILLER, O GRADY OZKARAHAN, PAI, PHEAN S, ROBBINS

ASSISTANT PROFESSORS:
DATTA FAINTER FAUSTINI, FOLEY, GOLSHANI JORGENSEN, MADARASZ, MELLON, MUTCH, SEN, YEH

Computers have had a significant impact on our way of life. This impact may be even greater in the future as the full potential of modern com puting systems and techniques is realized Com puter science is concerned with the study, de sign, development, construction, and applica tion of modern machinery, computing tech niques and appropriate languages for general in formation processing, for scientific computat ion, for the recognition, storage, retrieval and processing of data of all kinds, and for the auto matic control and simulation of processes.

The curricula offered by the Department of Computer Science are designed to prepare the student to be a participant in this rapidly chang ing area of technology by presenting an in depth treatment of the fundamenta s of computer sci ence. The Department offers two undergraduate degrees. a B.S in Computer Science and a B.S.E in Computer Systems Engineering.

General Information

Admission. See pages 22 25, 41 42, 223 224, and 226 for nformation regarding requirements for admission, transfer, retention, disqualifica tion, and reinstatement

In addition, students who wish to be admit ted to full freshn an standing in the computer science program should present certain secon dary school units in addition to the minimum University entrance requirements. A total of 3 units is required in mathematics, including ad vanced algebra geometry and trigonometry. Stu dents who have omissions or deficiencies in sub ject matter preparation may be required to com plete additional university credit course work which may not be applied toward a computer science degree Courses usually taken to satisfy

omissions or deficiencies include one or more of the following: MAT 115 College Algebra and Trigonometry, MAT 117 College Algebra, and MAT 118 Plane Trigonometry.

Minimum Scholastic Requirements. In addition to an overall "C" (2.00) average, all computer science students are required to obtain a minimum grade of "C" (2.00) in all required CSC courses and those courses used as Computer Science electives.

Computer Science–B.S.

The Department of Computer Science offers a B.S. degree designed to give the student in depth knowledge in computer science. All students pursuing a Bachelor of Science degree will complete the General Studies requirements described below, an English proficiency requirement, the Computer Science Core courses, a senior level breadth requirement in the major, and a set of electives in the major. It should be noted that the B.S. degree requirements consistently exceed the University minimum requirements shown in parentheses for each category shown below.

	Semester Hours
English Proficiency	
6 semester hours	
ENG 101 First Year Composition	3
ENG 102 First Year Composition (or ENG 105 Advanced First Year Composition (3	3
(See page 224 for English exemption.	
General Studies	
*Humanities and Social Sciences**	
18 semester hours	
Humanities and Fine Arts	6-12
Social Sciences	12-6
NOTES:	
1 For the B.S. degree through the College of Liberal Arts and Sciences the requirement is 12 units in each of the two categories above, for a total of 24 units in Humanities and Social Sciences	
2 At least one upper division course must be included, two of the courses must be from the same department, and two departments or more must be represented in the total selection	
Literacy and Critical Inquiry	
(6 semester hours)	
One course chosen from the University approved list. In general this course will be sophomore level and will include a series of formal, graded, written *or spoken* assignments in composing critical discourse	3
ECE 400 Engineering Communications or ENG 301 Writing for Prof (3)	3-4
Numeracy	
(7 semester hours)	
† MAT 270 Calculus with Analytic Geometry I or MAT 290 Calculus I (5)	4
† CSC 355 Introduction to Theoretical Computer Science	3
Natural Science	
10 semester hours)	
▲ PHY 115 University Physics I	4
PHY 116 University Physics II	4
† PHY 117 University Physics Lab I	1
▲ PHY 118 University Physics Lab II	1
Total General Studies	41

NOTE One course in the area of Global Awareness* and one course in Historical Awareness* *must* appear in the final list of courses offered in the student's graduation program of study. These can be included in the Humanities and Fine Arts and and Social Sciences course selections.

* See General Studies booklet for list of acceptable courses.

▲ Graduation requirement for the baccalaureate degree.

Computer Science Core

		Semester Hours
CSC 100	Introduction to Computer Science I	3
CSC 101	Introduction to Computer Science II	3
MAT 271, 272	Calculus with Analytic Geometry II, III (or MAT 291 Calculus II (5))	8
MAT 243	Discrete Mathematical Structures	3
CSC 201	Application Languages Laboratory	1-2
CSC 202	Functional Languages Laboratory	2-1
CSC 220	Computer Organization and Assembly Language Programming	4
CSC 310	Data Structures	3
CSC 320	Computer Architecture and Organization	4
CSC 321	Computer Systems Architecture	4
CSC 340	Structure of Programming Languages	3
MAT 342	Linear Algebra	3
ECE 383	Probability and Statistics for Engineers (or STP 326 Intermediate Probability 3))	2
Total Computer Science Core		43

Computer Science Breadth Requirement All students will complete 15 hours of CSC 400 level courses CSC 483 excluded which have no other CSC 400 level course prerequisite Each such course serves as a foundation course in an area of specialization	15
Computer Science Electives All computer science students must complete 12 hours of courses chosen from the Computer Science Elective list and approved by their advisor	12
Unrestricted Electives *(For the B S degree through the College of Liberal Arts and Sciences, the unrestricted electives requirement is only 5 units*	11 5
Total Degree Requirements	128

Computer Science Program of Study
Typical Four-Year Sequence

Freshman Year

	Semester Hour
First Semester	
CSC 100 Intro. to C.S.I	3
ENG 101 First Year Composition	3
MAT 270 Calculus w Analy. Geom. I	4
General Studies Elective	4
Unrestricted Elective	2
Total	16
Second Semester	
CSC 101 Intro to C.S. II	3
ENG 102 First Year Composition	3
MAT 271 Calc w Analy. Geom II	4
General Studies Elective	3
Unrestricted Elective	3
Total	16

Sophomore Year

First Semester	
CSC 220 Computer Organization and Assembly Language Programming	4
CSC 310 Data Structures	3
MAT 272 Calc An. Geom III	4
PHY 115 University Physics	4
PHY 117 Univ Physics Lab	1
CSC 201 Application Language Programming Laboratory	1
Total	17
Second Semester	
CSC 201 Application Languages Programming Laboratory or CSC 202 Functional Languages Programming Laboratory	1
CSC 320 Computer Architecture and Organization	4
CSC 340 Structure Prog. Lang.	3
PHY 116 University Physics	4
PHY 118 Univ. Physics Lab.	1
MAT 243 Discrete Math Structures	3
Total	16

Junior Year

First Semester	
CSC 321 Computer Systems Architecture	4
CSC 355 Intro to Theoret Comp. Sci.	3
MAT 342 Linear Algebra	3
General Studies Elective	3
Unrestricted Elective	3
Total	16
Second Semester	
CSC 400 level Course requirement	6
Computer Science Electives	3
General Studies Elective	3
Unrestricted Elective	3
Total	15

Senior Year

First Semester	
CSC 400 level Course requirement	6
ECE 383 Prob. Stat. Engineering	2
Computer Science Electives	3
General Studies Elective	3
CSC 202 Functional Languages Programming Laboratory	1
Total	15
Second Semester	
CSC 400 level Course requirement	3
Computer Science Elective	6
General Studies Elective	3
ECE 400 Engineering Communications	3
Unrestricted Elective	2
Total	17

Computer Systems Engineering–B.S.E.

The Department of Computer Science administers the B.S.E. Special Programs curriculum with an emphasis in Computer Systems Engineering. The requirements for this degree are the same as those specified by the School of Engineering for the B.S.E. degree. The Computer Systems Engineering emphasis is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Computer Systems Engineering Emphasis

The Engineering Core requirements are the same as those specified by the School of Engineering for the B.S.E. degree, but with the additional stipulation that the following courses be used to meet the microcomputer, mathematics, and materials requirements of the core.

		Semester Hours
MAT 342	Linear Algebra	3
CSC 220	Computer Organization and Assembly Language Programming	4
ECE 352	Semiconductor Devices	3
ECE 383	Probability and Statistics for Engineers	2

In addition, the following courses are required:

CSC 100	Introduction to Computer Science I	3
CSC 101	Introduction to Computer Science II	3
CSC 310	Data Structures	3
CSC 320	Computer Architecture and Organization	4
CSC 321	Computer Systems Architecture	4
CSC 340	Structure of Programming Languages	3
CSC 421	Microcomputer Fundamentals	4
CSC 422	Microcomputer Systems Design I	4
CSC 423	Microcomputer Systems Design II	3
CSC 430	Elementary Concepts of Operating Systems	3
MAT 243	Discrete Mathematical Structures	3
Area of Emphasis (Technical Electives)		13

Technical electives are selected from an approved list in consultation with an advisor.

Summary of Degree Requirements*

General Studies	39
Engineering Core	44
Computer Systems Engineering Major	50
Departmental Core	37
Technical Electives	13
Total Degree Requirements*	133

* These requirements are in addition to the University English proficiency requirement.

COMPUTER SCIENCE

CSC 100 Introduction to Computer Science I. 3 F, S
Concepts of problem solving, algorithm design, structured programming fundamentals, algorithms and techniques, computer systems concepts. Prerequisite: MAT 115.

101 Introduction to Computer Science II. 3 F, S
Computer systems concepts, advanced programming techniques, file systems, concepts and applications, development of large reliable programming systems, team programming. Prerequisite: CSC 100. *[Satisfies General Studies Requirement: N3]*

180 Computer Literacy. 3 F
Introduction to general problem solving approaches using widely available software tools such as database packages, word processors, spreadsheets, and report generators. Non-majors only. *[Satisfies General Studies Requirement: N3]*

181 Applied Problem Solving with BASIC. 3 F, S
Introductory systematic definitions of problems, solutions formulations, and methods validations. Computer solutions using BASIC required for projects. Lecture and laboratory. Non-majors only. Prerequisite: MAT 117. *[Satisfies General Studies Requirement: N3]*

183 Applied Problem Solving with Fortran. (3 F, S
A human-oriented systems approach to problem definition, formulations, and solutions using FORTRAN. Computer solutions required for projects. Non-majors only. Prerequisite: MAT 115. *[Satisfies General Studies Requirement: N3]*

201 Application Languages Programming Laboratory. 1 F, S, SS
Each module introduces a programming language such as C, FORTRAN, PL/1, or COBOL, including programming exercises. May be repeated for different languages. Prerequisite: CSC 101 or CSC 300.

202 Functional Languages Programming Laboratory. 1 F, S, SS
Each module introduces a programming language such as APL, Lisp, or PROLOG, including programming exercises. May be repeated for different languages. Prerequisite: CSC 101 or CSC 300.

220 Computer Organization and Assembly Language Programming. 4) F, S, SS
Computer organization, assembly language programming, data representation, data structure and addressing modes, assemblers, linkers. Three lectures, 3 hours laboratory. Prerequisite: ECE 105 or CSC 100.

300 Concepts of Computer Science. 4 F, S, SS
Accelerated coverage of fundamental concepts of computer science using Pascal for students with a strong background in at least one other high level programming language. *[Satisfies General Studies Requirement: N3]*

304 Introduction to Cobol. 3 F
Fundamenta concepts of the Cobo programm ng lan guage Emphas s on structured programm ng Prerequ s te CSC 100

305 Introduction to PL/I. 3 S
Bas c concepts of the programm ng anguage PL.I Pre requ s te CSC 100

310 Data Structures. 3 F S
Representat on of fundamenta data types, data struc tures such as arrays stacks queues nked sts trees Data abstract on Dynam c storage a ocat on Prerequ s te· CSC 101

320 Computer Architecture and Organization. (4 F, S SS
Comb nat ona and sequent a og c des gn, reg ster bus eve CPU des gn, nstruct on nterpretat on and m cropro gramm ng O dev ces, nterfaces and programm ng Three lectures, 3 hours aboratory Prerequ s te CSC 220

321 Computer Systems Arch tecture. 4 F S
ntegrat on of DMA O and other process ng elements nto a s ng e system arch tecture Memory h erarchy and s bsystems Processor context and memory manage ment Three ectures 3 hours aboratory Prerequ s te CSC 320.

340 Structure of Programm ng Languages. 3 F, S
Forma spec f cat ons for anguage syntax and dynam c runt me env ronments ntroduct on to anguage trans a t on Prerequ s tes at east 1 un t of CSC 201 or 202, CSC 220 CSC 310

355 An Introduction to Theoret cal Computer Science. 3 F
An ntroduct on to computab ty comp ex ty and correct ness of a gor thms. Uses of a gebra og c and topo ogy n computer sc ence Theory of computat on Prerequ s te MAT 243 CSC 310 *[Sat sf es Genera Stud es Requ re ment. N3]*

383 Applied Fortran Programming. 3 F S
Advanced Fortran character hand ng mach ne depend ency, sort ng and merg ng p ott ng tapes d sks t me shar ng term na s and brary programs Lecture and aboratory. Non ma ors on y Prerequ s te CSC 183

400 Advanced Assembly Language Programm ng. 3 F
A semb y anguage treatment of recur on coroutines nterpret ve rout nes, mu t p e buffer ng of O dynam c storage a ocat on v ar ous data structures Prerequ s tes CSC 220 310

408 Introduct on to Scene Analysis. 3 A
mage ana ys s and format on ow eve process ng ob ect segmentat on texture ana ys s, stereo vis on mot on h gher eve nterpretat on act ve sens ng. Pre requ s te CSC 310 or approva of nstructor

410 Information Processing 3 A
Pr mary, secondary f e access organ zat ons Mu t attr bute ndex ng F e proce s ng ntroduct on to data base management and document retr eva Prerequ s te CSC 310 *[Sat sf es Genera Stud es Requ rement N3]*

412 Database Management. 3 S
ntroduct on to DBMS concepts Data mode s and an guages Re at ona database theory Database secu r ty ntegr ty and concurrency Prerequ s te CSC 310 *[Sat sf es General Stud es Requ rement N3]*

420 Comparison of Computer Architectures. 3 A
Evo ut on f ma n ne arch tectures nstruct on sets ad dress ng modes contro structures Character zat on of computer arch tectures Performance eva uat on Pre requ s te CSC 321 or CSC 423 *[Sat sf es General Stud ies Requ rement N3]*

421 Microcomputer Fundamentals. 4 F S
Hardware, oftware and assemb y anguage program m ng of a m crocomputer system are used as ven c es to teach fundamenta s of d g ta system des gn Lecture and aboratory Prerequ s te CSC 320

422 Microcomputer Systems Design I. 4 F S
Des gn of m crocomputer systems us ng contemporary og c and m crocomputer system components Requ res assemb y anguage programm ng Corequ s te CSC 321 or CSC 421

423 Microcomputer Systems Design II. 3 S
Informat on and techn ques presented n CSC 422 are used to deve op the hardware des gn of a mu t proces sor mu t programm ng m croprocessor based system Prerequ te CSC 422

428 Computer-Aided Processes. 3 A
Hardware and software cons derat ons for computerized manufactur ng systems Spec f c concentrat on on auto mat c nspect on, numerica contro robotics and inte grated manufactur ng systems Prerequ s te CSC 321 or CSC 422 *[Sat sf es Genera Stud es Requirement N3]*

430 Elementary Concepts of Operating Systems. 3) F, S
Des gn and mp ementat on of superv sory system com ponents nput/output methods, process management mu t programm ng and mu t process ng systems storage management f e systems Prerequ s tes CSC 310 and CSC 321 or CSC 42ᵥ

438 Systems Programming. 3 A
Des gn and mp ementat on of systems programs text ed tors f e ut t es, mon tors assemb ers re ocat ng nk ng oaders I O hand ers, schedu ers etc Prerequ s te approva of n tructor

440 Compiler Construction I. 3 F
ntroduct on to programm ng anguage mp ementat on mp ementat on strateg es comp at on nterpretat on, trans at on Ma or comp at on phases. ex ca ana ys s semant c ana ys s opt m zat on code generat on Pre requ s te CSC 340

450 Analysis of Algorithms. 3 F
Des gn and ana ys s of computer a gor thms us ng ana yt ca and emp nca methods comp ex ty measures des gn methodo og es survey of mportant a gor thms Pre requ s te· CSC 310 *[Sat sf es Genera Stud es Requ re ment. N3]*

451 Switching Theory. 3 N
Comb nat ona og c funct ona decompos t on NAND NOR c rcu t ana ys s and synthes s. og c arrays, tera t ve networks fau t d agnos s sequent a c rcu t represen tat on memory dev ces Prerequ s te. CSC 320

457 Theory of Formal Languages. 3 A
Theory of grammar, methods of syntact c ana ys s and spec f cat on, types of art f c a anguages, re at onsh p be tween forma anguages and automata Prerequ s te: MAT 243 Equ va e t to MAT 401 *Sat sf es General Stud es Requ rement. N3]*

460 Software Project Management and Development I. 3 F
Software fe cyc e ana ys s programm ng teams pro ect documentat on and m estones, requ rements and spec f cat ons, des gn test ng and ma ntenance too s and tech n ques Prerequ s te sen or stand ng

470 Computer Graphics. 3 S
D sp ay dev ces, data structures transformat ons nter act ve graph cs three d mens ona graph cs h dden ne

prob em Prerequ s tes CSC 310, MAT 342 *[Sat sf es Genera Stud es Requ rement N3]*

471 Survey of Art ficial Intelligence. 3 F S
ntroduct on to heur st c search games know edge repre sentat on techn ques forma and fuzzy og cs natura anguage under tand ng, expert svstems and computer vison Prerequ s te CSC 310

473 Non-Procedural Programming Languages. 3 S
Funct ona and og c programm ng us ng anguages ke Luc d and Pro og Typ ca app cat ons wou d be a Screen Ed tor and an Expert System Prerequ s te CSC 355. *[Sat sf es Genera Stud es Requ rement N3]*

474 Modeling for Computer Simulation 3 A
Mathemat ca descript on of genera dynam c systems d screte event d screte t me. and cont nuous n forms su tab e for computer mp ementat on Prerequ s tes· CSC 310 and ECE 383 *[Sat sf es Genera Stud es Requ re ment· N3]*

475 Simulation Theory and Languages. 3 A
Stat st ca background for s mu at on Mode construct on and va dat on ana ys s of resu ts Languages wh ch support simu at on Prerequ s tes CSC 474 *[Sat sf es Genera Stud e Requ rement N3]*

483 Fortran Programming for Graduate Research. 3 F, S
Introductory course for graduate research comput ng Subrout nes program brar es, mathemat ca and stat s t ca app cat ons batch and t me shar ng env ronments data f es, p ott ng Two ecture 2 hours aboratory Non ma ors on y

508 Digital Image Processing I. 3 F
D g ta mage fundamenta s mage transforms, mage en hancement and restorat on techn ques mage encod ng and segmentat on method Prerequ te EEE 303 or ap prova of instructor.

509 Digital Image Process ng II. 3 S
Advanced ana yt ca techn ques app ed to d g ta mage process ng computer v s on and app cat ons nc ud ng robot cs Prerequ s te CSC 508

512 Database Systems Design. 3 F
Mu t eve genera zed DBMS arch tectures and des gn D str buted database transparent fun t ona t es, query process ng update synchron zat on and concurrency contro Prerequ s te. CSC 410 CSC 412

513 Database Machines. 3 N
Nonnumer c proces ng Von Neumann bott enecks. Para e and assoc at ve processors Database ma ch nes survey theory software and performance Ad vanced top cs n databa e arch tect re Prerequ s tes CSC 321, CSC 410 or 412

515 Information Storage and Retrieval. 3 N
Concepts f nformat on torage and retneva theory ap p cat ons and case st d es P erequ s te CSC 410

516 Digital Testing and Re iabil ty. 3 A
Fau t mode ng te t generat on and s mu at on for com b nat ona and equent a c rcu t memory test ng se f check ng eg c fau t tc erent eg re ab ty ana ys s Prerequ s te CSC 321 or CSC 423 CSC 451 or CSC 355

517 Digita Design Automat on. 3 N
Typ ca computer a ded des gn ystem S mu at on tech n ques test generat on m croprogrammed contro des gn a ds spec f cat n neet ana ys App cat ons Prerequ tes C C 520 or 524

518 Hardware Design Languages. 3 N
Introduct on to hardware des gn anguages HDL HDL descr pt on of ntegrated c rcu t components and sys tems HDL descr pt on of computer organ zat ons Pre requ s te CSC 321

519 Minicomputers. 4 N
O gan zat on f m n computers, w th "hands on empha s s of one part cu ar des gn Three ectures. 3 hours ab oratory Prerequ s te CSC 321 or CSC 423

520 Computer Architecture II. 3 A
Theoret ca tructure of computers and computat ons S MD and MIMD systems performance tradeoffs, mem· ory h erarch es, nterconnect on networks Prerequ s te CSC 321 or CSC 423

521 Microprocessor Applications. 4 S
M croprocessor techno ogy and ts app cat on to the de s gn of pract ca d g ta systems Hardware, assemb y anguage programm ng and nterfac ng of m croproces sor based systems Lecture and aboratory. Prerequ s te CSC 421

522 Microprogramming. (3 A
Theory pract ce and app cat on of m croprogramm ng Prerequ s te CSC 321 or CSC 423

523 Microcomputer Systems Software. 3 F
Deve op ng system software for a mu t processor, mu t programm ng m croprocessor based system us ng n format on and techn ques presented n CSC 421 422 Prerequ s te: CSC 422.

524 Multiprogramming Architectures. 3 N
Ma n ne computer arch tectures, mu t programm ng t meshar ng, mu t process ng, hardware software trade offs, memory h erarch es nput/ output structures com mun cat ons. Prerequ s te CSC 321 or 423

526 Parallel Processing. 3 N
Rea and apparent concurrency Hardware organ zat on of mu t processors, mu t ple computer systems, sc ent f c attached processors and other para le systems Prereq u s te CSC 321 or 423

527 High Level Language Machines. 3 N
Advantages and d sadvantages of h gh leve anguage mach nes Languages su tab ity M croprogramm ng and nterpret ve execut on O operat ons Examp es Prereq u s te CSC 520 or CSC 524

529 Bit Slice Processor Design. 4 N
Hardware and oftware des gn of a b t s ce computer w th wr tab e ontro store Three ectures, 3 hours abo ratory. Prerequ s te CSC 321 or CSC 423.

530 Operating System Case Study. 3 F
Organ zat on of sma operat ng system w th emphas s on the Un x operat ng system on a aboratory computer Three ectures Prerequ s te CSC 430.

531 D stributed Operating Systems. 3 N
nterprocess commun cat ons concurre cy contro f e system des gn, programm ng language constructs ar ch tecture and network cons derat ons n d stributed oper at ng systems Case stud es Prerequ site· CSC 530 or consent of nstructor

532 Security in Computing Systems. 3 A
n depth deve opment of the concepts of computer secu r ty mpact on computer hardware and oftware and on user Prerequ s te CSC 430

533 D stributed Computer Systems. 3 N
Top cs n d str buted computer systems Topo ogy com· mun cat on synchron zat on and recovery, concurrency control dead ock task a ocat on f e systems case stud es Prerequ s tes CSC 410, 430

534 Computer Networks. 3 N
Computer Network protoco s hardware e ements and oftware a gor thms. Error hand ng rout ng f ow contro

host to host commun cat on oca area networks Prereq u s te CSC 320

535 Performance Eva uation. 3 S
Top cs n computer system measurement and eva ua t on hardware software mon tor , work oad character za t on program behav or adapt ve schedu ng s mu at on mode s measurement nterpretat on Prerequ s te CSC 430

536 Theory of Operating Systems. 3 F
Forma meth ds of contro f concurre t pr cesses process s hedu ng memory and aux ary t rage ma agement Network operat ng systems Operat ng system des gn Prerequ s te CSC 430

540 Compiler Construction II. 3 S
F rma pars ng strateg es opt m zat on tech que ode generat on, extens b ty and transportab ty cons dera t ons recent deve opments Prerequ s te CSC 440

545 Programming Language Des gn. 3 N
Language constructs extens b ty and abstract o s runt me upport anguage des gn process Prerequ s te CSC 440

550 Combinator al Algorithms and Intractability. 3 N
Comb natona a gor thms, ondete m n st c a gor thms c asses P and NP NP hard a d NP comp ete prob em ntractab ty Des g techn ques for fast comb nator a a gor thms Prerequ s te CSC 450

554 Advanced Switching Theory. 3 S
Latt ces Boo ean a gebras post a gebras Boo ea d ffer ent a ca u us, mu t va ued og c fuzzy og c, f n te state mach nes Prerequ s te CSC 451

555 Automata Theory. 3 N
F n te state mach nes pushdown automata near bounded automata tuning mach nes reg ster mach e rams rasps re at onsh ps to computab ty forma an guages Prerequ s te CSC 355

560 Software Project Management and Development II. 3 S
Software qua ty measures Software re ab ty and ma n ta nab ty theory Software conf gurat on management. Ana ys s of requ rement and spec f cat on techn que and des gn methodo og es Prerequ s te CSC 460.

563 Software Requ'rements and Specification 3 F S, SS
In depth study of the def n tion stage of software deve opment nc udes software requ rements software spec f cat on, rap d prototyp ng Prerequ s te CSC 460

564 Software Design. 3 S
n depth study of software des gn nc ud ng theory and pract ce Inc udes arch tectura and a gor thm c des gn methodo ogy and too s Prerequ s te CSC 460.

565 Software Reliability. 3) A
Software re ab ty mode s and measures, program test ng theory, fau t to erant software, program verif cat on re ab e software des gn and deve opment regress on test ng Prerequ s te CSC 460

566 Software Maintenance. 3 A
Survey of software ma ntenance prob ems too s, metr cs and management approaches mpl cat ons of software ma ntenance on software deve opment Prerequ s te CSC 460.

570 Advanced Computer Graphics II. 3 A
H dden surface a gorithms ght ng mode s and shad ng techn ques User nterface des gn An mat on tech n ques Fracta s and stochast c mode s Raster a go r thms Prerequ s te CSC 470

571 Artificial Intelligence. 3 S
Def n t ons of nte gence, compute pr b em so v ng game p ay ng pattern re ogn t o theorem prov ng se mant c nformat on pro ess ng evo ut onary systems eu st c programm ng. Pre equ s te graduate stand ng

572 Pattern Recognition. 3 N
Pattern ass f cat on by d stance fu ct ons and ke hood f nct ons determ n t c and stat t ca approaches to t a nab e pattern c a s f ers synta t c pattern recogn t on Prerequ s te STP 326 or ECE 383

573 Advanced Computer Graphics II. 3 A
Comp ter a ded geo etr c des gn nteract ve and sur face ep esentat on and de gn Scattered data tech ques CAD CAM Construct ve so d geometry and mode ng Prerequ s te CSC 470.

See page 38 for spec al courses which may be offered by this academ ic unit

Division of Construction

Vernon L. Hastings, M S I.E., Director

PROFESSORS:
HASTINGS (COB 268
ASSOCIATE PROFESSORS:
BADGER BURTON, CUOMO, MULLIGAN, ROUNDS, WEBER
ASSISTANT PROFESSORS:
SH NG, W LSON
PROFESSORS EMERITi:
MICHELS, PETERMAN, SELLECK, WARD, WOODING

Purpose

The primary purpose of the Division of Con struction is to provide students the opportunity to obtain a quality education in construction and qualify them direct y for positions of lead ership and responsibil ty in the construction in dustry

Every effort s made to provide a well inte grated program which will give the student pro ficiency for a professional construction career, and also develop ideals, judgment, character and breadth of view necessary for a successful con structor as well as significant cultural atti tudes. The Division is a member of the Associat ed Schools of Construction, an organization dedicated to the development and advancement of construction education. The Construction pro gram is accredited by the American Council for Construction Education ACCE

General Information

Admission. See pages 22 25, 41 42, 223 224, and 226 for information regarding requirements

for admission transfer retention disqualification, and reinstatement

In addition, the Division of Construction requires secondary school units totalling 3 1/2 units in mathematics, including geometry, advanced algebra and trigonometry. Students having omissions or deficiencies in subject matter preparation will be required to complete additional university credit course work which will not be applied toward a construction degree. These may include MAT 115 College Algebra and Trigonometry, or MAT 117 College Algebra, and MAT 118 Plane Trigonometry and PHY 101 Introduction to Physics.

The freshman and sophomore programs of study are designed to facilitate transfer for junior and community college students or Associate Degree graduates. Vocational and craft oriented courses taught at community colleges will not be accepted for credit towards a bachelor's degree in construction.

Students shall complete the following basic requirements prior to registering for advanced courses:

(1) All first semester first year courses and the University English requirement (see page 34) must be completed by the time the student has accumulated 48 semester hours of program requirements.

(2) All second semester, first year courses must be completed by the time the student has completed 64 semester hours of program requirements. Transfer students will be given a one semester waiver.

Any student not making satisfactory progress will be permitted to register for only those courses required to correct any deficiencies.

Further information may be obtained from the Division of Construction, College of Engineering and Applied Sciences, Arizona State University, Tempe, Arizona 85287

Student Organizations. The Division has a chapter of Sigma Lambda Chi, a national honor society that recognizes high academic achievement in accepted construction programs. The Division is also host to student chapters of the Associated General Contractors of America (AGC) and the Associated Builders and Contractors (ABC).

Scholarships. Apart from those given by the University generally, a number of scholarships from the construction industry are awarded to students registered in the construction program. They are awarded on the basis of academic achievement and participation in activities of the construction program.

Requirements for Graduation. In order to qualify for graduation from the Division of Construction a student must have an overall grade point average of at least 2.00 in each of the following areas: mathematics, science, English and construction courses.

Construction–B.S.

Students seeking a Bachelor of Science degree in construction must satisfactorily complete a curriculum of not less than 132 semester hours. Construction careers are so broadly diversified that no single curriculum will fit the student for universal entry into all fields. As an example, heavy construction contractors usually place more emphasis on technical and engineering science skills than do residential contractors/developers, who usually prefer a greater depth of knowledge in management and urban science. To ensure a balanced understanding of the technical, professional and philosophical standards which distinguish modern day constructors, advisory groups representing leading associations of contractors and builders provide counsel in curriculum development. Construction has a common core of engineering science, management and behavioral courses on which students may build defined options to suit individual backgrounds, aptitudes and objectives. These options are not absolute but generally match major divisions of the construction industry.

The Division offers four options: General Building, Heavy, Military, and Special Construction. Each is arranged to accent requisite technical skills and develop management, leadership and competitive qualities in the student. Prescribed are a combination of general studies, technical courses basic to engineering and construction, and a broad range of applied management subjects fundamental to the business of construction contracting. The military construction option compliments the heavy construction option, but permits the use of 18 semester hours of ROTC credits for appropriate technical electives and management type courses.

Students must be educated to survive heavy demands for explicit technical performance during their early career years, and they also must understand the functions of their employers and the industry they serve. The students should acquire the motivation for continuing their education which, when combined with experience, will qualify them for top positions of leadership in the construction industry.

Students in all options will be required to complete a construction core of science based engineering, construction and management courses. Since the semester hours vary for some alternative courses in the core, any differences in credits will be made up in the selected fields of specialization to achieve a minimum of 132 semester hours.

English Proficiency

		Semester Hours
(6 semester hours)		
ENG 101	First Year Composition	3
ENG 102	First Year Composition	3
or ENG 105	Advanced First Year Composition (Must pass exemption examination see placement examinations for proficiency, page 224)	

General Studies Requirements

(36 semester hours

*Literacy and Critical Inquiry**

(6 semester hours minimum)

COM 225	Public Speaking	3
One upper division course involving critical writing in a specialized discipline		3

Numeracy

(6 semester hours minimum)

† MAT 270	Calculus I	4
† ECE 106	Introduction to Computer Aided Engineering	3

*Humanities and Social Sciences**

(15 semester hours minimum

(At least one course must be of upper division level; two courses must be from same department, and two departments or more must be represented in total selection

Humanities and Fine Arts		9 to 6
One course must be an approved Architecture (APH* course		
Social Sciences		6 to 9
† ECN 111	Macroeconomic Principles (3)	
† ECN 112	Microeconomic Principles (3)	

Natural Sciences

(8 semester hours minimum)

† PHY 111	General Physics	3
† PHY 112	General Physics	3
† PHY 113	General Physics Laboratory	1
† PHY 114	General Physics Laboratory	

Total General Studies 36

NOTE: One course in the area of Global Awareness* and one course in Historical Awareness* *must* appear in the final list of courses offered in the student's graduation program of study If desired, these can be included in the Humanities and Fine Arts and Social Sciences course selections

* See General Studies booklet for acceptable courses in these categories

† Required for graduation

Construction Core Requirements

(73 semester hours)

ACC 211	Elementary Accounting	3
ECE 105	Intro to Languages of Engineering	3
ENG 301	Writing for the Professionals	3
GNB 306	Business Law	3
STP 226	Elements of Statistics	3
CON 221	Static Mechanics	3
CON 243	Construction Materials and Spec.	2
CON 244	Construction Graphics	2
CON 251	Microcomputer Applications for Constructors	3
CON 252	Construction Equipment	2
CON 323	Strength of Materials	3
CON 331	Construction Safety	2
CON 341	Surveying	3
CON 345	Mechanical Systems	3
CON 366	Construction Methods	3
CON 374	Systems Management for Construction	2
CON 383	Construction Estimating	3
CON 389	Construction Cost Accounting and Control	3
CON 395	Construction Planning and Scheduling	3
CON 424	Structural Design	3
CON 453	Construction Labor Management	3
CON 463	Foundations and Concrete Structures	3
CON 496	Construction Contract Administration	3
CEE 310	Construction Materials Testing	3
CEE 380	Hydraulics and Hydrology	3
CEE 450	Soil Mechanics in Construction	3

Advisor approved alternates/transfer credits for courses listed above may vary from the total required semester hours indicated. Such variances shall not reduce the minimum of 132 semester hours required for the degree.

Construction Options

General Building Construction
Heavy Construction
Military Construction
Specialty Construction

The course work for the first two years is the same for all options except Military Construction. The specific lower division requirements are shown below

	Semester Hours
First Semester	
ENG 101 First Year Composition	3
PHY 111 113 Gen Physics	4
MAT 270 Calculus	4
ECE 105 Intro to Languages of Engineering	3
Humanities or Military Science* Elective	3
Total	17
Second Semester	
ENG 102 First Year Composition	3
APH Elective	2
PHY 112 114 Gen Physics	4
CON 243 Intro to Construction Materials	3
CON 244 Construction Graphics	2
Science or Military Science Elective*	4
Total	18
Third Semester	
ECN 111 Macroeconomic Principles	3
ECE 106 Intro to Computer Aided Engineering	3
ACC 211 Elementary Accounting	3
CON 221 Statics	3
COM 225 Public Speaking	3
CON 252 Construction Equipment	2
Total	17
Fourth Semester	
ECN 112 Microeconomic Principles	3
STP 226 Elements of Statistics	3
CON 251 Microcomputer Applications for Constructors	3
CON 323 Strength of Materials	3
Elective	4
Total	6

* Military Science courses may be used only by students in the Military Construction option

One of the following four options is to be selected by each student

Option in General Building Construction

The general building option provides a foundation for students who wish to follow careers as managers or owners of firms engaged in the construction of residential, commercial and institutional structures While conventional building is still a major factor in this field, modern educational focus is on building systems required for the mass development and production of large scale projects. General construction is treated as an integrated process from conception through delivery of completed facilities to users.

Requirements (17 semester hours)

REA 251 Real Estate Principles	3
REA 411 Real Estate Law	3
CON 472 Land Development Feasibility	2
CON 483 Advanced Building Estimating	3
Approved technical electives	6

Option in Heavy Construction

The heavy construction option prepares students for careers with constructors. Typical projects in which they are involved are highways, railroads, airports, power plants, rapid transit systems, process plants, harbor and waterfront facilities, pipelines, dams, tunnels, bridges, canals, sewerage and water works, mass earth work, and other heavy public works.

Requirements (17 semester hours

GNB 307 Business Law II	3
CON 344 Route Surveying	3
CON 482 Cost Engineering	2
CON 486 Heavy Construction Estimating	3
Approved technical electives	6

Option in Military Construction

The military construction option is open only to students in the four year ROTC program leading to a commission in the U S Army It prepares students for careers in either the military or engineering/highway construction field

Requirements: (18 semester hours)

CON 344 Route Surveying	3
CON 486 Heavy Estimating	3
MIS 301 Military Science	3
MIS 302 Military Science	3
MIS 401 Military Science	3
MIS 402 Military Science	3

Option in Specialty Construction

Specialty construction includes areas such as mechanical, electrical, air conditioning, roofing, concrete, commercial and industrial refrigeration and fire protection systems This option is also intended to provide a program for those students interested in such areas as utility contracting quarrying, and land development or other specialty areas. Upon application by the student and in consultation with an advisor a specific program of courses to be added to the General Studies and the core sequence may be developed subject to courses offered within the University and the approval of the Division director

Requirements (17 semester hours)

CON 455	Construction Office Methods	3
CON 468	Conceptual and Electrical Estimating	3
CON 482	Cost Engineering	2
Approved technical electives		9

CONSTRUCTION

CON 221 Static Mechanics 3 F S
Force systems acting on structure Forces moments equilibrium, centroids trusses beams cables frames machines friction connection properties masses Both SI and US units of measurements Field trips Prerequisites MAT 270 PHY 111 113 Equivalent to ETC 211

243 Introduction to Construction Materials and Specifications. 3 F
Construction materials and components Emphasizing materials description usages and incorporation into the structure Laboratory and field trips Prerequisite sophomore standing

244 Construction Graphics. 1 F, S
Sketching and architectural drafting of building materials and systems. Computer graphics applications for construction Field trips Lecture and four hours laboratory Prerequisite ECE 106 or equivalent

251 Microcomputer Applications for Constructors 3) F S
Application of the microcomputer as a problem solving tool for the constructor Characteristics of microcomputer hardware and operating systems Use of spreadsheets statistical package and database management Prerequisites ECE 106 STP 226 or equivalent

252 Construction Equipment. 2 F S
Characteristics capabilities limitations and employment of general building and heavy construction equipment Fleet operations maintenance programs Field trips Prerequisite sophomore standing

273 Electrical Construction Fundamentals. 4 F S
Circuits and machinery Power transmission and distribution with emphasis on secondary distribution systems Measurements and instrumentation Field trip Three lectures, 3 hours laboratory Prerequisites PHY 112 114, MAT 270

323 Strength of Materials. 3 F S
Analysis of strength and rigidity of structural members under static applied forces Stress strain shear moment deflections combined stresses connections moment distribution Both US and SI units of measurement Field trips Prerequisite CON 221

331 Construction Safety. 2 F S
Protective equipment and devices inspection procedures and record keeping OSHA requirements for construction Hazard analysis and ability assignment Economics of accident protection Field trips Prerequisite STP 226 CON 244 251

341 Surveying. 3 F, S
Theory and field work in construction and and surveys Two lectures 3 hours laboratory. Prerequisite MAT 118

344 Route Surveying. 3 F
Simple, compound and transition curves reconnaissance, preliminary and location surveys Calculation of earthwork Dimensional control for construction projects Two lectures 3 hours laboratory Prerequisite CON 341

345 Mechanical Systems. 3 F S
Heating and cooling systems for building Sanitary and water piping layout and simple design Computer aided calculations Field trips Four hours lecture and laboratory Prerequisite CON 243 251 PHY 111 113 Corequisite CEE 38

366 Construction Methods. 3 F S
Analysis of construction projects for the determination of the most appropriate and economic methods Job organization preplanning and site layout Field trips Four hours lecture and laboratory Prerequisite CON 243 244 252 or equivalent

374 Systems Management for Construction. 2 F S
Organization and management theory applied to the construction process Conceptual foundation industry environment process and management Leadership functions Prerequisite junior standing or approval of instructor

383 Construction Estimating. 3 F S
Methods and techniques used in estimating construction costs Standard approach to quantity surveys emphasized Practice in take off costing and fabricated preparation Microcomputer usage for semester project Four hours lecture and project workshop Prerequisites CON 243 244 251 Construction majors only or approval of instructor

389 Construction Cost Accounting and Control. 3 F, S
Nature of construction cost Depreciation and tax theory variable equipment cost Cash flow theory, investment models profitability and analysis Computer applications Funding sources and arrangements Bidder's insurance Prerequisites ACC 211 CON 251 required, CON 383 *[Satisfies General Studies Requirement N3]*

395 Construction Planning and Scheduling. 3 F S
Various network methods of project scheduling such as AOA and AON using Pert, manual bar chart linear balance and VPM techniques Microcomputers used for scheduling resource allocation and time cost analysis Prerequisites CON 251 383 389 *[Satisfies General Studies Requirement N3]*

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 trip Prerequisite CON 323

453 Construction Labor Management. 3 F, S
Labor and management history union and open shop organization of building and construction workers apprentice laws and government regulations grievance economic power jurisdictional disputes and grievance procedures Four hours lecture and laboratory Prerequisites ECN 112 CON 374 *[Satisfies General Studies Requirement H]*

455 Construction Office Methods. 3 S
Administrative systems and procedures for the construction company office including methods improvement and work simplification office layout business forms and design office manuals Prerequisites ENG 301 CON 389

463 Foundations and Concrete Structures. 3 F S
Subsurface construction theory and practice for foundations of building and engineered facilities Concrete form design for foundations and structural frames Underpinning piling dry and wet excavating dewatering cofferdams, caissons Field trips Three lectures 1 recitation Prerequisites CON 323 424 CEE 450

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 Land Development Feasibility. (2) S
Economic location theory. Analysis of the profitability of land developments. Field trips. Microcomputer applications in the analysis process. Prerequisites: CON 251, 383, 389.

477 Residential Construction. (3) F
Study of design concerns, construction material and contract administration problems related to residential construction. Owner and contractor relationship. Field trips. Prerequisite: junior standing or instructor approval.

482 Cost Engineering. (2) S
The time-value of money. Comparison of alternative, depreciation methods and impact on taxes, replacement and break-even analysis. Construction financing and analysis. Prerequisite: CON 389.

483 Advanced Building Estimating. (3) F, S
Concepts of pricing and markup, development of historic costs, life cycle costing, change order and conceptual estimating, emphasizing microcomputer methods. Prerequisites: CON 251, 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. Prerequisites: CON 383, CEE 344, or approval of instructor.

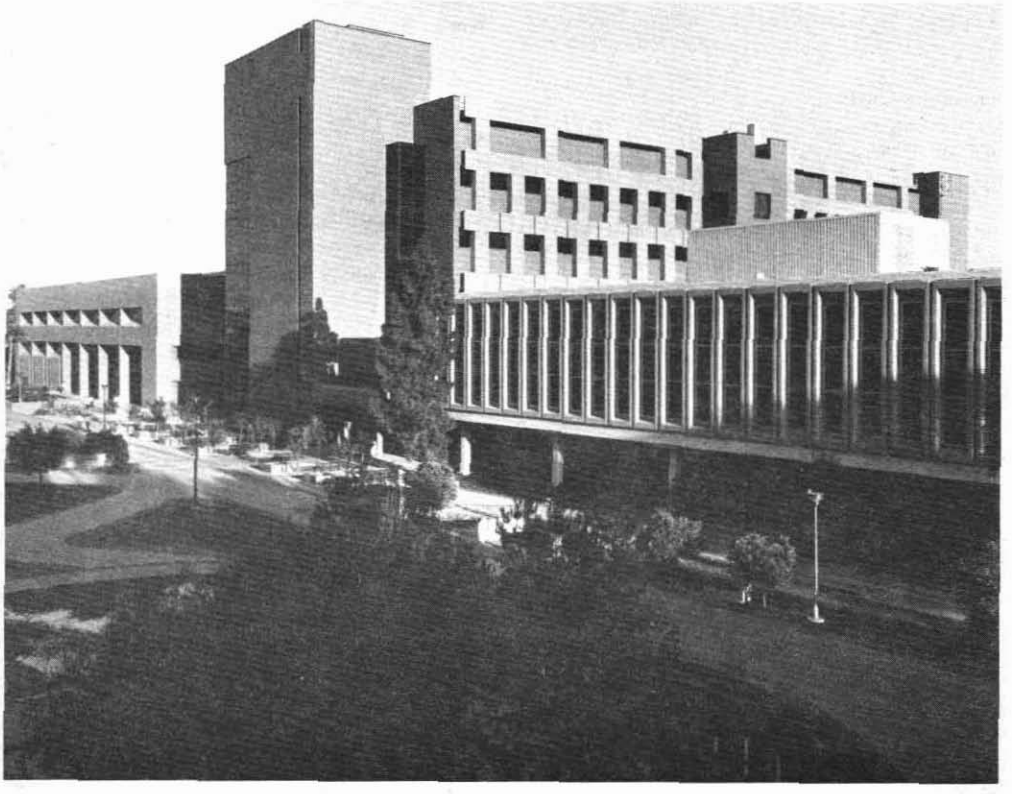
496 Construction Contract Administration. (3) F, S
Case studies. Effects of organization on construction contract operations. Essentials of construction law. Prime contracts, sub-contracts, joint venture and consortium agreements, and change orders. Documentation. Claims, arbitration, and litigation. Quality control requirements. Bonding, insurance, indemnification procedures. Ethical practice, licensing, codes, etc. Field trips. Prerequisites: senior standing; ENG 301 or equivalent; CON 374, or approval of instructor.

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. Prerequisites: ECN 500; CON 496 or approval of instructor.

551 Facilities Operation and Maintenance. (3) S
Analysis of maintenance work. Structure of the maintenance work and organization. Contract maintenance and force account economics. Maintenance control and supervision of operations. Field trips. Prerequisites: CON 389, CON 395 or approval of instructor.

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.

See page 38 for special courses which may be offered by this academic unit.



School of Engineering

C. R. Haden, Ph.D., Director

Purpose

A large percentage of all engineering degree holders are found in leadership positions in a wide variety of industrial settings. Although an education in engineering is generally considered to be one of the best of technical educations, it also provides an opportunity for the development of many additional activities, aptitudes and interests, including moral, ethical, and professional concepts. In this era of rapid technological change, an engineering education will serve our society well as a truly liberal education. Society's needs in the decades ahead call for engineering contributions on a scale not previously experienced. The well-being of our civilization as we know it may well depend upon how effectively this resource is developed.

Students studying engineering at Arizona State University are expected to acquire a thorough understanding of the fundamentals of mathematics and the sciences and their applications to the various engineering fields. The program is designed to develop a balance between science and engineering and an understanding of the economic and social consequences of engineering activity. The goals include the promotion of the general welfare of the engineering profession.

The courses offered are designed to meet the needs of the following students: (1) those who wish to obtain a degree in engineering and who plan careers in which science, mathematics, and analytical methods are of special value; (2) those who wish to do graduate work in engineering; (3) those who wish one or two years of training in mathematics, applied science, and engineering in preparation for a technical career; (4) those who desire pre-engineering for the purpose of deciding which program to undertake or those who desire to transfer to another college or university; (5) those who wish to take certain electives in engineering while pursuing another program in the University.

General Information

Admission

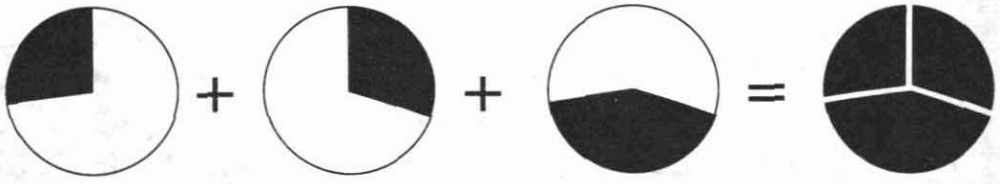
See pages 22-25, 41-42, 223-224 and 226 for information regarding requirements for admission, transfer, retention, disqualification, and reinstatement.

In addition, beginning college students who are beginning their initial college work in the School of Engineering should present certain secondary school units in addition to the minimum University requirements. A total of 3 units is required in mathematics. Included must be: college algebra, geometry and trigonometry. The laboratory sciences chosen must include at least one unit in physics and one unit in chemistry. Calculus and biology are recommended.

Students who have omissions or deficiencies in subject matter preparation may be required to complete additional university credit course work which may not be applied toward an engineering degree. One or more of the courses–MAT 115 College Algebra and Trigonometry, PHY 111, 113 College Physics (or PHY 101 or PHY 105), ENG 101 Freshman Composition*, CHM 113 General Chemistry–are taken to satisfy omissions or deficiencies.

Requirements for Graduation. In order to qualify for graduation from the School of Engineering a student must have a grade point average of at least 2.00 for the 52 semester hours of required courses in the major field.

* See statement on Placement Examinations for Proficiency–English, page 34.



General Studies
39 sem. hrs.

Engineering Core
42 sem. hrs.

Major (including Area of Emphasis)
52 sem. hrs.

BSE Degree
133 sem. hrs.

Programs of Study. The composition of the Bachelor of Science (B.S.) and Bachelor of Science in Engineering (B.S.E.) degrees is made up of three parts: University General Studies, an Engineering Core, and a major. This combination is illustrated in the chart shown on the previous page.

The General Studies satisfy a University requirement and include literacy and critical inquiry, humanities and social sciences, and natural sciences (see pages 43-46.) These courses comprise approximately 29 percent of the degree program.

The Engineering Core is a specific and organized body of knowledge that will serve as a foundation to engineering and for further specialized studies in a particular engineering major. These courses comprise approximately 32 percent of the degree program.

The majors available are of two types: (1) those associated with a particular department within the School of Engineering (for example, electrical engineering, civil engineering, etc.), and (2) those offered as Special and Interdisciplinary Studies (for example, Nuclear Sciences, Premedical Engineering, etc.). In general, the departmental curricula are extensions beyond the Engineering Core and cover a wide variety of subject areas within each field. In each case several courses are set aside for the student's use as technical electives to support an area of emphasis.

For convenience, the departments are designated as CEE (Civil Engineering), CHE (Chemical and Bio Engineering), EEE (Electrical and Computer Engineering), IEE (Industrial and Management Systems Engineering), and MAE (Mechanical and Aerospace Engineering). The majors of Bioengineering and Engineering Special and Interdisciplinary Studies are administered by the Office of the Dean and are designed for those students whose educational objectives require more intensity of concentration or flexibility than is possible in the traditional departmental fields (see pages 269-276).

The first two years of study are concerned primarily with the General Studies and the Engineering Core, with more time being spent with General Studies. The final two years of study are concerned with the Engineering Core and the major, with a considerable part of the time being spent with the major. This arrangement can be illustrated by the chart below.

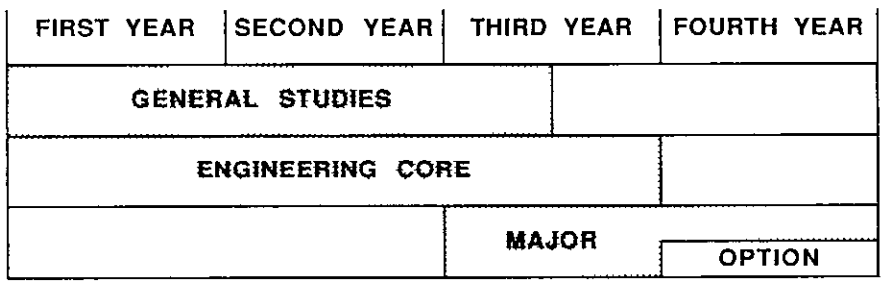
The sequential arrangement of all course work for the B.S. and B.S.E. degrees into the three categories shown below is especially helpful to the beginning student. The semester by semester selection of courses will vary from one field to another. An example of a typical freshman engineering schedule is shown below.

Typical Freshman Year

	Semester Hours
Fall Semester	
CHM 114 or CHM 116 General Chemistry	4
MAT 290[2] Calculus I	5
ECE 105[3] Intro to Languages of Engineering	3
Social Sciences or Humanities (or ENG 101)	5
Total	17
Spring Semester	
ECE 106 Intro to Computer Aided Engineering	3
MAT 291[4] Calculus II	5
PHY 115[5] University Physics	4
PHY 117 Univ. Physics Lab	1
ENG 102[6] or ENG 105 English	3
Total	16

Chemical Engineering, Bioengineering, and Premedical Engineering students will take CHM 113.

[2] Some students may desire a math review and take MAT 115 Algebra and Trigonometry, others may desire a less intense calculus sequence and take MAT 270.



[3] Students with no computer background should enroll in CSC 180 Computers and Society before enrolling in ECE 105.

[4] Students who elect to take MAT 270 must also complete MAT 271 and 272 totaling 12 semester hours However, only 10 semester hours may be used to satisfy graduation requirements.

[5] Students who have not completed one unit of physics in high school should complete PHY 111 and 113 (or PHY 105 or PHY 101 in the preceding semester

[6] Students not eligible for ENG 105 should complete ENG 101 in the preceding semester.

Well prepared students usually can complete the program of study leading to an undergraduate degree in engineering in four years, or fewer than four by attending Summer Sessions Many students, however, may find it advantageous or necessary to devote more than four years to the undergraduate program by pursuing, in any semester, fewer studies than are regularly prescribed. Where omissions or deficiencies exist, i.e., in chemistry, English, physics, or mathematics, the student must complete more than the minimum of 133 semester hours. Therefore, in cases of inadequate secondary preparation, poor health, or financial necessity requiring much time for outside work, the undergraduate program should be extended to five years or longer.

Professional Accreditation

The undergraduate programs majors bioengineering, chemical engineering, civil engineering, computer systems engineering, electrical engineering, industrial engineering, mechanical engineering, premedical engineering and the Engineering Special and Interdisciplinary Programs are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Degree Requirements

The degree programs in engineering at Arizona State University are intended to develop habits of quantitative thought having equal utility for both the practice of engineering and other professional fields. It is the intent of the faculty that all students be prepared in:

(1 *Competency in oral and written communication* in the English language which is considered to be essential for the engineering graduate. Although the requirement of specific course work may serve as a foundation for such competency, the development of communication skills should be demonstrated by student work in engineering courses. As a minimum and in addition to the 133 semester hour course requirements, all students must satisfy the University English proficiency requirements (see page 34).

(2) *General Studies* to ensure that the engineer will acquire a satisfactory level of basic knowledge in the humanities and fine arts, social and behavioral sciences, critical inquiry and numeracy and natural sciences These subjects are so selected as to give the engineer an increased awareness of social responsibilities, to provide an understanding of related factors in the decision making process, and to provide a foundation for the study of engineering.

(3) *Fundamental studies* in engineering and related subjects that will further develop the foundation for engineering and to provide the base for specialized studies in a particular engineering discipline.

(4) *Major studies* that provide a depth of understanding for a more definitive body of knowledge appropriate to a particular aspect of societal concern. These studies include technical elective course work in an area of emphasis that may be selected by the student with the assistance of an advisor.

The specific course requirements for the three parts of the B.S. and B.S.E. degrees are listed below

B.S. and B.S.E. Degree Requirements

	Semester Hours
English Proficiency	
ENG 101 First Year Composition	3
ENG 102 First Year Composition or ENG 105 Advanced First Year Composition (3)	3
General Studies	
*Literacy and Critical Inquiry**	
(6 semester hours minimum	
One course to be chosen from University approved list Course will be sophomore level and include a series of formal, graded, written or spoken assignments in composing critical discourse	3
† ECE 400 Engineering Communications	3
Numeracy	
6 semester hours minimum	
‡ MAT 290 Calculus I or MAT 270 Calculus with Analytic Geometry I 4)	5
‡ ECE 106 Introduction to Computer Aided Engineering	3
Humanities and Social Sciences	
(15 semester hours minimum)	
(At least one course must be of upper division level; two courses must be from same department, and two departments or more must be represented in total selection)	

Humanities and Fine Arts		9 to 6
Social Sciences		6 to 9
† ECN 111	Macroeconomic Principles	3
or ECN 112 Microeconomic Principles (3)		
Natural Sciences		
(8 semester hours minimum)		
† PHY 115	University Physics	4
† PHY 116	University Physics	4
† PHY 117	University Physics Laboratory	1
† PHY 118	University Physics Laboratory	1
Total General Studies		39

NOTE: One course in the area of Global Awareness* and one course in Historical Awareness* *must* appear in the final list of courses in the student's graduation program of study. These can be included in the Humanities and Fine Arts and Social Sciences course selections.

* Refer to General Studies booklet for specific requirements and approved list

† Required for graduation.

Engineering Core

The courses included in the Engineering Core are taught in such a manner that they serve as basic background material (1) for all engineering students who will be taking subsequent work in the same and related subject areas, and (2) for those students who may not desire to pursue additional studies in a particular subject area. Thus, subjects within the Engineering Core are taught with an integrity and quality appropriately relevant to the particular discipline, but always with an attitude and concern for both engineering in general and for the particular major(s). The courses required are listed below:

		Semester Hours
Engineering Core		
CHM 114	or CHM 116 General Chemistry	4
MAT 291	Calculus II	5
(or MAT 271 and MAT 272 (4,4))		
MAT 274	Elementary Differential Equations	3
Approved Mathematics Content Electives		4
ECE 105	Intro to Languages of Engineering	3
ECE 211	Engineering Mechanics I. Statics	2
ECE 301	Electrical Networks I	3
ECE 312	Engineering Mechanics II: Dynamics	3
ECE 314	Introduction to Deformable Solids	2
ECE 334	Electronic Devices and Instrumentation	4
ECE 340	Thermodynamics	3
or CHM 441 General Physical Chemistry		
ECE 350	Structure and Properties of Materials	3
or ECE 351 Engineering Materials or ECE 352 Semiconductors and Devices or CHM 442 General Physical Chemistry		
Microcomputer/Microprocessor Elective		3
Select one:		
CHE 461	Chemical Engineering Process Control (3)	
CEE 400	Microcomputer Applications in Civil Engineering 3)	
CSC 220	Computer Organization and Assembly Language Programming (4	
EEE 221	Digital Computer Fundamentals (4)	
IEE 463	Computer Aided Manufacturing and Control 3)	
MAE 405	Microcomputer Aided Processes for Mechanical Engineers (3)	
Total Engineering Core		42

Major

Majors and areas of emphasis are offered by the six engineering departments. Chemical and Bio Engineering, Civil Engineering, Electrical and Computer Engineering, Industrial and Management Systems Engineering, Mechanical and Aerospace Engineering, and Special and Interdisciplinary Engineering. About one fourth of the major credits are reserved for the student's use as an area of emphasis. These credits are traditionally referred to as 'technical electives. Requirements for each of the majors offered are described on the following pages.

Major (including area of emphasis)	52 semester hours
Total Degree Requirements*	133 semester hours

* These requirements are in addition to the University English proficiency requirements

Department of Chemical and Bio Engineering and Materials Science

PROFESSORS:
ZW EBEL COB B 210L), BERMAN CARPENTER DORSON GUILBEAU, JACOBSON KUESTER SATER STANLEY WAGNER
ASSOCIATE PROFESSORS:
BECKMAN BELLAMY, CALE, COGHLAN HENDR CKSON KRAUSE TORREST, TOWE
ASSISTANT PROFESSORS:
BEZANSON, BURROWS, RAUPP SH N WINTERS
PROFESSORS EMERITI:
RE SER, SHAW

Historically, materials have had a tremendous impact on the advancement of c vilization as re flected in the words stone, bronze, iron and 'paper attached to the various ages in the development of society Until recently an arbi trary d stinction was made between chemically reactive materials and relatively inert solid phase materials As our technological know how advances, we recogn ze that the fundamen tal principles, the molecular level mechanisms, and the processing techniques are very similar regardless of the state, phase, or shape of the materials Understanding of these principles and their application to real systems is the key to future progress as specially designed materi als are sought for the solution of complex tech nological problems Therefore, it is logical that the educational program of future scientists and engineers dea ing with the engineered materials be comprehens ve, covering all aspects of the materials world

Similarly, the h ui an body and other living systems process materials by analogous steps as do the chemical ndustr es. These living syster is are sma l, sophisticated integrated plants util izing pumps, aerators separators and reactors involving fluid flow, thermodynamics, he it and mass transfer and other fam l ar pr nciples Therefore, it s appropriate that the subdisci plines of chem ca , biomedical, and materials engineering work together in both education and research

Students asp ring to be engineers in either the chemical, biomedical, or materials areas must prepare to solve a wide variety of problems util izing chemistry, physics, mathematics, life sciences and engineering sciences As profession a s n industry they will apply these fundamen tals to creatively develop economically design, and productively operate systems, constituent equ pment, and specia ized analytica facilities

The department offers two B S E degrees, one in Chemical Engineering and one in Mate rials Science and Engineering The Chemical En gineering program provides opportunities for an area of emphasis in Biomedical Engineering B S E degree programs in B oengineering and Premedical Engineering are also available at ASU, they are described separately on pages 269 and 274

Chemical Engineering–B.S.E.

Chemical engineers are generally concerned with chemical change. They design and operate processes which accommodate such changes, in cluding the chemical activation of materials. Typically this nvolves complex multicom ponent systems wherein the interactions be tween species have to be considered and ana lyzed. The new challenge in chemical engineer ing is to apply the principles of mass transfer, solution thermodynamics, reaction kinetics, and separation techniques to technological endeavors such as integrated circuit design, solid state surface treatments, and materials processing

Consequently, in add tion to the chen ical and petroleum industries, chemical engineers find challenging opportunities in the plastics, solid state electronics, computer, metals, space, food, drugs, and health care industries, where they practice in a wide variety of occupations like env ironmental control, surface treatments energy and materia s transformations, biomedi cal applications, fermentatic n, protein recovery, extractive metal urgy, and separations While a large percentag e of the industrial positions are filled by graduates with bachelor s degrees, there are lucrative ar d creative opportunities in research and development for those who acquire post graduate education.

Subspecializations have deve oped within the profess on However, the same broad body of knowledge is generally expected of all chemical engineers for maximum flexibility in industrial positions. The preparation for chemical engineer ing i accompl shed by a blend of classroom instructior and laboratory experience The course for the undergraduate degree can be classi fied into the following categories in semester hours .

General Studies 40
See page 250 for School of Engineering requirements. (CHE 351 and 352 must be taken to satisfy the Literacy and Critical Inquiry requirement.)

Engineering Core 42
CHM 116, MAT 291 (or MAT 271 and MAT 272), MAT 242, MAT 274, ECE 383 OR ECE 384, ECE 105, ECE 211 ECE 301, ECE 312, ECE 314, ECE 334, CHM 441, CHM 442, CHE 461

Major 52
CHM 113, CHM 331, CHM 332, CHM 335, CHM 343, CHE 311, CHE 312, CHE 331, CHE 332, CHE 333, CHE 342, CHE 432, CHE 442, CHE 451, CHE 462

In addition, 10 hours of technical electives must be selected from among CHE upper division or graduate level courses or technical courses in other departments with advisor's approval. One elective course must have chemical content and be selected from CHE 458, CHE 473, CHM 361 or any three credit hour 400 level CHM course.

To fulfill accreditation requirements and to adequately prepare for the advanced chemistry courses, chemical engineering majors are required to take the CHM 113 and CHM 116 introductory chemistry sequence (CHM 117 and CHM 119 are acceptable substitutes). Other freshmen chemistry courses are *not acceptable*, and transfer students who have taken another chemistry course may be required to enroll in CHM 113 and or CHM 116.

The Chemical and Bio Engineering and Materials Science Department also offers graduate programs leading to the M.S.E., M.S. and Ph.D. degrees. These programs provide a blend of classroom instruction and research. A wide variety of topical and relevant research projects are available for thesis topics. Students interested in these programs should contact the department for up to date descriptive literature.

Chemical Engineering Areas of Emphasis

Most students interested in pursuing a career in chemical engineering will follow the typical sequence of courses outlined below. However, those students who wish to specialize may select to follow one of the following areas of emphasis through the elective courses. Also, substitutions may be made from selected required courses by petitioning the department faculty. In order to establish an area of emphasis the student must declare his/her intention in writing at least one year prior to graduation.

The following are possible areas of emphasis with a suggested list of elective courses.

Biomedical: BME 411, 412, 413, 418, 435.

Premedical: Students planning on attending medical school should select courses from those listed under the Biomedical emphasis. In addition, BIO 181 and 182 must be taken to satisfy medical school requirements but will not be counted towards the Chemical Engineering bachelors degree.

Biochemical BIO 340, 442; CHM 461, 462, 467, 468; CHE 528, 556.

Materials ECE 350, MSE 355, 420, 431, 470, 472.

Energy Conversion and Conservation CHE 553, 554, 556; MAE 436, 437, 438, 583.

Environmental Control CHE 553, 554, 556, 562; CEE 361, 362, 561.

Plant Administration CHE 553, 581; IEE 431; MGT 301.

Simulation, Systems Control, and Design CHE 556, 562, 563, 581; IEE 463.

Semiconductor Processing: CHE 458; ECE 352; EEE 435, 436

Chemical Engineering Program of Study

Typical Four-Year Sequence

First Year

		Semester Hours
First Semester		
CHM 113	General Chemistry	4
MAT 290	Calculus I	5
ENG 101	First Year Composition	3
ECE 105	Lang. of Engr.	3
SS or HUM	Elective	3
CHE 496	Professional Seminar	0
Total		18
Second Semester		
CHM 116	General Chemistry	4
MAT 291	Calculus II	5
ECE 106	Comp Aided Engr	3
PHY 115	University Physics	4
PHY 117	Univ. Physics Lab	1
CHE 496	Professional Seminar	0
Total		17

Second Year

First Semester		
CHE 311	Material Balances	3
ENG 102	First Year Composition	3
CHM 331	Gen. Organic Chemistry	3
MAT 274	Elem. Diff. Eqns.	3

PHY 116	University Physics	4
PHY 118	Univ Physic Lab	1
CHE 496	Professional Seminar	0
Total		17

Second Semester

CHE 312	Intro to Thermo	3
CHE 331	Transp. Phen. I: Fluids	3
CHM 332	Gen Organic Chemistry	3
CHM 335	Gen. Org. Chem. Lab	1
ECE 211	Engr Mech I. Statics	2
MAT 242	Lin Alg.	2
SS or HUM Elective		3
CHE 496	Prof. Seminar	0
Total		17

Third Year

First Semester

CHE 332	Tr. Ph. II: Energy Trans.	3
CHE 342	Applied ChE Thermo.	3
CHM 441	Gen. Physical Chem	3
CHM 343	Phys. Chem. Lab	1
CHE 351	Measurements Lab	2
ECE 312	Engrg Mech. II/Dynam.	3
SS or HUM Elective		3
CHE 496	Prof. Seminar	0
Total		18

Second Semester

CHE 333	Tr. Ph. III: Mass Trans.	3
CHE 352	Transport Laboratory	2
CHM 442	Physical Chemistry	3
ECE 301	Elect. Networks I	3
ECE 383	Prob. Stats. Engrg. or ECE 384 Num. Anal.	2
ECE 314	Intro/Deformable Sol.	2
SS or HUM Elective		3
CHE 496	Prof. Seminar	0
Total		18

Fourth Year

First Semester

CHE 432	Princ of ChE Design	3
CHE 442	Chemical Reactor Design	3
CHE 461	Process Control	3
CHE 451	CHE Laboratory	2
Tech. Elective		6
CHE 496	Prof Seminar	0
Total		17

Second Semester

CHE 462	Process Design	3
ECE 334	Elec Devices/Instru.	4
ECE 400	Engrg. Communications	3
Tech. Elective		4
SS or HUM Elective		3
CHE 496	Prof. Seminar	0
Total		17

Graduation Requirements 133 semester hours plus English proficiency

Materials Science

Materials Science is the engineering and scientific discipline that is concerned with the study of fundamental relationships between the structure of materials and their properties. The program provides students with the knowledge necessary to make decisions concerning the optimum utilization of existing materials or to develop and process new materials.

Essentially all major industries and research laboratories are involved to some extent with the selection, utilization, and development of materials in designing and producing engineered systems. Students who major in Materials Science find employment opportunities in a variety of industries and research facilities associated with aerospace, solid state electronics, energy conversion, transportation, manufacturing and chemical processing. The responsibilities of a materials scientist or materials engineer include research and development of materials to meet some new demand brought about by advancing technology, or to select the best choice of existing materials for a specific application. Materials scientists also develop new techniques for processing materials to reduce costs of products or to create new products. Also, they are often responsible for analyzing data on field tested materials to determine the effects of the environment on materials performance.

The tools of a materials scientist include highly sophisticated analytical equipment. Since a considerable emphasis in Materials Science is placed on the microscopic world, instruments such as transmission and scanning electron microscopes, X ray diffractometers, and Auger spectrometers are a necessary part of the field.

The undergraduate curriculum requires that students take a series of interdisciplinary courses of fundamental importance to an understanding of all materials.

The courses for the undergraduate degree can be classified into the following categories (in semester hours :

General Studies 39

See page 250 for School of Engineering requirements.

Engineering Core 42
CHM 116, MAT 291 o MAT 271 and MAT 272), MAT 242, MAT 274, ECE 105 ECE 2 1 ECE 312, ECE 01 ECE 314, ECE 334 ECE 35(, ECE 383 or ECE 384 or ECE 386, CHM 44 CSC 220 or IEE 463 or MAE 405

Majo r 52
CHM 113, CHE 311 CHE 312 CHE 351 MAE 351 MSE 355 MSE 420, MSE 43), MSE 431, MSE 44), MSE 450, MSE 470, MSE 472, MSE 492

In addition, n ne hours of e ectives must be selected from the ist be ow

Materials Science Areas of Emphasis

Technical electives may be se ected from one or more of the follow ing areas. A student may, with prior approv al of the department, select a general area or a set of courses that would sup port a career object ve not covered by the fol lowing categories.

Phys al Metallur gy PHY 361, 362 363, 471, 487; CHM 471; MAE 372, 422, 488, MSE 441, 480, 520, 521, 550, 558, 559, 560, 561, 573

Me hanical Metallurgy MAE 405, 415, 422, 441, 442, 520, 522, 524, 526, 527, 557, MSE 441, 480, 520, 521, 540, 550, 558, 560, 580

Electronic Materials PHY 471, 481, CHE 458, 548, 558, CHM 471; EEE 435, 539; MAE 437, 438, MSE 520, 521, 550, 562, 575

Polymers and Comp sites CHM 331, 332, 438, 471, MAE 372, 480, 520, 527; MSE 570

Chemical Pr cessing and Energy Systems CHE 432, 442, 451; MSE 530, 531, 533; MAE 371, 372, 430, 433, 437, 438, 488

Manufacturing ar d Materials Processing MSE 441, 480, 540, 560, 580; MAE 372, 403, 415, 422, 441, 442

Materials Science and Engineering Program of Study

Typical Four-Year Sequence

First Year

		Semester Hours
First Semester		
MAT 270	Calculus I	4
CHM 113	General Chem	4
ECE 105	Lang. of Engineering	3
ENG 101	First Year Composition	3
SS or HUM E ective		3
MSE 496	Seminar	0
Total		17
Second Semester		
MAT 271	Calculus II	4
PHY 115	Univ. Physics	4
PHY 117	Univ Physics Lab	1
ENG 102	First Year Composition	3
CHM 116	General Chemistry	4
ECE 106	Computer Aided Engineering	3
MSE 496	Seminar	0
Total		19

Second Year

First Semester		
MAT 272	Calculus III	4
MAT 274	Elem Diff Eqns	3
PHY 116	Univ. Physics	4
PHY 118	Univ. Physics Lab	1
ECE 211	Engr. Mech I Statics	2
CHE 311	Mat'l Ba ance	3
MSE 496	Seminar	0
Total		17
Second Semester		
Literacy and Critical Inquiry Elective		3
ECE 301	Networks	3
ECE 312	Engr. Mech II Dynamics	3
ECE 314	Intro. Deform. Solids	2
ECE 350	Structure/Properties of Materials	3
CHE 312	Thermodynamics	3
MSE 496	Seminar	0
Total		17

Third Year

First Semester		
CHM 441	Phys Chem. I	3
MSE 355	Metallurgy	3
MAT 242	Lin. Algebra	2
CSC 220, IEE 463, or MAE 405		4 or 3
ECE 334	E ectr Devices	4
SS or HUM Elective		3
MSE 496	Seminar	0
Total		19 or 18
Second Semester		
MAE 351	Prod. Processes	3
MSE 420	Phys Metal	4
ECE 383, 384 or 386		2
Technical Elective		3
SS or HUM Elective		6
MSE 496	Seminar	0
Total		18

Fourth Year

First Semester

MSE 430	Thermo. of Matls	3
MSE 450	X ray and Elect Diff.	3
MSE 470	Polv. & Composites	3
CHE 351	Meas. Lab	2
Technical Elective		3
SS or HUM Elective		3
MSE 496	Seminar	1
Total		17

Second Semester

MSE 431	Corrosion	3
MSE 440	Mech. Prop of Solids	3
MSE 472	Int Circuit Matl.	3
MSE 492	Capstone Design Proj	3
ECE 400	Eng Commun.	3
Technical Elective		3
MSE 496	Seminar	0
Total		18

Graduation Requirements 133 semester hours plus English requirements

Department of Civil Engineering

PROFESSORS:
O BANNON (EC G 136A), BETZ
BLACKBURN W. HOUSTON KLOCK
LUNDGREN, MATTH AS, RUFF
SINGHAL, TUMA

ASSOCIATE PROFESSORS:
DUFFY, H NKS, MAMLOUK
RADWAN, UPCHURCH

ASSISTANT PROFESSORS:
FAF T S, HOUSTON, KREAMER,
RAJAN ZANIEWSK

PROFESSORS EMERITI:
BORGO, HILL, PIAN

Civil engineers are responsible for the planning, design construction, research and management of many transportation structural, urban and environmental pro ects which form the basis of our modern civilization. These projects inc ude buildings, bridges, highways, airports, dams, ca nals, irrigation projects water and waste treat ment plants and various multipurpose systems Education in this field is established on scientific fundamentals with extensive training and practice in one or more areas of emphasis

Civil Engineering–B.S.E.

Civil Engineering Core

The following courses are required as a part of the Engineering Core

		Semester Hours
ECE 351	Engineering Materials	3
CEE 400	Microcomp Applica/CE	3

The additional requirements for science, engi neering sciences, and design specified in the engi neering core are satisfied within the civil engi neering core

		Semester Hours
CEE 296	Introduction to Civil Engineering	1
CEE 321	Structural Analysis	3
CEE 322	Steel Structures	3
CEE 323	Concrete Structures	3
CEE 351	Soil Mechanics	4
CEE 361, 362	Environmental Engineering	6
CEE 372	Transportation Engineering	4
CEE 381	Hydrau ic Engineering	4
CEE 496	Topics in CE Practice	1
MAE 371	Fluid Mechanics	3
IEE 300	Economic Analysis for Engineers	2

Special Requirements. Civil engineering core courses may not be taken without permis sion until.

(1) The engineering core (except electrical and communications courses has been completed with an average grade of 'C' or better;

(2 MAT 290, 291, or MAT 270, 271, 272, and MAT 274, ECE 211, 312 and 314 have all been completed with minimum grades of 'C, and

(3 For international students, an official TOEFL score of 550 (in addition to the successful completion of the English Compos tion requirements has been re ceived.

Entering freshmen must have completed one year of high school chem stry and one year of high school physics with grades of 'B' or better in each subject Students who do not meet these requiren ents will take CHM 113 4) CHM 116 4 sequence in lieu of CHM 114 (4 and PHY 111 113 3 1 as a prerequisite to PHY 115 117.

A student n ust have earned a cumulative GPA of 2 50 or better to be eligible to take a 500 level course for credit toward the BSE de gree.

Degree Requirements. Requirements for the bachelor s degree inc ude the completion of the Civil Engineering Core courses and 18 sem ester

hours of design and technical electives with an average grade of C' or better. Course selections will be made by the student with the advisor's approval. For those students wishing to enter an area of emphasis, the technical electives should be selected from the elective area of particular interest. The graduate courses listed under the elective areas may, with appropriate approvals, be taken for undergraduate credit by students whose cumulative GPA is 2.50 or better.

Civil Engineering Designated Design Electives (minimum of 2 required)

		Semester Hours
CEE 423	Structural Design	3
CEE 452	Foundations	3
CEE 466	Sanitary Systems Design	3
CEE 475	Highway Geometric Design	3
CEE 481	Water Resources Engineering	3

Civil Engineering Technical Electives (minimum 12 hours required) A maximum 6 hours may be selected outside Civil Engineering. Only one Construction course may be used for technical elective credit.

Civil Engineering Elective Areas of Emphasis with Suggested Courses

Structural Engineering Analysis and design of structures for buildings, bridges, space frames, structural mechanics. CEE 423, 432, 521, 531

Geotechnic Engineering Assessment of engineering properties and design utilizing soils and rocks as engineering materials. CEE 452, 550, 552, 555, 556.

Environmental Engineering Water treatment. Industrial and domestic waste treatment and disposal. Public health engineering. Industrial hygiene CEE 466, 563, CHM 231, MIC 210, or MIC 201, 202.

Transportation Engineering Analysis and design of transportation facilities Transportation planning and economics. Transportation in the urban environment. CEE 475, 412, 471, 512, 574, 575, 576

Water Resources Engineering Planning and design of facilities for collection, storage, and distribution of water Water systems management. Estimating availability of water resources. CEE 481, 579, 581, 582, 583.

Construction Engineering–CON 344, 383, 395, 496. Only one course may be selected

Civil Engineering Program of Study
Typical Four-Year Sequence

Freshman Year

		Semester Hour
First Semester		
PHY 115	University Physics	4
PHY 117	Univ. Physics Lab	1
MAT 290	Calculus I	5
CHM 114	General Chemistry	4
ECE 105	Lang of Engrg	3
Total		17
Second Semester		
PHY 116	University Physics	4
PHY 118	Univ. Physics Lab	1
MAT 291	Calculus II	5
ECE 106	Comp Aid. Engrg.	3
CEE 296[4]	Intro to CE	1
Social Science Elective[7]		3
Total		17

Sophomore Year

First Semester		
MAT 274	Elem. Diff. Eqns.	3
ECE 211	Engrg. Mech I: Statics	2
ECE 301	Elec Networks I	3
ECN 111[2]	Macroecon. Prin	3
ENG 101	First-Year Composition	3
Humanities Electives		3
Total		17
Second Semester		
ECE 312	Engrg. Mech. II: Dynamics	3
ECE 314	Mech. Deformable Sol.	2
ECE 334	Electr Device/Instru.	4
ECE 340	Thermodynamics	3
ENG 102[1]	First Year Composition	3
ECE 383	Prob. Stat. Engrs	2
Total		17

Junior Year

First Semester		
ECE 351	Engrg Materials	3
MAE 371	Fluid Mechanics	3
CEE 321[4]	Structural Analysis	3
CEE 400	Microcomp Applica/CE	3
ECE 384	Num. Anal. Engrs	2
Humanities Elective[7]		3
Total		17
Second Semester		
CEE 322[4]	Steel Structures	3

CEE 351[4] Soil Mechanics	4
CEE 361[4] Environmental Engrg.	3
CEE 372[4] Transportation Engrg	4
CEE 381[4] Hydraulic Engineering	4
Total	18

Senior Year

First Semester

CEE 423[4] Concrete Structures	3
CEE 362[4] Environmenta Engrg	3
CEE 496[4] Topics in CE Pract	1
IEE 300[4] Econ Anal Engrs	2
Design Elective[3]	3
Technical Elective[5]	3
Literacy Elective-	3
Total	18

Second Semester

ECE 400 Engrg Communications	3
Design Elective	3
Technical Elective[5]	9
Social Science Elective[2]	3
Total	18

1 With sufficient ACT or SAT scores ENG 105 substitutes for both ENG 101 and 102

2 ECN 111 is included in the required 6 hours of soc a science which makes up part of the 15 hours of social science and humanities at east 6 of which must be human ties

Design electives must be chosen from CEE 423, 45_ 466, 475 or 481.

4 Civi Engineering Core Courses

5 Technical electives may be selected from, but are not restricted to, any of the courses listed for the areas of emphasis

Concurrent Studies in Architecture and Civil Engineering

Undergraduate. Qualified lower division students interested in combining studies in architecture and Civil Engineering may prepare for upper division and graduate courses in both programs by taking courses listed in Option 'B' of the School of Architecture (pages 156)

Graduate. Qualified students may develop a program of study that leads to the concurrent degrees Master of Architecture and MSE with a focus in Civil Engineering The student s program of study is developed in conjunction with advisors in both departments. For specific details consult with advisors in both departments

Department of Electrical and Computer Engineering

PROFESSORS:
SAEKS EC G 127 AKERS, BACKUS, BALANIS, BOSE BYRNES CADZOW DeMASSA FERRY HADEN HIGG NS KARADY KAUFMAN, KELLY McKLVEEN, PALAIS RUSSELL SCHRODER, SCHWUTTKE, SIRK S T CE E Y WANG WELCH

ASSOCIATE PROFESSORS:
CROUCH, DAVIS GREENEICH ROEDEL SHEN Z MMER

ASSISTANT PROFESSORS:
GROND N KEARFOTT, KOZ CK MARACAS, SOHIE, TYLAVSKY, VARHUE

PROFESSORS EMERITI:
AX BARKSON DONNELLY, STEINMANN THOMPSON

The professional activities of electrical engineers directly affect the lives of most of the world s popu ation every day They are responsible for the design and development of radio and television transmitters and receivers, telephone networks and switching systems, computer systems, and electric power generation and distribution Within the broad scope of these systems, the electrical engineer is concerned with a challenging and diverse array of design and development problems.

Electrical engineers design miniscule semiconductor integrated circu ts which contain many thousands of elementary devices. They design systems for automatically controlling mechanical devices and a variety of processes. They are responsible for the design of satellite communication links as well as patient monitoring systems for hospitals. The development of the microprocessor has expanded the opportunities for electrical engineers to improve the design of familiar products since these devices are now incorporated in automobiles, consumer and office products, entertainment systems, and a vast variety of test and measurement instruments and machine tools.

A student who earns a B S.E. degree majoring in electrical engineering will be involved in a variety of electrical and electronic problems in the course of their careers. To insure the necessary breadth of knowledge, the electrical engi

neering curriculum includes basic (core) engi neering courses as well as courses in networks and electronic circuits, electromagnetic fields and waves, microprocessors, communication and control systems, solid state electronics, electri cal power systems, and other specialty courses

Electrical Engineering–B.S.E.

Academic Requirements

The curriculum in electrical engineering builds upon the base provided by the engineering core. Beyond the engineering core, the curriculum includes a number of required electrical engineering and technical elective courses. Approved technical elective courses serve to provide students with an opportunity to either broaden their background in electrical engineering or to study, in greater depth, technical subjects in which they have special interests. Successful completion of the curriculum leaves the student prepared to embark on a career in electrical engineering or to pursue advanced education in graduate school.

The attention of the student is directed to the retention and graduation requirements of the University and the School of Engineering. In addition to those requirements, a student must earn a grade of "C" or better in the mathematics and physics courses listed in the first two years of the program of study given below. The student must also have a grade point average of at least 2.00 for the following group of courses: ECE 301, 334, 352; all courses with an EEE prefix; and all other courses used as technical electives.

Electrical Engineering Core

Students in electrical engineering will fulfill the requirements of the engineering core materials and microprocessor electives by taking ECE 352 and EEE 221 and the mathematics electives by taking the following courses:

		Semester Hours
MAT 342	Linear Algebra	3
MAT 362	Adv. Math for Engineers	3

In addition, the following courses are required to fulfill the electrical engineering core:

		Semester Hours
EEE 302	Electrical Networks II	3
EEE 303	Signals and Filters	3
EEE 322	Microprocessor Applications	4
EEE 340	Electromagnetic Engineering I	3
EEE 396	Professional Seminar	0
EEE 360	Electromechanics	3
EEE 436	Fundamentals of Solid State Devices	3
EEE 440	Electromagnetic Engineering II	4
EEE 455	Communication Systems	4
EEE 480	Feedback Systems	4
EEE 432	Senior Design Lab	3

Technical Electives in Electrical Engineering

The program in electrical engineering requires a minimum total of 15 semester hours of approved technical elective courses. Technical elective courses may be selected from one or more of the following technical areas of emphasis:

Electromagnetic Fields and Waves. EEE 441, 443, 445, 448.

Solid State Electronics EEE 434, 435.

Networks and Electronic Circuits: EEE 405, 406, 425, 433.

Communication and Control EEE 451, 454, 459, 482

Power and Instrumentation: EEE 460, 461, 462, 463, 464, 470, 471, 473.

At least half of the total technical elective credits must be Electrical Engineering (EEE) courses Computer Science (CSC) 400 level courses may be used as an alternative to meet this requirement.

With the approval of their faculty advisor, qualified students may choose technical electives from other courses in engineering, mathematics, and the sciences at or above the 300 level including graduate courses. Students must have not less than a 3.00 grade point average and approval of the instructor to enroll in EEE graduate level courses. In addition up to six credit hours of technical electives may be chosen from the approved list of courses from the College of Business.

Electrical Engineering Program of Study
Typical Four-Year Sequence
Freshman Year

		Semester Hour
First Semester		
MAT 290	Calculus	5
CHM 114	or 116 Chemistry	4
ECE 105	Intro/Languages of Engr.	3
ENG 101	First Year Composition	3
HU/SS	Elective	3
Total		18
Second Semester		
MAT 291	Calculus II	5
PHY 115	Univ. Physics	4
PHY 117	Physics Lab	1

ECE 106	Computer Aided Engr	3
ENG 102	First Year Composition	3
Total		16

Sophomore Year

First Semester

MAT 274	Differential Eq.	3
MAT 342	Linear Algebra	3
EEE 221	Intro to Dig Comp.	4
ECE 211	Statics	2
PHY 116	Univ. Physics	4
PHY 118	Physics Lab	1
Total		17

Second Semester

MAT 362	Adv. Math for Engrs.	3
ECE 301	Electrical Networks I	3
EEE 322	Microprocessor Fund	4
ECE 312	Dynamics	3
ECE 314	Deformable Solids	2
ECN 111	Macroeconomic Principles	3
Total		18

Junior Year

First Semester

EEE 340	Electromagnetics I	3
ECE 334	Electronic Dev. and Inst.	4
EEE 302	Electrical Networks II	3
ECE 340	Thermodynamics	3
EEE 396	Professional Seminar	0
HU SS	Elective	2
Literacy Elective		3
Total		18

Second Semester

EEE 440	Electromagnetics II	4
EEE 360	Electromechanics	3
EEE 303	Signals and Filters	3
ECE 352	Semiconductors	3
HU/SS[1] Elective		4
Total		17

Senior Year

First Semester

EEE 480	Feedback Sys	4
EEE 455	Comm. Sys	4
EEE 436	Solid State Dev.	3
Tech. Electives		4
Design Lab		3
Total		18

Second Semester

Tech Electives		11
HU/SS[1] Elective		3
ECE 400	Engrg. Commun.	3
Total		17

[1] See General Studies booklet for approved list.

Department of Industrial and Management Systems Engineering

PROFESSORS:
SMITH (EC G 120B), BEDWORTH, YOUNG
ASSOCIATE PROFESSORS:
ANDERSON, BAILEY, DEAN, KEATS KNIGHT, MACKULAK MOOR, ROLL ER, SHUNK
ASSISTANT PROFESSOR:
COCHRAN, HUBELE RANDHAWA, RUCKER
PROFESSOR EMERITUS:
HOYT

The Industrial Engineer (IE) provides leader ship for American organizations in productivity improvement and in reestab ishing competitive ness in the domestic and international market places. This gives IE s a wide range of interests and responsibilities. In a manufacturing enter prise, for example, the common goal of American industry (and the IE) is to both modernize and migrate the organization towards the concept of the factory of the future (FOF). This goal focuses on the utilization of tech nology and systems methodologies to develop FOF's which are highly productive, flexible, and cost and quality competitive The key to realizing the FOF concept is the same as that for any systems oriented project; that is. the integration of resources people, technology, capital, information and energy to achieve societal goals.

Information technologies are of major inter est to the industrial engineer. Information tech nology makes it possible to integrate people, material, machines, money and other resources into productive enterprises Information sys tems, including networks, data base models, computer hardware and software, that tie peo ple and resources together symbolize the es sence of 'integration' from a systems perspec tive

Technology integration includes the ntegra tion of mechanical, electrical, chemical, struc tural, and biological systems to create synergis tic higher level systems and subsystems. Other disciplines tend to take vertical cuts deep into their areas of specialty, while IE s take horizon tal cuts across multiple areas of technology.

The Industrial Engineering undergraduate pro gram at ASU reflects this emphasis on mul tiple technologies in the first two years of basic ' science ' and ' core' engineering courses. In the last two years of the degree program the IE "major' courses relate to the fundamental science and engineering methodologies required to design, implement, and manage productive organizations and to provide leadership for tran sitioning existing American enterprises into the new and exciting 'high tech' era. Upon receiving an undergraduate degree, the Indus trial Engineer is prepared to work in any industry or type of organization that desires to achieve maximum return from the productive use of people and resources to produce products or services.

A distinguishing feature of industrial engi neering is the emphasis on people. In fact, IE is often referred to as the 'people oriented profes sion." It is a primary function of the IE to inte grate people and technology oriented systems. IE's are active in the fields of human factors and ergonomics. With the development of the field of artificial intelligence and expert systems, the IE is being called upon to lead the movement from muscle based work to knowl edge based work. The development of the ' knowledge worker ' is a primary task of the IE Developing systems that utilize surrogate knowledge (in the forms of expert systems) is an advanced form of technology integration.

The IE is not only the developer of people and technology integrated systems but also is a prime candidate for all levels of management, especially those in high tech organizations, be cause of their background in technology integra tion, organizational theory, management prac tice and engineering economics. This is evi denced by the fact that over half of all prac ticing IE s are in some level of management.

Industrial Engineers are increasingly being called upon to revitalize and reorient their or ganizations into more strategic and competitive postures. Technology and system integration em ployment opportunities for IE's are varied and provide exciting career opportunities for in dividuals dedicated to progressive change The demand for IE s is growing in direct proportion to the exponential increase in integration, mod ernization and automation activities. It has been predicted that the greatest shortfall in an indi vidual engineering discipline by 1990 will be in Industrial Engineering.

Industrial Engineering–B.S.E.

The following courses are required as a part of the Engineering Core mathematics requirement and the Microcomputer elective:

		Semester Hour
ECE 383	Probability and Statistics for Engineers	2
IEE 463	Computer-Aided Manufacturing and Control	3

In addition, the following courses are required for the Industrial Engineering major:

ASE 485	Engineering Statistics	3
IEE 300	Economic Analysis for Engineers	2
IEE 330	Microcomputer Applications in Industrial Engineering	3
IEE 367	Methods Engrg and Facilities Design	4
IEE 374	Quality Control	3
IEE 422	Info Sys Design	3
IEE 431	Engineering Administration	3
IEE 461	Integrated Production Control	3
IEE 475	Fundamentals of Simulation	3
IEE 476	Operations Research Techniques	4
IEE 488	Industrial Engineering Analysis	3
IEE 492	Project in Design and Development	3
MAE 351	Production Processes	3
Area of Emphasis (technical electives)		12

Technical Electives in Industrial Engineering

In consultation with an advisor, technical elec tives may be selected from one or more of the following areas of emphasis. A maximum of 2 courses are allowed outside the School of Engi neering The graduate courses listed under these areas may, with appropriate approvals, be taken for undergraduate credit provided the student has a GPA greater than or equal to 3.00.

Produ tion Systems: IEE 464, IEE 561, IEE 570, OPM 331

Computer aided Manufacturing: IEE 464, CHE 461, MET 346, MET 443.

Quality Control Reliability AET 409, ASE 483, MAE 441, MAE 442, IEE 549, IEE 570

Engineering Management: IEE 411, GNB 306, FIN 300, IEE 510, IEE 531

Information Systems: IEE 464, CSC 304, CSC 410, CSC 412, IEE 577

With the approval of the student's advisor, technical electives may also be chosen from other courses in engineering mathematics, the sciences, and business administration at or above the 300 level. A minimum of six hours of technical electives must be taken from this department.

Industrial Engineering Program of Study
Typical Four-Year Sequence

Freshman Year

	Semester Hour
First Semester	
ECE 105 Languages of Engrg	3
ENG 101[1] First Year Composition	3
MAT 270 Calc I	4
CHM 114 Gen Chemistry	4
Gen'l Studies Electives[3]	3
Total	17
Second Semester	
ECE 106 Computer Aided Engrg	3
ENG 102[1] First Year Composition	3
MAT 271 Calculus II	4
PHY 115 University Physics	4
PHY 117 Univ Physics Lab	1
Gen'l Studies Electives[3]	3
Total	18

Sophomore Year

First Semester	
PHY 116 University Physics	4
PHY 118 Univ Physics Lab	1
IEE 300 Econ Analysis for Engr	2
ECN 111 Macroeconomic Principles	3
MAT 242 Elem Linear Algebra	2
MAT 272 Calculus III	4
Total	16
Second Semester	
ECE 211 Engrg. Mech. I: Statics	2
ECE 383 Prob and Stat Engrs.	2
MAT 274 Elem. Diff. Equations	3
IEE 330 Microcomputer Appl. in IE	3
Technical Elective[4]	3
Gen'l Studies Electives[3]	4
Total	17

Junior Year

First Semester	
ECE 301 Elec Networks I	3
ECE 312 Engrg Mech II Dynamics	3
ECE 340 Thermodynamics	3
ECE 350 Stru/Proprts Material	3
Technica Elective[4]	2
ASE 485 Engrg Statistics	3
Total	17
Second Semester	
IEE 488 Industria Engineering Analysis	3
ECE 314 Intro to Deform Solids	2
MAE 351 Production Processes	3
IEE 463 Computer Aided Manufacturing and Control	3
IEE 367 Methods Engrg & Fac Design	4
Gen'l Studies Elective[3]	3
Total	18

Senior Year

First Semester	
IEE 374 Quality Control	3
IEE 431 Engrg. Administration	3
IEE 461 Integ Prod. Control	3
IEE 422 Info. Sys. Design	3
IEE 475 Fund of Simulation	3
Technical Elective[4]	3
Total	18
Second Semester	
ECE 334 Electr. Device/Instru.	4
ECE 400 Engrg Communication	3
IEE 476 Ops. Res. Techniques	4
IEE 492 Proj. in Design and Dev.	3
Technical Elective[4]	3
Total	17

Graduation Requirements: 133 semester hours minimum (excluding English requirement

[1] Students with ACT English test score of 25 (SAT 650) or better take ENG 105

No high school chemistry, take CHM 113 and CHM 116

[3] See General Studies booklet for requirements and approved list.

[4] Technical electives should be selected from an area of emphasis

Manufacturing Engineering. Manufacturing engineering is concerned with the application of the principles of science to increase productivity in industry. This involves the design of systems that allow for the best utilization of men, machines, material, and money. Modern manufacturing engineering is concerned with the application of technology including computers, robots, graphics, mathematical and digital models, in

formation and data base systems, microtechnology, and systems theory.

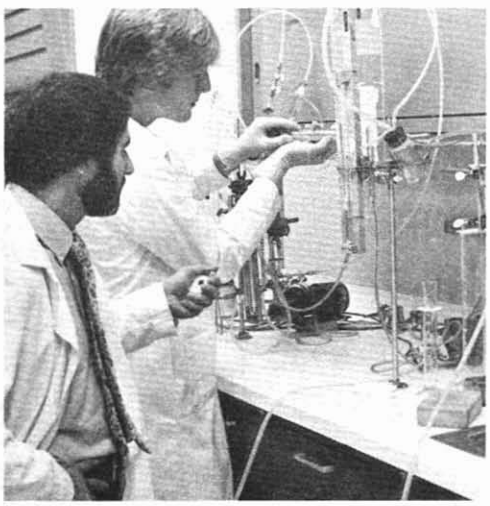
Emphasis is placed on management and economics as well as technology. Graduates of the program will be well qualified to participate in the introduction of CAD/CAM/CIM and factory automation technology to industry.

The following courses are required as part of the Engineering Core mathematics requirement and the Microcomputer elective:

		Semester Hours
ECE 350	Structure and Properties of Materials	3
ECE 383	Probability and Statistics for Engineers	2
IEE 463	Computer-Aided Manufacturing and Control	3

In addition, the following courses are required:

IEE 300	Economic Analysis for Engineers	2
IEE 330	Microcomputer Appl. in IE	3
IEE 374	Quality Control	3
IEE 422	Info Sys Design	3
IEE 431	Engineering Administration	3
IEE 464	Computer-Integrated Design	3
IEE 492	Proj. in Des. and Dev.	3
MAE 317	Dynamic Systems and Control	4
MAE 422	Mechanics of Materials	4
MAE 441	Principles of Design I	3
MAE 447	Robotics and Its Influence on Design	3
MSE 480	Manufacturing Engineering	3
MAE 351	Production Processes	3
MET 443	N/C Computer Programming	3
Technical Electives		9



Department of Mechanical and Aerospace Engineering

PROFESSORS:
METZGER (EC G-346E), BEAKLEY, BICKFORD, CHEN, DAVIDSON, DITSWORTH, EVANS, FLORSCHUETZ, JANKOWSKI, LOGAN, NELSON, RICE, ROY, SARIC, SHAW, SO, WALLACE, WOOD, YAO

ASSOCIATE PROFESSORS:
HIRLEMAN, LAANANEN, LIU, NEITZEL, PECK, RANKIN, REED, TONG

ASSISTANT PROFESSORS:
BILIMORIA, CASTELAZO, CHYU, FERNANDO, HASSAN, HENDERSON, KUO, McNEILL, MURTHY, RAJAN, SHAH, WELLS

PROFESSORS EMERITI:
ALLEN, AVERY, FRY, KAUFMAN, PRICE, SHAW, STAFFORD, THOMPSON, TURNBOW, WILCOX, WOOLDRIDGE

The Mechanical and Aerospace Engineering Department is the administrative home for four undergraduate majors:

Aerospace Engineering
Energy Systems Engineering
Engineering Science
Mechanical Engineering

All four majors build on the broad exposure to the engineering, chemical and physical sciences as well as the mathematics embodied in the General Studies and engineering core courses required of all engineering students.

The *Aerospace Engineering* major provides training for the aerospace industries and government agencies. The *Energy Systems Engineering* major provides training for students interested in the energy field and in employment with energy companies (i.e., petroleum companies, solar energy agencies, the nuclear industry, and with utility companies). The *Engineering Science* major is intended for students who prefer more emphasis in the science and analysis side of engineering than is generally available in more traditional engineering programs. The *Mechanical Engineering* major is, perhaps, one of the most broadly applicable programs in engineering, providing training for a wide variety of employment opportunities. All of these majors are discussed in more detail below.

The above majors can serve as entry points to immediate professional employment or to gradu-

ate study. The emphasis in all fields is on development of fundamental skills which will have long lasting utility in our rapidly changing technical society. Employers desire for this emphasis is a strong point in favor of these choices of curricula over technology programs or special programs which emphasize primarily current applications or specific industries.

Minimum Scholastic Requirements. All degree programs in the department require that students attain at least a 'C' (2.00) average in the engineering core and major in order to be eligible for graduation. Also, the department may require additional or remedial work for those students who have demonstrated a trend of academic difficulty.

Engineering Core Options

Among the options listed on page 251 as part of the engineering core requirements, Mechanical and Aerospace engineering students are required to select the following:

		Semester Hours
ECE 340	Thermodynamics	3
ECE 350	Structure and Properties of Materials	3

The Microcomputer/Microprocessor Elective must be selected from one of the following:

CSC 220	Computer Organization and Assembly Language Programming (4)
EEE 221	Digital Computer Fundamentals (4)
IEE 463	Computer Aided Manufacturing and Control (3)
MAE 405	Microcomputer Aided Processes for Mechanical Engineers (3)

The first two years are usually totally devoted to the General Studies and engineering core requirements. Thus, all the degree programs in the department share essentially the same course schedule for that period of time. A typical schedule is given below:

Program of Study
Typical First and Second-Year Sequence
Freshman Year

		Semester Hours
First Semester		
MAT 290	Calculus I	5
CHM 114 or CHM 116	General Chemistry	4
ECE 105	Introduction to Languages of Engineering	3
ENG 101	First Year Composition	3
SS or HUM Elective		3
Total		18
Second Semester		
MAT 291	Calculus II	5
PHY 115	Univ Physics	4
PHY 117	Univ Physics Lab	1
ECE 106	Introduction to Computer Aided Engineering	3
ENG 102	First Year Composition	3
Total		16

Sophomore Year

First Semester		
MAT 274	Elem Diff Equations	3
PHY 116	Univ Physics	4
PHY 118	Univ. Physics Lab	1
ECE 211	Engrg Mech. I: Statics	2
MAT 242	Linear Algebra	2
Literacy Elective		3
SS or HUM Elective[1]		3
Total		18
Second Semester		
ECE 301	Ntwks. I	3
ECE 312	Engrg. Mech. II: Dynamics	3
ECE 314	Intro./Deformable Solids	2
ECE 340	Thermodynamics	3
ECE 386	Part. Diff. Equations	2
ECE 350	Stru./Proprts. of Matls.	3
Total		16

[1] See General Studies booklet for specific requirements and approved list

Aerospace Engineering–B.S.E.

The primary concern of aerospace engineers is the design and development of a wide variety of aircraft and space vehicles. The current challenges to the aerospace engineer include the design of a new generation of high efficiency transport aircraft, the development of the next generation of space transports and the design of large space systems. In addition to the design of vehicles, the aerospace engineer is involved in the further development of the many spin offs of the aerospace industry. These include contributions to communications, air and water pollution monitoring, management of the earth's resources, and the understanding and control of weather. Future contributions are anticipated in the area of zero gravity manufacturing of high purity materials and medicines, and the design of solar power satellites.

The undergraduate curriculum includes the study of flight mechanics, aerospace structures, aerodynamics, and propulsion. These subjects

provide the foundation necessary for aerospace design

Aerospace Engineering Major

Aerospace Engineering students are required to fill their four hour Engineering Core approved mathematics content electives with

		Semester Hours
MAT 242	Elementary Linear Algebra	2
ECE 386	Part. Diff. Eqns. Engr	2

The Aerospace Engineering major consists of:

MAE 317	Dynamic Systems and Control	4
MAE 361	Aerodynamics I	3
MAE 413	Spacecraft Dyn and Ctrl	3
MAE 416	Vibration and Flutter	4
MAE 425	Aerospace Structures I	4
MAE 426	Aerospace Structures II	4
MAE 441	Principles of Design	3
MAE 460	Gas Dynamics	3
MAE 461	Aerodynamics II	3
MAE 462	Dynamics of Flight	3
MAE 463	Propulsion	3
MAE 464	Aerodynamics Laboratory	2
MAE 467	Aircraft Performance	3
MAE 468	Aerospace Systems Design	3
Area of Emphasis (Technical) Elec.		6 or 7

Aerospace Engineering Areas of Emphasis

Technical electives may be selected from one or more of the following areas. A student may, with prior approval of the department, select a general area or a set of courses that would support a career objective not covered by the following categories.

Aerodynamics. MAE 372, 382, 402, 471, 489, 492.

Design. MAE 403, 404, 435, 492, 498 (CAD Applications), 498 (Intro to Composites).

Propulsion. MAE 382, 436, 465, 489, 492

Stability and Control MAE 341, 417, 418, 447, 492.

Aerospace Structures. MAE 404, 410, 492; MSE 440

Aerospace Engineering
Program of Study
Typical Last Two-Year Sequence

Junior Year

		Semester Hour
First Semester		
ECE 334	Electr. Device/Instru.	4
MAE 317	Dynamic Systems and Control	4
MAE 361	Aerodynamics I	3
MAE 413	Spacecraft Dynamics	3
MAE 425	Aerospace Structures I	4
Total		18
Second Semester		
MAE 426	Aerospace Structures II	3
MAE 441	Principles of Design	3
MAE 460	Gas Dynamics	3
MAE 462	Dynamics of Flight	3
Microcomputer Elective		3 or 4
SS or HUM Elective[1]		2
Total		17 or 18

Senior Year

First Semester		
MAE 416	Vibration and Flutter	4
MAE 461	Aerodynamics II	3
MAE 463	Propulsion	3
MAE 464	Aerodynamics Laboratory	2
MAE 467	Aircraft Performance	3
SS or HUM Electives[1]		4
Total		19
Second Semester		
ECE 400	Engineering Communications	3
MAE 468	Aerospace Systems Design	3
Technical Electives		7
SS or HUM Electives[1]		3
Total		16

[1] See General Studies booklet

Energy Systems Engineering–B.S.E.

There is little doubt that the long range future of the United States is contingent upon our ability to deal effectively with our chronic energy problems. In an effort to solve these problems and to lessen their impact on economies and lifestyles, both government and industry have made commitments to energy production, conservation and research. This in turn has stimulated employment of engineers and scientists trained in fields that relate to this problem area.

Of the established fields of engineering, the field of mechanical engineering is the most closely allied to energy, its production (i.e., conversion of one form to another), transportation and end use. In this context, it is natural to find Energy Systems Engineering housed in the same department with Mechanical Engineering at ASU.

It is the purpose of this option to build on the traditional mechanical engineering areas of

fluid mechanics, thermodynamics, heat transfer, design and controls with student selected courses in the following areas of emphasis: alternative energy sources and conversion including solar energy; conventional sources and conversion; electrical power and distribution; environmental aspects, and nuclear power. A general area of emphasis is also available to allow a student to generate a pre-approved sequence of interest.

Energy Systems Engineering Major

Energy Systems students are required to fill their four hour Engineering Core approved mathematics content electives with:

		Semester Hour
ECE 384	Numerical Analys. Engr.	2
ECE 386	Part. Diff. Eqns. Engr.	2

The Energy Systems Engineering major consists of:

EEE 360	Electromechanics	3
PHY 361	Modern Physics	3
MAE 317	Dynamic Systems and Control	4
MAE 371	Fluid Mechanics	3
MAE 372	Fluid Mechanics	4
MAE 382	Thermodynamics	3
MAE 422	Mechanics of Materials	4
MAE 430	Introduction to Nuclear Engr.	3
MAE 441	Principles of Design	3
MAE 488	Heat Transfer	3
MAE 498	Energy Systems Engineering	3
MAE 491	Experimental Mechanical Engr.	3
MAE 492	Projects in Design and Development or MAE 443 Engineering Design (3)	2
Area of Emphasis (Technical) Electives		10, 11 or 12

Energy Systems Engineering Areas of Emphasis

Technical electives may be selected from one or more of the following areas. A student may, with prior approval of the department, select a general area or a set of courses that would support a career objective not covered by the following categories.

Alternative Sources and Conversion EEE 436; GLG 301, IEE 300; MAE 336, 437, 438.

Conventional Sources and Conversion IEE 300; MAE 415, 417, 422, 435, 436.

Electrical Power and Distribution EEE 302, 470, 471, 473; IEE 300; MAE 415, 417, 422, 435, 457, 462.

Environmental. BIO 320, 330; CEE 361, 362, 461; EEE 461; GLG 302, IEE 300; MAE 336, 417.

Nuclear EEE 439, 461, GLG 321, IEE 300; MAE 415, 417, 422, 431, 433, 435, 437, 442.

Energy Systems Engineering
Program of Study
Typical Last Two-Year Sequence

Junior Year

		Semester Hour
First Semester		
ECE 334	Electr. Device/Instru.	4
MAE 371	Fluid Mechanics	3
MAE 382	Thermodynamics	3
MAE 422	Mechanics of Materials	4
PHY 361	Modern Physics	3
Total		17
Second Semester		
EEE 360	Electromechanics	3
MAE 372	Fluid Mechanics	4
MAE 430	Intro. to Nuclear Engrg.	3
MAE 488	Heat Transfer	3
MAE 317	Dynamic Sys. and Contrl.	4
Total		17

Senior Year

First Semester		
Microcomputer Elective		3 or 4
MAE 441	Principles of Design	3
MAE 491	Exp. Mechanical Engineering	3
Technical Electives		6
SS or HUM Electives		4 or 3
Total		19
Second Semester		
ECE 400	Engineering Communications	3
MAE 498	Energy Systems Engineering	3
MAE 492	or MAE 443	2 or 3
Technical Electives		4, 5 or 6
SS or HUM Electives		5 or 6
Total		18

[1] See General Studies booklet.

Engineering Science--B.S.E.

The engineering science curriculum is designed for those who wish a more general background in engineering than is typically available in more specialized curricula paths and who wish

to gain a depth of understanding in underlying disciplines which are the scientific bases of engineering. The program is developed around fundamental course work in the broad fields of engineering mechanics, materials science, physics and mathematics. A major emphasis is placed on engineering mechanics which includes many important specialized areas such as acoustics and vibrations, elasticity of conventional and composite materials, rotor and gyrodynamics, finite element modeling of complex mechanical systems, and biomechanics of prostheses, just to name a few.

An Engineering Science graduate has the fundamental education which provides the flexibility and understanding required to cope with rapidly occurring changes in technology and needs of society. Problems in urban noise, vibration control in space vehicles at launch, optimal design of composite materials for aerospace and automotive structures, computer aided modeling of structures ranging from surgical implants in the body to space satellites are some examples of problems an engineering science graduate may encounter

Engineering Science Major

Engineering Science students are required to fulfill their four hour Engineering Core approved mathematics content electives with:

		Semester Hour
MAT 242	Elementary Linear Algebra	2
ECE 386	Part. Diff. Eqns Engr	2

The Engineering Science major consists of:

ECE 384	Numerical Analysis	2
EEE 340	Electromagnetic Engineering I	3
MAE 317	Dynamic Sys and Ctrl	3
MAE 371	Fluid Mechanics	3
MAE 372	Fluid Mechanics	4
MAE 402	Intro. to Continuum Mechanics	3
MAE 404	Finite Elements in Engineering	3
MAE 410	Acoustics and Noise Control	2
MAE 415	Vibration Analysis	4
MAE 422	Mechanics of Materials	4
MAE 488	Heat Transfer	3
MAE 492	Projects in Design and Development	2
MSE 440	Mech. Prop. of Solids	3
Area of Emphasis (Technical) Electives		11, 12 or 13

Engineering Science Areas of Emphasis

Technical electives may be selected from one or more of the following areas. A student may, with prior approval of the department, select a general area or a set of courses that would support a career objective not covered by the following categories (undergraduates must obtain instructor and department approval before enrolling in 500 level courses)

Biomechanics: BME 411, 412, EEE 434; MAE 341, 526.

Computer Science: CSC 305, 320, 383, 422, EEE 321, 421; IEE 463, MAE 405.

Engineering Mathematics: ASE 483, 485; CSC 383; ECE 383; MAT 460, 461, 462.

Engineering Mechanics: MAE 416, 426, 522, 523, 524, 527, 529, MSE 562.

Manufacturing Engineering: IEE 300, 374, 431, 463; MAE 351; MSE 440, 480.

Materials Science and Metallurgy: MSE 420, 431, 440, 480

Vibration and Acoustics: MAE 417, 511, 512, 513, 515, 516.

Engineering Science Program of Study
Typical Last Two-Year Sequence

Junior Year

		Semester Hours
First Semester		
ECE 334	Electr Device Instru	4
ECE 384	Numerical Analysis	2
EEE 340	Electrodynamics	3
MAE 371	Fluid Mechanics	3
MAE 404	Finite Elements in Engineering	3
MSE 440	Mechanical Properties of Solids	3
Total		18
Second Semester		
MAE 317	Dynamic Systems and Controls	4
MAE 372	Fluid Mechanics	4
MAE 410	Acoustics and Noise Control	3
MAE 402	Intro. to Continuum Mechanics	3
MAE 422	Mechanics of Materials	4
SS or HUM Electives		2
Total		20

Senior Year

First Semester		
MAE 415	Vibration Analysis	4
MAE 488	Heat Transfer	3
Technical Electives		4 or 3
Microcomputer Elective		4 or 3
SS or HUM Elective		4
Total		17
Second Semester		
ECE 400	Engineering Communications	3
MAE 492	Projects	2

SS or HUM Elective	5
Technical Electives	8
Total	18

See General Studies booklet

Mechanical Engineering–B.S.E.

Mechanical Engineering is a creative discipline that draws upon a number of basic sciences to design the devices, machines, processes, and systems which involve mechanical work and its conversion from, and into, other forms. It includes the conversion of thermal, chemical and nuclear energy into mechanical energy through various engines and powerplants; the transport of energy via devices like heat exchangers, pipelines, gears, and linkages, and the use of energy to perform a variety of tasks for the benefit of society, such as in transportation vehicles of all types, manufacturing tools and equipment, and household appliances. Furthermore, since all manufactured products must be constructed of solid materials and because most products contain parts that transmit forces, Mechanical Engineering is involved in the structural integrity and materials selection of almost every product on the market.

Mechanical engineers are employed in virtually every kind of industry. They are involved with seeking new knowledge through research, with doing creative design and development, and with the construction, control, management, and sales of the devices and systems needed by man. Therefore, a major strength of a Mechanical Engineering education is the flexibility it provides in future employment opportunities for its graduates.

The undergraduate curriculum includes the study of principles governing the use of energy, principles of design, instruments, and control devices; and the application of these studies to the creative solution of practical, modern problems.

Mechanical Engineering Major

Mechanical Engineering students are required to fill the four hour Engineering Core approved mathematics content elective with

		Semester Hours
MAT 242	Linear Algebra	2
ECE 386	Part. Diff. Eqns. Engr.	2

The Mechanical Engineering major consists of:

ECE 384	Numerical Analysis	2
MAE 317	Dynamic Systems and Control	4
MAE 371	Fluid Mechanics	3
MAE 372	Fluid Mechanics	4
MAE 382	Thermodynamics	3
MAE 415	Vibrations	4
MAE 422	Mechanics of Materials	4
MAE 441	Principles of Design	3
MAE 442	Principles of Design II	3
or		
MAE 446	Thermal Systems Design	(3)
MAE 443	Engineering Design	3
MAE 488	Heat Transfer	3
MAE 491	Experimental Mechanical Engineering	3
MAE 492	Projects	2
Area of Emphasis (Technical Electives		10 or 11

Mechanical Engineering Areas of Emphasis

Technical electives may be selected from one or more of the following areas. A student may, with prior approval of the department, select a general area or a set of courses that would support a career objective not covered by the following categories.

Aerospace. MAE 410, 413, 435, 436, 437, 446, 460, 461, 462, 463, 471, 489.

Biomechanical. BME 411, 412, 517 (recommended); EEE 302, 434; MAE 321, 526.

Computer Methods. ASE 483, 485; CHE 581; CSC 320, 422; ECE 383; IEE 463, 475; MAE 403, 404, 405, 471; MAT 464, 465.

Control and Dynamic Systems. CSC 320; ECE 383, EEE 360; IEE 463; MAE 413, 416, 417, 418, 419, 462.

Design. MAE 333, 341, 351, 403, 404, 417, 433, 435, 438, 442, 446, 447, 498 (CAD Applications), 498 (Intro. to Composites).

Engineering Mechanics. MAT 464, 466; MAE 341, 402, 404, 410, 413, 416, 426, 442, 460, 461, 471.

Manufacturing. IEE 300, 374, 411, 431, 461, 463; MAE 341, 351, 401, 403, 404, 442, 447, MSE 355, 420, 431, 440, 453.

Stress Analysis, Failure Prevention and Materials. ECE 383, MAE 341, 404, 426, 447; MSE 355, 420, 431, 440, 450.

Thermosciences. MAE 336, 430, 434, 435, 436, 437, 446, 460, 471.

Mechanical Engineering
Program of Study
Typical Last Two-Year Sequence

Junior Year

		Semester Hours
First Semester		
ECE 334	Electr. Device/Instru.	4
ECE 384	Numerical Analysis	2
MAE 371	Fluid Mechanics	3
MAE 382	Thermodynamics	3
MAE 422	Mechanics of Materials	4
Total		16
Second Semester		
MAE 317	Dynamic Systems and Control	4
MAE 372	Fluid Mechanics	4
MAE 441	Preliminary Design	3
MAE 488	Heat Transfer	3
Microcomputer Elective		3 or 4
Total		17 or 18

Senior Year

First Semester		
MAE 415	Vibration Analysis	4
MAE 442	or 446	3
MAE 491	Exp. Mech. Engrg.	3
Technical Electives		4 or 3
SS or HUM Electives[1]		5
Total		19 or 18
Second Semester		
ECE 400	Engineering Communications	3
MAE 443	Engineering Design	3
MAE 492	Projects	2
Technical Electives		7
SS or HUM Electives[1]		4
Total		19

[1] See General Studies booklet.

Programs in Engineering Special and Interdisciplinary Studies

George C. Beakley, Ph.D., Director

FACULTY:
DORSON, GUILBEAU, KEARFOTT, TOWE, WINTERS

Bioengineering–B.S.E.

Bioengineering is a separate major under the School of Engineering and is administered by the same office as the Special and Interdisciplinary Engineering Studies.

Bioengineering (synonyms: biomedical engineering, medical engineering) is that discipline of engineering that applies principles and methods from engineering, the physical sciences, the life sciences, and the medical sciences to understand, define, and solve problems in medicine, physiology and biology. Bioengineering bridges the engineering, physical, life, and medical sciences. More specifically, the bioengineering program at ASU educates engineering students to use engineering principles and technology to develop instrumentation, materials, diagnostic and therapeutic devices, artificial organs and other equipment needed in medicine and biology, and to discover new fundamental principles regarding the functioning and/or structure of living systems. The multidisciplinary approach to solving problems in medicine and biology has evolved from exchanges of information between specialists in the concerned areas.

Because a depth of knowledge from at least two diverse disciplines is required in the practice of bioengineering, students desiring a career in bioengineering should plan for advanced study beyond the bachelor's degree. The Bioengineering major at ASU is especially designed for students desiring advanced study in bioengineering in graduate programs, a career in the medical device industry, a career in biomedical research, a career in biotechnology research, or entry into a medical college.

Academic Requirements

In addition to the General Studies requirement, CHM 116 Chemistry must be selected in the Engineering Core and the following courses are required in the undergraduate bioengineering major which have been selected to meet all university requirements and ABET accreditation requirements:

		Semester Hours
BIO 181	General Biology	4
BIO 182	General Biology	4
CHM 113	General Chemistry	4
BME 331	Transport Phenomena II: Fluids	3
BME 334	Heat and Mass Transfer	3
BME 411	Biomedical Engineering I	3
BME 412	Biomedical Engineering II or CHM 331 General Organic Chemistry (3)	3
BME 413	Physiological Instrumentation	3
BME 417	Biomedical Engineering Design	3
BME 418	Biomaterials	3
BME 435	Animal Physiology or AGB 435 Animal Physio (4)	4
BME 492	Biomedical Engineering Projects	2
BME 496	Professional Seminar	0
Technical Electives		13

Areas of Emphasis

Students interested in a career in Bioengineering may elect to emphasize either biochemical, bioelectrical, biomechanical, bionuclear, biosystems or premedical engineering. Although organic chemistry and biochemistry are not required in the bioelectrical, biomechanical, bionuclear and biosystems engineering areas of emphasis, students selecting these areas are encouraged to include organic and biochemistry in their advanced degree programs of study.

Biochemical Engineering: Designed to strengthen the student's knowledge of chemistry and transport phenomena and is particularly well suited for students interested in biotechnology. The following courses are required in the Engineering Core: ECE 340, ECE 350 and CHE 461. Technical Electives must include: CHM 331, CHM 332, CHM 361 (or CHM 461 or 462). The remaining 4 hour technical elective must be an upper division engineering course of engineering science and design content

Bioelectrical Engineering Designed to strengthen the student's knowledge of electrical systems, signal processing, and medical imaging. It emphasizes bioelectric phenomena, medical instrumentation, non invasive imaging, and electro physiology. The following courses are required in the Engineering Core: ECE 340, ECE 352 and EEE 221. Technical electives must include: BME 414, EEE 302 and EEE 303 Remaining technical electives will be selected from BME 412, BME 419, BME 420 or any 400 level EEE course with acceptable engineering science and design content.

Biomechanical Engineering Designed to strengthen the student's knowledge of mechanics, materials science, control theory, and mechanical design. It emphasizes the design of orthopedic load bearing joint replacement devices, orthotic devices, and other mechanical devices important in the practice of medicine. It also provides the fundamentals for the study of neuro muscular control, human work systems, and the study of human motion The following courses are required in the Engineering Core: ECE 340, ECE 350, ECE 384, and MAE 405. Technical electives may be selected from one of the following three groups:

Biomechanics: BME 416, MAE 404 (or MAE 450 , MAE 422 and MAE 441.

Biocontrols: BME 416, BME 419, MAE 317, and MAE 417 (or MAE 447 .

Human Work Systems: BME 416, BME 419, IEE 362 and MAE 351

Bionuclear Engineering Designed to strengthen the student's knowledge of radiation interactions and shielding, health physics, radiation biology, and nuclear instrumentation. It emphasizes radiological imaging, medical physics, nuclear medicine, radio therapy, and radiation protection The following courses are required in the Engineering Core: ECE 340, ECE 352 and EEE 221. Technical electives will include: EEE 461, EEE 465 and PHY 361. Remaining technical electives will be selected from EEE 464 and BME 414 (or any 400 level BME, MAE [nuclear] or EEE courses with acceptable engineering science and design content).

Biosystems Engineering Designed to strengthen the background of students interested in physiological systems analysis and design of artificial organs and medical devices that are based on chemical reactions and include momentum, heat or mass transfer phenomena. Analyzing or designing flowing and reacting systems requires a background in transport phenomena, thermodynamics, and reaction engineering Whether the system involves our microcirculation and physiological events or an artificial organ and extracorporeal circulation, there is a core of bioengineering sciences and design common to both applications. The following courses are required in the Engineering Core: CHM 441, CHM 442 and CHE 461 Technical electives must include CHE 311, CHE 312, CHE 342 and BME 419.

Premedical Engineering Designed to meet the needs of students desiring entry into a medical or dental school The course sequence provides an excellent background for advanced study leading to a career in research in the medical or life

sciences. The following courses are required in the Engineering Core: ECE 340, ECE 350. Technical electives must include CHM 331, CHM 332 and CHM 335. Remaining technical electives must consist of 6 hours of BME prefix courses plus biology or biochemistry courses which must meet engineering science and design content requirements

Bioengineering Program of Study
Typical Four-Year Sequence

First Year

		Semester Hour
First Semester		
CHM 113	General Chemistry	4
MAT 290	Calculus I	5
ENG 101	First Year Composition	3
ECE 105	Language of Engineering	3
ECN 111	Macroeconomic Principles	3
BME 496	Professional Seminar	0
Total		18
Second Semester		
CHM 116	General Chemistry	4
MAT 291	Calculus II	5
ECE 106	Computer Aided Engineering	3
PHY 115	University Physics	4
PHY 117	University Physics Lab	1
BME 496	Professional Seminar	0
Total		17

Second Year

First Semester		
ENG 102	First Year Composition	3
MAT 274	Elem Diff. Equations	3
PHY 116	University Physics	4
PHY 118	University Physics Lab	1
BIO 181	General Biology	4
SS or HUM Elective		3
BME 496	Professional Seminar	0
Total		18
Second Semester		
BIO 182	General Biology	4
ECE 211	Engr Mech. I. Statics	2
ECE 384	Numerical Analysis or ECE 386 Part Diff. Eqns. or MAT 242 Linear Algebra	2
Literacy Elective[1]		3
ECE 301	Electrical Networks I	3
BME 435	Animal Physiology I	4
BME 496	Professional Seminar	0
Total		18

Third Year

First Semester		
ECE 312	Engr. Mech. II: Dynamics	3
ECE 340	Thermodynamics or CHM 441 Gen Phys Chem	3
BME 331	Transport Phenomena I: Fluids	3
ECE 314	Intro to Deformable Solids	2
BME 411	Biomedical Engineering I	3
SS or HUM Elective*		3
BME 496	Professional Seminar	0
Total		17
Second Semester		
ECE 350	Struc. and Prop. of Materials or ECE 351 Engr Materials or ECE 352 Semi. Cond. and Dev or CHM 442 Gen Phy Chem.	3
BME 334	Heat and Mass Transfer	3
BME 413	Physiological Instrumentation	3
ECE 354	Electrical Devices and Instr	4
Technical Elective		3
BME 496	Professional Seminar	0
Total		16

Fourth Year

First Semester		
BME 418	Biomaterials	3
SS or HUM Elective*		3
MAE 405	Micro. Computer Aided Processes or CHE 461 Process Control or CSC 220 Computer Organ. and Assembly Lang or EEE 221 Digital Comp. Fund. or IEE 463 Comp. Aided Manf.	3
BME 492	Senior Design Project	2
Technical Elective		3
Technical Elective		3
BME 496	Professional Seminar	0
Total		17
Second Semester		
BME 412	Biomedical Engr. II or CHM 331 (3)	3
BME 417	Biomedical Engineering Design	3
ECE 400	Engineering Communications	3
ECE 383	Probability and Statistics	2
SS or HUM Elective[1]		3
Technical Elective		4
BME 496	Professional Seminar	0
Total		18

Graduation requirement: 128 semester hours plus English proficiency

* See General Studies booklet for requirements and approved list of courses

Engineering Special Studies–B.S.E.

The majors of Engineering Special Studies and of Engineering Interdisciplinary Studies accommodate students whose educational objectives require more intensity of concentration on a particular subject or more curricular flexibility within an engineering discipline than the traditional departmental majors generally permit. These majors are School of Engineering programs. Unlike the departmental major areas, however, there is not a separate faculty. The faculty teaching and advising in these programs are from the School of Engineering.

For many students, engineering studies form the basis of preparation for professional engineering work where proficiency in the application of science and the physical and social technologies are brought to bear on problems of large scope. The necessary breadth that these students seek often is not obtainable in traditional engineering fields. Rather, especially designed programs of course work that merge the required principles and approaches drawn from all fields of engineering and other pertinent disciplines are desired. As an answer to this need, two types of course arrangements are available: (1) the Bachelor of Science in Engineering degree special programs, and (2) engineering interdisciplinary programs that lead to the degree Bachelor of Science.

The B.S.E. Engineering Special Programs are designed primarily for students intending to pursue engineering careers at a professional level in industry or graduate studies. The B.S. Engineering Interdisciplinary Programs accommodate those students who desire the integrity of an engineering education but plan to enter professions other than engineering, or particularly to serve society in socially relevant activities. Both are developed beyond the General Studies and the engineering core.

The curricula leading to both the Bachelor of Science in Engineering (B.S.E. and the Bachelor of Science (B.S. have been accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET).

Computer Systems Engineering. This program is administered by the Department of Computer Science (see page 239).

Manufacturing Engineering. This program is administered by the Department of Industrial and Management Systems Engineering (see page 262).

Nuclear Sciences. The nuclear sciences curriculum encourages an individualized program based on the student's own career interests and objectives. The program provides a strong foundation in basic engineering and nuclear concepts. Electives are generally taken during the junior and senior years and must be approved by a designated faculty advisor. The electives should focus on a technical or environmental area associated with the (1) discovery, development or utilization of energy, or (2) materials or products which use, release or may be affected by radiation.

Individual elective programs may also be aligned with a traditional discipline such as chemical, civil, electrical or mechanical engineering. They may be tailored toward specific energy resources such as those associated with fission, fusion, solar, geothermal, fossil fuels or synthetic fuels such as oil shale. They may be structured for specific high demand areas such as radiation health physics, medical physics, radiological imaging, power systems engineering, corrosion and radiation effects on materials, computer aided operation and accident analysis at power generation facilities, or designing better man machine interfaces. Finally, there are opportunities to pursue selected areas such as waste disposal, radiation effects on electronics in space, biomedical applications, nuclear applications in forensics, low level radiation measurements of our natural radiation environment, or anomalies from trace amounts of natural radioactivity in computer microprocessing circuits.

Motivated students who have demonstrated scholastic excellence will be encouraged to participate in summer research programs at national laboratories or with an appropriate industry. In addition, students may elect an independent study or senior research project. The exercise provides an opportunity to assemble and apply the newly acquired engineering knowledge and laboratory skills to an in depth investigation of a real world problem.

The following courses are required as a part of the engineering core:

		Semester Hours
ECE 350	Structure and Properties of Materials	3
	or ECE 352 Semiconductors and Devices	

CSC 220	Computer Org and Assembly Language Processes	4
	or EEE 221 Digital Computer Fundamentals (4)	
	or MAE 405 Microcomputer Aided Processes for Mechanica Engineers 3	

In addition, the following courses are required:

MAE 371	Fluid Mechanics	3
	or EEE 302 Electrical Networks II (3)	
MAE 382	Thermodynamics	3
	or EEE 303 Signals and Filters (3)	
	or EEE 322 Digital Computer Fundamentals (4)	
EEE 460	Nuclear Engineering	3
	or MAE 430 Introduction to Nuclear Engineering	
EEE 461	Health Physics Principles and Radiation Measurements	3
EEE 462	Reactor Safety Analysis	3
EEE 463	Electric Power Plant Systems	3
	or MAE 433 Nuclear Plant Systems Design	
EEE 464	Nuclear Engineering Experiments	3
EEE 465	C inical Nuclear Engineering I	3
MAE 415	Vibration Analysis	4
	or EEE 480 Feedback Systems	
MAE 422	Mechanics of Materials	4
PHY 361	Modern Physics	3
Technical Electives		16

Systems Engineering. Systems Engineering deals with the integration of diverse components into a functioning whole. This curriculum combines the more traditional studies of electrical and industrial engineering with contemporary analytical and computer based problem solving skills. The program also has a strong computer science component. Graduates are prepared for a broad variety of industrial, manufacturing, and design engineering career opportunities.

After completing a basic core of fundamental courses in mathematics, physical sciences, and engineering sciences, each Systems Engineering student undertakes a major which includes courses in computer science, electronic circuits, operations research, computer simulation, microprocessors, engineering economics, digital system design, microcomputer fundamentals, and integrated production control. Technical electives may be selected to allow the student to acquire concentrated knowledge in electrical engineering, industrial engineering, or computer science.

The following courses are required as a part of the engineering core and mathematics electives.

		Semester Hour
EEE 221	Digital Computer Fundamentals	4
ECE 352	Semiconductors and Devices	3
	or ECE 350 Structure and Properties of Materials	3
ECE 383	Probability and Statistics for Engineers	3
MAT 242	Linear Algebra	2

In addition, the following courses are required:

CSC 220	Computer Org. and Assembly Language Programming	4
CSC 320	Computer Arch. and Organization	4
CSC 422	Microcomputer System Design	4
EEE 302	Electrical Networks II	3
EEE 303	Signa s and Filters	3
EEE 455	Communication Systems	4
EEE 480	Feedback Systems	4
IEE 300	Economic Analysis for Engineers	2
IEE 461	Integrated Production Control	3
IEE 475	Introduction to Simulation	3
IEE 476	Operations Research Techniques Applications	4
ASE 492	Project in Design and Development	3
Technical Electives		11

Engineering Interdisciplinary Studies–B.S.

Business and Pre-Law. This program accommodates especially those engineering students whose primary intent is to earn a law degree (J.D.) or a graduate degree in business administration M.B.A. . The success with which engineers have risen to positions of leadership in business and government is well established. It is predicted that with the rapid increase in technological advance on every hand, opportunities for engineers to enter business and legal careers will be enhanced to an even greater degree in the future.

In addition to ECN 111, the following course is required as a part of the social sciences requirement:

		Semester Hour
ECN 112	Microeconomic Principles	3

The following courses are required as a part of the engineering core and mathematics elec tives:

MAT 242	Elementary Linear Algebra	2
ECE 383	Probability and Statistics for Engineers	3
IEE 463	Computer Aided Manufactur ing and Control	3

In addition, the following courses are re quired:

ACC 211	Elementary Accounting	3
ACC 212	Elementary Accounting	3
ASE 485	Engineering Statistics	3
GNB 305	Legal Environments of Business	3
FIN 300	Fundamentals of Finance	3
IEE 300	Economic Analysis for Engineers	2
IEE 367	Methods Engineering and Facilities Design or IEE 422 Information Acquisition (3)	4
IEE 461	Integrated Production Control	3
IEE 476	Operations Research Techniques Applications	4
IEE 492	Project in Design and Development	3
MGT 301	Principles of Management	3
MKT 300	Principles of Marketing	3
Engineering Technical Electives (including three courses of engineering science and one of engineering design type content)		15

Geological Engineering. This program incor porates the joint application of engineering and geological principles to the p anning, analysis and design of engineering projects directly related to the earth, its materials, structures and forces. The goal of the program is to inves tigate the physical properties of the shallow portions of the earth s crust which influence the design and construction of engineering struc tures such as foundations, excavations, dams, highways and sites for waste disposal Addition ally, the geological factors associated with land use planning and with the occurrence of petro leum and mineral deposits are encompassed within the program

The following courses are required as a part of the engineering core:

		Semester Hours
ECE 351	Engineering Materials	3
CEE 400	Microcomputer Applications in Civil Engineering	3

In addition, the following courses are re quired:

CEE 351	Soil Mechanics	4
CEE 452	Foundat ons	3
CEE 552	Geologica Engineering	3
GLG 01	Physical Geology	3
GLG 105	Introduction to Geology Lab	1
GLG 310	Structural Geology	3
GLG 321	Minera ogy	4
GLG 325	Opt cal and X Ray Techniques	3
GLG 474	Petrology Petrography	4
MAE 371	Fluid Mechanics	3
ASE 492	Project in Design and Development	3
Engineering Technical Electives (including two courses of engineering science and two courses of engineering design type con tent. An approved summer eng neering geology field course is also highly recom n ended		18

Premedical Engineering. In the past decade the interrelat on between engineering and medi cine l as become vigorous and exciting. Our rap idly expand ng technology dictates that engi neering will continue to become increasingly involved in all branches of medicine As this develops, so will the need for physicians train ed in the engineering sciences medical men and women with a knowledge of computer technol ogy, transport phenomena, biomechanics, bio electric phenomena, operations research, and cy bernet cs. This program emphasis would be of special nterest to students desir ng entry into a medical college and whose medical interests lie in research, aerospace and undersea med cine, ar tificial organs, prostheses, biomedical engineer ing, or biophysics Since both engineering and medicine have as their goal the well being of man, this program could be compatible with any field of medical endeavor

The follow ng courses are required as a part of the engineering core

		Semester Hours
CHM 116	General Chemistry	4
ECE 340	Thermodynamics or CHM 441 General Physical Chemistry (3)	3
ECE 350	Struc. and Prop/Mat ls or CHM 442 General Physical Chemistry 3)	3
ECE 383	Probability and Statistics	2
CHE 461	Chemical Engrg. Process Contro or CSC 220 Computer Organization and Assembly Language Programming (4) or IEE 465 Computer Aided Manufacturing and Control (3)	3

or MAE 405 Microcomputer Aided Processes for Mechanical Engineers 3

In addition, the following courses are required:

BIO 181	General Biology	4
BIO 182	General Biology	4
BME 331	Transport Phenomena I: Fluids	3
BME 334	Heat and Mass Transfer	3
BME 411	Biomedical Engineering I	3
BME 412	Biomedical Engineering II	3
BME 413	Physiological Instrumentation	3
BME 417	Biomedical Engineering Design	3
BME 435	Animal Physiology or AGB 435 Animal Physiology 4	4
BME 492	Biomedical Engineering Projects	2
BME 496	Professional Seminar*	0
CHM 113	General Chemistry	4
CHM 331	General Organic Chemistry	3
CHM 332	General Organic Chemistry	3
CHM 335	General Organic Chemistry Laboratory	1
CHM 336	General Organic Chemistry Laboratory	1
Engineering Technical Electives (to be selected from an area of emphasis)		8

* Students must register for BME 496 each semester

Students interested in premedical engineering may elect to emphasize either general bioengineering or computer science.

General Bioengineering Designed to strengthen the student's knowledge of bioengineering. It emphasizes biomedical research. The following courses are required in the Engineering Core ECE 340, ECE 350, and MAE 405. The 8 hours of technical electives may be selected from engineering, biology or chemistry upper division courses but these courses must include 6 hours of engineering science content.

Computer Science Designed for students interested in the application of modern computer technology for medical information processing, medical scientific computation, and for the recognition, storage, retrieval and processing of medical data. The following courses are required in the Engineering Core, MAT 242, ECE 340, ECE 352 and CSC 220. Technical electives must include CSC 310, one advanced computer programming course selected from CSC 383, CSC 400 or CSC 470, and an upper division engineering course of engineering science and design content.

Premedical Engineering Program of Study
Typical Four-Year Sequence

First Year

		Semester Hours
First Semester		
CHM 113	General Chemistry	4
MAT 290	Calculus I	5
ENG 101	First Year Composition	3
ECE 105	Language of Engineering	3
ECN 111	Macroeconomic Principles	3
BME 496	Professional Seminar	0
Total		18
Second Semester		
CHM 116	General Chemistry	4
MAT 291	Calculus II	5
ECE 106	Computer Aided Engineering	3
PHY 115	University Physics	4
PHY 117	University Physics Lab	1
BME 496	Professional Seminar	0
Total		17

Second Year

First Semester		
ENG 102	First Year Composition	3
MAT 274	Elem. Diff. Equations	3
PHY 116	University Physics	4
PHY 118	University Physics Lab	1
BIO 181	General Biology	4
SS or HUM Elective		3
BME 496	Professional Seminar	0
Total		18
Second Semester		
BIO 182	General Biology	4
ECE 211	Engr. Mech. I: Statics	2
ECE 384	Numerical Analysis or ECE 386 Part. Diff. Eqns. or MAT 242 Linear Algebra	2
Literacy Elective[1]		3
ECE 301	Electrical Networks I	3
CHM 331	General Organic Chemistry	3
CHM 335	Gen. Organic Chem. Lab	1
BME 496	Professional Seminar	0
Total		18

Third Year

First Semester		
ECE 312	Engr. Mech. II: Dynamics	3
ECE 340	Thermodynamics or CHM 441 Gen. Phys. Chem.	3
BME 331	Transport Phenomena I: Fluids	3

ECE 314	Intro. to Deformable Solids	2
CHM 332	General Organic Chemistry	3
CHM 336	Gen. Organic Chem. Lab	1
BME 411	Biomedical Engr. I	3
BME 496	Professional Seminar	0
Total		18

Second Semester

ECE 350	Struc. and Prop. of Materials or ECE 351 Engr Materials or ECE 352 Semi. Cond. and Dev. or CHM 442 Gen Phy Chem	3
BME 334	Heat and Mass Transfer	3
ECE 334	Elect. Devices and Instr.	4
SS or HUM Elective		3
BME 412	Biomedical Engr. II	3
BME 496	Professional Seminar	0
Total		16

Fourth Year

First Semester

BME 435	Animal Physiology	4
MAE 405	Microcomputer Aided Processes or CHE 461 Process Control or CSC 220 Computer Organ. and Assembly Lang. or EEE 221 Digital Comp. Fund or IEE 463 Comp. Aided Manf.	3
BME 492	Senior Design Project	2
SS or HUM Elective[1]		3
Technical Elective		3
Technical Elective		3
BME 496	Professional Seminar	0
Total		18

Second Semester

BME 413	Physiol. Instr.	3
BME 417	Biomedical Engineering Design	3
ECE 400	Engineering Communications	3
ECE 383	Probability and Statistics	2
SS or HUM Elective		3
Technical Elective		2
BME 496	Professional Seminar	0
Total		16

Graduation requirements 13 semester hours plus English proficiency

[1] See General Studies booklet for requirements and approved list of courses

Analysis and Systems

ASE 100 College Adjustment and Survival. 2 F, S
Exploration of career goals and majors. Emphasis on organization and development of study skills including time management, stress management, and use of the library.

399 Cooperative Work Experience. 1 F S
Usually involves two 6 month work periods with industrial firms or government agencies alternated with full-time semester and summer sessions students. Prerequisites: At least 45 hours completed in major area with minimum 2.50 GPA, approval of instructor. Not open to students from other colleges on campus.

483 Probability for Engineers. 3 S
First course in applied stochastic processes. Special emphasis on applying theory developed for Markov and renewal processes to queueing, reliability, time series and social and behavioral problems. Prerequisite: ECE 383.

485 Engineering Statistics. 3 F S SS
Statistical methods applied to engineering problems. Estimation, tests of hypotheses, regression, correlation, analysis of variance and nonparametric statistics. Prerequisite: ECE 383. *[Satisfies General Studies Requirement N2]*

492 Project in Design and Development. 2 3 F S, SS
Individual project in creative design and synthesis. Prerequisite: Senior standing.

496 Professional Seminar. 0 F, S
Topics of interest to students in the engineering specialized and interdisciplinary studies.

500 Engineering Statistics. 3 F S SS
Statistical methods applied to engineering problems. Estimation, tests of hypotheses, regression, correlation, analysis of variance and nonparametric statistics. Prerequisites: ECE 383 or ECE 500. Open only to students without previous credit in ASE 485.

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, heat transfer. Prerequisites: MAT 242, 274, ECE 386.

See page 38 for special courses which may be offered by this academic unit.

Chemical and Bio Engineering and Materials Science

BIOENGINEERING

BME 331 Transport Phenomena I: Fluids. 3 F S
Transport phenomena w th emphas s on f u d systems. Prerequ s tes MA 274 PHY 116 A so sted as CHE 331

334 Heat and Mass Transfer. 3 A
Appl cat on of the prnc p es of heat and mas transfer phenomena to so ut o of prob ems n med cine and medica dev ce des gn Prerequ te MAT 274 PHY 116 A so sted as CHE 334

411 Biomedical Engineering I. 3 F
Rev ew of d agnost c and prosthet c methods us ng eng neering methodo ogy Introduct on to transport, metabo c and autoregu atory processes n the human body Prerequ s tes approva of nstructor A so sted as CHE 411

412 Biomedical Engineering II. 3 S
Rev ew of e ectrophys o ogy and nerve pac ng app ica t ons ntroduct on to b omechan cs and jo nt/ mb replace ment techno ogy, card ovascu ar and pu onary f u d mechan cs app cat on of mathemat ca mode ng Prerequis tes approva of n tructor A so sted as CHE 412

413 Physiological Instrumentation. 3 S
Prob ems concepts, and techniques of b omed ca nstru mentat on n static and dynam c env ronments Pre requ s tes. BME 435 or AGB 435 ECE 334. A so sted as CHE 413. *[Sat sf es Genera Stud es Requ rement L2]*

414 Biomedical Instrumentation. 3 F
E ectr ca phys ca , and mechan ca pr nc p es govern ng the operat on of modern b omed ca nstrumentat on nc ud ng b osensors EEG ECG recorde s u trason c mag ng, d agn st c dev ces Prerequ s tes MAT 274 ECE 334.

415 Biomedical Transport Processes 4 A
Pr nc p es of momentum heat and mass transfe w th ap p cat ons to med ca and b o og ca systems and med ca dev ce des gn. Prerequ s tes MAT 274 PHY 116

416 Biomechan cs. 3 S
Mechan ca propert es of bo e musc e and soft t ssues Static and dynam c ana ys s f human movement tasks such as ocomot on Prerequ s tes ECE 312 ECE 314

417 Biomedical Engineer ng Design 3 A
Techn ca reg atory econom c ega soc a and eth ca aspects of med ca dev ce systems eng neer ng des gn Prerequ s tes. Sen or stand ng n B oeng neering o ap prova of nstructor

418 Biomaterials. 3 A
Material propert es of natura and art f c a b omatena s T ssue and b ood b ocompat b ty Uses of mater a s to rep ace body parts Prerequ s te ECE 314

419 Biocontrol Systems. 3 F
App cation of near and non near contro systems tech n ques toward ana ys s of neuromuscu oske eta card ovascu ar therma and mas transfer systems of body Prerequi tes· MAT 274 and ECE 301

435 Animal Physiology. 4 F
Contro and fu ct on of the nervous muscu ar card ovas cu ar resp ratory and renal systems of domest c an mals A so sted as AGB 435 3 hour ecture 3 hour ab oratory Prerequ s tes. CHM 113 B O 181

492 Biomedical Engineering Projects. 1 5 F, S, SS nd v dua projects n med ca systems or med ca dev ce des gn and deve opment

496 Professional Seminar. 0 F S
Profess ona and eth ca aspects w th a d scuss on of em p oyment opportun t es and respons bi t es Lecture and f e d tr ps

511 Biomedical Engineering. 3 A
D agnost c and prosthet c methods us ng eng neer ng methodo ogy Transport metabo c and autoregu atory processes n the body

512 Biomedical Engineering II. 3 A
E ectrophys o ogy and nerve pac ng app cat ons ntro duct o to b omechanics and jo nt/ mb rep acement, tech no ogy card ovasc ar and pu monary f u d mechan cs mathemat ca model ng

513 Physiolog cal Instrumentation I 3 A
Prob ems concepts and techn ques of biomed ca nstrumentat on n stat c and dynam c env ronments

514 Biomedical Instrumentation. 3 F
E ectr a phys ca and mechan ca pr nc p es govern ng the operat on of modern b omed ca nstrumentation Pre equ s tes MAT 274, ECE 334

515 Biomedical Transport Processes. 3 N
Pr nc p es of momentum heat and mass transport with ap p cat ons to med ca and b o og ca systems and med cal device des gn Prerequis te approva of nstructor A so sted as CHE 515.)

516 Topics in Biomechanics. 3 S
Mechan ca propert es of bone, musc e and soft t ssues. Stat c and dynam c ana ys s of human movement tasks, nc ud ng n depth project Prerequ s tes ECE 312 ECE 314 or approva of nstructor

517 Prosthetic and Diagnostic Engineering. 3 N
Cr ter a for mechan ca rep acement or ass stance of organ funct ons, d agnost c methods equ pment and usage ex st ng methodo ogy and future requ rements, nc ud ng deta ed des gns Prerequ site approva of n st uctor. A so sted as CHE 517

518 Introduction to Biomaterials. 3 F
Top cs nc ude structure property re at onsh ps for syn thet c and nat ra b omater a s b ocompat b ty and uses of mater a s to rep ace body parts Prerequ s te. ECE 313 or approva of nstructor A so sted as CHE 518

519 Topics in Biocontrol Systems. 3 F
L near and on near contro systems ana ys s of neuro muscu oske eta card ovascu ar, therma and mass transfer systems of body nclud ng n depth project Prerequ s te MAT 274

520 Bioelectric Phenomena. 3 N
Study of the or g n propagat on and nteract ons of b o e ectr c ty n v ng th ngs vo ume conductor prob em mathemat ca ana ys s of b oe ectr c nteractions uses n med ca d agnost cs

521 Neuromuscular Control Systems. 3 S
Overv ew of sensor motor bra n structures App cat on of non near adapt ve, opt ma and superv sory contro theory to eye head hand coord nat on locomot on

See page 38 for special courses which may be offered by this academic unit.

CHEMICAL ENGINEERING

CHE 311 Material Balances. 3 F, S
Pr ncip es of phys cs and chem stry app ed to the for mu at on of mater a balances Prerequ s tes. CHM 116 MAT 291 or MAT 271

312 Introduction to Thermodynamics. 3 F S
Energy ba ance ca cu at ons and ntroduct on of thermo dynam c princ p es Prerequ s te CHE 311

321 Computational Techniques in Chemical Eng'neering I. (2) F S
Computer methods for so v ng chem cal eng neering prob ems. Numerical so ut ons of a gebra c systems and ord nary d fferent a equat ons Prerequ s te ECE 106 Corequ site MAT 274

322 Computational Techniques in Chemica Engineering II. 2 F, S
Methods for solv ng chem cal eng neer ng prob ems Numer ca so ut on of P D E. s regress on ana ys s, op t m zat on stat st ca methods and exper menta des gn Prerequ s te CHE 321 MAT 272.

331 Transport Phenomena 1: Fluids. 3 F S
Transport phenomena w th emphas s on f u d systems Prerequ s tes. MAT 274 PHY 116 CHE 311 A so l sted as BME 331)

332 Transport Phenomena II. Energy Transfer. 3 F S
Cont nuat on of transport princ ples w th emphas s on energy transport in stat onary and f u d systems Pre requ s te. CHE 312, 331

333 Transport Phenomena III: Mass Transfer. 3) F, S
The app cat on of transport phenomena to mass transfer and the design of mass transfer equ pment. Prerequ s te CHE 312 331, Corequ s te. CHE 332, 342

342 Applied Chemical Thermodynamics. 3 F S
Energy relat ons and equi brium convers ons based on chem ca potent a s and phase equ bria Prerequ site· CHE 312

351 Measurements Laboratory. 2) F
Introduct on to aboratory pract ces and the use of mea surement dev ces Prerequ s te· CHM 116 Corequ s te CHE 311; CHM 335 *[Satisfies General Stud es Requ re ment. L1]*

352, 353 Transport Laboratories. 2, 2 S
The demonstrat on of transport phenomena princ p es w th exper ments n f u d f ow heat and mass transfer Prerequ s te: CHE 331 for CHE 352 CHE 332 for CHE 353, Corequ site CHE 333 for CHE 353. *[Sat sf es Gener al Studies Requ rement L1 (352)]*

411 Biomedical Engineering I. 3 F
Rev ew of d agnost c and prosthet c methods us ng en g neering methodology. Introduct on to transport meta bo c and autoregulatory processes n the human body Prerequ s te approval of nstructor (A so sted as BME 411.)

412 Biomedical Engineering II. 3) S
Rev ew of electrophys o ogy and nerve pac ng app ca t ons, ntroduct on to b omechan cs and jo nt/ mb rep ace ment techno ogy card ovascu ar and pu monary f u d mechanics app ication of mathemat ca mode ng Prerequ s te approval of instructor A so sted as BME 412.)

413 Physiological Instrumentation. 3) S
Prob ems concepts and techn ques of b omed ca nstru mentat on n static and dynamic env ronments Lecture and laboratory Prerequ s te BME 435 (or AGB 435 ; ECE 334 (A so sted as BME 413)

432 Principles of Chem cal Engineering Design. 3 F
S z ng of un t operat ons equ pment such as fract ona tors str ppe s, absorbers and extractors, w th app ca t ons to c mp ex ndu tr a proc ses Prerequ s tes CHE 333 342

442 Chemical Reactor Design. 3 F S
App cat on of k net s to chem ca reactor des gn Pre requ te CH" 342, Corequ s te CHE 333

451 Chemical Engineering Laboratory. 2 F
Operat on contro and des gn of exper menta and ndus tr a process equ pment ndependent research pro ec's Prerequ s tes CHE 333 352 S x hours aboratory

458 Semiconductor Mater al Processing. 3 N
ntrodu t on to the process ng and character zat on of e ectron c mater a s for sem conductor app cat ons Prerequ s tes CHE 333 342

461 Process Control. 3 F
Process dynam cs nstrumentat on and feedback ap p ed to automat c proce s contro Prerequ s te ECE 301 Lecture and aboratory *[Sat sf e Genera Stud es Requ rement N3]*

462 Process Design. 3 S
App cat on of econom c pr nc p es to opt m ze equ pment se ect on and des gn deve opment and des gn of process systems P erequ s tes CHE 432 442

473 Industrial Chemistry. 3 S
React on systems as encountered n arge sca e opera t ons Typ ca examp es from norgan c organ c, po ymer, b ochem ca fermentat on and e ectrochem ca ndus tr es Prerequ s tes CHM 318 or 332, CHM 442

492 Chemical Engineering Projects. 1 5 S
nd v dua pro ects n chem ca eng neer ng operat ons and des gn Prerequ s te Approva of nstructor

496 Professional Seminar. 0 F, S
Profess ona and eth ca aspects w th a d scuss on of em p oyment opportun t es and respons b t es Lectures and f e d tr ps.

501 Introduction to Transport Phenomena. 3 F, S
Transport phenomena w th emphas s on f u d systems Open on y to trans t on students w th approva of instruc tor.

502 Introduction to Energy Transport. 3 F, S
Cont nuat on of t ansport pr nc p es w th emphas s on energy transport n stat onary and f u d systems. Open on y to trans t on students w th approva of nstructor

503 Introduction to Mass Transport. 3 F S
The app cat on of transport phenomena to mass transfer and the des gn of mass transfer equ pment. Open on y to trans t on students w th approva of nstructor

504 Introduct on to Chemical Thermodynamics. 3 F S
Energy re at ons and equ br um convers ons based on chem ca potent a s and phase eq br a Open on y to trans t on students with approva of nstructor

505 Introduction to Chemical Reactor Design. 3 F, S
App cat on of k net cs to chem ca reactor des gn Open on y to trans t on students w th approva of nstructor

515 Physiological Transport Processes. 3 N
Ana ys s of heat mass momentum and e ectrical energy transfer n mamma s der vat on of both m croscop c and macroscop c mode s based on current research. A so sted as BME 515

517 Prosthetic and Diagnostic Engineering. 3 N
Criteria for mechanical replacement or assistance of organ functions diagnostic methods, equipment and usage, existing methodology and future requirements including detailed designs. (Also listed as BME 517.)

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. Also listed as BME 518.)

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
Methods for optimizing engineering processes Experimental design and analysis; linear and non-linear 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, multicomponent and multiphase systems.

534 Transport Processes II. 3 S
Continuation of CHE 533 emphasizing mass transfer Prerequisite CHE 533.

535 Turbulent Mixing. 3 N
Turbulence and mixing in multicomponent systems with/without chemical reactions Computational models applied to chemical processes Prerequisite: CHE 533

536 Convective Mass Transfer. 3 N
Turbulent flow for multicomponent systems including chemical reactions with application in separations and airpollution. 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

544 Chemical Reactor Engineering. 3 S
Reaction rates, thermodynamics, and transport principles applied to the design and operation of chemical reactors. Prerequisite CHE 543

548 Topics in Catalysis. 3 N
Engineering catalysis emphasizes: adsorption kinetics characterization diffusional considerations and reactor design Other topics mechanisms, surface analyses and electronic structure

553 Air and Water Quality Control. 3) N
Origins of pollutants; environmental interactions and concerns Physical and chemical processes including dispersion particle mechanics filtration, sampling sedimentation, coagulation, flotation absorption Control technology

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, staged operations.

558 Electronic Materials. 3 N
Processing and characterization of electronic materials for semiconductor type uses Thermodynamics and transport phenomena phase equilibra and structure mass transfer diffusion and thermal properties

561 Advanced Process Control. 3 S
Dynamic process representation, near optimal control optimal state reconstruction, parameter and state estimation techniques for continuous and discrete time systems.

562 Chemical Systems Engineering. (3) N
Process dynamics systems analysis, computer applications, process control

563 Chemical Engineering Design. (3 N
Computational methods the design of chemical plants and processes

See page 38 for special courses which may be offered by this academic unit.

MATERIALS SCIENCE

MSE 355 Introduction to Metallurgy. (3) S
Elements of the structure of metals and alloys, measurement of mechanical properties and optical metallography. Field trips Lecture and laboratory. Prerequisite CHM 114 or 116.

420 Physical Metallurgy. (4) F
Crystal structure and defects. Phase diagrams, metallography solidification and casting, deformation and annealing. Three lectures 3 hours laboratory Prerequisite: ECE 350.

430 Thermodynamics of Materials. 3) N
Principles of statistical mechanics, statistical thermodynamics of single crystals, solutions, phase equilibrium, free energy of reactions free electron theory thermodynamics of defects Prerequisite ECE 340 or CHE 312

431 Corrosion and Corrosion Control. (3) S
Introduction to corrosion mechanisms and methods of prevention. Topics: electrochemistry, polarization, corrosion rates oxidation, coatings, cathodic protection. Prerequisite: ECE 350

440 Mechanical Properties of Solids. 3) S
Effects of environmental and microstructural variables of mechanical properties: plastic deformation, fatigue, creep brittle fracture, internal friction Prerequisite. ECE 350

441 Analysis of Material Failures. 3) S
Identification of types of failures Analytical techniques. Fractography, SEM, nondestructive inspection, metallography. Mechanical and electronic components. Prerequisite ECE 350

450 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 flourescence Lecture and demonstrations Prereq u site ECE 350

470 Polymers and Composites. (3) F
Relationships between chemistry structure and properties of engineering polymers Design properties, and behavior of fiber polymer composite systems Prerequisite ECE 350.

472 Integrated Circuit Materials Science. (3) N
Principles of materials science applied to semiconductor processing and fabrication in metals ceramics, polymers, and semiconductors

480 Manufacturing Engineering 3 F
Ana ys s and opt m zat on of manufactur ng processes Prerequ s te ECE 350

492 Capstone Design Project ? F S
For sma groups n fundamenta o app ed aspects of eng neer ng mater a s emphas s on exper n enta prob ems and des gn Prerequ s tes MSE 430, 440 and 450

496 Professional Seminar. 0 F S
Profess ona and eth ca aspects w th a d scuss on of emp oyment opportun t es and respons bi t es Le tures and f e d tr ps

510 X-Ray and Electron Diffraction. 3 F
Fundamenta s of X ray d ffract on transm ss on e ectron microscopy and scann ng e ectron m croscopy Tech n ques for study ng surfaces nterna m crostructures and f uorescence Lecture and demonstrat ons Open on y to trans tion students w th approva of nstructor

511 Corrosion and Corrosion Control. (3) S
Introduct on to corros on mechan sms and methods of prevent ng corros on Top cs e ectrochemistry, polar za t on, corrosion rates, oxidat on, coatings cathod c pro tect on Open on y to trans tion students w th approva of nstructor

512 Analysis of Material Failures. (3) S
Ident f cat on of types of fa ures. Ana yt cal techn ques Fractography, SEM, nondestruct ve nspection metal ography Mechan ca and electronic components Open on y to trans t on students w th approva of nstruc tor

513 Polymers and Composites. (3) F
Re at onsh p between chem stry, structure and propert es of eng neer ng po ymers Des gn properties and behav or of fiber polymer compos te systems. Open on y to transition students with instructor approval.

514 Physical Metallurgy. (4) F
Crystal structure and defects Phase d agrams meta ography so d fication and cast ng, deformat on and an neal ng Three lectures, 3 hour aboratory Open on y to trans t on students with approva of nstructor

515 Thermodynamics of Materials. 3) N
Pr nc ples of stat st ca mechan cs stat st ca thermo dynamics of single crystals solut ons phase equi br um free energy of react ons free e ectron theory, thermo dynamics of defects Open only to trans t on students w th approva of nstructor

520 Theory of Crystalline Solids. 3 F
An sotrop c properties of crysta s tensor treatment of elastic, magnetic e ectr c and therma propert es crysta ography of Martens t c transformat ons

521 Defects in Crystalline Solids. 3) S
Introduct on to the geometry nteract on and equ br um between d s ocat ons and po nt defects Re at ons be tween defects and propert es w be d scussed

530 Metallurgical Thermodynamics and Kinetics 3 S
Thermodynam cs of a oy systems d ffus on n so ds, k net cs of prec p tat on and phase transformat ons n so ds Prerequ s te CHE 312 or ECE 340 ECE 350

531 Statistical Thermodynamics. 3 N
Cont nuat on of MAE 581 nc ud ng stat st ca and ir revers b e thermodynam cs Prerequ s te MAE 581 or equiva ent Also l sted as MAE 582)

533 Direct Energy Conversion Irreversible Thermodynamics. (3 N
Advanced se ected top cs n d rect energy convers on, theory des gn and app cat ons Prerequ s te· MAE 581 or equ va ent A so sted as MAE 583

540 Fracture, Fat gue, and Creep. 3 F
Re at onsh p between m rostructure and fracture fat gue and creep propert es of mater a Env ronmenta effects, recent deve pments Current theor es and exper menta res ts Prerequ s te MSE 440 or equ va ent

550 Advanced Materials Characterization. 3 N
Ana yt ca n trumentat on for character zat on f mate r a s SEM, S MS Auger ana yt a TEM and other ad vanced research techn ques

556 Electron Microscopy Lab. 3 F
Laboratory to support MSE 558

557 Electron Microscopy Laboratory. 3 S
Laboratory support for MSE 559.

558 Electron Microscopy I. 3) F
M croana ys s of the structure and compos t on of met a s, sem conductors and ceram cs us ng mages, diffrac t on and X ray and energy d spos ve oss spectroscopy

559 Electron Microscopy II. 3 S
M croanalys s of the structure and compos t on of met ais, sem conductors and ceram cs us ng mages diffrac t on, and X ray and energy oss spectroscopy

560 Strengthening Mechanisms. (3) S
Deformat on of crysta ne mater a s Propert es of d s o cat ons Theor es of stra n harden ng so d so ution, pre c p tation and transformat on strengthening Prerequ s te ECE 350 or equ va ent

561 Phase Transformation in Solids. 3) N
Heterogeneous and homogeneous prec p tat on reac t ons, shear d sp ac ve react ons order d sorder trans format on.

562 Ion Implantation. 3 S
nc udes defect product on and annea ng Genera zed treatment nc ud ng on mp antat on neutron rradiat on damage and the nteract on of other nc dent beams Pre requ s te MSE 450

570 Polymer Structure and Properties. 3) F
Re ationsh ps between structure and propert es of syn thet c po ymers glass trans t on mo ecu ar re axat ons crysta ne state v scoe ast c ty morpho og ca character zat on, process ng

571 Ceramics. 3 A
Inc udes ceram c process ng cast ng, mo d ng, f r ng s nter ng, crysta defects, mechanica , e ectron c and phys ca properties w l be nc uded Prerequ sites MSE 521 561

572 Electronic Materials. 3 A
Inc udes c ass ca waves quantum mechan cs, free e ec tron theory of meta s energy boards n so ds carr er transport scatter ng processes magnet c and opt ca effects and photoe ectron c effects Prerequ s te MSE 521

573 Magnetic Materials. 3 A
Cooperat ve behav or w th emphas s on mo ecu ar f e d treatments magnet c an sotropy magnetostruct on mag netism n a oys Prerequ s te MSE 521

580 Manufacturing Analys s. 3 S
Ana ys s and opt m zat on of manufactur ng processes Prerequ s te MSE 480

See page 38 for special courses which may be offered by this academic unit.

Civil Engineering

CEE 296 Introduction to Civil Engineering. 1 F, S
Introduct on to the profess on. Descr pt on of areas of spec a zat on Deg ee requ rements academ c stand ng and adv s ng procedures Introduct on to ab fac t es Prerequ s te· Freshman stand ng

310 Testing of Materials for Construction. 3) F, S
Structural and behav ora character stics engineering propert es, measurements and app cation of construc t on matena s. Not open to eng neering students Lecture and aboratory Prerequ s te· CON 323 or equ va ent

321 Structural Analysis. 3) F, S
Stat cal y determ nate and ndeterm nate structures by c ass ca and matr x methods trusses, beams and frames Two ectures, 2 hours recitat on Prerequ s te· same as CEE 322 except ECE 351 and MAE 371

322 Steel Structures. 3) F S
Behavior of structural components and systems Des gn of stee members and connect ons Part a des gn of a stee bu ding system Two ectures, 2 hours recitat on Prerequ s te· CEE 321 and complet on of the Eng neering Core (except elect ca and communications courses) w th an average grade of C or better p us at east a C n MAT 290 and 291 ECE 211, 312, 314, and MAT 274 (or equiva ent), and an off cia TOEFL score of at least 550 if an nternat onal student

323 Concrete Structures. (3 F S
Behav or of concrete structures Des gn of re nforced and prestressed concrete members nc uding foot ngs Part a des gn of concrete bu ld ng system Two lectures 2 hours rec tation Prerequ s te Same as CEE 322.

351 Soil Mechanics. 4) F S
ndex propert es and eng neer ng character st cs of so s Compact on permeab ty and seepage compres s b ity and settlement and shear strength Three ec tures 3 hours aboratory Prerequ site Same as CEE 322

361 Environmental Engineering (3 F, S
Natura env ronment water resources, hydrolog c cyc e, chem stry of natura waters qua ity requ rements and water treatment water d str bution systems Prerequ site. Same as CEE 322 Corequ s te CEE 381

362 Environmenta Engineering. 3 F S
Natura env ronment, the carbon cyc e and b ochem stry of wastes pr nc p es of waste treatment, dra nage sys tems Prerequ s te Same as CEE 322 Corequisite CEE 381

371 Urban Problems. (3) F
Prob ems of the modern urban env ronment. Concepts of comprehens ve plann ng. H story of urban deve opment transportat on pub c serv ce zon ng and d v s on, ur ban renewa ne ghborhood p ann ng Not acceptable as a techn ca e ect ve for CEE students (A so sted as PUP 301

372 Transportation Engineering. 4 F S
H ghway ra water and a r transportat on. Operat ona character st cs and traff c contro dev ces of ea h trans port mode mpact on urban form Prerequ s te Same as CEE 322

380 Hydraulics and Hydrology. 3 F S
App cat on of hydrau c eng neer ng pr nc p es to f ow of qu ds n p pe systems and open channe s hydrostat cs, character st cs of pumps and turb nes Introduct on to hydro ogy Not open to eng neer ng students Two ec tures 3 hours aboratory Prerequ s te CON 221

381 Hydraulic Engineering. 4) F, S
Fundamenta pr nc p es and methods of f u d mechan cs forming ana yt ca bas s for water resources engineering F ow n condu ts and open channe s Introduct on to hy dro ogy Three lectures, 3 hours aboratory Prerequ s te MAE 371.

400 Microcomputer Applications in Civil Engineering. 3) F, S
Deve opment of m crocomputer teracy n C v Eng neer ng app cations Prerequis tes ECE 106 and three of the fol owing courses· CEE 321 351, 361, 372 381. *[Satisfies General Stud es Requirement N3]*

412 Pavement Analysis and Design. (3 F
Des gn of f ex b e and r g d pavements for h ghways and airports Surface base, subgrade courses Cost analysis and pavement se ect on. Prerequ sites ECE 351, CEE 351

423 Structural Design. (3) F
Ana ysis and design of structura systems. Two ectures, 3 hours laboratory Prerequ sites CEE 322, 323.

432 Matrix and Computer Applications in Structural Engineering. (3) S
Matrix and computer appl cat ons to structura eng neer ng and structura mechan cs St ffness and flex bil ty methods fin te elements, d fferences Prerequ site CEE 321

450 Soil Mechanics in Construction. (3) F S
So l mechanics as appl ed to the construction field: foun dat ons highways retain ng wa ls and slope stability Re lat onsh p between soi character st cs and geo og c for mat ons Not open to eng neer ng students Lecture and aboratory Prerequ s te: CON 323

452 Foundations. (3) F S
App cat ons of soi mechan cs to foundation systems, bearing capac ty, latera earth pressure, s ope stabi ty Prerequ s te CEE 351

466 Sanitary Systems Design. (3) F
Capacity p ann ng and design of water supp y domestic and storm dra nage and so d waste systems Prerequ s te CEE 361 or 362.

471 Planning and Design of Urban Systems. (3) F
For students n c ty p ann ng urban systems civ l engi neering and re ated areas work ng as nterd scip nary p ann ng and des gn teams Effect of econom c base, emp oyment and popu at on on urban and use requ re ments Location and requ red capacity of urban systems to serve urban and uses. Two ectures 3 hours abora tory Prerequ site. sen or stand ng

475 Highway Geometric Design. (3) S
Des gn of the v sib e e ements of the roadway Fundamen ta des gn contro s w th appl cat on to rura roads at grade ntersect ons, freeways and nterchanges Two ec tures, 2 hours rec tat on Prerequ s te CEE 372.

481 Water Resources Engineering. 3) S
App cat on of the pr nc ples of hydrau cs and hydrology to the engineer ng of water resources projects; design and operat on of water resources systems· water quality Prerequ s te CEE 381

496 Topics in Civil Engineering Practice. 1) F S
Profess ona eng neer ng pract ce Interv ewing and re sume wr t ng profess onal reg strat on requ rements, con t nu ng educat on, graduate study financ a p ann ng and emp oyment Prerequ s te sen or stand ng

512 Pavement Performance and Management. 3 S
Pavement management systems nc ud ng data co ec t on evaluat on opt m zat on econom c ana ys s and com puter app cat ons for h ghway and a rport des gn. Prereq u s te. CEE 412

514 Bituminous Materials and Mixture. 3 F
Types of b tum nous mater a s used n pavement m x tures Chem ca compos t on and phys ca propert es, des rab e aggregate characterist cs opt mum aspha t contents. Two hours ecture and 3 hours ab Prerequ site ECE 351

515 Design and Behavior of Portland Cement Concrete Mixtures. 3 S
Properties of cements and aggregates M x des gn for strength and durab ty requ rements Fa ures caused by chem cal react on weather ng and oad ng. Prerequ s te ECE 351

521 Stress Analysis. 3) F
Advanced top cs n the ana yt ca determ nat on of tress and stra n. Prerequ s te CEE 321

524 Advanced Steel Structures. 3 S
Strength propert es of stee and the r effects on stru tura behav or E ast c des gn of stee structures P astic analys s and des gn of beams frames and bents P ast c deflections P astic des gn requ rements Mu t story bu ld ngs Prerequ s te CEE 322

526 Finite Element Methods in Civil Engineering. 3 F
F n te e ement formulat on for so ut ons of structura , geo techn c and hydrau c problems Prerequ s te CEE 432

527 Advanced Concrete Structures. 3 F
Elast c u t mate strength and y e d ne theory. Deflect on tors on shr nkage and p ast c f ow Prestressed con crete, spec a systems Prerequ s te CEE 323.

528 Stability of Structures. 3 F
E ast c and 'ne ast c buck ng of ro ed and cold formed columns and beams Stab ty of p ates r g d frames and trusses Prerequ s tes CEE 322 and approval of n structor

529 Complex Structures. 3 S
C assica and numer ca nvest gat ons of near and n n l near structures composed of f at and curved surfaces and near o curv near e ements Prerequ s te CEE 323

531 Theory of Structures. 3 F
General theorems re at ng to e ast c systems; def ect on of trusses and beams stat ca y ndeterm nate trusses beams r ngs arches, and frames by cons stent def rma t on east work and e ast c center hor zonta y curved members n bend ng and tors on Prerequ s te CEE 322 323

536 Dynamics of Structures. 3) S
Structures and structura members subje ted to dynam c oad ngs re ponse spectra theory emphas z ng earth quake app cat ons nvest gat ons of the response of mu t -degree of freedom stru tures, matr x methods of analys s Two ectures 2 hours rec tat on Prerequ sites CEE 322 323 and approva of nstru tor.

537 Topics in Structural Engineering. (1 3 F, S
Advanced top cs nc ud ng w nd eng neer ng, earthquake eng neer ng probab st c concepts opt m zat on a d be hav or of structura systems Prerequ s tes CEE 322, 323 and approva of nstructor

550 Soil Behavior. 3 S
Phys co chemical aspects of so behavior stab zat on of soi s, engineering propert es of so ls. Three hours lecture Prerequ s te: CEE 351

551 Advanced Soil Mechanics Laboratory. 3 F
Oedometer tr axia stat c a d cyc c) back pressure saturated and unsaturated samp es, pore pressure mea surements, resonant co umn, automatic data acquis t on n s tu test ng. One hour ecture, two 3 hour abo rator es Prerequ s te CEE 351

552 Geological Engineering. 3 S
Geo og ca nvest gat ons for eng neer ng purposes case h sto es geo og c structure, weather ng, remote sens ng geophys cs, a rphoto nterpretat on for eng neer ng s te ocat ons Three hours ecture, f e d tr ps requ red Prerequ s te CEE 351

553 Advanced Soil Mechanics. 3 S
App cat on of theor es of e ast c ty and p astic ty to so s, theor es of conso dat on fa ure theor es, response to stat c and dynam c oad ng Three hours ecture Corequ s te CEE 452. Prerequ s te CEE 551

554 Shear Strength and Slope Stability. 3 F
Shear strength of saturated and unsaturated so s strength deformat on re ationsh ps t me dependent strength parameters effects of samp ng advanced s ope stab ty Three hours ecture Corequ s tes· CEE 452 and 551

555 Applied Soil Mechanics. 3 S
Deep foundations braced excavat ons anchored bulk heads re nforced earth, underp nn ng, and dewater ng Three hours ecture Corequ site· CEE 452

556 Seepage and Earth Dams. 3) F
Trans ent and steady state f uid f ow through so con f ned and unconf ned f ow, pore water pressures and app cat on to earth dams Three hours ecture Prereq s te CEE 351 Corequ s te CEE 554

558 Numerical Methods. 3 F 88
Const tut ve re at ons for so s numerica techn ques ap p ed to geotechn ca eng neer ng nc ud ng computer app cat ons Three h urs ecture Prerequ sites CEE 351, computer programm ng and graduate stand ng

559 Earthquake Engineering. 3 F 87
Character st s of earthquake mot ons se ect on of de s gn earthquakes s te response ana yses se sm c s ope stab ty qu f cat on Three hours ecture Prerequ s tes: CEE 351 and graduate tand ng

561 Physical-Chemical Treatment of Water and Waste. 3 F
Theory and des gn of phys ca and chem ca processes for the treatment f water and waste waters Prerequ s te CEE 361 or equ va ent

562 Environmental Biochemistry and Waste Treatment. 3 S
Theory and des gn of b o og ca waste treatment sys tems Po ut o a d env ronme ta ass m at on of wastes Prerequ s te CEE 362 or equ va ent

563 Environmental Chemistry Laboratory. 3 S
Ana ys s of water domest c and ndustr a wastes abo ratory procedures for po ut on eva uat on and the contro of water and waste treatment processes One ecture 5 hours aboratory Prerequ s te CEE 361 or 362

564 Industria Hygiene. 3 F
Survey methods ega and phys olog ca aspects of occu pat ona hea th hazards Methods of measurement and analys s and phys o ogica act ons of such contam nants as tox c gases m neral du ts metals and the r com pounds and ndustr a so vents.

574, 575 Traffic Engineering. (3 3 F S
Operator and veh c e characterist cs street capac ty, s gnals s gns and mark ngs etc A phases of traff c en g neer ng as app ed to urban areas Prerequisite CEE 372.

576 Airport Engineering. 3 F
P ann ng and des gn of a rport fac t es Effect of a rcraft character st cs, a r traff c contro procedures, and a rcraft demand for runway and passenger hand g fac t es on s te se ect on runway conf gurat on and term na des gn Prerequ s te CEE 372

577 Urban Transportation Planning. 3 S 88
App cat on of and use parameters traff c generat on theory traff c d str but on and ass gnment mode s, trans t ana ys s and econom c factors to the o ut on of the ur ban transportat on prob em Prerequ s te CEE 372

578 Highway Engineering, Planning and Economics. 3 S 89
H ghway transpor'at on nc ud ng des gn, operat on p an n ng env ronmenta mpact econom c fea b ty and f nan c ng H ghways as a reg ona system Prerequ te CEE 372

579 Groundwater Hydrology. 3 F
Phys ca propert es of aqu fer groundwater exp orat on we construct on and pump ng subsurface f ow mode ng and subs dence, groundwater po ut on and water rights. Prerequ s te CEE 381 or approva of nstructor

581 Surface Water Hydrology. 3 S '89
Hydro og c yc e and mechan sms, nc ud ng prec p ta t on evaporat on and transp rat on hydrograph ana ys s f ood rout ng stat st ca method n hydro ogy, hydro og c des gn Prerequ s te CEE 381 or approva of nstructor

582 Free Surface Hydraulics. 2 S 89
Der vat on of one d mens ona equat ons used n open channe flow ana ys s Computat ons for un form and non un form f ows unsteady f ow f ood rout ng Mathemat ca and phys ca mode Prerequ s te CEE 381

583 Water Resources Systems Planning. 2 F 8~
Ph osophy of water resources p ann ng econom c so c a and eng neer ng nteract on, ntroduct on to the the ory and app cat on f quant tat ve p ann ng methodo o g es n water resources p ann ng Guest ecturers and case stud es Prerequ s te approva of nstructor

584 Foundations of Hydraulic Engineering. 2 F 88
Rev ew of ncompress b e f u d dynam cs F ow n p pes and channe , unsteady and var ed f ows wave m t on Prerequ s te CEE 381

585 Principles of River Engineering. 2 F 87
Uses of r vers study of watershed and channe proc esses Sed ment sources y e d and contro , hydro og c ana ys s Case stud es Prerequ s te CEE 381 or approv a of nstructor

586 Water Resources Systems I. 3 S 88
Theory and app cat on of quant tat ve p ann ng meth odo og es for the des gn and operat on of water re sources systems· c ass projects us ng computer case stud es Corequ s te CEE 583 or approva of nstructor

587 Water Resources Systems II. 3) F 88
Advanced computer or ented workshop n the app ca t on of quant tat ve p ann ng techn ques to the des gn and operat on of water resources systems Prerequ s te CEE 586

588 Sedimentation Engineering. 2 S 88
ntroduct on to the transportat on of granu ar sed men tary mater a s by mov ng f u ds Degradat on aggregra t on and oca scour n a uv a channe s Mathemat ca and phys ca mode s Prerequ s te CEE 585 or approva of nstructor

Students enro ed n CEE 580 584 590 592, 599, 792 and 799 are requ red to attend graduate student sem nars at t me shown n c ass schedu e Each semester every graduate student enro ed for more than 6 semes ter hours s to enro for at east 1 cred t hour of CEE 592 599, 792 or 799 Each c v eng neer ng graduate student ho d ng an appo ntment as a Teach ng or Research As s stant or Assoc ate s to enro for 1 cred t hour of CE_ 580 such cred t does not app y toward graduat on

See page 38 for special courses which may be of fered by this academic unit.

Electrical and Computer Engineering

EEE 221 Digital Computer Fundamentals. (4 F S SS
Comb nat ona and sequent a og c network des gn Data representat ons and ar thmet c un t operat ons Intro duct on to m crocomputer programm ng and operat on Three ectures, 3 hours aboratory Prerequ s te· ECE 105 or CSC 100 *[Sat sfies General Stud es Requ rement N3]*

302 Electrical Networks II. 3 F S SS
Ana ys s of near and non near networks Ana yt ca and numer ca methods Prerequ s te ECE 301

303 Signals and Filters. 3 F S SS
F ter ng and spectra ana ys s n cont nuous and d s crete systems Prerequ s te ECE 301

322 Microprocessor Applications. 4 F S
Cont nuat on of EEE 221. M crocomputer system organ zat on and operat on O dev ce operat on, O pro gramm ng and nterfac ng Memory systems microcom puter app cat ons Three ectures 3 hours aboratory. Prerequ s te. EEE 221

340 Electromagnet c Engineering I. 3 F S, SS
Stat c and t me vary ng vector f e ds boundary va ue prob ems d e ectr c and magnet c mater a s Maxwe s equat ons boundary cond t ons un form p ane waves P erequ s tes PHY 116 MAT 362

360 Electromechanics. 3 F S
The ac and dc operat ons of magnet c c rcu ts perma nent magnets transformers ncremental mot on e ectro mechan ca systems dc mach nes nduct on machines synchronous mach nes, contro of electr ca machines Prerequ s te ECE 301

396 Professional Seminar. 0 F S
Top cs of nterest to upper d v s on electrical eng neers One ecture Prerequ s te· jun or stand ng.

405 Filter Design. 3 N
Pr nc p es of act ve and passive f lter des gn T me and frequency doma n approx mat ons Prerequ s te. EEE 303 or equ va ent

406 Computer-Aided Design. 3 N
Pr nc p es and app cation of modern CAD techn ques to so ve eng neer ng prob ems ncludes ndependent proj ect Prerequ s te EEE 303 or equ va ent

425 Digital Systems Circuits. 4 F, S
Ana ys s of saturat ng and non saturat ng og c fam lies nc ud ng TTL Schottky TTL ECL, IL NMOS and CMOS. Se ected MS LSI/VLS top cs including mem or es, A/D and D A converters Three ectures, 3 hours aboratory Prerequ s tes ECE 334, EEE 322

432 Senior Design Laboratory. 3 F, S
Project or ented aboratory Each student w l comp ete severa des gn projects dur ng the semester One ec ture 6 hours aboratory Prerequis tes ECE 334 EEE 303.

433 Analog Circuit Design. 4 A
Des gn of e ectron c c rcu ts nc ud ng amp fiers m xers waveform generators and act ve f ters Three ectures 3 hours aboratory. Prerequ s te EEE 302 or equ valent.

434 Quantum Mechanics for Engineers. 3 N
Probab ty, Schroed nger equat on e genfunctions, har mon c osc lator period c potent a superpos t on, angu lar momentum scatter ng tunne ng perturbation theory Prerequ site EEE 340

435 Microelectronics. 3 S
Pract ce of so id state dev ce fabricat on techn ques n c ud ng th n f m and ntegrated c rcu t fabr cat on pnnc p es Two lectures 3 hours aboratory Prerequis te· EEE 436 or equiva ent

436 Fundamentals of Solid State Devices. 3 F S
Meta sem conductor contacts P N junct ons ght n teract ng dev ces Schottky d odes, b po ar and f e d effect trans stors, p anar and th n f m ntegrated c rcu t I C dev ces Prerequisite· ECE 352

440 Electromagnetic Engineering II. 4 F, S
Coax a and waveguide transm ssion nes· match ng techn ques p ane waves n ossy med a; po ar zat on; ref ect on and refract on e ectromagnet c system con cepts rad at on Three ectures, 3 hours aboratory Prerequ s tes EEE 340, ECE 105 and ECE 301 or equ v alents

443 Antennas. 3 N
Fundamenta parameters eng neer ng princ ples rad a t on integra s near w re antennas oops arrays, numer cal computat ons, measurements Prerequ s te: EEE 440 or equ valent

445 Microwaves. 4) N
Wavegu des c rcu t theory for wavegu d ng systems m crowave dev ces systems and energy sources, strip ines and m crostr ps; impedance match ng transformers measurements Three lectures 3 hours aboratory Prerequ s te· EEE 440 or equ va ent.

448 Fiber Optics. 4 F
Pr nc p es of fiber opt c commun cat ons Three ectures 3 hours aboratory Prerequ s tes EEE 303 340

451 Error-Correcting Codes. 3 N
App cat on of modern a gebra to the ana ys s and syn thes s o' random error detect ng and error correct ng block codes Prerequ site EEE 221

454 Random Signal Theory I. 3 F
App icat on of stat st ca techn ques to the representa t on and ana ys s of electr ca s gna s and to commun ca t ons system ana ys s. Prerequ s te EEE 303

455 Communication Systems. 4 F S
S gna analys s L near exponent a and pu se modu a t on. Comparat ve ana ys s of c rcu ts and systems Three ectures 3 hours aboratory Prerequ s te EEE 303

459 Data Communication Systems. 3 N
System characteris cs Commun cat ons med a. Commu n cat on codes Data va id'ty check ng. L ne protoco s term na s, system conf gurat ons Examp es Prerequ s tes EEE 303 322

460 Introduction to Nuclear Engineering. 3 F
Neutron nteract ons w th matter Pr nc ples of neutron cha n react ng systems Neutron d ffus on and modera t on Heat remova from nuc ear reactors. Po nt reactor k net cs Prerequ s te PHY 361 A so sted as MAE 430)

461 Health Physics Principles and Radiation Measurements. 3 S
Sources character st cs dos metry sh e d ng and mea surement techn ques for natural and man made radia t on Ph losophy of rad at on protect on Emphas s on instrumentat on detectors, and env ronmenta mon tor ng Two ectures, 3 hours aboratory Prerequ s te ECE 301

462 Reactor Safety Ana ys's. 3 S
Power reactor safety and cens'ng methodo ogies Reac tor trans ent and acc dent ana ys s T me dependent so ut on to neutron d ffus on equation Use of ndustry codes to assess f ss on product bu d up emergency core coo ng behav or react vity offs te re eases and dose ca cu at ons Prerequ s te EEE 460

463 Electric Power Plant Systems. 3 F
Nuc ear and foss fue steam supp y system e ectnca generat ng system and po ut on contro system des gn Theory of mach nery and component des gn Power plant effic encies Prerequ s tes ECE 301 340

464 Nuclear Engineering Experiments. 3 F
Theory and app ed concepts n reactor des gn nstru mentat on, electron cs and shie d ng Exper'menta mea surements of nuc ear parameters us ng subcnt ca reac tors and fus on neutron generator Fast and therma ac t vat on ana ys s Pr mary coo ant ana ys s Mossbauer spectrometry Two ectures, 3 hours aboratory Corequ site EEE 460

465 Clinical Nuclear Engineering I. 3 N
Fundamenta s of c n ca nuc ear eng neering and med ca health phys cs pract ce. Rad at on b'o ogy, dos metry and sh eld'ng for rad otherapy and d agnost c proce- dures Prerequ s te· approval of nstructor

470 Power System Fundamentals. 3 F
Bas c power system analyt ca concepts three phase systems phasors mpedance, steady state network ana ysis, norma zat on transm ss on nes transformers synchronous mach nes, power f ow Prerequ s te· EEE 302 or equ va ent

471 Power System Analysis. 3 F
ntroduct on to symmetr ca components, fau ted system ana ys s protect on and stabi ty Prerequ s te EEE 470 or equ va ent

473 Electrical Machinery. 3 F
Fundamenta s of transformers and rotat ng mach nes dc, nduct on and synchronous mach nes Prerequ s te EEE 360 or equ va ent

480 Feedback Systems. 4 F S
Ana ys s and des gn of near feedback systems Fre quency response and root ocus techn ques ser es com pensat on and state var ab e feedback Three lectures, 3 hours aboratory Prerequ s te EEE 303

482 Digital Simulation of Continuous Systems. 3 N
System representat on cont nuous system s mu at on lan guages, operat ona and numer ca methods. Prereq u s te EEE 303

504 Filter Synthesis. 3 N
Synthes s of act ve and pass ve f ters Methods of ap prox mat on n the t me and frequency doma ns. Sensit'v ty and opt m zation Prerequ s te: EEE 405 or equ va ent

505 Signal Processing of Time Series I 3 F
T me and frequency doma n character zat on of determ n st c t me ser es L near operators Four er and z trans forms d g ta f ter synthes s, system model ng Co requ s te EEE 454 Prerequ s te EEE 303

506 Signal Processing of Time Series II. 3) S
Study of random t me series, autocorre at on sequence, power spectra dens ty, opt mum f lters spectra ana ysis,

rat ona mode ing of stat onary t me ser es. Prerequ s te· EEE 505.

525 VLSI Design. (3) F
Ana ysis and des gn of Very Large Scale Integrated C r cu'ts (VLSI). Physics of sma dev ces fabrication, regu- ar structures, and system t m ng Open only to graduate students.

531 Semiconductor Device Theory I. 3 F
Transport and recomb nation theory pn and Schottky barr er d odes, bipolar and junct on f eld effect trans s tors, MOS capac tors and trans stors Prerequ site EEE 436 or equ va ent.

532 Semiconductor Device Theory II. 3) S
Advanced MOSFETs, charge coup ed dev ces, so ar ce s photodetectors ght em tt ng d odes, m crowave devices modu at on doped structures Prerequ s te: EEE 531.

533 Integrated Circuit Design. 3) F
ntegrated c rcu t fabr cat on dev ce mode ng act ve and pass ve paras tics Comparison of ntegrated and d screte circu ts Character zat on and des gn of nte- grated og c and smal s gna c rcu ts Prerequis te EEE 436 or equ va ent

534 Semiconductor Transport. 3) F
Carr er transport n sem conductors. Ha effect h gh e ectr c f e d, Boltzmann equat on, corre at on funct ons, carrier carrier nteract ons Prerequ s te EEE 436 or equ va ent.

535 Solar Cells. 3) F
Photovo ta c dev ces inc ud ng homojunctions and heterojunct ons Photogenerat on of carr ers, spectra re sponse, e ectrica characterist cs eff ciency. Prereq u site: EEE 436

536 Semiconductor Characterization. (3) N
Measurement techn ques for sem conductor mater als and dev ces. E ectr ca opt cal, phys cal and chem ca character zation methods. Prerequ s te EEE 436 or equ valent.

537 Semiconductor Optoelectronics I. 3) F
Electronic states n sem conductors, quantum theory of radiat on, absorpt on processes, rad ative processes, non radiat ve processes photoluminescence, photon c dev ces Prerequ site· EEE 434.

538 Semiconductor Optoelectronics II. (3) S
Mater a and dev ce phys cs of sem conductor asers l ght em tting diodes, photodetector, etc Emerg ng mate na and dev ce techno ogy n II V sem conductors Pre requ s te EEE 537

539 Introduction to Solid State Electronics. (3 F
Crysta latt ces, rec proca att ces, quantum stat st cs, lattice dynam cs equ' brium and nonequ brium proc esses n sem conductors. Prerequ s te ECE 334

541 Electromagnetic Fields and Guided Waves. 3) S
Polar zat on and magnet zation; d e ectr c conduct ng, an sotrop c and sem conduct ng med a dua ty, un que ness and mage theory p ane wave funct ons wave gu des, resonators and surface gu ded waves Prerequi site EEE 440 or equ va ent

542 Selected Microwave Devices. 3 N
Use of ferr te sem conductor and p ezoe ectr c mater a s n m crowave systems. Prereq s tes ECE 352 and EEE 445 or equ va ents

543 Antenna Analysis and Design. 3 F
mpedances broadband antennas· frequency ndepen dent antennas, m n atur zat on, aperture antennas horns reflectors, ens antennas cont nuous sources des gn techn ques. Prerequ site EEE 443 or equivalent

545 Microwave Circuit Design. 3) S
Analys s and des gn of m crowave attenuators, n-phase and quadrature phase power d v ders mag c tee's, d rec t ona coup ers phase sh fters DC b ocks, equalizers, etc Prerequ site EEE 445 or approval of nstructor.

546 Advanced Fiber Optics. (3) N
Theory of propogation n f bers, frequency modu at on of ght fiber opt c heterodyne rece vers f ber opt c sen sors b refr ngence n f bers Prerequ s te: EE 448 or con sent of instructor

547 Microwave Solid State Circuit Design I. 3) F
App icat on of sem conductor character st cs to pract ca des gn of m crowave m xers detectors m ters sw tches attenuators mu t p ers, phase sh fters, and ampl fiers Prerequ s te EEE 545 or approva of instructor

548 Coherent Optics. 3 N
D ffract on, enses, opt ca process ng ho ography, e ec tro opt cs, asers Prerequ s te EEE 440

549 Lasers. 3 N
Theory and des gn of gas so d and semiconductor asers Prerequ s te. EEE 448 or approva of nstructor

550 Transform Theory and Applications. 3) F
App cat ons of comp ex var ab es to Four er, Laplace, a d z transforms. Oriented to app cations n contro , net work, communicat on, and near system theory. Prereq uisite EEE 303

551 Information and Coding Theory. 3 N
Fundamenta theorems of nformation theory for sources and channels, convolut ona and burst codes. Prerequ s tes EEE 451, 454

552 Coherent Communications. 3) N
Systems ana ys s and design of te ecommun cation sys tems us ng phase ocked oops Prerequ s te EEE 454

555 Random Signal Theory II. (3) S
Process ng of s gna s n the presence of no se Random s gna s correlat on frequency spectra, estimation, fi ter ng, no se, pred ct on trans ents Prerequ s te: EEE 454.

556 Detection and Estimation Theory. (3 N
Combinat on of the class ca techn ques of stat st ca in ference and the random process character zat on of com municat on, radar and other modern data processing systems. Prerequ s tes EEE 454, 455

558 Modulation Theory. (3) N
No se performance of ana og and d g ta modulat on sys tems Emphas s on modern d g ta techn ques n terres tr a and satel te communicat ons systems Prerequ sites. EEE 454, 455

559 Computer Communication Networks. (3 N
Introduction to computer networks Hardware e ements. Data link protoco s Packet and message sw tching software e ements Network contro Examp es. Prerequ s tes EEE 459

566 Advanced Medical Instrumentation. 3 N
Des gn and analys s of mag ng systems and nuc ear dev ces for med ca d agnos s, therapy and research Prerequ s te: approva of nstructor

570 Symmetrical Components. 3 N
Power system parameters, ana ys s of phase and se quence mpedances for nes, mach nes, and trans formers. Prerequ s te EEE 471 or equ va ent.

571 Fault Analysis. 3) N
Symmetr ca compone t appl cat ons changes n sym metry s multaneous fau ts, two component method com puter so ution of fau ted systems. Prerequ s te EEE 570 or equ va ent

572 Power System Protection. 3 N
Elements of protect ve systems re ays re ay ng schemes, c rcu t nterrupt g dev ces, fau t protect on of rad a feeders, network protect ve schemes, comp ex o i in Z and Y P anes protect ve system re ab ty Prerequ s te EEE 571 or equ valent

573 Power Systems Control. 3 N
Ana ytica concepts of econom c d spatch of e ectr c generat on system frequency contro , contro center funct ons rea t me contro concepts Prerequ s te EEE 4~0 or equ va ent corequ s te EEE 480

574 Computer Solution of Power Systems. 3 N
A gonthms for d g ta computat on for power f ow and stab l ty ana ys s, spars ty programm ng, opt m zation Prerequ s te EEE 471 or equ valent.

575 Power System Stability Modeling. 3 N
Mathematical mode ng of synchronous mach nes, ex citat on systems governors, power p ants and oads for dynam c ana ys s. S mu at on of sma systems Prerequ s tes EEE 480

576 Power System Reliabi ity. 3 N
Re ab ty funct ons d stnbut ons Markov processes, recurs ve techn ques generat on capac ty eva uat on sp nn ng capac ty frequency and durat on method trans m ss on re ab ty compos te systems Prerequ s te EEE 471 or equ valent

577 Power System Planning. (3) N
Load forecast ng methods energy forecasts, nterconnected system re ab ity generat on cost ana ys s trans m ss on p ann ng. Prerequ s tes EEE 576

578 Electric Power Distribution. 3) N
D str bution components oad character stics vo tage ca cu ations pr mary and secondary systems trans formers, capac tor app cat ons. Prequ site EEE 471 or equiva ent

579 Electric Power Transmission. 3) N
EHV des gn characterstics conductor conf gurat ons corona phenomena and osses, radio no se, nsu at on coord nat on sw tch ng surges l ghtng phenomenon dc transm ssion Prerequ s te EEE 471 or equ va ent.

580 Digital Control Systems. (3 S
Ana ys s and des gn of d g ta and samp ed data contro systems nc ud ng sampl ng theory z transforms the state trans t on method stabi ty, design and synthes s Prerequ s tes EEE 550, 582

581 Random Processes in Control Systems. (3) N
Statist ca fi ter ng, est mation and control w th emphas s on the Kalman f ter and ts appl cat ons and computa t onal prob ems Prerequ s tes EEE 454 550 582

582 Linear System Theory. (3 F
State var ab es contro ab ty and observab ty, state feedback and observers, mu t var ab e systems Prereq u site EEE 480.

586 Nonlinear Control Systems. 3) N
Stab ty theory nc ud ng phase plane, descr b ng func t on L apunov s method and frequency doma n cr teria for continuous and d screte non near and t me vary ng systems Prerequ s te EEE 582

587 Optimal Control Systems. 3) N
Appl cat on of ca cu us of var at ons Pontryag n s pr nc p e and dynam c programm ng to contro prob ems Com putationa techn ques for so v ng opt ma contro prob lems Prerequ s te EEE 582

641 Advanced Electromagnetic Fie d Theory. (3) S
Cylindr cal wave funct ons, wave gu des and resonators spherica wave funct ons and resonators, ntegral equa t ons scatter ng and rad at o ; perturbat ona and var a t ona methods Prerequ s te EEE 541 or equ va ent

643 Advanced Topics in Electromagnetic Radiation. 3 S
H gh frequency asymptot c techn ques, geometr ca and phys ca theor es of d ffract on GTD and PTD ; moment method MM radar cross sect n RCS pred ct on; Four er transforms n rad at on synthes s methods Pre requ s te EEE 543

645 Microwave Filter Des gn. 3 S
Ana ys s and des gn of m crowave ow pass h gh pass band pass and band stop f ters and m crowave d p ex ers/mult p exers Prerequ te EEE 545 or consent of nstructor

647 Microwave Sol d State Circuit Design II. 3 S
Pract ca des gn of m crowave free runn ng and vo tage contro ed osc ators us ng Gunn and Impatt d odes and trans stors, ana y s of no se character st s of the osc ator Prerequ s te EEE 545 and 547

731 Small MOS Devices. 3 S
Subthresho d current, thresho d vo tage modu at on, sca ng and other sma s ze m tat ons Prerequ te EEE 532

732 Advanced Bipolar Devices and Circuits. 3 S
Crit ca exam nat on of new b po ar dev e and c rcu t techno og es Performance trade ffs sca ng effects and mode ng techn ques Prerequ s te EEE 531

770 Advanced Topics in Power Systems. 3 N
Power system prob ems of current nterest approached at an advanced techn ca eve for mature students Pre requ site EEE 571, 575 577 or equ valents and approva of nstructor

See page 38 for special courses which may be offered by this academic unit.

Engineering Core

ECE 105 Introduction to Languages of Engineering. 3) F S SS
Computer programm ng us ng C and FORTRAN 77, free hand draw ng, v sua zat on and computer graph cs One ecture, 2 hours rec tat on 3 hours laboratory Prerequ sites Algebra and BAS C programming exper ence

106 Introduction to Computer-Aided Engineering. 3 F, S
Computer a ded ana ys s and des gn computer graph cs, mode ng opt m zation and graph c documentat on One ecture 2 hours rec tat on 3 hours aboratory Pre requ s tes ECE 105 one year h gh schoo phys cs or corequ s te of PHY 105 PHY 112 or 116 *[Sat sf es Gen era Stud es Requ rement N3]*

107 Freehand Drawing and Visualization. 1 F, S SS
Representat ona draw ng from d rect observat on to ass st v sua zat on spat a awareness and percept on Techn ques nc ude contour gesture and va ue draw ng Med a nc ude penc and computer graph cs Three hours aboratory

211 Engineering Mechanics I: Statics. 2 F, S, SS
Force systems res tants equ br um d str buted forces area moments nternal st esses and fr ct on Lecture and rec tat on Prerequ s te PHY 115 117 corequ s te MAT 274

301 Electrical Networks I. 3 F S SS
Introduct on to e ectr ca networks Component mode s trans ent and steady state ana ys s Lecture and rec tat on Prerequ s tes. MAT 274 PHY 116 118

312 Engineering Mechanics II: Dynamics. 3 F S SS
K nematics and k net cs of part c es trans at ng and ro tat ng coord nate systems r g d body k nematics dy nam cs of systems of part c es and rig d bod es energy and momentum pr nc p e Lecture and rec tat on Pre requ s te ECE 211

314 Introduction to Deformable Solids. 2 F, S SS
Equ l br um geometr c compat b ty force deformat on re at ons concepts of stress and stra n transformat on equat ons, measurement of stra n stress stra n temper ature re at ons App cat ons n var ous eng neer ng d sc p nes Lecture and rec tat on Prerequ s tes ECE 211 MAT 274

334 Electronic Devices and Instrumentation. 4 F S SS
App cat n of e ectr c network theory to sem conductor d screte and integrated c rcu ts E ectron c dev ce and c rcu t app cat ons aboratory c rcu t des gn test ng and verif cat on Lecture rec tat on aboratory Prerequ s te ECE 301

340 Thermodynamics. 3 F S SS
Work, heat and energy transformat ons, re at onsh ps be tween propert es aws concepts and modes of ana ys s common to a app cat ons of thermodynam cs n eng neer ng Lecture and rec tat on Corequ s tes ECE 312 MAT 274

350 Structure and Properties of Materials. 3 F S, SS
Bas c concepts of mater a structure and ts re at on to propert es App cat on to eng neer ng prob ems. Lecture and rec tat on Corequ s te ECE 340

351 Engineering Materials. 3 F, S
Structure and behav or of c v eng neering mater a s Laboratory nvest gations and test cr teria Two lectures 3 hours aboratory Prerequ s te ECE 314

352 Semiconductors and Devices. 3 F S
Crysta ne nature of so ds, c ass ca and quantum me chanica descr pt on of so ids excess carr ers n sem conductors junct ons trans stors and ntegrated c r cu ts Prerequ s tes ECE 334 MAT 274

383 Probability and Statistics for Engineers. 2) F, S SS
Probab ty, random var ables d screte and cont nuous d stnbut ons, descnptive statist cs and samp ing d stn but ons Prerequ s te MAT 272 or MAT 291. *[Satisf es General Stud es Requirement N2]*

384 Numerical Analysis for Engineers. 2) F S
Numerica so ut on of a gebra c and transcendenta equations, and systems of near equat ons Numer ca in tegrat on Curve f tt ng Error bounds and error propa gation Emphas s on use of d gita computer. Prerequ sites. ECE 105 MAT 272 or MAT 291

386 Partial Differential Equations for Engineers. 2 F S
Boundary va ue problems separat on of var ab es Four er ser es as app ed to n tia boundary va ue prob ems Prerequ s te MAT 274

400 Engineering Communications. 3) F S SS
P ann ng and prepar ng eng neer ng publ cat ons and ora presentat ons, based on d rected brary research related to current eng neer ng top cs. Prerequ s te Sen ior stand ng n an eng neering fie d and comp et on of f rst year Eng ish requ rements p us sophomore critica wr ting course *[Satisf es General Stud es Requ rement L2]*

500 Probability and Statistics for Engineers. 2 F S SS
Probab l ty random vanab es, d screte and cont nuous d str but ons descr pt ve stat stics and samp ng d stn but ons Prerequ s te. MAT 272 or MAT 291 Open on y to students w thout prev ous cred t for ECE 383

See page 38 for specia courses which may be of fered by this academic unit.

Industrial and Management Systems Engineering

IEE 300 Economic Analysis for Engineers. 2 F S
Econom c eva uat on of a ternat ves for eng neer ng de c s ons emphas z ng the time va ue of money

330 Microcomputer Applications in Industrial Engineering. 3 F S
Concepts re ated to deve opment of operat ona capa b ty n the use of m crocomputer hardware software, and network ng as related to ndustr a eng neer ng ap p cat ons Prerequ s tes· ECE 105 106 *[Sat sf es Gen era Stud es Requ rement N3]*

367 Methods Engineering and Facilities Design. 4 F S
Ana ys s and des gn of work systems product v ty mo t on and time study techn ques human factors Ana ys s and des gn of fac t es for automated and man machine systems emphas s on process des gn mater a hand ng ayout design and faci t es locat on Three lectures 2 hour ab each week Prerequ s tes EE 300 330 Co requ site MAE 351 or approva of nstructor

374 Quality Control. (3) F
n depth ana ys s of contro chart and other stat st cal process contro techniques Organ zat on and manager a aspects of qua ty assurance Attr bute and var able *acceptance samp ng p ans Prerequ s te ECE 383.*

411 Engineering Economy. (3 S
Equ pment rep acement ana ys s treatment of nf ation n cash f ow stud es and cons derat on of risk and uncer ta nty Prerequ s te· IEE 300

422 Information Systems Design. 3) F, SS
Emphas s on the appl cat on of system ana ys s and de s gn to nformation systems M croprocessor M S project requ red

431 Engineering Administration. 3 F SS
Eng neering o·ganizat on and adm n strat on ntroduction to dec s on mak ng, quantitat ve and qua itative ap proaches to management and eng neering adm n stra t on.

437 Human Factors Engineering. 3 F
Study of peop e at work des gning for human perform ance effect veness and product v ty. Cons derat ons of human physio og ca and psycho og ca factors Prereq· u s te IEE 367

461 Integrated Production Control. (3 F S
Product on contro techn ques for the p ann ng, analys s *contro and eva uat on of operat ng systems T me ser es* forecast ng network p ann ng, schedu ng and contro Prerequ s te ECE 383

463 Computer-Aided Manufacturing and Control. 3 F, S
Emphas s on computer control n manufacturing; rea t me concepts, CIM NC group techno ogy and process plann ng, robotics Prerequ s te· ECE 105 *[Satisf es Gen eral Stud es Requirement N3]*

464 Computer-Integrated Design. 3 F, S
Use of CAD tools to create geometric objects and ayout des gns. Des gn nterfacing through database structure w th manufactur ng p ann ng contro funct ons Inc udes open shop des gn aboratory ass gnments n add t on to c assroom work. Prerequis te ECE 105 or equiva ent *[Sat sfies General Studies Requ rement. N3]*

475 Introduction to Simulation. (3 F S
Use of s mu at on n the ana ys s and design of network and d screte systems Methods for us ng a s mu at on anguage ntroduct on to statist cal aspects to s mu at on. Prerequisites. ECE 105 383. *[Sat sf es General Stud ies Requirement N3]*

476 Operations Research Techniques Applications. (4) F S
Top cs nc ude near programm ng network opt mizat on dynam c programm ng Markov processes, and queue ng mode s. Emphas s on the des gn and development of models for so v ng dec s on prob ems n ndustr a sys tems Prerequ sites. MAT 242 ECE 383 *[Sat sf es Gen eral Stud es Requirement. N2]*

488 Industrial Engineering Analysis. 3 S
Labor material and overhead cost ana ys s, parametr c cost est mating nsk ana ys s nvolv ng budget m tat ons assurance of est mates qua ty cost systems fe cyc e cost ana ys s ncclud ng effects on eng neenng des gn re ab ity, mainta nab ty serv ceab ty, testab ty and ava lab l'ty. Prerequ s tes ECE 383 EE 300

492 Project in Design and Development. 3 F S, SS
Ind v dual project n creat ve des gn and synthes s

501 Foundations of Industrial Engineering I. (3 F
Techn ques for the ana ys s and des gn of man mach ne systems Emphas s on work p ann ng, methods, measure ments, matenal hand ng and fac ity des gn. Not ava ab e for E graduate cred t

502 Foundations of Industrial Engineering II. 3 S
Introduct on to quant tat ve product on contro tech n ques plann ng, forecast ng nventory contro and MRP, schedu ing Influence of CAD CAM and automat on on product on control process. Not ava ab e for I E graduate credit Prerequ s te ECE 383 or ECE 500 or equiva ent

503 Economic Analysis for Engineers. 2 F, S
Econom c eva uat on of alternat ves for eng neenng de c s ons emphas z ng the t me va ue of money. Not ava - ab e for I E graduate cred t

510 Measurement of Productivity. (3 F
The eng neer ng econom c aud t and ts use w th app cations to break even ana ys s vanab e budget contro cost ana ys s, and product pr c ng Prerequis te ECE 383 or ECE 500

511 Analysis of Decision Processes. (3 F S
Methods of mak ng dec s ons n comp ex env ronments stat st cal dec s on theory effects of nsk uncerta nty and strategy on eng neering and managena dec s ons Prerequ s te ECE 383 or ECE 500

520 Ergonomics Design. 3 S
Human phys olog ca and psycho og ca factors n the des gn of work env ronments and n the emp oyment of peop e n man mach ne systems Open shop laboratory ass gnments n add t on to c ass work Prerequ s te EE 501

531 Topics in Engineering Administration. 3 S
Cons derat on g ven to ph osoph ca psycho og ca , po t- ca and soc a mp cat ons of adm n strat ve dec s ons

533 Scheduling and Network Analysis Models. (3 S
App cat on of schedu ng and sequenc ng a gor thms determ n st c and stochast c network ana y s and f ow a gor thms Prerequ tes· ECE 383 or ECE 500, EE 475 or IEE 545

540 Engineering Economy. 3 S
Equ pment rep acement ana y s s, treatment of nf at on n cash f ow stud es and cons derat on of nsk and uncer ta nty Open on y to students w thout prev ous cred t for EE 411 Prerequ s te EE 503.

541 Engineering Administration. 3 F SS
Eng neer ng organ zat on and admin strat on ntroduct on to dec s on mak ng· quant tat ve and qua tat ve ap proaches to management and eng neer ng adm n stra t on Open only to students w thout prev ous cred t for EE 431

542 Information System Design. 3 F, SS
Emphasis on the app cat on of system ana ys s and de s gn to nformat on systems. Microprocessor MIS pro ect requ red Open on y to students w thout prev ous cred t for EE 422

543 Computer-Aided Manufacturing and Control. (3 F S
Emphas s on computer contro in manufactur ng rea t me concepts C M NC group techno ogy and process p ann ng robot cs Open only to students w thout pre v ous cred t for IEE 463 Prerequ s te ECE 105

544 Computer-Integrated Design. 3 F S
Use of CAD too s to create geometr c ob ects and ayout des gns Des gn nterfa ng through database structure w th manufactur ng p ann ng contro funct ons nc udes open shop des gn aboratory ass gnments n add t on to c assroom work. Open on y to students w thout prev ous cred t for IEE 464. Prerequ s te ECE 105 or equ va ent

545 Introduction to Simulat on. 3 F S
Use of s mu at on n the ana ys s and des gn of network and d screte systems Methods for us ng a s mu at on anguage Introduct on to stat stica aspects of s mula- t on. Open on y to students w thout prev ous cred t for EE 475 Prerequ s tes ECE 105, ECE 383 or ECE 500

546 Operations Research Techn ques Applications. 4) F S
Top cs nc ude near programm ng network optim zat on dynam c programm ng Markov processes and queue ng mode s Emphas s on the des gn and deve opme t of mode s for so v ng dec s on prob ems n ndustr a sys tems Open only to students w thout prev ous cred t for EE 476 Prerequ s tes. MAT 242, ECE 383 or ECE 500

547 Human Factors Engineering. 3 F
Study of peop e at work, des gn ng for human perfor mance effect veness and product v ty Cons derat ons of human phys o ogical and psycho ogica factors Open only to students w thout prev ous cred t for EE 437 Prerequ s te EE 501

548 Industrial Engineering Analysis. 3 S
Labor matena and overhead cost ana ys s parametr c cost est mat ng, r sk analys s nvo v ng budget m tat ons assurance of est mates qua ty cost systems fe cyc e ana ys s nc ud ng effects on eng neer ng des gn re ab ty ma nta nab ty, serv ceab ty testab ty and ava ab ty Open only to students w thout prev ous cred t for IEE 488 Prerequ s tes IEE 300 or EE 503, ECE 383 or ECE 500

549 Reliability Evaluation Techniques. 3 S
Top cs nc ude the nature of re ab ty t me to fa ure dens ties, espec a y the exponent a and We bu se nes para e standby systems comp ex system re ab ty, Bayes an re ab ty ana ys s and sequent a re ab ty tests Prerequ s te ECE 383 or ECE 500

560 Data Base Concepts for Industrial Management Systems. 3) F S
App cat on of data base concepts to ndustr al systems problems Top cs nc ude conceptua mode ng, data structures, data base software, and perspect ves from expert and know edge base systems Prerequ s tes MAT 242; IEE 330 IEE 422 or EE 542, ASE 485 or ASE 500.

561 Production Control Information Systems. (3 S
Deve opment of nformat on system des gns for produc t on contro Top cs nc ude MRP MRP I schedul ng, sequenc ng, and nventory contro On ne des gn con cepts are covered Prerequ s tes MAT 242, IEE 330; IEE 422 or IEE 542; ASE 485 or ASE 500

563 Systems Analysis for Distributed Systems. 3 S
Ana ysis and des gn of d str buted systems for computer integrated manufacturing and nformat on process ng Concepts of host driven m croprocessors to co lect store and commun cate data.

564 Planning for Computer-Integrated Manufacturing. 3) F,S
Theory and use of DEF methodo ogy in p anning for f ex ible manufacturing, robot cs and rea t me contro . S mulat on concepts applied to computer integrated man ufacturing p ann ng Prerequ s tes. IEE 501 502

565 Computer-Integrated Manufacturing Research. (3) N
Determ nat on and eva uat on of research areas n com puter ntegrated manufacturing includ ng rea t me soft ware, manufactur ng nformat on systems f exible and integrated manufacturing systems robotics, computer graphics Prerequ s te EE 463 or IEE 543 or approval of instructor

566 Simulation in Computer-Integrated Manufacturing Planning. 3) N
Use of simu at on n the p ann ng of computer ntegrated manufacturing plann ng related to robotics flex ble and integrated manufacturing systems Use of computer graphics combined with s mu at on analys s for CIM de cis on support Prerequ site: IEE 475 or IEE 545 or approva of nstructor

567 System Simulation. (3 S
Use of simu ation in the ana ys s and design of systems involv ng cont nuous and d screte processes s mulat on languages, stat st ca aspects of s mu at on Prerequ site: IEE 475 or IEE 545

569 Nonparametric Statistical Inference. 3) S
App ication of statist ca inference procedures based on ranks, to eng neer ng prob ems Eff c ent alternat ves to class ca statist ca nference constra ned by norma ty assumpt ons Prerequ site ASE 485 or ASE 500

570 Advanced Quality Control. 3 F
Econom c based acceptance samp ng mu tiattr bute acceptance samp ng, narrow m t gaug ng n nspector error and attr butes acceptance samp ng pr nc p es of qua ty management se ected top cs from current ter- ature. Prerequ s te. EE 3~4 or approva of nstructor

572 Engineering Statistics. 3 F
Analys s of vanance and exper menta des gn. Top cs nciude genera des gn methodo ogy ncomp ete b ocks, confound ng fract ona rep cat on response surface methodo ogy Prerequ s te. ASE 485 or ASE 500

574 Applied Deterministic Operations Research Models. 3) F
Formu at on, solut on ana ys s and app cat on of deter m n st c mode s n operat ons research nc ud ng those of near programm ng nteger programm ng, and non near programm ng Prerequ s te· MAT 242

575 Applied Stochastic Operations Research Models. (3 S
App cat on of stochast c mode s nc ud ng nventory theory queue ng theory Markov processes stochast c programm ng, and renewa theory Prerequ s'te: ECE 383 or ECE 500

576 Applications of Operations Research. 3 F
Case stud es of appl cat on of near and non near mod e s and genera types of search techn ques Prerequ s te IEE 574 or approva of nstructor

577 Information Systems Methodology. (3) S
Systems approach to the ana ys s des gn and imp emen tat on of dec s on support systems Emphas s on de ve opment of databases mode bases d a ogs and sys tems arch tecture as we l as systems effect veness ntro- duct on to Expert Systems as dec s on a d nc uded Term project requ red Prerequisite· EE 542.

578 Advanced Decision Theory. (3 S
Advanced dec s on theory techn ques for industrial sys tems Top cs inc ude conjugate fam es of d stribut ons, va ue theory, dec s ons with mu t p e objectives and goal programming Prerequ s te IEE 511

579 Time Series Analysis and Forecasting. (3) F
Forecast ng t me series by the Box Jenkins and ex ponent al smooth ng techn ques ex st ng digital com puter programs are ut zed to augment the theory Pre requis te: ASE 485 or ASE 500

581 Reliability, Availability and Serviceability. (3) F
Inc udes organ zing for RAS, hardware and software RAS, integrity and fau t-to erant design, ma ntenance de sign and ma ntenance strategy Markov models for RAS, fau t free analys s and m tary standards for RAS. Prerequ s te. ECE 383 or ECE 500

See page 38 for special courses which may be offered by this academic unit.

Mechanical and Aerospace Engineering

MAE 317 Dynamic Systems and Control. 4) F S
Mode ng and representat ons of dynamic physica sys tems transfer funct ons, b ock d agrams, state equations Transient response. Pr nc p es of feedback contro and near system ana ysis nc ud ng root locus and fre quency response ntroductory analog computer abora tory Prerequ s tes. ECE 301 312

336 Air Conditioning and Refrigeration. (3) F
Refr geration cyc es refr gerant propert es heat ng coo ng loads psychrometry pur f cat on, temperature and hum d ty contro Prerequ s te MET 381 or MAE 382 or approva of nstructor

341 Mechanism Analysis and Design. 3 F
Pos t ons ve oc t es and acce erat ons of mach ne parts cams gears flexib e connectors ro ng contact, ntroduct on to synthes s Prerequ s te ECE 312

351 Production Processes. (3 F, S
Product on techn ques and equ pment Cast ng and mo d ng, pressure form ng, mater a removal, join ng and assemb y processes automat on and material hand ng Prerequ s te ECE 350

361 Aerodynamics I. (3) F, S
F u d statics conservat on princ ples, stream function ve oc ty potent a , vort c ty nv sc d f ow Kutta Joukowsk th n-airfoi theory pane methods. Prerequis te· ECE 312, 340.

371 Fluid Mechanics. (3) F S
ntroductory concepts of f uid mot ons f u d stat cs, con tro vo ume forms of bas c pr nc p es, introduct on to ocal princ p es. Prerequ s tes: ECE 312 340

372 Fluid Mechanics. (4) F S
App cat on of bas c princ p es of f u d mechan cs to prob ems in v scous and compress b e flow Laboratory exper mentat on and demonstrat ons Prerequ s tes. ECE 384, 386 MAE 371

382 Thermodynamics. (3) F S
App ed thermodynam cs, gas m xtures, power cyc es and react ve systems Laboratory exper mentat on and demonstrat ons Prerequis te ECE 340

402 Introduction to Continuum Mechanics. (3) S
App cat on of the princ p es of cont nuum mechan cs to such f e ds as flow n porous med a b omechan cs, elec tromagnetic cont nua, magneto f u d mechan cs. Prerequ s tes. ECE 314; MAE 361 or 371, MAT 242

403 CAD CAM. 3) F
CAD system deve opment us ng CORE graph cs, data structures, term na and NC mach ne contro er arch tecture Prerequ s tes ECE 105 or CSC 183, one of CSC 220, EEE 221, IEE 463 MAE 405

404 Finite Elements in Engineering. (3 S
ntroduct on to ideas and methodo ogy of fin te e ement ana ysis. Appl cat ons to so d mechan cs heat transfer, f u d mechan cs v brat ons Prerequis tes· MAT 242 ECE 314.

405 Microcomputer-Aided Processes for Mechanical Engineers. (3 F S
Microcomputer and m croprocesso fundamenta s Over v ew of programm ng anguages, input/output, nterfac ng and ana og d g ta convers on data acqu s tion contro app cat ons Prerequ s te ECE 106 or CSC 100 *[Sat s fies Genera Stud es Requ rement N3]*

410 Acoustics and Noise Control. 2 S
Acoust c ana ys s and des gn. Acoust c fat gue of aero space structures A rcraft traff c and ndustria no se control. Env ronmenta no se standards. Arch tectura acoust cs Prerequ s te. PHY 116

413 Spacecraft Dynamics and Contro . 3 F S
K nemat cs of part c es and r g d bod es Eu er s moment equat ons sate te orb ts a d maneuvers spacecraft att tude dynam cs and contro Prerequ s te ECE 312

415 Vibration Analysis. 4) F, S
Free v brat on and forced response of s ng e and mu t p e degree of freedom systems, norma modes random v bra t ons Lecture and aboratory. Prerequ site ECE 312, MAE 422.

416 Vibrations and Flutter. 4 F S
F nite degree of freedom systems· se f exc ted systems o e d mens ona cont nuous system v brat ons; two d mens onal f utter theory; f utter ana yses us ng norma modes. Prerequ s tes MAT 242 MAE 361 425

417 Control System Design. 3 S
Too s and methods of contro system des gn and com pensation s mu at on response opt m zat on frequency doma n techn ques state variab e feedback sensit v ty ana ys s Introduct on to nonlinear and d screte t me sys tems Prerequ s te MAE 317.

422 Mechanics of Materials. (4) F, S
Fa lure theories energy methods, f n te e ement methods p ates torsion of non c rcular members, unsymmetrica bending shear center, beam co umn Lecture, recitation, and aboratory Prerequ s tes: ECE 314 MAT 242

425 Aerospace Structures I. 4 F, S
Stabi ty fai ure theor es, oads stress concentration and fat gue, energy methods tors on curved bars f nite ele ments p ates she s of revolut on Prerequ s tes ECE 314 MAT 242

426 Aerospace Structures II. 4) F S
Jo nts and connect ons torsion stab l ty unsymmetrical bending shear lag, stringer sk n analyses, mult ce con struct on, f n te e ement app ication ons Lecture and laboratory Prerequ s te MAE 425

430 Introduction to Nuclear Engineering. (3) F
Neutron nteract ons w th matter Pr nc p es of neutron chain reacting systems Neutron diffus on and modera- t on Heat remova from nuclear reactors. Po nt reactor k net cs Prerequ s te PHY 361. (Also sted as EEE 460

431 Nuclear Reactor Theory I. (3 N
Neutron transport theory d ffus on theory app cat ons. Reactor k net cs, app cat ons React v ty, interdepen dence between neutron cs and thermal hydrau cs. Pre requ site MAE 430

433 Nuclear Plant Systems Design. (3) F
Relevant thermodynamic cycles Conceptua des gn of c mmerc al f ss on reactor systems (ght water reactors, gas coo ed reactors fast breeder reactors) and fusion reactor systems Emphas s on therma hydrau c aspects Prerequ s tes: ECE 340· MAE 430

434 Internal Combustion Engines. (3 S
Performance character stics, combust on carburet on and fuel njection coo ng and contro of nternal combus t on eng nes. Computer mode ng Laboratory demon strat ons. Prerequ s te MAE 382

435 Turbomachinery. 3 S
Des gn and performance of turbomach nes inc uding steam gas and hydrau c turb nes centr fuga pumps compressors, fans and b owers Corequ s tes MAE 372, 382

436 Combustion. 3 N
Thermodynam cs and chem ca k net cs of combust on Structure propagat on, and stab ty of f ames. Ign tion theor es drop et and so d part c e combust on Po utant format on Prerequ s te MAE 382

437 Direct Energy Conversion. 3 F
Unconvent ona methods of e ergy convers on fue ce s thermoe e tr cs, therm on cs photovolta cs, and magnetohydrodynam cs Prerequis tes ECE 340 350

438 Solar Energy. 3 S
So ar rad at on and nstrumentat on des gn and test ng of co lectors performance ana yses of systems therma storage photovo ta cs, mater a s and econom c ana ys s Prerequ s tes MAE 382, 488

441 Principles of Design. 3 F, S
The des gn process n ud ng prob em defin t on des gn feas b ty and opt m zat on mater a s select on, des gn for manufacture modes of fa ure nc ud ng fat gue and fracture, eng neering profess ona sm and eth cs Prereq u sites ECE 106 350, MAE 422 or 425.

442 Principles of Design II. (3) S
Continuation of MAE 441 App cat on of eng neering principles and techn ques to the des gn of mechan ca systems and components. Mode ng and des gn with mechan cal e ectrica hydrau c and pneumat c com ponents Prerequ s te· MAE 441

443 Engineering Design. 3) F, S
Group projects to des gn eng neer ng components and systems Prob em def n t on deat on, mode ng and ana y s s, decis on making and commun cat on act v ties em phas zed. S x hours laboratory Prerequ s tes: ECE 384 MAE 441· three of MAE 415 422, 382 317 372 488.

446 Thermal System Design. (3) F
Appl cation of thermodynam cs flu d mechan cs and heat transfer to the des gn of heat exchangers, coo ng towers, power plants and turb ne eng nes. Steady state system s mulat on techn ques studied Prerequ sites: MAE 382 488

447 Robotics and Its Influence on Design. (3 N
Robot app cat ons, conf gurat ons s ngu ar pos t ons, and work space, modes of contro v s on programming exerc ses, des gn of parts for assemb y Prerequ s te MAE 317

460 Gas Dynamics. 3 F S
Compress b e f ow at subson c and supersonic speeds duct flow, normal and ob ique shocks, perturbat on the ory Prerequis te. MAE 361 or 371

461 Aerodynamics II. (3) F S
Transon c/hyperson c f ows w ng theory Nav er Stokes, aminar/turbulent shear f ows, pressure drop n tubes separat on, drag v scous nv sc d nteract ons. Prerequ site· MAE 361

462 Dynamics of Flight. (3 F,S
Aerodynam c forces and moments stat c stab ty and contro equations of mot on, stab l ty der vat ves atera and ongitudinal mot on and contro Prerequ s te: MAE 413.

463 Propulsion. 3) F, S
Appl cat on of gas dynam cs and thermodynam cs to a r breath ng eng nes emphas s on turbojet turbofan and turboprop engines. Corequ s te. MAE 460.

464 Aerodynamics Laboratory. (2) F S
Measurements of aerodynamic parameters n both sub son c and supersonic f ows flow over a rfo ls, wedges and cones. S x hours aboratory. Prerequis te MAE 460, corequ s te· MAE 461

465 Rocket Propulsion. (3) S
Rocket f ght performance; nozz e design; combustion of l qu d and sol'd prope ants· component des gn, ad vanced propu s on systems, nterplanetary missions testing Prerequis te MAE 460

467 Aircraft Performance. (3 F, S
Technical aspects of f ght ntegrating aerodynam c prn cıples re at ng to ift drag, and thrust w th power operat ing characterist cs, performance of an airp ane analyzed as a system. Prerequisites MAE 361, 462 corequ s te· MAE 441

468 Aerospace Systems Design. (3) F, S
Group projects re ated to aerospace veh c e des gn working from m ssion defin t on and cont nuing through pre m nary des gn· decision mak ng and communicat on activit es emphas zed Prerequ s tes· MAE 426 441, 467.

471 Numerical Fluid Mechanics. (3 F
Numerical so ut ons for se ected prob ems n f u d me chanics Prerequ s te: MAE 372

488 Heat Transfer. 3 F, S
Steady and unsteady heat conduction nc ud ng numer ical solut ons· therma boundary ayer concepts and ap p ıcat ons to free and forced convection Therma radia t on concepts Laboratory experimentat on and demon strat ons Prerequ s te MAE 371.

489 Aerothermophysics. 3 F
Bas c principles of heat transfer and their app cat on to propu s on dev ces therma contro heat rejection and cryogen c systems Prerequisite ECE 340

491 Experimental Mechanical Engineering. (3) F, S
Experimental and ana yt ca stud es of phenomena and performance of f u d f ow heat transfer thermodynam cs, refrigerat on and mechanical power systems One hour ecture/three hours aboratory Prerequis tes· MAE 382 ECE 334; corequ s te MAE 488

492 Projects in Design and Development. (2 F S
Capstone projects n fundamenta or app ed aspects of eng neer ng Prerequis'tes· Mechan ca Engineer ng and Energy Systems majors. MAE 441 491· Eng neering Sc ence majors· MAE 422

498 Pro-Seminar. (1 3) N
Specia topics for advanced students. Appl cat on of the eng neer ng d sc pl nes to des gn and ana ys s of modern techn ca dev ces and systems Prerequ s te· approva of ınstructor

502 Computation Methods in Engineering Science. (3) F
Uti zation of documented computer programs Applica t'on n ana ys s des gn and computer graph cs.

503 Engineering Structures and Systems. (3) F
Princ ples of d mens onal ana ys s and s m l tude w th ap p cat on to a w de variety of prob ems from severa f elds of eng neering.

504 Laser Diagnostics for the Thermal Sciences. (3 S
Fundamenta s of lasers and ght scatter ng, laser ve oc metry part c e and drop et siz ng

505 Perturbation Methods in Mechanics (3) N
Non near osci lat ons, stra ned coord nates renorma za t on mu t p e sca es, boundary layers, matched asymp tot c expans ons turn ng po nt prob ems, WKBJ method

506 Advanced System Modeling, Dynamics, and Control. (3) F
Lumped parameter mode ng of phys ca systems w th ex amples State var able representat ons and dynam c response ntroduct on to modern control Prerequ s te MAE 317 or approval of ınstructor

507 Modern Control Theory and Applications. (3) S
Advanced techn ques for the contro of phys ca sys tems and processes Opt mal contro Pontryag n formu lat on, numerica methods, l near regu ator Accommoda t on of disturbances; determ n stic observers. Introduc t on to stochastic est mat on and contro . Kalman filter ng Prerequis te· MAE 506

508 Digital Control. 3) S
Introduct on to d screte time systems d fference equa t ons Z transforms, and d g ta f lters Hybr d ana og d g ta systems model ng. Contro des gn methods Lec tures demonstrat ons, and aboratory. Prerequ s te MAE 317

511 Acoustics. (3) F
Princ p es under y ng the generat on, transmiss on and recept on of acoust c waves App cat ons to noise con tro arch tectura acoust cs, random v brat ons, acoustic fatigue

512 Random Vibrations and Acoustic Fatigue. (3) F
Random processes and stochast c response Acoust c f elds. Design and acoust c fat gue

513 Advanced Dynamics. (3) F
Dynam cs of mechanical systems, variat ona principles, Lagrange's and Ham ton s equat ons app icat ons to ve hicle motion gyroscopes, and space mechan cs Non-l near systems.

515 Vibrations: Discrete Systems. (3) S
Free v bration and forced response of d screte e astic systems Finite e ements. Ana ytica and computer meth ods of solut on. Random vibrations. Prerequisite: MAE 415

516 Vibrations: Continuous Systems. 3) F
Free vibration and forced response of cont nuous e ast c systems Variat onal methods Exact and approx mate methods of solut on Wave propagat on Prerequ s te MAE 415.

518 Dynamics of Rotor-Bearing Systems. (3) S
Critical speed and response analys s of rig d and f ex b e rotor systems. Bear ng inf uence and representat on Stab ty ana ys s Methods of ba ancing

520 Continuum Mechanics. (3 F
Methods of cont nuum mechan cs w th appl cat ons to current research Prerequ s te: ASE 582.

522 Variational Principles of Mechanics. 3) S
V rtua work, stationary and comp ementary potent al en erg es. Ham lton s pr nc p e Appl cat on of these and d rect methods to v brations e astic ty and stab ty.

523 Theory of Plates and Shells. (3 S
Large deflection and bend ng of p ates Membrane theory of shells Bending theory of cy ndr ca she ls Shel s of revo ution Approx mate methods Prerequ s te. ECE 386 or MAT 462

524 Theory of Elasticity. (3 F
Analys s of stress and stra n n three dimens ons Gener a theorems P ane e astostat c prob ems Bend ng and tors on thermoe ast c ty ax symmetrica prob ems App i cations Prerequ s te: ECE 386 or MAT 462

526 Biomechanics. (3) S
Mechan cs of the human body Mechan ca and phys ca propert es of t ssues. Applicat on to f e ds of interest in cluding jo nt replacement sports medicine

527 Finite Element Methods in Engineering Science. (3 F
Discret zat on nterpo ation e ementa matr ces assem bly, computer implementat on App cat on to so d and f u d mechan cs heat transfer, t me dependent prob ems Prerequ s te: ASE 582

529 Theory of Elastic Stability. (3) S
General concepts; stab ty of discrete and cont nuous systems. Tors ona and atera buck ng of thin p ates. Dynam c justab lity Prerequ s te ECE 386 or MAT 462.

534 Reactor Design. (3) N
Heterogeneous reactor systems, perturbat on theory fuel burn up. Introduct on to transport theory K netics controls and feedback methodo ogy Prerequ ste MAE 532

536 Combustion. (3) N
K net c theory, chemica k net cs and reaction rate theories Ign t on theor es drop et, coa and fluidized bed combustion. Laser diagnost cs n combust on Prerequ s te. MAE 436 or approva of nstructor

544 Mechanical Design and Failure Prevention. (3) F
Modes of mechan ca fai ure; app cation of princ ples of e astic ty and p ast c ty n mu t axia state of stress to de s gn synthes s; fai ure theor es fatigue, creep impact Prerequisite: MAE 443

547 Mechanical Design and Control of Robots. (3) N
Homogeneous transformations, three d mens ona kine matics geometry of mot on, solving kinemat c equations, d fferentia relat onships, mot on trajector es, dynam cs, contro stat c forces

548 Mechanism Synthesis and Analysis. (3) S
A gebra c and graph cal methods for exact and approx mate synthes s of cam, gear and l nkage mechan sms; des gn opt mizat on methods of planar mot on ana ysis: character stics of plane mot on spatia k nemat cs

560 Propulsion Systems. (3) N
Princ ples of gas dynam cs w th appl cat on to propuls on system components. A r breath ng and chemical rocket eng nes.

561 Computational Aerodynamics. (3) S
Finite difference and f nite-vo ume techn ques for so v ng the subson c, transon c and superson c f ow equat ons The method of characterist cs Numerical grid generat on techn ques. Prerequ site MAE 571 or approva of nstructor

562 Transonic Flow. (3) F
Transon c f ow, nonl near sma d sturbance equations m xed flow w th shock waves Ana yt ca and numer ca treatments for a rfo ls Applicat ons to w ngs, bod es and turbomachinery Prerequis tes: MAE 460 or 461

563 Unsteady Aerodynamics. 3 S
Unsteady ncompressib e and compress ble flow W ngs and bod es n osc atory and trans ent motions. Kernel funct on approach and pane methods. Aeroelast c ap-pl cat ons. Prerequisites: MAE 460 or 461: MAE 562

565 Turbomachinery. 3) N
Des gn and performance of turbomach nes nc ud ng turb nes, compressors, pumps fans and blowers.

571 Fluid Mechanics. (3 F
Bas c k nematic, dynam c and thermodynam c equations of the f u d cont nuum and the r appl cat on to basic flu d mode s

572 Inviscid Fluid Flow. (3) S
Mechan cs of flu ds for f ows n which the effects of vis cos ty may be gnored Potentia f ow theory, waves, in-v sc d compress ble f ows. Prerequ s te MAE 571.

573 Viscous Fluid Flow. 3) F
Mechan cs of fluids for f ows n wh ch the effects of vis cos ty are s gn f cant Exact and approximate solut ons of the Navier Stokes system, lam nar f ow at ow and h gh Reyno ds number Prerequ s te MAE 571.

574 Viscous, Compressible Fluid Flow. (3) N
Mechan cs of fluids for flows n wh ch the effects of com press bi ty and viscos ty are s gn f cant Compress b e boundary layers free shear layers shock waves, interna f ows Prerequisite: MAE 572

575 Turbulent Shear Flows. (3) F
Homogeneous and sotrop c turbu ence, wa turbu ence. Experimenta resu ts Introduction to turbulent flow ca cu at ons Prerequ site MAE 571

577 Turbulent Flow Modeling. (3) S
Reyno ds equat ons and the r c osure Mode ng of s m ple and complex turbu ent flows ca culat ons of nterna and external f ows and app ication to engineering prob lems Prerequ s te MAE 571

581 Thermodynamics. (3) F
Bas c concepts and laws of class ca equ l brium ther modynam cs ntroduct on to statist ca thermodynam cs. App cations to eng neer ng systems

582 Thermodynamics. (3) N
Cont nuat on of MAE 581 nc ud ng stat st ca and rre versib e thermodynam cs. Prerequ s te MAE 581

583 Direct Energy Conversion. 3 N
Advanced selected topics in d rect energy convers on, theory, des gn and appl cat ons. Prerequ s te MAE 581

584 Heat Transfer. (3) F
Bas c concepts, phys ca and mathematica mode s for heat transfer. App cations to conduct ve, convect ve, radiative and comb ned mode heat transfer. Prerequ s te MAE 488 or equ va ent.

585 Conduction Heat Transfer. 3) F
Bas c equations and concepts of conduct on heat trans fer. Mathemat ca formu ation and solut on (analyt ca and numer ca) of steady and unsteady, one and multi d men s onal heat conduction problems Prerequ s tes. MAE 488; ECE 386.

586 Convection Heat Transfer. 3) S
Bas c concepts and govern ng equat ons Analys s of lam nar and turbulent heat transfer for interna and ex ternal flows Natural and m xed convect on. Prerequ s te: MAE 488.

587 Radiation Heat Transfer. (3) F
Advanced concepts and so ut on methodolog es for ra d ation heat transfer nc ud ng exchange of therma rad ation between surfaces, rad at on n absorb ng, em tt ng and scattering med a, and radiat on comb ned w th con duct on and convect on. Prerequ site MAE 488.

588 Two-Phase Flows and Boiling Heat Transfer. (3) S
Pool and f ow boi ing heat transfer; condensat on heat transfer, various models of vapor liquid m xture f ows, gas so d mixture flows, experimenta measurement techniques

594 Graduate Research Conference. (1) F S
Top cs in contemporary research Requ red every se mester of a l departmenta graduate students reg stered for 9 or more semester hours. Not for degree credit

598 Special Topics. (1 3) F, S
Special topics courses, including the fol ow ng wh ch are regular y offered, are open to qua ified students. (a) Dy namics and Contro (b) Two Phase F ow (c) Hydrody namic Stab lity. (d) Combustion D agnostics (e) CAD CAM Too s (f) Aeroe ast city

See page 38 for special courses which may be offered by this academic unit.

Society, Values, and Technology

STE 201 Technology and Social Change. (2) A
Techno ogy as re ated to soc al change, contemporary mpact of technology on society. (A so l sted as HPS 201). *[Satisfies General Studies Requirement. HU]*

310 Man and Machine. (2) A
Relat on of man to mach ne exam ned n historica po l tical, and socia terms. Compar sons with a ook at art fic a inte ligence stud es. (Also listed as HPS 321.)

311, 312 Science and Technology in History. (3, 3) F S
Development and appl cat on of sc entif c th nk ng from ancient t mes to present. F rst semester through 17th century Second semester 18th to present A so sted as HPS 322, 323 *[Sat sfies General Studies Require ments HU H]*

402 Technology, Society and Human Values. (3) A
Va ues which mot vate mank nd to create techno ogy Areas of confl ct and reso ut on between bas c human va ues and techno ogy. Read ng and d scuss on w th v s t ng lecturers (A so sted as HPS 402) Prerequ s te jun or stand ng or above.

411 Social Effects of Invention. (3) S
The ro e of science and invention, the pr vate and pub ic sector, n the deve opment and app cation of technology The ssue of the persona and pub ic respons bi ity of scient sts and eng neers s exam ned. (A so isted as HPS 411)

See page 38 for special courses which may be offered by this academic unit.

Division of Technology

C. R. Haden, Ph.D., Director

Purpose

The Division of Technology provides the oppor tunity to earn a degree in a technological field which stresses theory reinforced by laboratory application, in other words, a more "hands-on' approach than engineering students experience. The engineering technology and industrial tech nology programs offer challenging career oppor tunities in industry and government for the for ward looking student. The programs in indus trial vocational education prepare students for instructional and administrative positions in secondary and post-secondary educational insti tutions as well as industry.

The technology graduate in industry becomes a member of the total engineering effort, con tributing applications-oriented skills along with the engineer's more theoretical concepts. A student will be educated to render practical decisions with safety and economy in mind; to install and operate technical systems; develop or improve a product; to service machines and re vise systems; and to provide customer support when needed.

The degree programs offered by the Division will provide not only technical competence but a realization of the problems facing humanity today as well as an appreciation of the cultural accomplishments of the past.

Master of Technology (M.Tech.) degree is offered in accordance with the details given on page 222. See the *Graduate Catalog* for com plete details.

General Information

See pages 22-25, 41-42, 223-224, and 226 for complete information regarding requirements for admission, transfer, retention, disqualification, and reinstatement.

In addition, students who are initiating their college work in the Division of Technology should present secondary school units in accordance with minimum University requirements. Students who have omissions or deficiencies in secondary school subject matter may be required to complete additional university course work which will not be applied toward their degree.

The requirement for admission of transfer students is a 2.25 GPA. The freshman and sophomore programs of study are designed to facilitate transfer of junior and community college students or Associate Degree graduates.

International students are required to have a TOEFL score of 500.

Graduation Requirements

In order to qualify for graduation from the Division of Technology, a student must have a grade point average of at least 2.00 for the required courses in the major field.

Cooperative Education

The co-op program includes one or more periods of employment within the degree curriculum, the employment necessarily relating to a student's major. A student who chooses this program will graduate with both the academic background and practical experience gained from working with professionals in his or her chosen field.

Interested students should contact the Coordinator of Cooperative Education in the Student Academic Services office in the Engineering Center G Wing. Registration is required to earn academic credit.

Professional Accreditation

The programs in Aeronautical Engineering Technology, Electronic Engineering Technology, and Manufacturing Engineering Technology are accredited by the Accreditation Board for Engineering and Technology.

Degree Requirements–B.S.

All baccalaureate degree programs require completion of the University English Proficiency requirement, a General Studies component, and a Technology Core component. All programs in the engineering technologies also require completion of an Engineering Technology Core in addition to requirements of the chosen major and option. All programs in the Division of Technology require a minimum of 132 semester hours.

The specific course requirements for the General Studies, Technology Core, and the Engineering Technology Core are listed below. Refer to the individual majors or options for their additional required courses.

			Semester Hours
English Proficiency			
*	ENG 101	First Year Composition	3
*	ENG 102	First Year Composition or ENG 105 Advanced First Year Composition	3
General Studies			
*Literature and Critical Inquiry** (6 semester hours minimum)			
		One course to be chosen from University approved list. Course will be sophomore level and include a series of formal, graded written *or spoken* assignments in composing critical discourse	3
†	TCE 400	Technical Communications	3
Numeracy (6 semester hours minimum)			
†	MAT 115	College Algebra and Trigonometry	4
†	ECE 106	Introduction to Computer Aided Engineering	3
*Humanities and Social Sciences** (15 semester hours minimum)			
		At least one course must be of upper division level, two courses must be from same department, and two departments or more must be represented in total selection.)	
		Humanities and Fine Arts	9 to 6
		Social Sciences	6 to 9
†	ECN 111	Macroeconomic Principles (3) or ECN 112 Microeconomic Principles (3	
Natural Sciences (8 semester hours minimum)			
†	PHY 111	General Physics	3
†	PHY 112	General Physics	3
†	PHY 113	General Physics Laboratory	1
†	PHY 114	General Physics Laboratory	1
		Total General Studies	36

NOTE: One course in the area of Global Awareness* and one course in Historical Awareness* *must* appear in the final list of courses offered in the student's graduation program of study. These can be included in the Humanities and Fine Arts and Social Sciences course selections. See list of acceptable courses.

* See General Studies booklet for acceptable courses in these categories.

† Graduation requirement for the baccalaureate degree.

Technology Core

The following courses comprise the Technology Core, which is required in all baccalaureate degree programs in the Division of Technology:

		Semester Hours
ECE 105	Introduction to Languages of Engineering	3
CHM 101	Introductory Chemistry or CHM 113 General Chemistry (4) or CHM 114 General Chemistry for Engineers (4)	4
MAT 260	Technical Calculus I or STP 420 Introductory Applied Statistics (3)	3
TCE 100	Structured Problem Solving with BASIC	3
TCE 201	Applied Electrical Science	4
TCE 230	Engineering Materials and Processing or TCE 250 Digital Systems and Microprocessors (3)	3
Total Technology Core		20

Engineering Technology Core

The following courses comprise the Engineering Technology Core, which is required in all baccalaureate degree programs in the Engineering Technologies:

		Semester Hours
ETC 205	Electronic Devices and Circuits or ETC 307 Electrical Power Circuits and Machines (4)	4
ETC 211	Applied Engineering Mechanics Statics	3
ETC 313	Applied Engineering Mechanics Materials or ETC 312 Applied Engineering Mechanics Dynamics (3)	3
ETC 340	Applied Thermodynamics and Heat Transfer or ETC 331 Semiconductor Materials Science/Devices (3)	3
MAT 261	Technical Calculus II	3
MAT 262	Technical Calculus III or STP 420 Introductory Applied Statistics (3)	3
Total Engineering Technology Core		19

Major

Majors, and options within each major, are offered in the four technology departments as shown on pages 220 221. In each case, the curriculum includes some elective courses which are reserved for the student's use to add a unique emphasis or dimension. These credits are traditionally referred to as technical electives and are normally restricted to upper-division courses in technology, construction, engineering, or computer science. In each case, the choice of technical electives must be approved by the student's faculty advisor. Requirements for each of the majors offered are described on the following pages.

Department of Aeronautical Technology

ASSOCIATE PROFESSORS:
REED, ROPER, SALMIRS
ASSISTANT PROFESSORS:
SCHOEN (TCB 203), CARLSEN, GESELL, PEARCE
INSTRUCTOR:
ROGERS
LECTURER:
NELSON
PROFESSORS EMERITI:
COX, THOMASON

The Department of Aeronautical Technology offers two majors leading to a Bachelor of Science degree The options within these majors are as follows:

Aeronautical Engineering Technology

Aeronautical Technology
Helicopter Technology

Aeronautical Management Technology

Aircraft Flight Management
Airway Science Management

Graduates are prepared for entry into the aerospace industry in productive, professional employment or, alternatively, for graduate study. The curricula emphasize the recognized principles underlying the application of technical knowledge as well as current technology, preparing the graduate to adapt to the rapid and continual changes in aerospace technology.

General Information

Admission. See pages 22 25, 41-42, 223 224, and 226 for information regarding requirements for admission, transfer, retention, disqualification, and reinstatement A pre professional category is available for applicants deficient in regular admission requirements. Transfer students must have a minimum grade point average of 2.25 at the time of transfer. Otherwise admission requirements of the University apply.

Freshman and sophomore programs of study are designed to facilitate the transfer of students from the community college system who have completed the appropriate lower division courses. Students at a community college should consult a faculty advisor as to the appropriate courses to take.

Students seeking one of the two degrees from the Department of Aeronautical Technology must satisfactorily complete a curriculum of not less than 132 semester hours. The curriculum requires completion of the University English requirements, general studies, appropriate core courses, and the area of specialization courses to include electives.

Advisor approved alternates for transfer credit for listed courses may vary from the total required semester hours indicated. Such variances shall not reduce the minimum of 132 semester hours required for the degree.

The Technology Core is required of all Technology majors and where a choice is indicated, please see the requirements of each option.

Student Organizations. The department hosts the local chapter of Alpha Eta Rho, the international professional aviation fraternity. Students also are eligible for membership in Tau Alpha Pi, the national honor society for engineering technology, and the Precision Flight Team, which competes in regional and national flying safety competitions.

A Master of Technology degree program is available. See the *Graduate Catalog* for more information.

Aeronautical Engineering Technology–B.S.

The Aeronautical Engineering Technology curriculum is designed to prepare the technologist for technical support of engineering activities throughout the aerospace field. Areas of responsibility include the application of applied engineering practice related to fixed wing aircraft and aerospace vehicle design, helicopter applications, internal combustion engines, combustion processes, turbomachinery, systems analysis, computer modeling, quality assurance and nondestructive testing, and low speed wind tunnel applications.

The Aeronautical Engineering Technology students are required to complete the Technology Core, the Engineering Technology Core, and the following courses as part of their General Studies under humanities/social sciences:

		Semester Hours
ECN 111	Macroeconomic Principles	3
One Upper division Humanities		3

In the Technology Core (see page 295), the following course is required:

MAT 260	Technical Calculus I	3

In the Engineering Technology Core (see page 295), the following courses are required:

ETC 313	Applied Engineering Mechanics Materials	3
ETC 340	Applied Thermodynamics and Heat Transfer	3
MAT 262	Technical Calculus III	3
	or AET 472 Applied Linear Analysis	3

The following courses are required in both options: AET 280, 281, 287, 310, 320, 321, 322, 409, 414, 487, ETC 312; IEE 300; MET 432.

The following courses are also required for the option listed:

Aeronautical Technology: AET 288, 415, 417, 490; Elective Hours 3.

Helicopter Technology AET 360, 461, 462, 463, 464.

Suggested Course Pattern for Freshmen

		Semester Hours
Fall Semester		
ENG 101	First-Year Composition	3
MAT 115	College Algebra and Trigonometry	4
ECN 111	Macroeconomic Principles	3
TCE 100	Structured Problem Solving with BASIC	3
CHM 101	Introductory Chemistry	4
Total		17
Spring Semester		
ENG 102	First Year Composition	3
ECE 105	Introduction to Languages of Engineering	3
PHY 111	General Physics	3
PHY 113	General Physics Laboratory	1
TCE 230	Engineering Materials and Processing	3

MAT 260	Technical Calculus I	3
Total		16

Aeronautical Management Technology–B.S.

The Aeronautical Management Technology curriculum is designed to combine a thorough technical training with an interdisciplinary general university education. The graduate is prepared to assume responsibilities in a wide area of managerial and technically related areas of aviation. The student is prepared with a background in aircraft structures, reciprocating and turbine engines, performance, design, management skills, business principles, systems analysis and a variety of course work specific to flight, airports, and air transportation. The degree offers two options: Airway Science Management and Aircraft Flight Management. These curricula have the approval of the Federal Aviation Administrator and can lead to employment in that agency. The two options are described separately below.

Option in Aircraft Flight Management

(Flight training is certified by the Federal Aviation Administration.)

Aircraft Flight Management combines academic studies and flight training to prepare graduates for a variety of positions within the air transportation industry, primarily in the area of flight operations. Ground school and flight training are available, allowing the student to obtain the private pilot, commercial pilot and flight instructor certificates, and also the instrument pilot, instrument instructor, and multi-engine pilot ratings.

This curriculum concentrates on flying, plus the technical, management and computer related applications necessary to operate aircraft in the high density environment of today's airspace. This career option leads to development, administration, and enforcement of safety regulations including airworthiness and operational standards in civil aviation. It emphasizes critical thinking, and cognitive, analytical and communication skills.

While enrolled at Arizona State University, students will not receive college credit for flight instruction received at flight schools other than schools with which the University has currently contracted for such instruction. Consideration for credit will be given for flight experience and certificates received prior to enrollment at the University.

Flight instruction costs are not included in University tuition.

Aircraft Flight Management students are required to complete the following courses as part of their General Studies under humanities/social sciences:

		Semester Hours
One Upper division Humanities		3
ECN 111	Macroeconomic Principles	3
PGS 100	Introduction to Psychology	3
COM 100	Introduction to Human Communication	3

In the Technology Core (see page 295), the following course is required:

MAT 260	Technical Calculus I	3

In addition, the following listed courses are required: AET 182, 183, 220, 222, 280, 281, 287, 288, 308, 314, 322, 342, 382, 383, 385, 386, 387, 389, 392, 393, 394, 408, 410, 444, 489; GPH 212; IVE 452; MGT 301, 311.

Suggested Course Pattern for Freshmen

		Semester Hours
Fall Semester		
ENG 101	First-Year Composition	3
TCE 100	Structured Problem Solving with BASIC	3
AET 182	Private Pilot Ground School	3
MAT 115	College Algebra and Trigonometry	4
CHM 101	Introductory Chemistry	4
Total		17
Spring Semester		
ENG 102	First Year Composition	3
ECE 105	Introduction to Languages of Engineering	3
AET 183	Private Pilot Certificate	1
MAT 260	Technical Calculus I	3
GPH 212	Introduction to Meteorology	3
PHY 111	General Physics	3
PHY 113	General Physics Laboratory	1
Total		17

Option in Airway Science Management

The management option is designed to prepare graduates for managerial and supervisory positions throughout the air transportation industry. A depth of technical training is included along with a broad exposure to business and management courses. This program of study, interdisciplinary in nature, will prepare the aeronautical career oriented student for such positions as air traffic control specialist, air

carrier manager, airport manager, and general aviation operations manager.

Air Science Management students are required to complete the following courses as part of their General Studies under humanities/social sciences:

		Semester Hours
Humanities (must be upper division, selected from two different departments)		6
ECN 111	Macroeconomic Principles	3
ECN 112	Microeconomic Principles	3
SOC 301	Principles of Sociology	3

In the Technology Core (see page 295), the following course is required:

MAT 260	Technical Calculus I	3

In addition, the following listed courses are required: ACC 211, AET 101, 201, 280, 281, 287, 288, 308, 342, 408, 444, 489; COM 110, 210; IEE 300 or OPM 301, IVE 452; MGT 301, 311, 423; PGS 100, 315; Elective hours 8.

Suggested Course Pattern for Freshmen

		Semester Hours
Fall Semester		
ENG 101	First Year Composition	3
TCE 100	Structured Problem Solving with BASIC	3
MAT 115	College Algebra and Trigonometry	4
AET 101	Introduction to Aeronautics	3
PGS 100	Introduction to Psychology	3
Total		16
Spring Semester		
ENG 102	First Year Composition	3
ECE 105	Introduction to Languages of Engineering	3
ECN 111	Macroeconomic Principles	3
PHY 111	General Physics	3
PHY 113	General Physics Laboratory	1
MAT 260	Technical Calculus I	3
Total		16

Department of Electronics and Computer Technology

PROFESSORS:
McHENRY(TC 301A), MAISEL
ASSOCIATE PROFESSORS:
STRAWN, WOOD, YOUNG
ASSISTANT PROFESSORS:
BAXTER, EDWARDS, PETERSON, SADDLER (Visiting), YOUNG

The Department of Electronics and Computer Technology offers the Bachelor of Science degree with a major in Electronic Engineering Technology (BS/EET). Electronic Engineering Technology is a technological field of specialization which requires the application of scientific and engineering knowledge and methods combined with technical skills in support of electrical/electronic engineering activities. It lies in the occupational spectrum between the crafts man and the engineer at the end of the spectrum closest to the engineer. The electronic engineering technologist is a member of the electrical engineering team that consists of electrical engineers, electronic engineering technologists, and electronic engineering technicians

The electronic engineering technologist is applications oriented, building upon a background of applied mathematics including the concepts and applications of calculus. Utilizing applied science and state-of the art technology, the electronic technologist is able to: produce practical, workable and safe results quickly and economically, install and operate technical systems, configure hardware for unique applications from proven concepts, develop and produce products, service machines and systems, manage construction and production processes, and provide customer support to technical products and systems

The BS/EET degree is earned in one of four option areas. The options available are:

Computer Systems
Electronic Systems
Microelectronics
Telecommunications

The *Computer Systems* option combines applied electronics and computer hardware-software concepts and applications. It has been formulated to meet the needs of persons who wish

to engage in digital and computer systems applications as a career focus.

The *Electronic Systems* option is aimed at preparing persons for careers in instrumentation, control, and power systems applications. This option allows a student to develop a broad based knowledge of electrical electronic fundamentals with an applications perspective. Sixteen of the 23 specialization hours are specified and the remaining 7 hours will be approved technical electives. The ECT department has had a concentration in electronic systems or instrumentation and systems control for many years. The course patterns in support of these emphasis areas have been well developed and will continue to provide strong support for the Electronics Systems Option under the BS/EET program. There are several departmental faculty currently involved in leading the course work in electronic systems.

The *Microelectronics* option combines applied electronics, monolithic and hybrid integrated circuit processing and applications, device and component fabrication and manufacturing. The objective of this option is to prepare persons to assume positions in the area of microelectronics manufacturing with immediately applicable knowledge as well as to develop a strong foundation of electronics fundamentals and methods. Students should be interested in the design, fabrication and manufacture of imprinted circuitry, monolithic integrated circuits (bipolar and MOS), and hybrid thick film and thin film circuitry, components and systems. Graduates of this program have various career opportunities in industry, particularly in semiconductor processing, fabrication, manufacturing and device product application areas. The continuing explosion in semiconductor and related technologies and their applications to electronic and computer related products offer unique and challenging opportunities. Graduates of this program option will secure positions in processing, manufacturing, operations and applications areas in industry as members of the diverse scientific engineering team.

The *Telecommunications* option has been structured to take advantage of the recent changes in the telecommunications industry. The program provides orientation to the entire spectrum of telecommunications activities from the basics of radio and television to the applications of satellites in modern communications applications.

A Master of Technology degree program, with a concentration in Electronics Engineering Technology, is available for qualified B.S. graduates. The undergraduate program options are supported as emphasis areas in the master's degree program. See the *Graduate Catalog* for more information.

General Information

Admission. See pages 22-25, 41-42, 223-224, and 226 for information regarding requirements for admission, transfer, retention, disqualification, and reinstatement. A pre-professional admission category is available for applicants deficient in admission requirements.

Entry into the program as a freshman student assumes three (3) years of high school math (algebra I, II, and geometry). High school chemistry and physics are recommended. Students without the required math background must take appropriate deficiency courses prior to entry, or immediately upon enrollment at ASU. Associate degree transfer students are expected to have completed college algebra and trigonometry (MAT 115 or equivalent).

Students who begin their college education at institutions other than ASU with intent to transfer to ASU should consult the given pattern and seek equivalent courses at the transfer institution. Since efficient transfer will depend on close adherence to the course content and prerequisites structure associated with the indicated pattern, lower division courses will not be transferred for upper division work at ASU.

Student Organizations. The department hosts one of the local chapters of the Institute of Electrical and Electronic Engineers (IEEE), the International Society for Hybrid Microelectronics (ISHM), and the Instrument Society of America (ISA). Students may also be elected to membership in Tau Alpha Pi, the national honor society for engineering technology.

Electronics Engineering Technology–B.S.

The departmental curriculum is organized into two categories: technical studies consisting of core areas and the option specialty area, and general studies consisting of courses selected to meet the University's General Studies requirement as well as the math/science requirement of TAC/ABET. Graduation is granted to students who complete the required courses and electives for a total of 132 semester hours minimum. A minimum of 50 upper division hours are required, including at least 24 semester hours of EET, CET, and/or UET upper division hours to be taken at ASU. Complete program of study guides with typical four-year patterns are available from the department for each option.

The technical studies curriculum component consists of 90 semester hours of course work which includes the Technology Core (20 hours), Engineering Technology Core (19 hours), Electronics Engineering Technology Core (28 hours), and an Option (23 hours). The General Studies* portion of the BS/EET curriculum has been carefully structured to meet the specific requirements of the University studies program as well as to include the content required by TAC ABET, the professional accrediting agency for such curricula.

Degree Requirements

In addition to the General Studies required courses listed on page 294, the following courses are required:

		Semester Hours
Literacy and Critical Inquiry elective:		
COM 225	Public Speaking	3
Social Science elective		
ECN 112	Microeconomic Principles	3

The following courses are required as part of the Technology Core:

TCE 250	Digital Systems and Microprocessors	3
CHM 113	General Chemistry (UET only)	4

The following courses are required as part of the Engineering Technology Core:

ETC 205	Electronic Devices and Circuits	4
ETC 312	Applied Engineering Mechanics - Dynamics or ETC 340 Applied Thermodynamics and Heat Transfer (3) UET ONLY	3
ETC 331	Semiconductor Materials Science/Devices	3

Electronics Engineering Technology Core Requirements:

		Semester Hours
CET 350	Digital Logic Principles	4
CET 354	Microcomputer Systems Principles	4
CSC 383	Applied FORTRAN Programming	3
EET 208	Electric Circuits	3
EET 301	Electric Networks I	3
EET 310	Electronic Circuits	4
EET 372	Communication Systems	3
EET 396	Professional Orientation*	1
EET 415	Electronic Fabrication Principles	3
	Total	28

* Students must register for EET 396 the semester in which they are enrolled in the 87th hour of credit (ASU plus transfer hours. If this occurs in Summer Session, students should register for EET 396 the prior Spring Semester.

Electronics Engineering Technology Options

Computer Systems Required courses: CET 452, 457, 473; plus 8 hours of *approved* technical electives.

Electronic Systems. Required courses: EET 406, 430, 460; ETC 307, plus 7 hours of *approved* technical electives.

Microelectronics Required courses: CHM 116, EET 416, 418, 430; plus 7 hours of *approved* technical electives.

Telecommunications Systems. Required courses: CET 473; EET 404, 470, 478; plus 7 hours of *approved* technical electives.

Electronics Engineering Technology Program of Study

Typical First- and Second-Year Sequence

Freshman Year

		Semester Hours
First Semester		
CHM 101	Introductory Chemistry or CHM 113 General Chemistry (UET ONLY)	4
ECN 111	Macroeconomic Principles	3
ENG 101	First Year Composition	3
MAT 115	College Algebra and Trigonometry	4
TCE 100	Structured Problem Solving with BASIC	3
	Total	17
Second Semester		
ECE 105	Introduction to Languages of Engineering	3
ENG 102	First Year Composition	3
PHY 111	General Physics I	3
PHY 113	General Physics Laboratory I	1
MAT 260	Technical Calculus I	3
TCE 201	Applied Electrical Science	4
	Total	17

* See General Studies booklet for specific general studies requirements and the approved course list

Sophomore Year

First Semester

ECE 106	Introduction to Computer Aided Engineering	3
ETC 205	Electronic Devices and Circuits	4
ETC 211	Applied Engineering Mechanics Statics	3
MAT 261	Technical Calculus II	3
PHY 112	General Physics II	3
PHY 114	General Physics Laboratory II	1
Total		17

Second Semester

ECN 112	Microeconomic Principles	3
EET 208	Electric Circuits	3
ETC 312	Applied Engineering Mechanics Dynamics or ETC 340 Applied Thermodynamics and Heat Transfer UET ONLY)	3
MAT 262	Technical Calculus III	3
TCE 250	Digital Systems and Microprocessors	3
Total		17

Department of Industrial Technology

PROFESSORS:
, TC 203H), AUTORE KIGIN

ASSOCIATE PROFESSORS:
BOWERS, HIRATA, HOROWITZ, LAWLER, PARDIN ROE SCH LDGEN, W LLIAMS

ASSISTANT PROFESSORS:
ABERLE, MATSON

PROFESSORS EMERITI:
BROWN BURDETTE, BURK KE TH, LITTRELL PRUST, ROOK WATKINS

The purpose of Industrial Technology is to provide students with a broad technical and managerial background in a variety of disciplines related to industry.

The Department of Industrial Technology offers four options leading to a Bachelor of Science Degree. The four options are: Graphic Communications, Industrial Supervision, Industrial/Technology Education, and Interactive Computer Graphics.

Typically the programs are applications oriented to include functional knowledge and understanding of materials and production processes, industrial management and human relations, problem solving, the physical sciences, mathematics, computer science, and current technological skills.

Industrial Technology–B.S.

In addition to the Technology Core courses, Option Core courses, Area of Emphasis courses, English Proficiency and General Studies requirements, the following Industrial Technology Core courses are required:

		Semester Hours
ITC 200	Technology of Communication	3
ITC 202	Design and Enterprise	3
ITC 443	Occupational Safety	3
ITC 444	Industrial Organization	3
Total		12

A minimum of 132 semester hours of approved credits are required to complete this major.

Option in Graphic Communications (GRC)

The purpose of the Graphic Communications Option is to prepare people for a wide variety of professional positions in the printing and graphic communications industry. The Graphic Communications Option offers a blend of technological and managerial skills and knowledge. It has been specifically designed to prepare graduates to address the opportunities and increased competitive challenges taking place in the industry as a result of technological change, and turbulent economic and human relations concerns.

All courses are industry responsive. The students are exposed to case histories and problems related to actual industry issues. The case studies, problems and issues are prepared by a Board which is made up of prominent industry experts. Graduates, throughout the entire four year curriculum, are exposed to practical, situational analysis and effective problem solving techniques. As a prerequisite for graduation, students are expected to acquire job related industry experience as practical preparation for making an immediate contribution to an employer s business.

Students are required to take designated Graphic Communications courses during the first two years of the program. After the sophomore year, each student must select an area of emphasis in consultation with an advisor The areas of emphasis are: Equipment/ Supply Manu

facturing, Operations Management, Sales/Marketing, and Technology.

Graphic Communications Core

To achieve its objectives, the Graphic Communications Option offers the following required and technical elective courses.

		Semester Hours
GRC 135	Graphic Communications	3
GRC 136	Industrial Printing Processes	3
GRC 237	Image Preparation	3
GRC 238	Instruments and Controls	3
GRC 331	Substrates and Inks	3
GRC 332	Film Assembly and Platemaking	3
GRC 333	Sheet Web Press Technology	3
GRC 334	Photo-Mechanical Reproduction	3
Total		24

Areas of Emphasis (Technical Electives) 36 semester hours

After selecting the area of emphasis which best suits the student's interests, courses are to be selected, with an advisor, that relate to the following topics:

Equipment Supply Manufacturing: Marketing to the printing industry, distribution and location concepts; sales/service techniques; approaches to field service; manufacturing processes for equipment, materials and supplies; customer education; printing systems design and engineering.

Operations Management: Production management; plant information systems; planning and scheduling for manufacturing; plant design, organizations, and layout; conformance requirements for government regulation; optimization of production systems; industrial cost accounting; supervisory techniques; computer graphics applications; decision making in a manufacturing environment; product development and management; printing systems maintenance; manufacturing strategy; instrumentation for graphic arts manufacturing; materials testing and performance prediction; production coordination; traffic management.

Sales Marketing: Markets for printing; print and electronic media; finance, personnel and human relations, sales management; strategic planning; market planning; sales service; estimating and job costing.

Technology: Scientific properties of graphic communications materials; evaluation of new technologies; creation, management, and transmission of digital imaging information, integrated computer graphics; quality management and process control; analytical modeling for manufacturing systems; applied electronics for the graphic communications industry; technological planning and forecasting; printing plant engineering; environmental control.

Typical Freshman Year Course Pattern (Faculty Advisor Approval Required)

		Semester Hours
First Semester		
ENG 101	First Year Composition	3
MAT 115	College Algebra and Trigonometry	4
ECN 111	Macroeconomic Principles	3
GRC 135	Graphic Communications	3
TCE 100	Structured Problem Solving with BASIC	3
Total		16
Second Semester		
ENG 102	First-Year Composition	3
ITC 200	Technology of Communications	3
CHM 101	Introductory Chemistry or CHM 113 or CHM 114	4
GRC 136	Industrial Printing Processes	3
ECE 105	Introduction to Languages of Engineering	3
Total		16

Each student is advised to seek assistance in planning transferable courses.

Option in Industrial Supervision (IST)

The purpose of Industrial Supervision is to prepare supervisors and high level personnel for management functions in manufacturing and public service organizations.

The Industrial Supervision Option is articulated with the Maricopa County Community College District. Consulting an advisor is required to coordinate the course selection for transfer to the Industrial Supervision areas of emphasis.

Classes are scheduled to accommodate the student who is employed in a full time position. Classes are also scheduled at facilities where the demand is sufficient to justify a class.

Prior to completion of the degree, the student must show evidence of adequate and appropriate occupational experience.

Industrial Supervision Core

To achieve its objectives, the Industrial Supervision Option requires the following courses:

		Semester Hours
IST 450	Industrial Training	3
IST 451	Materials Control	3
IST 452	Industrial Supervision	3
IST 453	Safety Supervision	3
MGT 301	Management and Organization Behavior	3
PGS 430	Industrial Psychology	3
Bus/Mgmt Electives		9
Total		27

Areas of Emphasis Technical Electives) 31 semester hours

A technical support area must be chosen by the student in consultation with an advisor Typical areas of emphasis are: aeronautics, construction, electronics, fire science, graphic communications, safety and health, interactive computer graphics, and manufacturing. Articulation agreements are to be followed by consulting an advisor.

Electives must be approved by the advisor to fulfill the graduation requirements of 132 semester hours of credit.

Typical Freshman Year Course Pattern (Faculty Advisor Approval Required)

		Semester Hours
First Semester		
ENG 101	First Year Composition	3
MAT 115	College Algebra and Trigonometry	3
TCE 100	Structured Problem Solving with BASIC	3
ECN 111	Macroeconomic Principles	3
PGS 100	General Psychology	3
Total		15
Second Semester		
ENG 102	First Year Composition	3
CHM 101	Introductory Chemistry	4
ECE 105	Introduction to Languages of Engineering	3
PHY 111	General Physics	3
PHY 113	General Physics Laboratory	1
Area of Emphasis		3
Total		17

Each student must seek assistance in planning transferable courses.

Option in Industrial/Technology Education

The Industrial/Technology Education option consists of four areas of emphasis: Industrial Arts Education, Pre Vocational Industrial Education, Technical Teacher Education, and Vocational Teacher Education.

Students in each of these areas of emphasis combine technology courses, professional education, and General Studies to prepare for educational careers. Concentration in a variety of technical fields is available

Industrial Arts Education. This program is in cooperation with the College of Education. The Industrial Arts Education student is being prepared to teach technical subjects at the elementary and secondary school levels. Each person will choose two technical areas, such as auto motives, interactive computer graphics, electronics, graphic communications, manufacturing and construction. A minimum of 60 semester hours, approved by an advisor, is required in technical and ITE professional courses to meet degree requirements leading to a teaching certificate. A 30 semester hour minor is available in Industrial Arts Education. Automotive courses should be selected at a community college in consultation with an advisor.

Industrial Arts Education Core

The following courses are required of all Industrial Arts Education students:

		Semester Hours
ELT 200	Applied Electricity/ Electronics	3
GRC 135	Graphic Communications	3
ECE 105	Introduction to Languages of Engineering	3
ITE 222	Wood Technology	3
TCE 230	Engineering Materials and Processing	3
ITE 402	Occupational Analysis and Course Development	3
ITE 442	Facility Planning and Management	3
ITC 443	Occupationa Safety	3
ITE 480	Teaching Industrial and Vocational Subjects	3
Total		27

While there are variations in the sequence in which courses are taken in Industrial Arts education, the suggested freshman pattern may be useful as a general guide, subject to the approval of a faculty advisor.

		Semester Hours
First Semester		
ENG 101	First Year Composition	3
ITC 200	Technology of Communications	3
TCE 100	Structured Problem Solving with BASIC	3
CHM 101	Introductory Chemistry	4
MAT 115	College Algebra and Trigonometry	4
Total		17
Second Semester		
ENG 102	First Year Composition	3
GRC 135	Graphic Communications	3
PGS 101	General Psychology	3
ECE 105	Introduction to Languages of Engineering	3
PHY 111	General Physics	3
PHY 113	General Physics Laboratory	1
Total		16

Industrial Arts Education students transfer to the College of Education when they are classified as juniors. The student must meet the College of Education requirements. Professional education courses are designated by the College of Education.

Industrial/Technology Education Core

To achieve its objective, the Industrial/Technology Education Option requires the following courses:

		Semester Hours
ITE 402	Occupational Analysis and Course Development	3
ITE 442	Facility Planning and Management	3
ITE 446	Instructional Aids and Materials	3
ITE 480	Teaching Industrial and Vocational Subjects	3
ITE 485	Teaching Internship	4
ITE 491	Organization and Management of Co Op Programs	3
ITC 443	Occupational Safety	3
Total		22

Areas of Emphasis (Technical Electives) 38 semester hours

After selecting the area of emphasis, courses are to be selected with an advisor that relate to the following areas of emphasis. Pre Vocational Industrial Education, Technical Teacher Education, and Vocational Teacher Education.

Pre Vocational Industrial Education. This is a broad based curriculum with specialization in industrial areas which will meet requirements for pre vocational industrial education. Five specialization areas are available: construction, manufacturing, transportation, visual communications, and electronic communications. Each of these represents a career cluster for which occupational preparation is found in Arizona

Requirements established by the Arizona Department of Education must be followed by consulting an advisor

In addition to the core, each Pre Vocational Industrial Education student must select two areas of specialization according to career interests (19 hours each . Industrial internships may be used to fulfill a part of these requirements.

Construction. Required: ITE 222, 321, 424; plus an additional 10 hours of *approved* technical electives.

Manufacturing: Required: TCE 230, MET 231; plus an additional 13 hours of *approved* technical electives.

Transportation: Required: ITE 377, 471, 478; plus an additional 10 hours of *approved* electives.

Visual Communications. Required: ECE 105, 106; ICG 212, 312; GRC 135; plus an additional 4 hours of *approved* technical electives.

Electronic Communications. Required: TCE 201; ETC 307; plus an additional 13 hours of *approved* technical electives.

Technical Teacher Education: The objective of Technical Teacher Education is the preparation of technical educators for the post secondary level. A technical area of emphasis is required. Internship and prior industrial experience, approved by the advisor, is considered a means of gaining technical expertise in an industrial situation.

Prior to the completion of the degree, the student must show evidence of adequate and appropriate occupational experience

Vocational Teacher Education The purpose of Vocational Teacher Education is to provide courses that will meet the needs of vocational teachers and prospective vocational teachers for meeting Arizona vocational certification requirements.

The selection of courses is under direct supervision of a faculty advisor.

Typical Freshman Year Course Pattern (Faculty Advisor Approval Required)

		Semester Hours
First Semester		
ENG 101	First Year Composition	3
MAT 115	College Algebra and Trigonometry	4
TCE 100	Structured Problem Solving with BASIC	3
ITC 200	Technology of Communications	3
CHM 101	Introductory Chemistry	4
Total		17
Second Semester		
ENG 102	First Year Composition	3
MAT 260	Technical Calculus I	3
ECE 105	Introduction to Languages of Engineering	3
PGS 101	General Psychology	3
Technical Elective		3
Total		15

Each student must seek assistance in planning transferable courses.

Option in Interactive Computer Graphics (ICG)

The purpose of the Interactive Computer Graphics (ICG) option is to prepare students to enter the diverse field of computer graphics applications as professionals who are immediately productive and who have the breadth of educational experiences to advance into positions of leadership.

Typical career paths may include:
- Applications Supervision and Management
- Design (specialty areas such as electronics, mechanical, manufacturing, illustration, etc.)
- Training (administration and/or instruction)
- Operational Services and Support Supervision
- Applications Development/Testing/Implementation
- Graphics System Analysis
- Sales/Marketing/Field Service
- Technical Graphics and Publications

Interactive Computer Graphics Core:

		Semester Hours
ICG 212	Design Documentation	3
ICG 310	Computer Graphics Fundamentals	3
ICG 312	Computer Assisted Graphics	3
ICG 314	The CIM Database	3
ICG 412	3D Computer Graphics Applications	3
ICG 413	Graphic Applications or Approved ICG course	3
ICG 417	Computer Graphics Systems	3
Total		21

Interdisciplinary Areas of Emphasis: 37 semester hours

The student will choose a minimum of 12 hours from each of three of the suggested emphasis areas listed below, one of which must be in a technology area. Courses will be selected in consultation with an academic advisor. Certain courses may be required in some of the areas.

- Industrial Technology
- Graphic Communications
- Industrial Supervision
- Technology Education
- Manufacturing Technology
- Science/Mathematics
- Computer Science
- Engineering Technology
- Journalism and Telecommunications
- Electronics and Computer Technology
- Management
- Design
- Business
- Geography
- Engineering
- Art
- Construction
- Architecture
- Marketing
- Aeronautical Technology

Typical Freshman Year Course Pattern (Faculty Advisor Approval Required)

		Semester Hours
ENG 101	First Year Composition	3
MAT 115	College Algebra and Trigonometry	4
TCE 100	Structured Problem Solving with BASIC	3
ITC 200	Technology of Communications	3
CHM 101	Introductory Chemistry	4
Total		17
Second Semester		
ENG 102	First Year Composition	3
MAT 260	Technical Calculus I	3
ECE 105	Introduction to Languages of Engineering	3
ECN 111	Macroeconomic Principles	3
PHY 111	General Physics	3
PHY 113	General Physics Laboratory	1
Total		16

Each student must seek assistance in planning transferable courses.

Department of Manufacturing Technology

ASSOCIATE PROFESSORS:
KELLEY (TC 201H), GRAHAM, KISIELEWSKI, SHELLER
ASSISTANT PROFESSORS:
LAMERAND, SHELLER PALMGREN
PROFESSORS EMERITI:
CAVALL ERE, MINTER

Increased technological complexity and sophisti cation have created great industrial demand for the services of those individuals who possess working knowledge of the technical phases of planning, testing production and fabrication of consumer and industrial products and equip ment. To meet these needs, five options are available in Manufacturing Engineering Technol ogy

- Computer Integrated Manufacturing Engineering Technology
- Manufacturing Engineering Technology
- Mechanical Engineering Technology
- Robotic and Automation Engineering Technology
- Welding Engineering Technology

Manufacturing Engineering Technology–B.S.

Graduation Requirements:

	Semester Hours
Technology Core	20
Engineering Technology Core	19
General Studies requirements	36
University English requirements	6
Manufacturing Engineering Technology Core	16
Selected option	35
Total Semester Hours Required	132

The following courses are required as part of the Technology Core

		Semester Hours
CHM 114	General Chemistry for Engineers	4
MAT 260	Technical Calculus I	3
TCE 230	Engineering Materials and Processing	3

The following courses are required as a part of the Engineering Technology Core:

ETC 307	Electrical Power Circuits and Machines	4
ETC 313	Applied Engineering Mechanics Materials	3
ETC 340	Applied Thermodynamics and Heat Transfer	3

Manufacturing Engineering Technology Core

		Semester Hours
MET 231	Manufacturing Processes	3
MET 300	Applied Metallurgy	3
MET 302	Welding Survey	4
MET 401	Statistical Process Control	3
MET 460	Manufacturing Capstone Project or MET 461 Mechanical Capstone Project (3) or MET 462 Welding CapstoneProject (3) or MET 463 Robotic Capstone Project (3) or MET 464 CIM Capstone Project (3)	3
Total		16

The faculty of the Department of Manufactur ing Technology offers a program of study lead ing to the Bachelor of Science degree with a ma jor in Manufacturing Engineering Technology (BS/MET). The program will appeal to persons interested in developing a career in the field of manufacturing with a primary focus on practice oriented applications of existing or state of the art manufacturing techniques

The faculty ma ntains proficiency through contact with industry both by maintenance of the Industrial Advisory Committee and through working directly in an appropriate field

Transfer applicants must meet the general re quirements for undergraduate admission to ASU as well as meet the minimum grade point average of 2.25. Those students who seek admission to the program from other programs within the Co lege of Engineering and Applied Sciences may be admitted with a minimum GPA of 2 00 Students admitted to the program will be required to develop an area of specialization. To fac litate this, the program structure pro vides five options from which the student may choose.

Option in Computer Integrated Manufacturing Engineering Technology

Computer integrated manufacturing has proven to be a powerful tool for increasing productiv ity in manufacturing. This impact will be greater in the future as the full potential of computers is integrated into the manufacturing factory. Computer Integrated Manufacturing Engineering Technology is concerned with the coordination of computer information and computer implementation in manufacturing.

Required courses: MET 341, 345, 416, 443, 448, 451, 453; ICG 212, 314; plus 7 hours *approved* technical electives

Option in Manufacturing Engineering Technology

This option is designed to prepare technologists with both conceptual and practical applications of processes, materials, and products related to metalworking industries. Accordingly, this con centration is intended to prepare students to meet the responsibilities in planning the proc esses of production, developing the tools and machines, and integrating the facilities of pro duction or manufacturing

Required courses MET 341, 344, 345, 346, 416, 442, 443, 444; AET 409; plus 7 hours *ap proved* technical electives

Option in Mechanical Engineering Technology

The primary objective of the Mechanical Engineering Technology option is to prepare the stu dent for entry level work in mechanical design and test either in engineering or manufacturing departments in product oriented industries. Major emphasis is placed on reducing the amount of time required by industry to make the grad uate productive in any area of work. The student will obtain a well rounded academic background in the general studies, basic sci ences, mechanics and thermal sciences.

Required courses: MET 331, 432, 433, 434, 436, 438; AET 310; ETC 312; plus 7 hours of *approved* technical electives.

Option in Robotic and Automation Engineerng Technology

The challenges to improve productivity, im prove product quality, reliability, and reduce costs must be addressed by integrating robots and automation in manufacturing. Robotic and automation technology will address the field of automating manufacturing processes.

Required courses MET 341, 345, 346, 416, 444, 451, 452, 453; ICG 314; plus 7 hours *ap proved* technical electives.

Option in Welding Engineering Technology

This option is designed primarily to prepare in dividuals for technical positions in industries utilizing welding and related processes. The focus is on the application of welding technology as applied to current and near future industrial needs. The program is structured to provide the individual with a balance of theory, application and hands on experiences. The general areas covered by the courses are: welding processes, mate rials, which includes non destructive testing, and weldment design. The student also has the opportunity to work with robots in robotic welding applications. Also, a laser is available for investigating the area of high energy weld ing processes.

Graduates of this program have the capability to function in a variety of technical positions related to welding and manufacturing. Typical ly, a graduate from this program may work in the areas of. Robotic Welding, Metallurgy, Quality Control, Non-Destructive Evaluation, Welding Process Evaluation, and Technical Sales

The industries where graduates may find employment are: aerospace, automotive, heavy ma chinery, heavy fabrication, and energy produc tion.

Required courses. MET 321, 322, 325, 341, 346, 420, 421, 425; AET 409; plus 7 hours of *approved* technical electives.

First Two-Year Typical Curriculum for Manufacturing Engineering Technology

Freshman Year

		Semester Hours
First Semester		
ENG 101	First Year Composition	3
MAT 115	College Algebra and Trigonometry	4
TCE 100	Structured Problem Solving with BASIC	3
COM 100	Introduction to Human Communication	3
CHM 114	General Chemistry for Engineers	4
Total		17
Second Semester		
ENG 102	First Year Composition	3
MAT 260	Technical Calculus I	3
PHY 111	General Physics	3
PHY 113	General Physics Laboratory	1
ECE 105	Introduction to Languages in Engineering	3

TCE 230	Engineering Materials and Processing	3
Total		16

Sophomore Year

First Semester

MET 231	Manufacturing Processes	3
PHY 112	General Physics	3
PHY 114	General Physics Laboratory	1
TCE 201	Applied Electrical Science	4
MAT 261	Technical Calculus II	3
ECE 106	Introduction to Computer Aided Engineering	3
Total		17

Second Semester

MAT 262	Technical Calculus III	3
ETC 211	Applied Engineering Mechanics Statics	3
MET 345	Manufacturing Proc II and Mach Theory	4
ECN 111	Macroeconomic Principles	3
General Studies Elective		3
Total		16

Technology

TECHNOLOGY CORE

TCE 100 Structured Problem Solving with BASIC. 3 F, S SS
Methods of def n ng organ z ng deve op ng deas and so ut ons to problems us ng computer and structured BAS C anguage as a too . Corequ s te MAT 115

201 Applied Electrical Science. 4 F, S SS
Pr nc p es of e ectric ty, pass ve e ements and d c and a c circuit ana ys s Laboratory exp oration of c rcu t con cepts and techn ques us ng nstrumentation and the computer as a too . Three hours ecture, 3 hours labora tory. Prerequ s te· TCE 100

230 Engineering Materials and Processing. 3 F S SS
Materia s, the r structures propert es, fabr cat on char acterist cs and appl cat ons Materia form ng, join ng and finish ng processes. Automat on and quality contro Pre requ s tes. CHM 101 113 or 114

250 Digital Systems and Microprocessors. 3 F, S
Fundamenta s of d g ta systems and m croprocessors with Boo ean A gebra and comb nat ona log c M cro processor programm ng and app cat ons Three hours ecture demonstrat on Prerequ s tes ECE 105 TCE 201. *[Satisfies General Studies Requirement N3]*

400 Technical Communications. (3 F, S, SS
P ann ng and preparing techn cal pub cations and ora presentations based on d rected library research related to current techn ca top cs Prerequ sites sen or stand ng w th a techno ogy major comp et on of first year Eng sh requ rements p us sophomore cr tica wr t ng course *[Satisfies General Studies Requirement L2]*

ENGINEERING TECHNOLOGY CORE

ETC 205 Electronic Devices and Circuits. 4 F, S
Act ve device character st cs mode s and bas c e ec tron c c rcu t des gn pr nc p es Three ectures, 3 hours aboratory Prerequ s tes· TCE 201 MAT 260

211 App ied Engineering Mechanics–Statics. 3) F S SS
Vectors, forces and moments force systems equ bri um ana ys s of bas c structures and structura com ponents fric on, centroids moments of nert a Prereq u s tes MAT 261 or equ va ent, PHY 111 113 Equ va ent to CON 221.

307 Electrical Power Circuits and Machines. 4 F S
Pr nc p es and ana ys s of e ectrica power c rcu ts and components transformers rotat ng mach nes and re ated contro equ pment Three lectures 3 hours labora tory. Prerequ s tes TCE 201; PHY 112 114

312 Applied Eng neering Mechanics–Dynamics. 3 S
Masses; mot on kinemat cs dynam cs of mach nery Prerequ s tes ETC 211 MAT 261.

313 Applied Engineering Mechanics–Materials. 3 F S, SS
Stress strain, re at ons between stress and stra n, shear moments deflect ons comb ned stresses. Two hours ecture 3 hours aboratory Prerequ s te ETC 211

331 Semiconductor Materials Science Devices. 3 F S
ntroduct on to mechan ca and e ectro magnet c prop ert es of mater a s used n e ectron cs Semiconductor phys cs and so d state dev ce character st cs mater a propert es Three hours ecture Prerequ s tes· CHM 101 or 113 ECE 105· EET 310 PHY 112 114

340 App ied Thermodynamics and Heat Transfer. 3 F S SS
Thermodynam c systems and processes f rst and sec ond aws of thermodynam cs, propert es of pure sub stances, app cat ons to heat eng nes and specia sys tems. Fundamenta s of conduct on rad at on and con vect on Prerequ s tes MAT 261 PHY 112 114

Aeronautical Technology

AERONAUTICAL TECHNOLOGY

Fl ght nstruction costs are not included in Unive sity tu t on

AET 101 Introduction to Aeronautics. 3 F
Evo ut on of av at on A rcraft types and uses Pr nc p es of f ght Techn ca deve opment of equ pment/systems A rspace use

182 Private Pilot Ground School. 3 F S SS
Ground schoo ead ng to FAA Pnvate P ot Certif cat on. Student may beg n f ght train ng w th approva of nstruc tor Aerodynam cs, a r nav gat on performance, regu at ons

183 Private Pilot Certificate. 1 F, S SS
F ght tra n ng for the FAA Pr vate P ot Cert f cate Sat sfactory comp et on of FAA tests s requ red Prereq uis te or corequ s te AET 182

200 Interim Flight Course. 0) F S SS
A ows students to accrue f ght time n preparat on for the Instrument P ot Rat ng and the Commerc a P ot Cert f cate Prerequ s te Pr vate P ot Certif cate

201 Air Traffic Control. 3 S
Ground and a r operat ons Weather serv ces com mun cat ons and rout ng F ght p ans and IFR oper ations Departures and arr va s A rport cond t ons and emergencies

220 Aviation Meteorology. (3 F, S
Eva uat on ana ys s, nterpretat on of atmospheric phenomena. Low and h gh a t'tude weather from the pi ot s v ewpo nt Nephology Prerequ s te. GPH 212

222 Instrument Pilot Ground School. (3) F
Ground school eading to the FAA Instrument Pi ot Rat ng Ten hours s mulator requ red Prerequ s te or corequ s te Private P ot Cert f cate, AET 220

280 Aerospace Structures and Materials. 3) F, SS
Bas c aerodynamics, aerospace veh c e structura de sign and materia s. Manufacturing processes, assemb y and repair techn ques and hardware se ect on Two ectures, 4 hours laboratory. Prerequ s tes PHY 111, 113

281 Aerospace Systems. (3 S, SS
Modern a rcraft and aerospace veh cle systems (hydrau cs, pneumat cs, auxi ary contro nstrument etc), we ght and ba ance nspect on requ rements and methods. Two lectures, 4 hours aboratory. Prerequ s tes PHY 111, 113.

287 Aircraft and Aerospace Powerplants. (3 F, S, SS
Theory of nterna combust on eng nes, components performance ana ysis, eng ne accessories systems and environmenta control. Two lectures 4 hours aboratory. Prerequisites. PHY 111, 113, or nstructor approval.

288 Gas Turbine and Turbomachinery. (3) F S, SS
Development and theory of gas turbine eng nes. Thrust and performance ana ysis Engine components, systems aerodynamic problem app cat ons and env ronmental contro Two ectures 4 hours aboratory Prerequ sites. PHY 111 113 or nstructor approval

308 Air Transportation. (3 F
A r commerce re ated to the transportation system H storical deve opment of air transportat on regs, the regu ators and the regulatory c mate with n the Nat ona A rspace System Prerequ s te AET 101 or equ va ent. *[Satisfies General Studies Requirement G]*

310 Instrumentation. 2) F
Measurement system responses and the character stics of exper menta data. Methods of col ect ng and ana yzing data. Prerequisites: TCE 201 MAT 261

314 Commercial Pilot Ground School. 3) S
Ground school eading to Commerc a P ot certif cat on Ten hours s mulator requ red Prerequ s tes: Pr vate P ot Cert ficate AET 220

320 Applied Aerodynamics I. (3) F
ntroduct on to potent a and v scous f ows and the r relat onsh p to a rcraft ft and drag Prerequisites. AET 280, ECE 106 MAT 262.

321 Applied Aerodynamics II. 3 S
Wind tunnel and f ght test theory measurements and ana ys s A rcraft stab ty and contro Two lectures, 2 hours laboratory Prerequ s te AET 320

322 Aircraft Design I. 3) F S, SS
Bas c app ed aerodynam cs prope er performance and a rp ane performance ana ys s Prerequ s tes. AET 280 287 ECE 106, MAT 260 PHY 112 114

342 Av ation Law Regulations. (3 F, S
Study wh ch encompasses the fie d of av at on w th n the context of the U S. Common Law system Pub c law, ad m n strat ve ru emak ng, sovere gnty enforcement, and case aw ana ys s. Prerequis tes AET 101 or 182 or equ valent

360 Introduction to Helicopter Technology. 3) S
ntroduct on to the working funct ons of modern rotary w ng a rcraft Rotary w ng f ght theory aerodynam cs, controls f ght and power requ rements Prerequ s tes: Jun or stand ng PHY 112 114

381 Instrument Pilot Rating. 1 F, S, SS
F ght tra n ng for the FAA Instrument P lot Rat ng. Sat sfactory comp et on of FAA Instrument Rating requ red. Prerequ s te. AET 222 Not for AET majors.

382 Air Navigation. (2) F
Advanced D R theory appl cat on of VLF INS Loran, pressure pattern gnd nav gat on. Corequ site AET 222 or nstructor approval

383 Commercial Pilot Certificate and Instrument Rating. 2) F, S, SS
F ght train ng for the FAA Unrestricted Commercial P ot Cert f cate Sat sfactory comp et on of FAA Cert f cate Rating requ red Prerequ s tes. AET 222, 314; flying time, 150 hours m n mum

385 Flight Instructor Ground School. (3) F
Ground school n preparat on for the FAA F ght Instruc· tor Certif cate. Prerequ s te. AET 383.

386 Flight Instructor Rating. (1) F, S, SS
Fl ght tra n ng for FAA F ght nstructor Certificate Certif · cate required for course comp etion Prerequ site. AET 385

387 Multi-Engine Ground School. (1 F
Ground schoo preparat on for the FAA Multi Eng ne Rat ng. Prerequisites AET 287 383 and current Second C ass Med ca Certif cate

389 Multi-Engine Rating. (1) F, S, SS
F ght training for the FAA Multi Engine Rat ng. FAA rating requ red for course complet on. Corequ s te AET 387.

392 Flight Instructor Instrument Ground School. (2) S
Ground school preparation for FAA nstrument F ght nstructor Rat ng Prerequ s te: AET 386 or approval of nstructor

393 Flight Instructor Instrument Rating. (1) F S, SS
Fl ght tra n ng for the FAA CF I CFI certificate requ red for course comp etion Corequ site: AET 392

394 Multi-Engine Land, Airplane Flight Instructor Rating. 1) F, S SS
Norma and emergency f ght operat ons. Instruct on techn ques and procedures assoc ated with ght mu t eng ne and, a rp ane. Prerequ s te AET 389

408 National Airspace System. (3) S
A rway faci it es. Operat ons and communicat ons, air route traff c contro centers and f ght serv ce stat ons. Navigat on a ds a rport env ronment, cert f cat on and secur ty Prerequ s tes: AET 201 or AET 222

409 Nondestructive Testing and Quality Assurance. 3) F S SS
Purpose of inspection and qua ity assurance Theory, app cat on of nondestruct ve nspect on methods Ap p cat on of pert nent standards specifications and

codes Two ectures, 4 hours aboratory Prerequ s tes AET 280 or TCE 230 TCE 400 Sen or stand ng n Technology or nstructor approva

410 Aviation Safety. (2 F
Aviat on accident prevent on human factors, life support fire prevent on, and crash surv vab ity Deve opment and analys s of av at on safety programs Prerequis te Jun or standing

411 Aircraft Accident Investigation. (3) S
Development and evaluation of ev dence, ana ys s and recommendations for prevent ve pract ces Prerequ s te Jun or standing

414 Applied High Speed Aerodynamics. (3) F
Basic concepts of compress b e f u d mechan cs nc ud ng nterna and externa f ows Prerequ s tes ETC 340· MAT 262.

415 Propulsion. 3 S
Princ ples, thrust performance cyc es, combust on sys tems, mechan cal, mater a and other des gn cons der at ons, ram jets rockets and advanced propu s on sys tems. Prerequ s te· AET 414.

417 Aerospace Systems Design. (3) F
Analys s and des gn of rockets, m ss les and sate tes Therma design of aerospace systems. ntroduct on to orb tal mechan cs. Computer s mu at ons and app cat ons Prerequ s tes AET 322· ETC 313; MAT 262

444 Airport Management and Planning. (3 S
Career or entat on nto administration and management of modern pub c a rports to nc ude an overv ew of p anning fund ng and development of a rport fac ties Prerequ s te AET 308 or instructor approval.

461 Applied Helicopter Aerodynamics and Performance Measurements. (3) F
Hovering theory, vertical fi ght, b ade mot on and rotor contro Aerodynam cs of forward f ght stab ty Pre requ s tes AET 322, 360

462 Aerodynamics of Wind Tunnel Models. (3) S
He copter mode types, des gn cons derations pro pulsion oads surfaces mount ngs nstrumentat on Prerequ s tes AET 321 461

463 Aircraft/Helicopter Handling Qualities. (3) F
FAR's, M LSPEC's human resources, ana yt ca tech niques simu ator and f ght test techniques. W nd tunne data acqu s tion and ana ys s Prerequ s te: AET 461

464 Flow Modeling Validation. (3) S
F ow mode concepts, f ow mode s n airp ane and he copter design. Test requ rements data analys s error analys s. Prerequis te· AET 462

472 Applied Linear Analysis. (3) N
Linear a gebra, d fferential equations and computer methods app ed to prob ems n Eng neer ng Techno ogy Prerequ sites ECE 106, MAT 262 *[Satisfies General Studies Requirement· N1]*

484 Aeronautical Internship. (1 3) F, S, SS
Work experience assignment at a rports or w th aero space ndustry commensurate with student's program. Spec a projects and/or specialized supervis on by ndustry with Un versity supervision Prerequis tes. ap proval of adv sor, Jun or status

487 Aircraft Design II. (3) F, S
Basic aerodynamics and a rplane performance ana ys s methods app ed to pract cal design project. Prerequ site: AET 322

489 Airline Administration. (2) S
Adm n strative organ zations econom cs of a r ne ad m n strat on, operational structure re ationship w th fed era government agenc es Prerequ s te· AET 308 or n structor approva

490 Mathematical Modeling of Aerospace Systems. 2 S
Methods of ana yz ng and opt m z ng aerospace sys tems, us ng bas c stat st cs and we known numerica methods w th emphas s on computer s mu at on Prereq u s te MAT 261. *[Sat sf es General Stud es Requ re ment N2]*

See page 38 for special courses which may be offered by this academic unit.

Electronic Engineering Technology

EET 208 Electric Circuits. 3 F S
Graph ca and ana yt ca ana ys s of e ectr c c rcu ts trans ent and s nusoida exc'tat on App cat ons of circu t theorems and computer so ut ons Prerequ s tes TCE 201· coreq u s te· MAT 261

301 Electric Networks I. 3 F S
Analyt ca and graph ca ana ys s of e ectr c networks trans ents steady state s nuso dal frequency response and transfer funct ons us ng ca cu us essent a s and Lap ace transforms Prerequ s tes· EET 208, MAT 261.

310 Electronic Circuits. (4) F, S
Analys s and des gn of b po ar and FET e ectron c c r cu ts us ng the mode approach. Amp f er and transfer funct on princip es Prerequ s tes ETC 205; EET 208

372 Communication Systems. 4 F S
Systems ana ys s and design of AM, FM, PCM, and SSB commun cat on systems No se and d stort on perfor mance of communicat on systems Prerequ s tes EET 301 310 CET 350

396 Professional Or entation. 1 F, S
Techn ca , profess onal, economic and ethica aspects of e ectronics computer eng neer ng techno ogy pract ce and ndustr a organ zat on Lectures and projects. Pre requ s te Junior stand ng

401 Electric Networks II. (3 A
Graph ca and ana yt ca ana ys s of d screte systems Time, frequency and transform domain techn ques Waveform ana ys s Computer solut ons Prerequ s te. EET 301

404 Transmission Lines and Waveguides. (4) S
Theory and app cat on of transm ss on nes wave gu des and m crowave components Analys s and match ng us ng the Sm th Chart. W th aboratory Prerequ s te· EET 301

406 Control System Technology. 4) S
Contro system components, ana ys s of feedback control systems stab ity performance, appl cat on. With aboratory and computer s mu at ons techn ques. Pre requ s tes EET 400 (or EET 301 and MAT 262).

410 Linear Electronic Circuits. 4 F
Frequency response and feedback des gn of mult stage e ectron c c rcuits and systems L near ntegrated c r cu try SP CE ana ys s Lecture and aboratory Pre requis tes EET 301, 310

420 Operational Amplifier Theory and Application. (4) A
Different al and operational amp fier circu try, feedback configurat ons, op-amp errors and compensation, l near and non 'near circu try. App cat ons Lecture and abo ratory Prerequ's tes: EET 301, 310

422 Electronic Switching Circuits. (4) S
Analys s and design of e ectron c c rcu ts operat ng 'n a switching mode. Waveshap ng t m ng, log c. SPICE analys s. Lecture and laboratory Prerequ's tes EET 301 310; CET 350

430 Instrumentation Systems. 4 F
Measurement pnnc ples and nstrumentat on tech n ques S gnal and error ana ys s Lecture and ab oratory. Prerequis tes EET 301, 310; CET 350

440 Electrical Power Systems Technology. 3 S
Electnca power systems ana ysis transmiss on d s tnbution nstrumentat on, protect on and re ated system components Prerequ s te· ETC 307.

460 Industrial Electronics. 4 S
Ana ysis and des gn of e ectron c c rcu ts for control and instrumentation Lecture and aboratory. Prerequ s tes EET 301 310, CET 350

470 Communication Circuits. 4 S
Ana ys s and des gn of pass ve and act ve commun ication c'rcu ts. Coup ng networks, fi ters, impedance matching. Modulation and demodu at on techniques Computer so ut ons. Prerequ s tes EET 301, 310 MAT 262

478 Communication Transmission System Design. (4) S
S'gna propagat on, transm ss on. Antenna pr nc p es and applications Cab e TV and other commun cat on transm ss on system des gn Lecture and aboratory Prerequ s tes: EET 404, 372 MAT 262

482 Industrial Practice: Internship Coop. Programs. (1 4) F, S SS
Specia y ass gned or approved act vit es n e ectron c ndustnes or institut ons. Report requ red Max mum of 10 credits. Prerequ s te Majors on y enro ed at junior senior evel.

490 Electronics Project. (1 4 F, S SS
Individual or smal group projects n app ed electronics with emphasis on aboratory pract ce or hardware so u t ons to pract ca prob ems Prerequ s te approva of nstructor.

501 Signal Analysis/Processing. (3 A
Theory; hardware Transform and computer techn ques Appl cations. Prerequ s tes EET 301 MAT 262.

506 System Dynamics and Control. 3 S
T me frequency and transform doma n analys s of phys ca systems. Transfer funct on analys s of feedback contro systems performance and stab ty Compensa tion Prerequ s tes EET 301 MAT 262 or EET 501

510 Linear Integrated Circuits and Applications. (3) F
Ana ysis, des gn and app ication ons of near ntegrated c rcuits and systems Prerequ s tes: EET 301, 310 CET 350

522 Digital Integrated Circuits and Applications. 3) S
Analys s, design and app cat ons of ntegrated c rcuits and systems. Prerequis tes EET 301 310; CET 350

530 Electronic Test Systems and Applications. (3) F
Analysis, design and app cat on of e ectron c test equ p ment, test systems, specif cat ons documentat on Prerequ s tes· EET 301, 310 CET 354

540 Electrical Power Systems. (3) S
Electnca power system analys s transm ss on, distri bution nstrumentat on, protect on, and related system components Prerequ s te ETC 307 EET 301

560 Industrial Electronics and Applications. (3) A
Ana ys s des gn and appl cat on of specia electron c dev'ces, and systems to ndustria contro power com munication ons and processes Prerequ sites: EET 301, 310, CET 350.

574 Communication Circuits and Applications. (3) S
Se ected top cs n e ectronic commun cat on circu ts Appl cat ons to ana og and d g ta communication F lter des gn. Prerequ'sites· EET 301, 310, 372; CET 350

576 Modern Telecommunication Systems. (3 S
Appl ed ana ys s and des gn of sate ite, and and fiber optic systems. App cations of coherent system design and compensation. Four er and Laplace analys s Prerequ s tes EET 372 MAT 262 or consent of nstructor

578 Communication Transmission Systems. (3) S
E ectromagnet c s gna propagat on and transm ss on, antenna pr nc'ples and appl cat on Cable TV and other commun cat on transmiss'on systems Prerequ s tes EET 372 404; MAT 262

See page 38 for special courses which may be offered by this academic unit.

Computer Engineering Technology

CET 350 Digital Logic Principles. (4) F S
Combinat onal og c ana ys s and design and sequent a circu t ana ysis and design w th aboratory. Lecture and aboratory. Prerequ s tes TCE 250, ECE 106

354 Microcomputer Principles. (4) F S
M crocomputer organ zation, pr nc p es, and assemb y anguage programm'ng w th aboratory Prerequ sites TCE 250, CSC 100

408 Digital Control and Simulation. (3) F
D g ta systems analys s control techn ques and com puter simu at on and des gn Prerequ s tes: CSC 383; EET 400 CET 354.

452 Digital Logic Applications. (4) S
Des gn of sequentia mach nes us ng system des gn techn ques and comp ex MS LSI devices with abo ratory Prerequis tes. CET 350, CSC 383

456 Minicomputer Systems and Programming. (3) S
Assemb y language programm ng. Input output and off ne d agnost cs Ut lity operating system and software. Prerequ s tes: CET 354, CSC 383 or 100.

457 Microcomputer Systems and Applications. (3) F
Applicat ons of m ni and/or m cro computer hardware and software. Specia purpose contro ers, nterface de s gn and app cat ons Prerequisites CET 354 CSC 383; EET 310

473 Digital Data Communication Systems. (4) F
S gna s, distort on, noise error detect on correction Transm ss on and system des gn. Interface techn ques and standards. D g ta hardware App 'cations. W'th laboratory. Prerequ sites: EET 372; TCE 250, CET 350.

485 Digital Testing Techniques. (3) S
Hardware software aspects of digital testing technology; board and logic test equipment. Prerequisites· CET 350; EET 310, CSC 383.

486 Electronics Computer Aided Design. (3 F
CAD CAM for e ectron cs manufacturing Printed-circuit ayout, documentation schemat c plott ng Prerequ s tes: CSC 383, TCE 250, EET 310.

508 Computer Process Control Technology. 3) F
Process computer contro hardware software Samp ed data contro systems process model ng, m croprocessor contro techniques, computer a ded design s mu at on Process applicat ons Prerequ sites EET 400 or 406; CET 354

552 Digital Systems and Applications. 3 S
Ana ysis, des gn and app cat ons of d g ta networks and systems Prerequ s tes: CET 350 354, CSC 383

556 Computer Software Technology. (3) S
Assemb y anguage programm ng techniques and oper ations, operat ng system characteristics systems soft ware app cations. Prerequ site: CET 354.

557 Microcomputers and Applications. (3 F
App cat ons of sma l computer systems m n and m cro computer hardware and software Prerequ s tes. CET 354; CSC 383 or 100 EET 310.

See page 38 for special courses which may be offered by this academic unit.

Microelectronics Engineering Technology

UET 415 Electronics Fabrication Principles. (3) F S
Electronic equ pment design and fabr cat on princ ples and pract ce. Completion of e ectron cs hardware design project and report. Lecture and laboratory With ab fee. Prerequ s te: Senior stand ng

416 Monolithic Integrated Circuit Technology. (4) F
Processing and fabrication of monol th c b po ar and MOS integrated circuits Lecture and laboratory. Pre requ site: ETC 331

418 Hybrid Integrated Circuit Technology. (4) S
Layout fabrication design and manufacture of thin and th ck fi m hybrid circu ts Lecture and laboratory Pre requ s te: EET 310, ETC 331

513 Microelectronics Technology. (3) A
Special processes techn ques and advances n mono ith c and hybrid techno ogy Emphas s on manufactur ng pract ce and product app cat on for LSI and VLSI Pre requisite: approval of instructor.

516 Monolithic IC Technology and Applications. 3) F
Processing fabr cat on and manufacturing of mono th c integrated circu ts App cations Prerequ s te: ETC 331 or equiva ent

518 Hybrid IC Technology and Applications. (3) S
Theory, process ng, fabricat on and manufactur ng of hybr d microelectronics devices and products App cat ons. Prerequisite ETC 331 or equ va ent, or approv a of nstructor

See page 38 for special courses which may be offered by this academic unit.

Industrial Technology

INDUSTRIAL TECHNOLOGY CORE

ITC 200 Technology of Communications. 3 F S
The study of the techno og ca methods techn ques and workstat ons used to create transm t rece ve process preserve and retr eve nformat on n the techno ogy area F e d trips S x hours ecture and aboratory

202 Design and Enterprise. (3) F S
Appl cat on concepts of des gn creativity, prob em so v ng research deve opment organ zat ons and produc t on as used n the work ng environment of techno ogy Prerequ s te: ITC 200.

443 Occupational Safety. 3) N
Acc dent prevent on acc dent factors methods of record ng and report ng ana ys s psycho og ca aspects att tudes recent leg s ation, safety consciousness and l ab ty. Prerequ s te jun or status

444 Industrial Organization. (3) N
Industria organ zation concepts Top cs re ate to n dustrial re at ons, governmenta regu at ons, organ zat ona structure abor re at ons, human factors and current ndustr a pract ces F e d trips Prerequis te: jun or status.

GRAPHIC COMMUNICATIONS

GRC 135 Graphic Communications. 3) F S
Introduction to the techno og es nvo ved n the design mage generat on, transm ss on and product on of mu t p e mages for consumer ut zation Two hours ecture and four hours aboratory F eld trips

136 Industrial Printing Processes. 3) S
Theory and pract ces of the major ndustr a printing processes, inc ud ng photography and other support techno ogies Two hours lecture and four hours abora tory F e d trips. Prerequ s te GRC 135.

236 Screen Process Printing. (3) N
Theory and study of ndustr a app cations re ating to the technology and uses of screen process print ng F eld trips S x hours ecture and laboratory Prerequ s te GRC 136.

237 Image Preparation. (3) F
Basic pr nc p es of typograph c ayout Preparat on of thumbna s, roughs comprehensives and mechan ca s Introduct on to photocompos t on systems S x hours ecture and aboratory

238 Instruments and Controls. (3) N
Instrumentat on and methodo og es for materials test ng and qua ty control. Prerequ s te GRC 136

331 Substrates and Inks. 3 N
Techn cal study of nk and paper w th print ng capab ty stressed F e d tr ps Prerequ s te approval of nstructor.

332 Film Assembly and Platemaking. (3) N
Str pp ng negat ves a d pos t ves ne ha ftone duo-tone fu co or contact ng f ats onto var ous types of ithograph c p ates F eld tr ps Two hours ecture and four hours aboratory Prerequ s te. GRC 136

333 Sheet-Web Press Technology. 3) F
Function of the offset pr nt ng equ pment L thograph c dy nam cs of both sheet fed and web systems Two hours

lecture and four hours laboratory Prerequ s te: GRC 332 or approva of nstructor.

334 Photo-Mechanical Reproductions. (3) F
Theory and product on of ne work, ha ftones, contact work and special effects for the graph c arts ndustry. Two hours lecture and four hours aboratory Prereq u site GRC 136

335 Binding and F nishing. 3) F
Operat ons, nvo v ng cutt ng, trimm ng, perforat ng, stamping d e cutting am nat ng emboss ng and b ndery process. Prerequ s te GRC 333.

336 Color Separation. (3) S
Methods of produc ng separat on negatives and pos t ves Prerequis te· GRC 334

337 Production Management. (3) N
P ann ng and contro ng work f ow of graph c arts prod ucts Fie d tr ps. Prerequ s te· GRC 136.

339 Estimating and Cost Analysis. (3) N
Estimat ng print ng operat ons and mater a s, elements of cost find ng us ng se ected systems Prerequ s te GRC 136.

433 Production Techniques. (3) N
Systemat c product on p ann ng experience S x hours ecture and aboratory Prerequ s tes GRC 333, 334

435 Plant Management. (3) N
ndependent documentary research equ pment person ne p ant s te se ect on and p ant management prob ems Field trips Prerequ s te. GRC 337.

436 Gravure Technology. (3) N
n-depth study of the product on sequences and proc esses re ated to the gravure method of printing. Pre requ site: GRC 336.

437 Advanced Color Reproduction. (3) F
Scientific analys s for the engineer ng of co or reproduc tion systems used in the graph c arts ndustry. F eld trips Prerequ site GRC 336

438 Graphic Arts Techniques and Processes. (3) F, S SS
Re ating matena s to graphic arts printed products production practice. Six hours lecture and aboratory. Prerequ s te· Junior status.

439 Photocomposition. (3) S
Deta ed study of modern image preparation equ pment Prerequ s te· GRC 237

537 Web Press Problems. (3) N
D rected group study of se ected web press problems

See page 38 for special courses which may be offered by this academic unit.

INDUSTRIAL SUPERVISION

IST 445 Industrial Internship. 1 10) N
Work experience assignment n ndustry commensurate w th student s program. Spec a zed nstruction by indus try w th Un vers ty superv s on. Prerequ s te: approval of adv sor jun or sen or status 2 50 GPA

450 Industrial Training. 3) N
Train ng techn ques and earn ng processes. P ann ng, deve op ng and eva uat ng tra n ng programs n ndustry and governmental agenc es Prerequ s te approval of advisor

451 Materials Control. (3 N
Activit es of mater a hand ng nclud ng purchas ng, re ce v ng, warehousing traff c p ant ayout nventory and product on contro and sh pp ng re at ng to techn ca procedures

452 Industrial Supervision. (3) N
Superv sory pr nc p es as appl ed to ndustria and governmenta agencies. Superv sor emp oyee relat ons, group mora e, eadersh p techn ques po cy nterpreta t on and tra n ng. Prerequ s te· approval of adv sor

453 Safety Supervision. (3 N
Contro ng phys ca cond tions environmental control, persona protect on controls, cost ana ys s, systems safety ana ys s aux ary funct ons. Prerequis te. ITC 443,444.

455 Industrial and Vocational Programs. (3) N
Industrial governmenta , factory and spec al school programs Prerequisite advisor and ST faculty ap- proval; jun or or sen or status

See page 38 for special courses which may be offered by this academic unit.

INDUSTRIAL TECHNOLOGY EDUCATION

ITE 222 Wood Technology. (2) N
Phys ca , structura and mechan cal properties. Analysis of adhesives preservat ves and hybr d materia s. Field trips Six hours lecture and aboratory

321 Light Building Technology. (3) N
Principles and pract ces as related to light construction nc us ve of pre minary considerat ons and functions through postconstruct on concern F eld trips Two hours ecture 4 hours laboratory. Prerequ s te approval of nstructor

322 Design and Manufacture in Wood. (3) N
Furniture, cab net, pricing, exper mentation, modified wood products, joining, forming laminating, structural des gn. F e d trips Six hours lecture and laboratory Prerequ s te· ITE 222.

361 Industrial Projects Design. (2) N
Des gn and deve opment of projects for the classroom. Four hours lecture and aboratory Prerequis te: approval of nstructor

377 Internal Combustion Engines. (3) N
Eng ne princ p es, des gn, performance testing fue s. Fie d trips. Six hours lecture and aboratory. Prereq uisite: approval of instructor.

402 Occupational Analysis and Course Develop- ment. (3) A
Selecting nstruct on un ts through task ana ysis techn ques, industr a and vocat ona course and training program deve opment. Prerequ site approval of nstructor.

405 Improving Instruction in Industrial Education. 3) N
Methods evaluat on and instructional mprovement in Industria Educat on Prerequ s te ITE 402

421 Production Wood Technology. (3) N
Des gn and manufacture of products, economy of mater ials, structura factors j gs and f xtures work environ ment assembl ng, f n sh ng Fie d trips S x hours lecture and aboratory Prerequis te ITE 222

424 Techniques of Construction. (3) N
Bu d ngs nonbu d ngs plann ng s te preparation, structure, construction materials personne F e d trips S x hours lecture and aboratory Prerequis te TE 222

427 Industrial Plastics. 3) N
Theory of thermoset p astics Inject on mo d ng, vacuum form ng, we ding Cast ng foam. Compression mo d ng and

fabrication F e d trips S x hours ecture and aboratory Prerequ s te· approva of nstructor.

442 Facility Planning and Management. 3) N
Plann ng, organiz ng and manag ng ndustr al and voca t ona educat on aboratories, equ pment and supp y se ect on, fac l ty arrangement F e d trips Prerequ s te· un or status.

446 Instructional Aids and Materials. (3) N
Selection preparat on, construct on and methods of use in ndustna and vocat onal educat on Prerequ s te approva of instructor

461 Hot Metal Techniques. (3) N
Propert es of metals sand and nvestment casting; pattern mak ng. Fie d trips Six hours lecture and abo ratory Prerequ s te: MET 200.

465 General Metals. (3) N
Numer ca control, ch p ess mach n ng study of spec a nterest n metalwork ng processes S x hours ecture and aboratory. Prerequisite ITE 160

470 Improv'ng Instruction in Pre-Vocational Education. 3 N
Methods, eva uat on and nstruct ona mprovement n Pre Vocationa Educat on. Prerequ site ITE 402

471 Power Transmission. 3) N
Princip es and servic ng of c utches, transm ssions different a s, steer ng and suspension S x hours ecture and laboratory Prerequ s te. approva of instructor

478 Engine Analysis. 3 N
Automot ve em ss on contro , a r cond t on ng operat on performance test ng, gn t on and fue control Field tr ps Prerequ s te. approva of nstructor.

480 Teaching Industrial and Vocational Subjects. (3) N
Teach ng techn ques ph osophy, organ zat on p ann ng evaluation of teach ng eff c ency Prerequ site Jun or status.

485 Teaching Internship. 1 8 N
Classroom, aboratory and tra n ng procedures n post secondary nst tut ons ndustry and or governmenta agencies Prerequ s tes ITE 402, 480, senior status and departmental approva

491 Organization and Management of Cooperative Programs. (3) N
Workstudy programs for ndustr a and vocat onal oc cupat ons n h gh schoo s and community co eges Deve op ng and coord nat ng programs nstruct'ona mater a s Prerequ site junior status

513 Experimental Activities. 3 N
nvest gat on and so ution of techn ca prob ems n the student's area of spec a zat on invo v ng materia des gn and ana ys s

540 Evaluation in Industrial and Vocational Education. (3 N
Eva uat ve factors such as att tudes behav ora factors, sk l s, techn ca nformat on instrument const uct on· eva uat on of program effectiveness

541 Vocational Education for Special Needs. (3) N
Organiz ng and adm n stering vocat ona programs to meet spec al needs of youth and adu ts n schoo s agenc es and ndustry.

542 History and Philosophy of Industrial and Vocational Education. (3 N
Evo ution of modern programs, current concepts future trends

544 Industrial Processes in Special Education. (3) N
Emphas s on task ana ysis n development of man pu lat ve activ ties for specia needs learners

545 Legal Aspects of Occupational Education. (3 N
nterpretat on of federa and state acts regu at ons, and respons bi t es related to vocat ona educat on pro grams

546 Post-Secondary Occupational Education. (3) N
Trends, commun ty surveys, needs, curr cu a nstruc t on, eva uat on of occupat ona programs f nancing, emphasis on ndustna occupat ona educat on at the post secondary eve

548 Adm'nistration of Industrial and Vocational Education. (3 N
Improv ng instruct on fund and materia contro , student personne problems curricu ar patterns.

549 Research Techniques and Applications. (3) N
Se ect on of research prob ems, ana ys s of terature, nd v dua nvest gat ons prepar ng reports proposa writing

See page 38 for special courses which may be offered by this academic unit.

INTERACTIVE COMPUTER GRAPHICS

ICG 212 Design Documentation. (3) N
Us ng m crocomputer based graph cs systems for product des gn and documentation. Geometric shape ana ys s and descript on. Documentat on techn ques and standards D mens on ng F e d tr ps Lecture Lab oratory Prerequisite ECE 106

310 Computer Graphics Fundamentals. 3 N
Computer image creat on, transformat on and man pu at on Current techn ques for database generation Concepts of applicat ons software deve opment Hands on exper ence F e d tr ps Lecture Laboratory Pre requ s te. programm ng background he pfu but not nec essary *[Sat sf es Genera Studies Requirement N3]*

312 Computer-Assisted Graphics. (3 N
Us ng computer a ded des gn and draft ng app cation software for advanced geometr c construct on System and workstat on configurat on and product v ty. Model ng app cat ons F e d trips Lecture Laboratory. Prerequ s te CG 212 *[Sat sf es General Stud es Requ rement· N3]*

313 Technical Illustration. (3 N
P ctor al draw ng shades and shadows and mu t media render ng techn ques Lecture Laboratory. Prerequ s te ICG 212 or equ va ent

314 The CIM Database. (3 N
Prepar ng the product def n t on database for computer ntegrated manufactur ng Documentat on and process requ rements, systems and standards Prec s on d mens oning F e d tr ps Lecture Laboratory Prereq u s te CG 212, TCE 230 or equivalent

412 Computer Graphics Modeling. 3 N
Estab sh ng and man pu ating 3D computer mode s App cat ons 'nclud ng so ds mode ng concepts, des gn ana ysis, dynamic s mu at on, and database nterchange F e d trips Lecture Laboratory Prerequ s te CG 312 *[Sat sfies General Studies Requ rement N3]*

413 Graphic Applications. (3) N
Student se ected modu es arch tectura construction, c vi ut ty and electronic draw ng· descript ve geometry b uepr nt read ng computer graphics and others. F e d trips Lecture Laboratory. Prerequ s te ICG 212 or equiva ent

417 Computer Graphics Systems. 3 N
Plann ng, imp ement ng manag ng computer graph cs systems Appl cat ons, needs assessment ana ysis of

components system ergonom cs nterfac ng, ma nte nance and human resources management F e d tr ps. Lecture Laboratory Prerequ s te nstructor approva .

517 Graphics Systems Development. (3) N
Research and development n computer graph cs sys tems Appl ed project management deve opment eva uat on and mplementat on F e d tr ps Lecture Lab oratory Prerequ s tes CG 212 312 and 412 or equ v a ents, or nstructor approva .

See page 38 for special courses which may be offered by this academic unit.

Manufacturing Technology

MET 110 Welding Survey. (3) N
Oxy acety ene arc, braz ng resistance and gas tung sten arc weld ng procedures for ferrous and nonferrous meta s S x hours lecture and aboratory

116 Aeronautical Welding. (2) F
Oxy acety ene and tungsten gas tungsten arc welding procedures and braz ng techniques used for aircraft structures Four hours ecture and laboratory

231 Manufacturing Processes. 3) F
Metal removal processes emphasizing dr l ng m ng and athe processes inc uding too b t gr nd ng. Empha s s on production speeds and feeds. Six hours ecture and aboratory. Prerequ s tes. ECE 105; TCE 230.

300 Applied Metallurgy. (3) *F*
Princ ples of meta lurgy emphasiz ng concepts most relevant to typ cal manufacturing requ rements, factors affecting propert es and eva uat on methods, metal o graphy expenences Two hours lecture 3 hours laboratory. Prerequ site TCE 230

302 Welding Survey. (4) F
Theory and appl cat on of industria we d ng processes ntroductory we d ng metallurgy and weldment des gn, SMAW, GTAW, GMAW, Oxy acety ene, braz ng ex periences Three hours ecture three hours laboratory. Prerequisites: upper-c ass stand ng.

303 Machine Control Systems. (3) F, S
Theory and application of e ectromechan ca , hydraulic, *pneumat c, flu d c and e ectrica contro systems for man* ufacturing S x hours lecture and laboratory. Pre requisites MAT 260 TCE 201 or PHY 112

321 Welding Processes. (3) N
Theory and app ication of the arc welding processes and oxy fue cutt ng f xturing procedures, safety codes and exper menta techn ques are covered. S x hours ecture and aboratory. Prerequ s te. PHY 112; MET 302.

322 Welding Processes. 3) N
Theory and app cat ons of EBW, LBW, so d state bond ing braz ng and so dering Six hours ecture and labora tory Prerequ s te PHY 112 MET 302

325 Welding Power Source Analysis. (4) N
Des gn and operating characteristics of weld ng power sources and related equ pment. Equ pment selection setup, and troubleshooting procedures covered Six hours ecture and aboratory. Prerequisites: PHY 112; TCE 201, MET 302

331 Design for Manufacturing I. (3) F
Introduction to design of mach nes and structures w th emphasis on ayout design drawing Bas cs of gears, cams, fasteners, springs, bear ng nkages cy ndrica f ts f at pattern deve opment and surface fin sh re qu rements emphas zed Prerequ s te ETC 313

341 Manufacturing Analysis. (3 S
ntroduct on to the organ zational and functiona re qu rements for effective product on. Inc udes writ ng product on operation p ans. Prerequ site: MET 231

343 Material Processes. 3 S
ndustria process ng as app ed to ow med um and high vo ume manufactur ng Bas c and secondary process ng fasten ng and jo n ng coat ng qual ty contro (Not for construct on engineering or techno ogy degree cred t) Prerequ s te DSC 342

344 Casting and Forming Processes. 3) S
Analys s of various forming processes to determ ne load requirements necessary for a part cu ar metal form ng operat on Th s nformation s used to se ect equ pment and des gn too ng Metal cast ng processes and des gn of cast ng Introduction to powder metal urgy Pre requis te MET 300 or nstructor approval

345 Manufacturing Processes II and Machinability Theory. (4) S
Meta removal processes emphas zing m ng, gr nd ng, turret and tracer lathe and cutter sharpening Applicat on of machinabi ty theory to pract ce Production feeds, speeds and too wear measurement Six hours lecture and laboratory Prerequ s te MET 231, 300.

346 Numerical Control Point To Point and Continuous Path Programming. (3) F
Methods of programm ng, set up and operat on of nu merical contro mach nes emphas zing athe and m systems S x hours lecture and aboratory Prereq u s tes MET 231, ECE 106

354 Mechanics of Materials. *(4) F*
Vectors, force systems fnct on equ bnum centroids, and moment of nert a. Concepts of stress, stra n and stress ana ysis appl es to beams co umns, and com b ned oad ng. (Not for construct on, eng neer ng tech no ogy or production des gn degree credit) Prerequi s tes PHY 111 MAT 115

401 Statistical Process Control. (3) S
Introduction to stat st cal quality contro methods as app ied to to erances process contro samp ing and re ab ty Prerequisite: MAT 115

407 Aerospace Materials. (2) N
Materials used for aircraft powerplants and a rframes, emphasis on criteria for se ect on in terms of mechanica propert es and manufacturing processes Prerequis te TCE 230 or equiva ent

416 Applied Computer Integrated Manufacturing. (3) S
Techniques and practices of Computer ntegrated Man ufacturing w th an emphasis on Computer A ded Design and Computer A ded Manufactur ng. Prerequ sites. MET 443 *[Satisfies General Studies Requirement: N3]*

420 Welding Metallurgy. (3) N
Metal urgical princ ples app ed to structural and a loy stee and alum num weldments, laboratory emphas s on we d ng exper ments metal ography and mechanical testing Six hours lecture and aboratory Prerequ s tes CHM 114; MET 300, 302

421 Welding Metallurgy. (3) N
Metal urg ca principles as app ed to stainless steel, super a loy titanium and other refractory metal weld ments and braze joints. Prerequ site: MET 420.

425 Welding Codes. (2) S
Familiarization with and application of the various codes, standards, specifications applicable to weldments. Prerequisite: MET 302 or equivalent.

432 Applied Thermodynamics and Heat Transfer. (3) S
Thermodynamics of mixtures. Combustion process. Applications of thermodynamics to power and refrigeration cycles. Heat transfer: steady state conduction, convection and radiation. Six hours lecture and laboratory. Prerequisites: ETC 340. Corequisite: MET 434.

433 Thermal Power Systems. (4) N
Analysis of refrigeration cycles. Components of air conditioning systems. Heat transmission through building. Psychrometry. Analysis of internal combustion engines. Components of the engine. Prerequisites: MET 432, 434.

434 Applied Fluid Mechanics. (3) F
Fluid statics. Basic fluid flow equations. Viscous flow in pipes and channels. Compressible flow. Applications to fluid measurement and flow in conduits. Prerequisites: ETC 340; MAT 261.

436 Turbomachinery Design. (3) N
The application of thermodynamics and fluid mechanics to the analysis of machinery design. Prerequisite: MET 433.

438 Design for Manufacturing II. (4) N
The application of mechanics in the design of machine elements and structures. The use of experimental stress analysis in design evaluation. Five hours lecture and laboratory. Prerequisites: MET 331.

442 Specialized Production Processes. (3) S
Non-traditional manufacturing processes emphasizing EDM, ECM, ECG, CM, PM, HERF, EBW, LBW, etc. Prerequisite: TCE 230.

443 N/C Computer Programming. (3) F
Theory and application of computer-aided N/C languages with programming emphasis with APT and suitable postprocessors. Six hours lecture and programming laboratory. Prerequisites: ECE 105; MET 345.

444 Production Tooling. (3) F
Fabrication and design of jigs, fixtures and special industrial tooling related to manufacturing methods. Six hours lecture and laboratory. Prerequisite: MET 231.

448 Expert Systems in Manufacturing. (3) S
Introduction to expert systems through conceptual analysis with an emphasis on manufacturing applications. Prerequisite: MET 416 or MET 452.

451 Introduction to Robotics. (3) F
Introduction to industrial robots. Topics included are: robot geometry, robot workspace, trajectory generation, robot actuators and sensors, design of end effectors and economic justification. Prerequisite: MET 303 or approval of instructor.

452 Implementation of Robots in Manufacturing. (3) S
Robotic workcell design including end effectors, parts presentors, and optimum material flow. Prerequisite: MET 451 or approval of instructor.

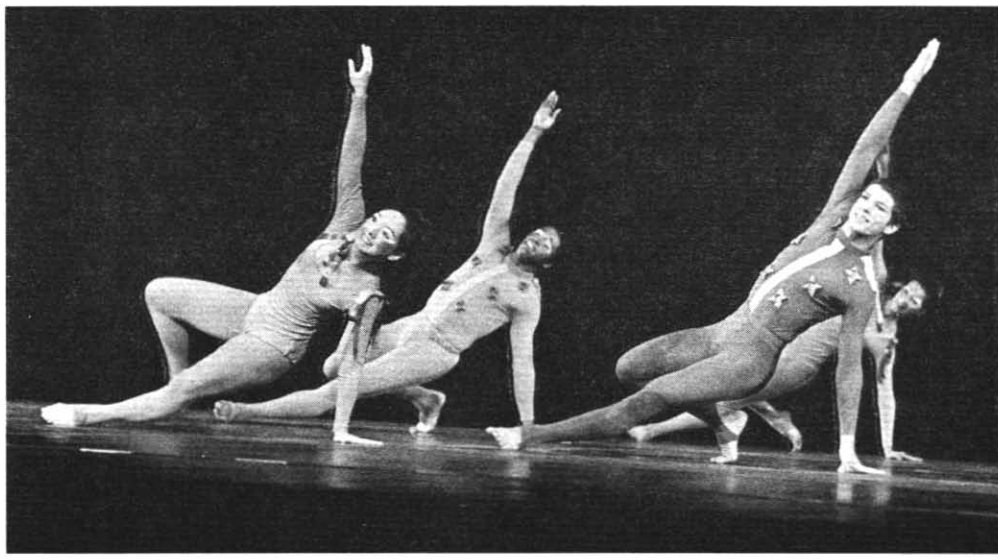
453 Robotic Applications. (3) S
Lab course utilizing robots and other automated manufacturing equipment to produce a part. Students are required to program robots, as well as interface the robots with other equipment. Prerequisite: MET 303 or MET 325.

460 Manufacturing Capstone Project. (3) S
Small group project applying manufacturing techniques with an emphasis on demonstrating state-of-the-art technology. Prerequisite: MET 416 or MET 452.

461 Mechanical Capstone Project. (3) F
Integration of materials, mechanics, and power into analysis of engineering design of system components. Prerequisite: MET 438.

462 Welding Capstone Project. (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; ETC 313.

See page 38 for special courses which may be offered by this academic unit.



College of Fine Arts

Seymour L. Rosen, B.A.
Dean

Purpose

The College of Fine Arts provides for pre pro fessional and professional education in the sev eral arts disciplines and also an opportunity for non-majors to become culturally literate through participation and involvement in the creative and performing arts.

The College, through its programs in art, dance, music, and theatre, reflects a wide range of challenges facing the artist and scholar in the 20th century. The arts as an integral part of our curriculum and of human expression offer the student a rewarding educational development balanced and strengthened by studies in related fine arts areas, the humanities, social sciences, and the sciences

In addition to professional curricula offered in each department or school, the College makes available courses designed to meet the specific educational needs of students pursuing majors in other colleges. The cultural life of the University community is further enriched by study opportunities offered at off campus sites. The College of Fine Arts also offers com munity audiences many hours of cultural enjoyment through the University Art Collec tions, the Louise Lincoln Kerr Cultural Center, myriad concerts, art exhibitions, music and dance concerts, dramatic productions, opera, lectures, and seminars.

Information

Admissions. Students meeting basic admission standards of Arizona State University may matriculate in the College of Fine Arts. Separate admissions procedures and approvals are required for some programs within the College. Students must contact specific Departments or *Schools for details.*

Transfer of Community College Credits. Credits transferred from any accredited junior or community college will be accepted up to a maximum of 64 semester hours. Community college students planning to transfer at the end of their first or second year should plan their community college courses to meet the require ments of the Arizona State University curricu lum selected. Students attending Arizona Community Colleges will be permitted to follow the degree requirements specified in the Arizona State University *Catalog* in effect at the time they began their community college work, pro viding their college attendance has been continuous.

Courses transferred from community col leges will not be accepted as upper-division credit at Arizona State University. Arizona stu dents are urged to refer to the *Arizona Higher Education Course Equivalency Guide* for transferability of specific courses from Arizona Community Colleges. Copies of the guide are available in counselors offices. In choosing courses at a community college students should be aware that a minimum of 50 hours of work taken at the University must be upper division credits. While attending a community college, it is suggested that students elect General Stud ies and lower division courses in the major field.

General Transfer Credit. Direct transfer of courses from other accredited institutions to the College of Fine Arts will be subject to: (1) the existence of parallel and equal courses in the College's curriculum, and (2) departmental or school evaluation of studio courses with respect to performance standards. A minimum of 30 semester hours earned in resident credit courses at Arizona State University is required of every candidate for the bachelor's degree. Transfer students enrolled in the College of

Fine Arts must complete a minimum of 15 se mester hours of resident credit in the major as approved by the faculty

Undergraduate Credit for Graduate Courses. To enable interested students to bene fit as much as possible from their undergrad uate studies, the Graduate College and the Col lege of Fine Arts extend to seniors, with a grade point average of at least 2.50, the privi lege of taking 500 level graduate courses for undergraduate credit. Application for admission to a graduate course for undergraduate credit must be completed in advance of the regular reg istration period. The application must be ap proved by the instructor of the class, the stu dent s advisor, the Chair or Director of the De partment or School, and Dean of the College in which the course is offered.

Certificate of Merit. The Certificate of Mer it, awarded by the College of Fine Arts upon recommendation of the faculty of the School of Art, recognizes excellence in some aspect of studio art. The Certificate of Merit seeks to identify outstanding accomplishment and may or may not be awarded every year.

Performer's Certificate. The Performer's Cer tificate, awarded by the College of Fine Arts upon recommendation of the faculties of the School of Music and Department of Dance, gives special recognition to excellence in inter pretation and technical proficiency in music or dance performance. Specific information may be obtained by contacting the Department of Dance or School of Music. The Performer s Certificate parallels the Certificate of Merit in intent and may or may not be awarded every year.

Pre-Professional Programs. Students pre paring for admission to professional graduate schools should obtain information regarding admission requirements by writing directly to schools in which they may be interested.

Degrees

Baccalaureate Degrees

Bachelor of Arts (B.A.):
- Art, Music, Dance or Theatre

Bachelor of Fine Arts (B.F.A):
- Art:
  - Concentrations in Art Education, Ceramics, Drawing, Fibers, Graphic Design, Intermedia, Metals, Painting, Photography, Printmaking, Sculpture, Wood
- Dance:
  - Concentrations in Performance and Choreography, Dance Education
- Theatre:
  - Concentrations in Theatre Education, Performance/Production: (Acting, Child Drama, Design/Technology)

Bachelor of Music (B.M.):
- Choral-General Music
- Instrumental Music: (Instrumental, String)
- Music Therapy
- Performance:
  - (Voice, Keyboard, Guitar, Orchestral Instrument, Piano Accompanying, Jazz, Music Theatre)
- Theory and Composition: (Theory, Composition)

The three baccalaureate degrees differ in cur ricula with respect to the amount of specializa tion permitted in the major field. The Bachelor of Arts degree provides a broad, scholarly, hu manistic program, while the other two pro grams place greater emphasis upon the major field. General Studies play an integral role within the educational mission of the university and as such comprise an important component of all undergraduate degrees in the College of Fine Arts. See below for General Studies re quirements.

In cooperation with the College of Educa tion, certification is available at the secondary level in the disciplines of art, dance, music, and theatre for students preparing for a teaching career in the public schools. Students should, with the advice and counsel of their arts educa tion advisors, fulfill the requirements for the appropriate area of specialization under the Bach elor of Fine Arts or Bachelor of Music degrees. In addition, students wishing to be admitted to the Professional Teacher Preparation program in the College of Education leading to teaching cer tification must have completed 56 hours with a 2.50 GPA and also have passed the three Pre-Professional Skills tests.

Graduate Degrees

Master of Arts (M.A.):
- Art, Music History and Literature, or Theatre

Master of Fine Arts (M.F.A.):
- Art:
  - Concentrations in Ceramics, Drawing, Fibers, Metals, Painting, Photography, Printmaking, Sculpture, Wood
- Dance:
  - Concentrations in Performance and Choreography
- Theatre:
  - Concentration in Child Drama

Master of Music (M.M):
- Choral Music:
  - Choral Music
  - General Music
- Instrumental Music
- Performance
  - Solo Performance (Instrumental, Keyboard, Voice)
  - Performance Pedagogy
  - Piano Accompanying
  - Music Theatre Performance
  - Music Theatre Musical Direction
- Theory and Composition
  - Theory
  - Composition

Doctor of Musical Arts (D.M.A.):
- Choral Music, Instrumental Music, Solo Performance

Doctor of Philosophy and Doctor of Education (Ph.D, Ed D.):
- Ma or m Secondary Education with concentrations in Art Education, Music Education, Choral Music, General Music or Instrumental Music, Theatre)

Master s programs range from 30 60 semester hours dependent upon the degree chosen Doctoral programs vary in scope and curricula. See the *Graduate Catalog* for specific requirements for the M.A., M.F.A., M.M., D.M.A., Ph.D , and Ed.D degrees

Undergraduate Degree Requirements. In addition to the general information given below, consult the sections of this *Catalog* listed under School of Art, Department of Dance, School of Music, or Department of Theatre for specific degree requirements.

Bachelor of Arts Degree (B.A.). The Bachelor of Arts degree requires 45 60 semester hours of credit for the major. Dependent on the major, 18 24 credits must be selected from upper division courses (300 or 400 level). The credit hour requirements in the major are distributed between a field of specialization (30 45 credits and one or more related fields (an additional 15 credits). The exact content of the major is selected by the student in consultation with his/her advisor under rules and regulations of the Department or School concerned.

Bachelor of Fine Arts Degree (B.F.A.). The Bachelor of Fine Arts degree requires 65 85 semester hours of credit for the major. At least 30 of these credits, dependent on the major, must be selected from upper division courses (300 or 400 level). The curriculum for the major is designed as pre-professional study in art, dance, or theatre. Auditions and/or interviews are required for admission to the B.F.A. program in dance or theatre. Consult these departments for specific information.

Bachelor of Music Degree (B.M.). The Bachelor of Music degree requires 84 semester hours of credit for the major. The required number of upper division courses (300-400 level) is dependent on the area of specialization. The curriculum for the major is designed to provide a broad, yet concentrated, preparation with a choice of specialization among the areas of music performance, music theatre, jazz, music therapy, piano accompanying, theory-composition, instrumental music, or choral general music. Entering undergraduate music majors, regardless of area of specialization, must perform an entrance audition in their primary performing medium (voice or instrument).

General Studies

To meet the General Studies requirement, a minimum of 35 semester hours must be completed in the General Studies core areas. Six semester hours must also be completed in the awareness areas. A course may concurrently satisfy a core area requirement and an awareness area requirement.

	Semester Hours
Core Areas:	
Literacy and Critical Inquiry	6
Numeracy	6
Humanities and Fine Arts (Fine Arts majors must elect to take at least 6 semester hours of fine arts course work in areas outside of the major school or department. These may be courses in art, dance, music or theatre.)	6 or 9 *
Social and Behavioral Sciences	6 or 9 *
Natural Sciences	8
Awareness Areas:	
Global Awareness	3
Historical Awareness	3

* 15 hours total

Refer to pages 43-46 of the *Catalog* for a description of the University s General Studies Requirements. It should be noted that special minimum requirements may be higher in certain departments schools.

Additional General Studies electives may be selected from approved courses in the above categories as well as interdisciplinary studies in liberal arts (LIA), journalism and telecommunication, physical education (except activity courses), foreign languages (101, 102, 201, and 202) and any College of Fine Arts course out

side of the student's major to complete the minimum number of General Studies credits required for a particular degree program. Neither courses in the major nor related area courses may be cross-listed in fulfillment of both major and General Studies requirements except where concurrent listing is specifically allowed in the University's General Studies guidelines.

In addition, the student will meet the University English proficiency requirement: ENG 101 and 102 (six hours) or ENG 105 (three hours). Foreign students may satisfy this requirement by taking ENG 107 and 108. These courses may not be used to meet General Studies requirements.

Core courses are regularly reviewed. To determine whether a course meets one or more General Studies Core course credit requirements, see the *General Studies Course Guide* available prior to registration for courses.

Key to General Studies Core Credit Abbreviations

L1	Literacy and Critical Inquiry Core Courses (Intermediate level)
L2	Literacy and Critical Inquiry Core Courses (Upper division)
N1	Numeracy Core Courses (Mathematics)
N2	Numeracy Core Courses (Statistics and Quantitative Reasoning)
N3	Numeracy Core Courses (Computer Applications)
HU	Humanities and Fine Arts Core Courses
SB	Social and Behavioral Science Core Courses
S1	Natural Science Core Courses (Introductory)
S2	Natural Science Core Courses (Additional Courses)
G	Global Awareness Courses
H	Historical Awareness Courses

Foreign Language Requirement. All Bachelor of Arts degrees require the equivalent of 16 semester hours of credit in one foreign language. (Exception: The Bachelor of Arts degrees in studio art and in dance strongly recommend but do not require foreign language study). Course work may be selected in any language and must follow the sequence of language courses 101, 102, 201, and 202. This requirement may be fulfilled at the secondary school level or by examination. If acquired in secondary school, two years of instruction in one foreign language is considered the equivalent of one year of college instruction. Transfer students will be placed in language study at the level above completed work. Candidates for the Bachelor of Music degree in voice performance and piano accompanying have specific foreign language requirements. These are stated in each of the degree requirements (pages 334 and 335). There is no foreign language requirement for other areas of specialization of the Bachelor of Fine Arts or Bachelor of Music degrees.

Retention, Disqualification, Reinstatement, Appeals. The terms of disqualification, reinstatement and appeals are consistent with those set forth by the University on pages 41-43 of this *Catalog*, except for Theatre. For the B.F.A. in Theatre, a student must have a 3.00 GPA in the major to enroll in upper-division courses and remain in good standing. In addition, a student disqualified in any program is normally not eligible for reinstatement for two semesters.

Graduation Requirements. The minimum graduation requirement is the completion of 126 semester hours of credit with a minimum cumulative scholarship index of 2.00. Of these 126 credits at least 50 must be selected from upper-division courses numbered 300 to 400. Many professional programs within the College of Fine Arts require additional semester hours of credit for graduation and a higher cumulative scholarship index of their majors. To be acceptable as graduation credit, all course work in the major discipline must show an earned grade of "C" (2.00) or higher.

School of Art

PROFESSORS:
LEHRER (ART 102) BRECKENRIDGE, BROADLEY, CHOU F NK, GASOWSKI, GR GSBY, HAHN, HELLER, JAY, KELLY LINDERMAN, MAGENTA MEISSINGER, SCHAUMBURG STULER, J J. TAYLOR, J. R TAYLOR, WAGNER, WOODS

ASSOCIATE PROFESSORS:
ALQU ST, BRITTON, DEMARSCHE, deMATTIES DETRIE, ECKERT, G LL NGWATER, GULLY, HAJICEK, JENKINS JOHNSON, KA DA KRONENGOLD, OTIS, PILE, PIMENTEL, RAB NER, RISSEEUW, ROWLEY, SCHMIDT, SHARER, SWEENEY WATSON, WH TE, WILSON, YOUNG

ASSISTANT PROFESSORS:
BERNHISEL COCKE, HAYES THUMANN, SHIPP THOMPSON UMBERGER WILD

PROFESSORS EMERITI:
GOO, FARNESS, HALE, JACOBSON, WOOD

Major Requirements

For advisement purposes, all students register ing in an art degree program will enroll through the College of Fine Arts. Each degree program and area of specialization has its own check sheet which describes the particulars of course sequence and special requirements. These are available in the School of Art office.

Bachelor of Arts Degree Curriculum

The School of Art offers three emphases at the Bachelor of Arts level. Studio Art, Photograph ic Studies and Art History. These emphases are intended to give the student a broadly-based general education in the field with some more specialized work at the upper division level.

Studio Art–Consists of a minimum of 45 se mester hours of credit as approved by the stu dent's advisor. An emphasis in studio art re quires 30 semester hours in studio including ART 111, 112, 113, 115 and 15 hours in a re lated fie d(s) inc uding ARS 101 and 102 Nor mally the related f eld is art history. At least 18 of the 45 hours must be upper d vision cred it All credit applied to the emphasis must be a 'C or better The foreign anguage requirement of the B A degree is optional but strongly rec ommended.

Art History–Consists of a minimum of 45 se mester hours of credit as approved by the stu dent's advisor

An emphasis in art history requires 33 semester hours of art history courses and 12 in a re lated field(s). Normally the related field is studio art. At least 18 of the 45 hours must be upper division credit. All credit applied to the major must be with a 'C or better. The art his tory areas of Ancient, Medieval, Renaissance, Baroque, Modern and Non Western Art must each be represented with at least one course. Sat isfactory completion of ARS 480, Research Methods, is required before the senior year. Other requirements are ARS 101, 102, lower division ARS non-western course, one ARS 498 Pro Seminar; ART 111, 112 and 115. Knowledge in at least one foreign language is required, equivalent to the level obtained through the completion of two years' study at the college level For specific courses, see For eign Language Department.

Photographic Studies–Consists of a minimum of 48 semester hours of credit as approved by the student's advisor Required courses include ARS 450, 451 and 454, ART 409, and one upper division ARS course in modern art and one in criticism. Knowledge in at least one foreign language is required, equivalent to the level obtained through the completion of two years of study at the college level For specific courses, see Foreign Laguages Department.

Bachelor of Fine Arts Degree Curriculum

Art–Consists of 75 semester hours of credit, with a concentration in one area selected on the basis of the student s interests. The following concentrations are available to the student: art education, ceramics, drawing, fibers, graphic design, intermedia, metals, painting, photography, printmaking and sculpture, wood.

All students in this degree program follow the same pattern of courses in art for the first two semesters: ART 111, 112, 113 and 115; ARS 101 and 102.

At least 30 upper division semester hours must be earned within the major, with a minimum of 12 semester hours within the concentra tion.

All course work counted in the major must be 'C' or better The specific requirements for the concentration are determined by the faculty advisors of the area, and are listed on School of Art checksheets.

Courses from other departments, when ap proved by the advisor and the School of Art, may be applied to the major if deemed appropri ate to the students program of study.

Graphic Design The concentration in graphic design requires a special application procedure. The application procedure for new and transfer students is separate from, and in addition to, the required admission to Arizona State University. Acceptance is determined by the graphic design faculty and is based on an application, test, and portfolio. Applications must be made between February 15 and March 15 for admission for the following fall semester. Students are accepted for entry into the graphic design program in the fall semester only of each academic year. Selection of applicants is made by April 1. Due to space limitations, not all qualified applicants can be accommodated and the admission process is necessarily selective. For application forms and further information contact the School of Art.

Art Education The concentration in art education consists of 75 semester hours of credit in art including ART 111, 112, 113, 115, 201, 223, one three dimensional course (either ART 231, 261, 272, 274, 276); ARS 101, 102 and two ARS upper-division electives (including one in 20th Century art : and ARA 488. The following art education courses are required: ARE 300, 302, 474, 480, 484 (Internship: Art Education), and 490. In addition, a minimum of 21 hours (including 12 hours of upper division credit) are to be taken in a specific area of art proficiency approved by an advisor in art education. The art proficiency can be in drawing, painting, intermedia, photography, printmaking, sculpture, ceramics, metals, wood, fibers, or art history.

A student with a GPA of 2.50 or better, pursuing a B.F.A. with a concentration in art education may also choose to become certified for teaching art K-12. If certification is elected, 25 semester hours are required of specified course work in the College of Education. For additional certification requirements, see an art education advisor.

Elementary Education Major, Minor in Art–Consists of 27 semester hours including ART 111, 112, 113, 115; ARS 101, 102; ARE 302, 474 and 484.

Secondary Education Major, Minor in Art–Consists of 24 semester hours including ART 111, 112, 115; ARS 101, 102; ARE 474, 480 and 484.

Graduate Programs

The School of Art offers programs leading to the degree of Master of Arts with a major in Art, including an emphasis in art education or art history, and the Master of Fine Arts degree with emphases in ceramics, drawing, fibers, metals, painting, photography, printmaking, sculpture, or wood. In cooperation with the College of Education, the degrees of Master of Arts in Education, Doctor of Education and Doctor of Philosophy are offered with concentration in art education. Consult the *Graduate Catalog* for requirements for all graduate degrees.

STUDIO CORE CURRICULUM

ART 111 Drawing I. 3) F S SS
Fundamental technical and perceptual skills using common drawing media and their application to pictorial organization. Six hours a week.

112 Two-dimensional Design. 3) F, S SS
Fundamentals of pictorial design. Six hours a week.

113 Color. (3) F S SS
Principles of color theory as related to the visual arts. Six hours a week. Prerequisites. ART 111 and 112.

115 Three-dimensional Design. 3 F, S, SS
Fundamentals of three dimensional form. Six hours a week. Prerequisites: ART 111 and 112.

DRAWING

ART 211 Drawing II. (3 F, S SS
Continued development of technical and perceptual skills. Emphasis on materials and pictorial content. Six hours a week. Prerequisites: ART 111 112 113 and 115.

214 Life Drawing I. (3) F, S, SS
Development of skill and expressiveness in drawing the basic form construction and gesture from the human figure. Six hours a week. Prerequisites ART 111, 112, 113 and 115.

311 Drawing III. (3) F, S
Emphasis on composition, exploration of drawing media. Six hours a week. Prerequisites: ART 211 214 and approval of instructor.

314 Life Drawing II. (3) F, S
Drawing from the model with greater reference to structural graphic and compositional concerns. Six hours a week. Prerequisite: ART 214 or approval of instructor.

315 Life Drawing III. 3 F, S
The human figure as the subject for drawing. Emphasis on conceptual alternatives and management of materials. Six hours a week. Prerequisite: ART 314 or approval of instructor.

411 Advanced Drawing. (3) F S
Visual and intellectual concepts through problem solving and independent study. Emphasis on the individual creative statement. May be repeated for credit. Six hours a week. Prerequisites ART 311 and approval of instructor.

412 Drawing Techniques of the Old Masters. (3) N
Techniques of drawing from early Renaissance to the present silverpoint, bistre, ink, quill pen pastels and chiaroscuro drawings. May be repeated for credit. Six hours a week. Prerequisite approval of instructor.

414 Advanced Life Drawing. 3) F S
Various media and techn ques on an advanced eve The human f gure as an express ve veh c e n var ous contexts May be repeated for cred t S x hours a week Prerequ s te. ART 315 or approva of nstructor

415 Art Anatomy. 4 N
Study of human anatom ca structures as app ed to the pract ce of f gure or ented art Three hours ecture 5 hours studio a week Prerequ s te ART 214

PAINTING

ART 223 Painting I. 3 F, S SS
Fundamenta concepts and mater a s of trad t ona and exper menta pa nt ng med a Empha s on preparat on of paint ng supports compos t on and co or S x hours a week. Prerequ s tes. ART 111, 112, 113 and 115

227 Watercolor I. 3 F S
Pa nt ng n a water so ub e med a Emphas s on tech n ques compos t on and co or S x hours a week Prereq u s tes ART 111 112 113 and 115

323 Painting II. 3) F S
Deve opment of competency n sk s and express on Ass gned prob ems nvo ve ght space co or form and content S x hours a week Prerequ s te ART 223 or ap prova of nstructor

324 Painting III. 3 F S
Cont nuat on of ART 323 S x hours a week Prerequ s te ART 323 or approva of nstructor

325 Figure Painting. 3 F S
The human figure c othed and nude as the subject for pa nt ng n se ected med a S x hours a week. Prerequ s tes ART 314 and 323.

327 Watercolor II. 3 A
Explorat ons us ng a var ety of surfaces and a comb n at on of media and mater a s S x hours a week Prerequ site ART 227

421 Painting Materials and Techniques. 3 A
Trad t ona and modern mater a s and techn ques of pa nt ng Exper menta problems in tempera encaust c case n emuls ons, Maroger's Med um and synthet c med a S x hours a week Prerequ s te approva of nstructor

423 Advanced Painting. 3 F, S
Cont nuat on of ART 324. May be repeated for cred t S x hours a week Prerequ s te ART 324

425 Advanced Figure Painting. (3 F S
Continuat on of ART 325 May be repeated for cred t S x hours a week Prerequ s tes ART 315 324 and 325

427 Advanced Watercolor. 3) F S
Continuat on of ART 327. May be repeated for cred t Six hours a week Prerequ s te ART 327.

INTERMEDIA

ART 340 Intermedia. (3 F, S
Experimenta conceptua and nter d sc p nary stud o art w th emphas's on new med a and techno og es S x hours a week May be repeated once for cred t Prerequ s tes ART 111 112 113 and 115 and s x hours add t ona stud o requ rements or approva of nstructor

341 Mixed Media. 3 A
Exp or ng v sua effects by comb n ng trad t ona and non tradit ona methods techn ques and concepts Re peatable once for cred t S x hours a week Prerequ sites ART 111, 112, 113, 115, and s x hours add t ona stud o requ rements or approva of nstructor.

440 New Media Concepts. 3 F S
Cont nued exper ments w th new med a and nterd sc p nary concerns n art May be repeated for cred t S x hours a week Prerequ s te ART 340

441 Video Art. 1 F S
Ut z ng v deo and audio equ pment essent a to the pro duct on of broadcast qua ty v deo art May be repeated for cred t Two hours a week Prerequ s tes Concurrent enro ment n ART 340 341, or 440 and approva of n structor

PHOTOGRAPHY

ART 201 Photography I. 3 F S
Deve opment of sk s and techn ques of b ack and wh te photography Emphas s on camera work and darkroom procedures Two ectures 3 hours laboratory

301 Photography II. 3 F, S
Photography as an art med um w th add t ona exp orat on nto persona photograph c esthet cs S x hours a week Prerequ s tes ART 111, 112 113 115 201 or approval of nstructor

304 Advanced Photography. 3 F, S
nterpretat on and man pu at on of ght as a too n the performance of express ve photography S x hours a week Prerequ s tes ART 205 or 206 and approva of structor

305 Color Photography I. 3 F S
App cat on of co or transparenc es and pr nts to photo graph c art S x hours a week Prerequ s te ART 304 or approva of nstructor

306 Photo Techniques. 3 F S
Exp orat on of camera and darkroom techn ques w th em phas s on creat ve contro for the we crafted b ack and wh te pr nt S x hours a week Prerequis tes ART 205 or 206 and approva of nstructor

401 Nonsilver Photography. 3 F, S
Recogn t on of the nherent character stics of nons ver processes and the use of these processes n the com mun cat on of deas. May be repeated for cred t S x hours a week Prerequ s tes· ART 306 and approva of nstructor.

403 Black and White Photography. 3 F S
Advanced exp orat on of exper menta nterpret ve and stra ght photography. May be repeated for cred t S x hours a week Prerequ s tes ART 304 and approva of nstructor

404 Portraiture Photography. (3 F, S
Photograph ng peop e Crit ca d scuss ons and s de ectures on ssues in portra ture May be repeated for cred t Six hours a week Prerequ s tes ART 304 306 or approva of nstructor

405 Advanced Color Photography. 3 F S
ntens ve use of subtract ve co or process n photogra ph c pr nt ng. May be repeated for cred t S x hours a week Prerequ s tes. ART 305 and approva of nstructor

409 Photographic Exhibition. 3 A
Care of photograph c pr nts print presentat on and exh b t on Pract ca exper ence n ga lery operat ons May be repeated for cred t S x hours a week Prerequ s tes ART 304 and approva of nstructor

PRINTMAKING

ART 252 Lithography I. (3) F S
Black and wh te planographic pr ntmak ng ut l z ng stone and a um num p ate processes S x hours a week Prereq u sites· ART 111, 112 113 and 115

351 Intaglio I. (3) F S
Introduct on to contemporary and tradit ona develop menta techniques for black and wh te prints S x hours a week Prerequisite. approva of i structor.

352 Lithography II. (3) F, S
Cont nuat on of ART 252 ntroduct on to color tech n ques and advanced mage format on processes S x hours a week Prerequis te ART 252 or approval of instructor

354 Screen Printing I. 3) A
Various methods and app cat ons includ ng the photo graphic stenc l and transfer techn ques. S x hours a week Prerequ s te. approva of nstructor.

355 Photo Process for Printmaking I. 3 A
ntroduct on to photographic pr ncip es and ski s for photo mechanica pr ntmak ng processes nclud ng photo s kscreen, photo tho and photo etch ng. S x hours a week Prerequ's te approva of instructor

451 Advanced Intaglio. (3) F S
Var ous contemporary and tradit ona methods of pr nt ng to ach eve color prints May be repeated for cred t S x hours a week. Prerequ s te· approva of nstructor

452 Advanced Lithography. 3 F, S
Continuation of ART 352 May be repeated for cred t S x hours a week. Prerequ s te· approva of nstructor

454 Advanced Screen Printing. (3 A
Cont nuat on of ART 354. May be repeated for cred t Six hours a week Prerequis te approva of nstructor

455 Advanced Photo Processes for Printmaking. 3) A
A continued study of photomechan ca techniques and app icat ons to printmaking or photograph c processes Prerequisite ART 355 or approa of nstructor

456 Fine Printing and Bookmaking I. (3 A
Letterpress pr nting and typography as f ne art. Study of h story a phabets mechan cs of hand typesett ng press work and var ous forms of pr nted matter Prerequ s te: approval of nstructor

457 Fine Printing and Bookmaking II. 3 A
Continuat on of ART 456 Bookb nding, book des gn and pr nting advanced typography theory and presswork May be repeated for credit Prerequ sites. ART 456 and approva of nstructor

458 Papermaking. 3 F S
H story theory demonstrat ons sheet form ng co lage treatments and three d mens onal approaches. May be repeated for cred t. S x hours a week Prerequ s te· ap prova of nstructor.

459 Monoprinting. (3) F S
The non mu tip e printed mage us ng a var ety of tech cal approaches. May be repeated for cred t. Six hours a week Prerequ s tes ART 311 or 323 or any 300 eve pr ntmak ng class and approva of nstructor

SCULPTURE

ART 231 Sculpture I. 3) F S SS
Exp orat on and express on of scu ptural form through ideas and concepts re ated to bas c mater a s stud o safety S x hours a week Prerequ sites ART 111 112, 113 and 115.

331 Sculpture II. (3) F, S
Cont nuat on of ART 231. S x hours a week Prerequ s te ART 231

332 Advanced Sculpture. 3 F, S
Scu ptura prob ems related to arch tecture and man s environment Explorat on in a media. Color re at onships as appl ed to scu pture Six hours a week Prerequisite· ART 331

333 Experimental Sculpture. 3) N
An experimental approach to form mater a relat onsh p toward atmospheric, k net c, aud o, e ectronic and earth works S x hours a week Prerequ s te ART 332 or ap prova of nstructor.

431 Special Problems in Sculpture. (3 F, S
Development of a persona approach to scu pture, em phasis on form, nd v dua problems and re ated color technology Profess onal practices and presentat on May be repeated for cred t S x hours a week. Prerequ sites ART 332 and approva of nstructor

432 New Directions in Sculpture. 3) A
Exam nation of env ronment as resource for mages and deas Exper mentat on n nontrad t onal methods and nter re at ng d sc p nes May be repeated for cred t S x hours a week Prerequ s te ART 332 or approva of n structor.

436 Architectural Sculpture. (3 N
Scu ptura concepts as related to architecture and other *man made env ronments Scale draw ng, models, and re* ef scu pture May be repeated for cred t S x hours a week. Prerequ s te ART 332 or approva of instructor

437 Non-Permanent Sculpture. (3 N
Art of a temporary ature nc ud ng sequential and con ceptual works Att tudes may be presented in f ms or other v sua media May be repeated for credit S x hours a week. Prerequisite approva of nstructor

438 Experimental Systems in Sculpture. (3 N
Systems and concepts for phase changes of matena s, temperature pressure f e d time compression extens on and electron c act vat on of d mens ona forms. May be repeated for cred t S x hours a week. Prerequ s te: approva of nstructor

CERAMICS

ART 261 Ceramic Survey. (3) F S, SS
Handforming methods throw ng on the whee decorat ve processes, glaze app cat on S x hours a week. Prerequ s tes ART 111, 112 113 and 115

360 Ceramic Throw ng. 3 F S
Des gn ana ysis and product on of functional pottery Emphas s on throw ng techniques, surface enrichment and g aze app cation May be repeated once for cred t S x hours a week Prerequ site ART 261

364 Ceramic Handbuilding. 3 F, S
Search for form and persona express on through hand bu ld ng techn ques K n f r ng and re ated prob ems. May be repeated once for cred t S x hour a week Prerequ sites· ART 231 and 360.

460 Ceramic Clay. 3) A
Research nto various clay body formu ations, oca natura mater a s, s p glazes and engobes S x hours a week Prerequ s te ART 360 or 364 or approva of n structor.

463 Ceramic Glaze. (3 A
G aze formulat on and ca cu at on S x hours a week Pre requisite. ART 360 or 364 or approva of instructor

466 Advanced Ceramics. 3) F S SS
Emphas s on persona express on with n structure of sem nars cr t ques stud o work Profess ona methods of presentation documentat on of work. May be repeated for credit S x hours a week Prerequ s tes ART 360 and 364 or approva of nstructor

FIBERS

ART 276 Fiber Arts I. 3) F, S
Structural use of f ber ut z ng a variety of techn ques Surface treatment nc ud ng bat k, block print ng, fo d and t e dye. S x hours a week

376 Fibers: Loom Techniques. (3) A
Investigation of oom control ed techniques. P ain weave, doub e weave tapestry w be exp ored Six hours a week Prerequ sites· ART 111 112 113 and 276 or ap proval of instructor

377 Fibers: Surface Design. (3) A
Surface design techn ques. s k screen ng paint ng, stamping, dyeing on fabr c w be exp ored. Prerequisites ART 111 112, 113 and 276 or approva of nstructor

476 Advanced Fibers. 3) F S
Experimentat on w th advanced techn ques in f ber and fabnc. May be repeated for cred t Six hours a week Prerequisites. ART 376 and approva of nstructor

METALS

ART 272 Jewelry I. 3) F S
Emphas s on fabncat on n jewelry making Bas c tech niques of form ng cutting and p erc ng forging and so der ng Six hours a week

372 Jewelry II. (3) F, S
Fabr cated approach to jewelry mak ng. Techn ques n stone setting and surface embe l shment. S x hours a week Prerequ s tes ART 111, 112, 113 115 and 272 or approva of nstructor.

373 Metalworking I. (3) A
Compress on, die and stretch form ng as appl ed to ho ow form construct on Hot and co d forg ng techn ques as app ied to sm thing S x hours a week Prerequ s tes: ART 111 112, 113, 115, and 272 or approva of nstruc tor

472 Advanced Jewelry. 3 F, S
Jewe ry mak ng w th emphasis on deve op ng persona statements and craftsmansh p May be repeated for cred t. Six hours a week Prerequis tes ART 372 and approva of nstructor.

473 Advanced Metalworking. 3) A
Forg ng and form ng techn ques n nd v dua zed d rec tions May be repeated for cred t S x hours a week Prerequ s tes ART 373 and approval of instructor

WOOD

ART 274 Wood I. 3 F, S
Fundamenta woodworking techniques to produce crea tive funct'ona three d mens ona objects. S x hours a week

374 Wood II. 3) F S
Ind v dual and d rected prob ems n wood re ated to the product on of un que funct ona art objects Six hours a week Prerequ s tes ART 111, 112 113 115, and 274 or approva of nstructor

378 Furniture I. (3 A
Des gn and bu ld ng of contemporary furniture. Explora t on in the techn que of jo nery am nation carv ng and f n sh ng procedures Six hours a week Prerequisites ART 111 112, 113, 115 and 274 or approva of nstruc tor

474 Advanced Wood. 3) F S
Extended experience and advanced techn ques in the use of wood to create funct ona works of art May be re-peated for credit. S x hours a week Prerequ s tes ART 374 and approva of nstructor.

478 Advanced Furniture. (3) A
Form concepts are exp ored n construct on of inventive furniture Emphas s on med a experimentation May be repeated for credit Six hours a week Prerequisite ART 378

GRAPHIC DESIGN

ART 283 Letterforms I. (3 F
Draw ng of etterforms with focus on proport on and struc ture Introduct on to etterform nomenclature and c ass f cat ons Six hours a week Prerequ sites ART 111 112, 113, 115 and acceptance nto graphic design program Must have concurrent enrol ment w th ART 284

284 Visual Communications I. (4) F
Theoret ca and app ed stud es in shape draw ng and color E ght hours a week Prerequ sites. ART 111 112, 113 115 and acceptance into graph c des gn program Must have concurrent enro lment with ART 283

285 Typeset I. (3) S
Theoretica exerc ses n spat al and textural qua ties of type. Prob ems n tens on activation and ba ance Exer c ses in s mple typographica applications Six hours a week Prerequis tes ART 283 284 and acceptance nto graph c design program Must have concurrent enrol ment w th ART 286.

286 Visual Communications II. 4) S
Transition from theoret cal to applied prob ems. Empha s s on ref nement of visual sk s E ght hours a week. Prerequ s tes ART 283, 284 and acceptance nto graph c des gn program Must have concurrent enro ment w th ART 285

382 Graphic Representation. (3 F
Stud o pract ce n draw ng w th an app cat on towards graph c commun cat on May be repeated once for cred t S x hours a week Prerequ s tes: ART 284 and approva of nstructor

385 Typeset II. (3 F
Problems n composit on cho ce and comb nat ons of type faces, formats and the r applicat on to a var ety of de s gn projects S x hours a week Prerequ s tes· ART 285 286 concurrent enro lment n ART 386

386 Visual Communications III. 3 F
Prob ems n specif c des gn app cations such as poster, packag ng pub ication ons etc Emphasis on deve opment of concepts v sua commun cations S x hours a week Prerequisites ART 285 286 Concurrent enro lment n ART 385

387 Visual Communications IV. 3) S
C ent or ented projects Prob ems w i be mu t faceted and the emphases wi be o cont nu ty of des gn n more than one med um and format S x hours a week Prerequ s te. ART 386

481 Visual Communications V. 3
Stud o prob ems w th an emphas s on ana ys s prob em so v ng and professiona portfo o preparat on S x hours a week Prerequ s tes. ART 387 and approva of nstruc tor

482 Visual Communications VI. 3 S
nd v dua and group projects w th outside c ents Al projects cu m nate n an exh b t S x hours a week Pre requ s te ART 481.

485 Graphic Design Pre-Professional Program. 3 F S SS
Pre profess onal c ent des gner situat ons from concept to pr nted work. Stud o workshop and internships for se lected students May be repeated for cred t S x hours a week. Prerequ site approva of nstructor

SPECIAL STUDIO ART

ART 444 Computer Art I. 3)
A study of PC hardware and software for creat ng art Emphas s on computer graph cs h story hardware software conf gurations DOS, pr nc ples of 2D and 3D graph cs Two hours ecture 2 hours stud o. Prerequ sites ART 111 112 or equ va ent and approva of n structor.

621 Studio Problems. 3 F S SS
Advanced study n the fo owing areas:

(a)	Draw ng	f	Ceram cs
(b)	Paint ng	g	Meta s
c)	Photography	h	Wood
d	Pr ntmak ng		F ber Art
e)	Sculpture	(j	Stud o Art

May be repeated for cred t S x hours a week each sect on. Prerequ s te: approva of nstructor

680 Practicum: M.F.A. Exhibition. (1 15 F S SS
Studio work n preparat on for requ red M F.A exh b t on. Pub c exh b t to be approved by the student's superv sory comm ttee and accompan ed by a f na ora exam na t on Photograph c documentat on and wr tten statement of prob em Prerequ s te· approva of the student s superv sory comm ttee

See page 38 for special courses which may be offered by this academic unit.

ART EDUCATION

ARE 300 Educating in the Visual Arts. 3 F S
Stud o exper ences and nqu ry nto the ways peop e earn n art An ntroduct on to the terature n art and art educat on Two ectures 2 hours stud o Prerequ s tes ART 111, 112, 113 115, ARS 101 and 102 or approva of nstructor

301 Art in the Elementary School. 3 F, S
(For non majors on y The study of chi dren s v sua art work from ear y ch dhood to ear y ado escence One ectu e 4 hours stud o

302 Child Art and Artists. 3 F S
(Majors on y.) Curr cu um deve opment nstruct ona re sources, learning and the psycho ogy of the ch d, cur rent ssues n art nstruct on and c assroom manage ment Two hours lecture 2 hours stud o Prerequ s tes ART 111 112, 113, 115 ARS 101 and 102 ARE 300 or approva of nstructor

420 Crafts for the Elementary School Teacher. (3) A
Pract ca aboratory exper ences stress ng a var ety of med a and act v t es for c assroom teach ng Not for MA cred t n Art Educat on One ecture, 4 hours stud o.

474 Planning Art Instruction. 3 S
ntroduct on to prob ems and approaches n plann ng in struction re ated to the product on and v ew ng of art Pre requ s te· ARE 302 or approva nstructor

480 Adolescent Art and Artists. 3 F
Strateg es for teach ng art, understand ng des gn and ex p or ng concepts re ated to art and art sts n school and commun ty art programs. Two hours ecture, 2 hours stud o Prerequ s tes· ART 111, 112 113, 115 ARS 101 and 102 ARE 300 or approva of 'nstructor

484 Internship: Art Education. (3 6)

485 Women's View of Art. (3 A
Study of women v sual art sts, the r ves and the socia , pol t ca esthet c and educat ona ssues related to the r art Lecture-d scuss on read ngs and stud o exper ences Three hours a week Prerequ site approva of n structor

490 Instructional Resources in Art. 3) F
Deve opment of audiov sua mater a s n art and nquiry nto strateg es for the r mp ementat on Two ectures, 2 hours studio Prerequ s tes ARE 474 and ARA 488 or approva of nstructor

510 Art in the Self-Contained and Open Classroom. 3 A
A ternate teach ng earn ng strategies art concepts, and ski s re evant to elementary schoo art exper ences for teachers

511 Issues in Art Education. 3) A
nvest gation of ssues n art educat on

515 Foundations of Art Education. (3 A
Behav ora foundat ons of educat on as related to art educat on Emphas s on psycholog ca and ph losophica frame of reference

520 Creativity in Art Education. 3) A
The nature of creat ve behav or espec a y as t app es to the teach ng of the v sua arts

525 Art and Society. 3 A
Interre at onsh p of art, soc ety, and soc al change and the r re evance to areas such as government, museums, and techno ogy

540 Instructional Resources, Art Education. 3) N
Deve opment of aud o v sual mater a s n art and nqu ry nto strateg es for the r mp ementat on. May be repeated once for cred t.

545 Perception and Learning. 3 A
Concepts of percept on and earn ng n art nstruct on

550 Aesthetic Inquiry. 3 A
L terature on aesthet cs methods of nqu ry and mp ca- t ons for art educat on

570 Analyz ng Works of Art. 3 N
The cr t ca exam nat on of art or statements about art and the deve opment of ways for gu d ng th s exam na t on.

575 Curriculum in Art and Education. 3 A
L teratu e n art educat on and educat on on ex st ng strateg es for deve op ng curr cu um the ssues and prob ems of d ffer ng curr cu um or entat ons

610 Issues and Trends in Art Education. 3 N
Doctora leve nvest gat on of h stonca and contempo rary ssues re ated to teach ng and research n art ed ucat on

611 Curriculum Development in Art Education. 3) N
Doctoral eve inqu ry nto the ph osoph ca psycho og cal and soc o ogica foundat ons of curr cu um deve op ment

See page 38 for special courses which may be offered by this academic unit.

ART HISTORY

ARS 100 Introduction to Art. (3 F, S, SS
Deve opment of understand ng and enjoyment of art and its relat onsh p to everyday fe through the study of pa nt ing sculpture, arch tecture and des gn May not be taken for cred t by student who has completed ARS 300, nor used as art history cred t by art majors *[Satisf es Gener al Stud es Requ rements HU, H]*

101 Art of the Western World I. (3 F S
H story of Western art from the Pa eo th c period to the M ddle Ages *[Sat sf es General Studies Requirements HU H]*

102 Art of the Western World II. (3 F, S
H story of Western art from the Rena ssance to the present *[Sat sfies General Stud es Requirements HU H]*

201 Art of the Non-Western World I. 3 A
H story of the art of the As an cu tures w th an emphas s on Ind a Ch na and Japa *[Satisf es General Studies Requ rements HU G]*

202 Art of the Non-Western World II. 3 A
History of the art of Afnca Ocean a and the New Wor d. *[Satisf es Genera Stud es Requirement HU]*

300 Introduction to Art. 3 F S
Course content same as ARS 100 but requ res a h gher eve of accomp shment and comprehens on May not be taken for cred t by student who has comp eted ARS 100 nor used as art h story cred t by art major *[Sat sfies General Studies Requ rements HU, H]*

325 History of Christian Art. 3 N
Christ an art from the 4th century n Rome to the present Mean ng and use of arch tectura pa t ng scu ptura and decorat ve art forms Prerequ s tes· ARS 101 and 102 or approva of nstructor *[Sat sf es Genera Stud es Requirements HU H*

400 History of Printmaking. 3 A
H story of the p t as an art form and ts re at on to other mode and forms of art st c express on Pre equ s tes ARS 101 and 102 or approva of nstructor *[Sat sf e Genera Stud es Requ ements HU H]*

402 Ancient Near Eastern Art. 3 N
H tory of pa nt ng, scu pture and arch tecture n Mesopotam a Egypt and the Aegean Prerequ s tes ARS 101 and 102 or appr va of nst uctor *[Satisf e General Stud es Requ rements HU H*

404 Greek Art. 3 A
Art and arch tect re of Greece and the He en st c Em p re Prerequ s tes· ARS 101 and 102 or approva of n structor *[Satisfies General Stud es Requ rements HU H]*

406 Roman Art. 3 A
Art and arch tecture of Etrur'a Rome and the Roman Empire Prerequisites ARS 101 and 102 or approva of nstructor *[Sat sf es Genera Studies Requirements HU, H]*

410 Early Christian and Byzantine Art. *3* A
Art ano arch tecture of the ear y church and the Byzant ne Emp re from the 4th to the 15th century Prereq uis tes ARS 101 and 102 or approval of instructor *[Satisf es General Stud es Requirements· HU H]*

412 Early Medieval Art. (3 A
Arch tecture scu pture and pa nt ng n the Lat n West from the 7th century to the end of the Otton an Per od Prerequ s tes ARS 101 and 102 or approval of nstruc tor *[Sat sfies General Studies Requ rements HU H]*

414 Romanesque Art. (3 A
Scu pture, pa nt ng, architecture and m nor arts n west ern Europe dur ng the Romanesque period Prerequ s tes ARS 101 and 102 or approva of instructor *[Satis fies General Studies Requ rements· HU H]*

416 Gothic Art. 3) A
Pa nt ng scu pture and arch tecture n western Europe dur ng the Goth c period Prerequ s tes: ARS 101 and 102 or approval of nstructor *[Satisfies General Studies Requirements HU H]*

418 Renaissance Art in Northern Europe. (3) A
Pa nt ng, scu pture, and arch tecture during the 1400s and 1500s north of the A ps. Prerequ s tes ARS 101 and 102 or approva of nstructor *[Sat sfies General Studies Requ rements· HU H]*

420 Early Renaissance Art in Italy. 3) A
Pa nting, scu pture and arch tecture n Ita y from 1300 to 1500 Prerequ s tes. ARS 101 and 102 or approva of n structor *[Sat sf es Genera Stud es Requirements. HU, H]*

422 Italian High Renaissance Art and Mannerism. 3) A
History of ta an art dur ng the 16th century nc ud ng the ach evements and nf uence of Leonardo da Vinci, Raphae and M che ange o Prerequ s tes: ARS 101 and 102 or approva of nstructor *[Sat sf es General Studies Requ rement. HU]*

424 Italian Baroque Art. 3) A
ta an pa nt ng, scu pture and arch tecture of the 17th century Prerequisites ARS 101 and 102 or approva of nst uctor *[Satisfies General Stud es Requ rements HU H]*

426 Art of the 17th Century in Northern Europe. 3) A
Baroque pa nt ng scu pture and arch tecture n Flanders, the Nether ands France and Eng and. Prerequ s tes. ARS 101 and 102 or approval of nstructor. *[Sat sfies Genera Stud es Requirements· HU H]*

428 Art of the 18th Century. 3 A
H story of pa nt ng, scu pture, arch tecture graph c arts and the decorat ve arts from 17 0 to the French Revo u tion 1789 Prerequ s te ARS 1 1 and 102 or approval of nstructor *Sat sfies Genera Stud es Requirements· HU, H*

430 Art of Spain and Its Colonies 3) A
Arch tecture pa nt ng and scu pture from 1500 to 1800 Co on a focus on Mex co and Amen an S uthwe t Pre requ s tes. ARS 101 and 1 2 or approva of nstructor *Sat sf es Genera Stud es Requ rements HU H]*

432 Art and Revolution 3 A
mpact of American and French Revo ut ons and the Napo eon c epoch on v sua arts Concentrat on on Goya Dav d Gericau t, B ake etc Prerequ sites ARS 101 and 102 or approva of nstructor *[Satisfies General Studies Requirement HU*

434 Romant cism and Realism. 3 A
H story of the v sua arts n the r rst ha f of the 19th cen tury Prerequis tes ARS 101 and 102 or approval of n structor *[Sat'sfies Genera Studies Requ rement· HU]*

436 Impressionism and Late 19th Century Art. (3) A
H story of pa nt ng, scu pture and graph c arts n atter half of the 19th century Prerequ s tes ARS 101 and 102

or approva of nstructor *Sat sf es Genera Stud es Re qu rement HU]*

438 Art of the 20th Century I. 3 A
Deve opments and d rect ons n art between 1900 and Wor d War I Prerequ s tes ARS 101 and 102 or ap proval of nstructor *[Sat sf e Genera Stud es Requ re ment HU]*

439 Art of the 20th Century II. 3 A
Art s nce Wor d War w th cons derat on of new con cepts and exper mentat on w th media and modes of pre sentat on Prerequ s te ARS 101 102 and 438 or ap prova of nstructor *[Sat sf es Genera Studies Requ re ments· HU H]*

442 American Art I. 3 A
Art n the Un ted States from European sett ement to 1850 Prerequ s tes ARS 101 and 102 or approva of n structor

443 American Art II. 3 A
Art n the Un ted States from 1850 to the Armory Show n 1913 Prerequ s tes ARS 101 and 102 or approva of n structor

444 American Art III. 3 A
Art n the Un ted States from 1913 to Wor d War I Pre requ s tes: ARS 101 and 102 or approval of nstructor

450 19th Century Photography. 3 A
H story of photography from the med um's pre h story to 1914: persona t es, processes, mages, and deas Pre requ s tes· ARS 101 102 or approva of nstructor. *[Satis fies General Studies Requirements HU H]*

451 20th Century Photography. (3) A
Persona ties processes, mages and deas n photogra phy from 1914 to present Prerequ s tes: ARS 101 and 102 or approva of nstructor [Sat sf es Genera Stud es *Requirements HU H]*

454 Research and Writing in Photography. (3) A
Pr ncip es and pract ce of research and wrt ng n the h s tory and cr tic sm of photography Papers required Prerequ s tes ENG 101 and 102 or equ va ent, ARS 450, 451 or approva of nstructor *[Satisfies General Studies Requirement HU]*

456 History of Art Criticism I. (3 N
H story of theories of cr t c sm of the v sual arts. Read ngs from visua arts cr t ca terature from P ato to 18th century Prerequ s tes ARS 101 and 102 or approva of nstructor. *[Sat sfies General Studies Requ rements HU, H]*

457 History of Art Criticism II. (3) N
Cont nuat on of ARS 456, focus ng on various theor es of cr tic sm of the v sua arts from late 18th century to pres ent Prerequis te· ARS 456 *[Sat sf es General Stud es Requ rements HU H]*

458 20th Century Art Criticism. 3 N
Sem na , nf uent a wr t ngs n deve opment of modern art cr t c sm Ro e of art cr t c, art journa s n relat on to art commun ty Prerequ s tes ARS 456, 457 or approva of nstructor *[Satisfies General Stud es Requirement HU]*

459 Writing Art Critic sm. 3 N
Trad t ona and contemporary approaches to the cr t c sm of art Students w wr te cr t ca essays The atter ha f of the semester w stress the c t cism of contempo rary art n var ous med a Prerequ s tes ARS 458 and r approva of nstructor *[Sat sf es General Stud es Re qu rement HU]*

462 Pre-Columbian Art I. 3 A
Arch tecture scu pture, ceram cs, manusc pts pa nt ng and other arts of Mesoamerica prior to European con tact Prerequ s tes ARS 101 and 102 or approval of n structor *[Sat sfies Genera Stud es Requ rements· HU, H]*

463 Pre-Columbian Art I. 3 A
Arch tecture scu pture ceram cs text es and meta work of Centra and South Amer ca prior to European contact Prerequ s tes ARS 101 and 102 or approva of nstruc tor *[Sat sf es Genera Stud es Requ rement HU]*

465 North American Indian Art. 3 A
Nat ve Amer can art forms of the Un ted States and Canada from preh stor c t mes to present. Prerequ s tes ARS 101 and 102 or approva of nstructor. *[Sat sfies Genera Stud es Requ rement. HU]*

466 Southwest Indian Art. 3 A
Amer can nd an art n the southwestern states from ts or g ns to the present day Prerequ s tes ARS 101 and 102 or approva of nstructor *[Sat sf es General Studies Requ rements HU, H]*

468 Shamanism and Art. 3 A
Performance arts as we as trad tiona art objects assoc ated w th the shama n S ber a and North Amer ca Pre requisites ARS 101 and 102 or approva of nstructor. *[Sat sf es General Studies Requirements HU SB G]*

469 Mexican Art. 3 A
Art of Mex co and related Ce tra Amer can cultures from the preh stor c to the contemporary schoo s. Pre requ s tes ARS 101 102 or approval of nstructor. *[Satis f es Genera Studies Requ rements HU H, G)*

472 Art of China. 3 A
Study of major forms n Ch nese art r tua bronze sculp ture ceram c, ca graphy, pa nt ng and arch tecture. Pre requ s tes ARS 101 102 or approval of nstructor. *[Satis· f es General Studies Requirements· HU G, H]*

473 Art of Japan. 3 A
Japanese art from the Joman period to the present Pre requis tes ARS 101 102 or approval of nstructor *[Satis fies General Studies Requirements HU, G, H]*

475 Chinese Painting. (3) A
From Ku K'a ch n to Ch Pa shih. Major art sts styles and movements n Chinese pa nt ng Prerequ s tes· ARS 101 102 or approva of nstructor. *[Satisfies General Stud es Requ rements HU H]*

480 Research Methods. (3) F S
Methodology and resource materia for art h stor cal re search Techn ques of scho arly and cr t cal wr t ng and eva uat on of b bl ograph c sources Prerequis tes: ARS 101 and 102 or approva of nstructor. *[Satisfies General Stud es Requ rements HU H]*

498 Pro-Seminar. (3 6) A
Undergraduate sem nar n topics selected from the fo low ng Prerequ s te approva of nstructor Prob ems or cr t c sm in

a	Ch nese Art	f	Modern Art
b	Anc ent Art	g)	Amer can Ind an Art
c	Med eva Art	(h	Pre Co umb an Art
d	Rena ssa ce Art	(i	Photograph c History
(e	Baroque Art	(j	Amer can Art

591 Seminar. 3 6 A
Graduate sem nar n top cs se ected from the fol ow ng. Prerequ s te approva of nstructor Prob ems or cr t c sm n

a	Ch nese Art	f	Modern Art
b	Anc ent Art	g	Amer can nd an Art
c)	Medieva Art	h	Pre Co umb an Art
d	Rena ssance Art	( )	Photograph c H story
e	Baroque Art	(j	American Art

See page 38 for special courses which may be offered by this academic unit.

AUXILIARY COURSES

ARA 202 Introduction to Photo Aesthetics. 3 F S
S de ecture course n understand ng photography as a f ne art form *[Sat sf es Genera Stud es Requ rement H]*

454 Museum Studies I. 3 A
H story of the or g s and deve opment of m seum T p cs covered w be the h story of co e t ng co no sseur sh p and con ervat on Prerequ s te approva of nstruc tor

456 Museum Studies II 3 N
Pract ca operat on of museums, methodo ogy theory pract ce nc ud ng organ zat on adm n trat on fund ra ng, grant proposa s co ect ng, reg strat on budget personne and educat on programs Prerequ s te ARA 454

460 Gallery Exhibitions 3 F S
Pract ca exper ence n a phases of department ga ery operat ons and preparat on of ga ery pub cat ons Pre requ s te approva of nstructor May be repeated for credit

488 Understanding Art. 3 F S
Understand ng art as an emergent cultura phenomenon with an emphas s on a cr t ca exam nat on of conceptua ssues n art Wr t ng requ red Prerequ s tes: ARS 101, 102 or approva of nstructor *[Satisf es General Stud es Requirements L2 HU]*

See page 38 for special courses which may be of fered by this academic unit.

Department of Dance

PROFESSORS:
LESSARD (PEBE 115), JONES, NAGRIN
ASSOCIATE PROFESSORS:
CHLISTOWA HUSKEY LUDWIG, MARION
ASSISTANT PROFESSOR:
KAPLAN
INSTRUCTORS:
HARPER, MATT
ACADEMIC PROFESSIONAL:
ROSEN

Departmental Major Requirements

For advisement purposes, all students register ing in a dance degree program will enroll through the College of Fine Arts Each degree program and area of specialization has its own check sheet which describes the particulars of course sequence and special requirements These are available in the Department of Dance office.

Bachelor of Arts Degree Curriculum

Dance–Consists of a minimum of 50 semester hours of credit in dance, of which the follow ing are required DAH 160, 401, 402, DAN 130, 131, 134, 135, 232, 234, 235, 261, 262, 334, 464, and 494. Fifteen additional hours ap proved by an advisor must be in no more than two related fields Additional requirements are listed on the departmental check sheet

At least 50 semester hours, including 24 in the major, must be upper division. Grades in classes required for the major must be C' or better First semester students should take: DAH 160, DAN 134 Modern, DAN 135 Ba let, ENG 101; MUS 10(; and two General Stud ies requirements

Bachelor of Fine Arts Degree Curriculum

Dance–Consists of 66 to 85 hours of credit with a concentration in either Performance and Choreography or Dance Education Core courses required are: DAH 160, 401, 402; DAN 130, 131, 134, 135, 230, 232, 234, 235, 261, 262, 263, 334, 464, 465, 490, and 494. For the con centration in Performance and Choreography ad ditiona requirements include DAN 331, 332, 335, 371, 434; MUS 100; MUS 347 or 355 or 356; THP 101. For the specialization in second ary education, MUS 100, DAN 360, 361, 367, and one credit of Jazz Dance must be completed as well as all state secondary certification re quirements. Other requirements for each option are listed on the departmental check sheet.

At least 50 semester hours, including 30 in the major, must be upper division. Grades in classes required for the major must be C or better First semester students should take. DAH 160; DAN 134 Modern; DAN 135 Bal let; ENG 101; MUS 100; and two General Stud ies requirements.

Departmental Graduate Program

The faculty in the Department of Dance offer a program leading to the Master of Fine Arts de gree with a major in Dance. The program is de signed to train professionals in the technique, performance, choreography and theoretical bases of modern dance. Consult the *Graduate Catalog* for requirements.

DANCE HISTORY

DAH 100 Introduction to Dance. 3 F S
Or entat on to the f e d of dance focusing on h story, ty es and theatr ca aspects of the art form *[Sat sf es Genera Stud es Requ rement H]*

160 Introduction to the Dance Profession. 1 F
Sem nar introduc ng career opt ons, study of anatom ca andmarks and bas c njury prevent on pr nc p es

300 Introduction to Dance. 3 F, S
Course content same as DAH 100 but requ res a h gher eve of accomp shment and comprehens on. Ma/ not be taken by student who has completed DAH 100 *[Satis f es General Stud es Requirement· HU]*

301 History and Philosophy of Dance. 3 N
Dance from anc ent t mes to the present Cons derat on of dance as an art n re at on to other arts; pr m t ve, prec ass c, and modern forms *[Satisf es General Stud ies Requ rement· HU]*

401 Dance History I. 3 F
Cu tura and theatr ca deve opment of dance from pre h story through the 19th century Romantic per od n c uding the ear y h story of ba e *[Sat sf es General Stud ies Requ rements HU H]*

402 Dance History II. 3) S
Cu tura and theatr ca deve opment of dance from 19th century Romantic per od through Co temporary t mes nc udes ba let modern and mus ca theatre dance *[Sat isf es General Stud es Requ rements HU H]*

550 Cultural Concepts of Dance 3 S
Cu tural concepts trends economic po t ca , and geo *graph ca forces n ma or eras of dance h story*

560 Dance Philosophy and Criticism. 3 S
Theor es of cr t c sm, esthet c exper ence n dance n relat onsh p to other art forms concepts of c eat v ty sty e and art stic truth (Intended to ntegrate and g ve mean ng to stud o sk ls

See page 38 for special courses which may be of fered by this academic unit.

DANCE

DAN 130 Dance. 1 F S SS
Ba et mprov sat on azz moder and other dance act vi t es Two hours a week May be epeated for cred t

131 Music Theory for Dance. 2 S
E ements of mus c mus c structures and the r re ation sh p to dance Emphas s on rhythm c ana ys s and dance accompan ment Prerequ s te· MUS 100 or ap proval of nstructor

134 Technique and Theory of Modern Dance 3 F S
E ementary concepts of modern dance techn que De ve opment of movement qua ty and performance sk s S x h urs w eek y May be repeated for cred t P acement a d t on requ red Dance ma ors on y

135 Technique and Theory of Ballet. 2 F S
E ementary ba et techn q e w th emphas s on a gnment, contro and deve opment of the feet w th prope aware e s of sty e and phras ng. Four hours week y P a e ment and a d t ons req red

230 Dance. 1 F S
ntermed ate eve ont nuat on of DAN 130 Two hours a week May be r peated cred t

232 Dance Notation I.
Survey f ystems of dance tat on Introduct o t effort shape ana ys of moveme t Emphasi on earn ng e ementary Labanotat on Prerequ s te MUS 0 or approva ot nstructor

234 Technique and Theory of Modern Dance. 3 F, S
Intermed ate concepts of m der n dance techn que De /elopment f movement qua ty and performa ce sk S x hours week y May be repeated for cred t P acement *aud t on requ red Dance ma o s only*

235 Technique and Theory of Ballet. 2 F, S
The advanced study of e ementary ba let techn que through the trad t ona exerc ses w th proper awareness of style and phras ng Four hours week y May be re peated for cred t P acement aud tion requ red

237 Beginning Pointe. 1 F, S
The study of e ementary po nte techn que through the trad t ona exerc ses Two hours week y. May be re peated for cred t Prerequisites bas c ba et tra n ng and approva of nstructor

261 Fundamentals of Choreography. 3 F, S
ntroduct on to and app cation of bas c choreograph c pr nc p es w th emphas s on movement nvention and deve opment of eva uat ve sk s. Prerequ s tes: DAN 130 mprov sat on and approva of instructor

262 Dance Production I. 2) F
Theory of ght ng scenery and sound as related to dance

263 Dance Product on II. 2 S
Theory a d pract ce of pub c ty makeup, costum ng house and stage management as re ated to dance pro duct on Prerequ s te DAN 262 or approva of nstructor

330 Dance. 1 F S
Advanced eve s Cont nuation of DAN 230. Two hours week y May be repeated fo cred t.

331 Music Literature for Dance. 3 F
H stor ca survey of mus c re at ve to dance Emphas s on deve op ng sten ng sk s and know edge of mus ca versus choreograph c forms Prerequ s te. DAN 131 or approva of nstructor

332 Dance Notation II. 2 F
ntermediate study of Labanotat on Emphas s on score read ng Prerequ s te DAN 232 or equiva ent.

334 Technique and Theory of Modern Dance. 3) F, S
Advanced concepts of modern dance techn que De /e opment of movement qua ty and performance ski s S x hours week y May be repeated for credit P acement aud t on requ red

335 Technique and Theory of Ballet. 2 F S
ntermed ate ba et techn que w th emphas s on strength dynamics rhythm ca mpu ses, and trans t ons w th awareness of proper sty e and phras ng Four hours week y May be repeated for c ed t P acement aud tion *requ red*

337 Intermediate Pointe. 1 F S
Study of ntern ed ate and advan ed po nte techn que thr ugh the trad t ona exerc se Two hour week y Ma be repeated fo cred t Prerequ s te DAN 237 or appr va f nstru tor

342 Ideokinesis. 3 F S
A t dy of po ture us ng the v sua zat on of mage g a s to fac tate mproved a gnment and movement eff c e cy May be repeated for cred t

360 Theory and Practice of Teach ng Dance. 3 F
A a ys s and acqu s t on f teach ng mater a s for t e te h q e mpro sat on and choreography of modern dance

361 Theory and Practice of Teach ng Dance. 2 S
Ana ys and acqu t o of teach ng te hn ques and mater a s fo ba et a d jazz dance forms

364 Dance and Video 2 N
undamenta of dance v deo pr duct on nc ud ng camera operat n scr pt ng and n came a ed ting At ea t un or standing or approva of nstructor

367 Children's Dance. (3) F, SS
Theory and practice of teaching creative and other dance forms for children. Designed for dance majors and related curriculum, but open to all students.

371 Dance Theatre Performance/Production. (1) F, S
Performance or technical theatre work in designated dance productions. Prerequisite: approval of instructor. Three hours a week per credit hour. May be repeated for credit.

380 Jazz Dance Styles. (2) F
Study of 150 years of jazz dance in America through the learning of period dances, reading, creative work and performance. Prerequisite: consent of instructor. May be repeated for credit.

434 Technique and Theory of Modern Dance. (3) F, S
Preparation in the performance and comprehension of professional level modern dance technique. Six 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. Four 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). Prerequisite: consent of instructor. May be repeated for credit.

464 Choreography and Accompaniment. (3) 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. Prerequisite: DAN 261 or approval of instructor.

465 Advanced Choreography. (3) S
Investigation and practice of contemporary styles of choreography. Prerequisite: DAN 261, or approval of instructor.

490 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 261, 464 and 465.

530 Advanced Problems in Analysis of Dance Technique. (3) S
Theories and principles of human anatomy and biomechanics applied to analysis and evaluation of dance movement. Prerequisite: approval of instructor.

531 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. Prerequisite: approval of instructor.

534, 634 Technique and Theory of Modern Dance. (3) F, S
Preparation in the performance and comprehension of professional level modern dance for first year 534 and second year 634 graduate students. Six hours weekly. May be repeated for credit. Placement audition required.

535 Technique and Theory of Ballet. (2) F, S
Graduate level study of professional advanced ballet technique with emphasis on preparation for performance. Four 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). Prerequisite: consent of instructor. May be repeated for credit.

542 Ideokinesis. (3) F, S
A theoretical examination of Ideokinetic methods of facilitating postural change and movement efficiency.

560 Graduate Dance Pedagogy. (3) F
Advanced analysis of teaching techniques for modern dance and ballet. Prerequisite: consent of instructor.

562 Dance Stagecraft and Production. (3) N
Theory of lighting, costuming, make-up, scenery and sound as related to dance performance. May be repeated once for credit. Prerequisites: DAN 262 and 263 or equivalent.

563 Individual and Group Choreography. (3) F
Original choreography created for solo and group performance. May be repeated once for credit. Prerequisites: DAN 464 and 465 or equivalent.

564 Video Dance Production. (2) N
Dance video production and analysis of current research in the field. Special projects, including thesis documentation, are discussed.

571 Dance Theatre. (1) F, S
Performance in specially choreographed dance productions. Prerequisite: approval of instructor. Three hours a week. May be repeated for credit.

580 Jazz Dance Styles. (2) F
Study of 150 years of jazz dance in America, learning period dances, reading and choreographic assignments. Prerequisite: consent of instructor. May be repeated for credit.

591 Seminar. (0-3) F, S
Seminar focusing on enrichment topics, production aspects of thesis projects, teaching concerns, special lectures, films or critiques.

632 Dance Notation III. (3) S
Advanced study of Labanotation. Experiences in notating and reconstruction of Labanotation dance scores. Prerequisite: DAN 332 or equivalent.

680 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 be followed by a final oral examination. A written bound document as well as video documentation must be left with the department.

See page 38 for special courses which may be offered by this academic unit

School of Music

PROFESSORS:
UMBERSON (MUSIC 183), ANDRESS, ATSUMI BOSWELL, BRITTON, CARROLL, CLARK, de KANT ENGLISH, HAMILTON H CKMAN, HOOVER, LOCKWOOD LOMBARDI, MAGERS, McEWEN, McLEOD, PAGANO, PERANTON , ROSEN SE PP, SKOLDBERG, SPINOSA, STOCKER STRANGE, SWAIM

ASSOCIATE PROFESSORS:
BARROLL, COSAND, CROWE, DEBENPORT, DE MARS, DOAN, FLEM NG, HACKBARTH, HAEFER, HANNA, HARRIS, HOFFER, KL EWER, MAROHNIC, METZ, MEYER OLDANI, RAUSCH RAVE, REYNOLDS, ROUX, SH NN, SMITH, STALZER, SUNKETT WELLS, WILL AMSON, WILSON, WYTKO

ASSISTANT PROFESSORS:
DAVIES FERRIS HOLBROOK, KOONCE, MAY

The School of Music is a member of the Nation al Association of Schools of Music, and the re quirements for entrance and graduation set forth in this *Catalog* are in accordance with the published regulations of the Association. The following statement of Basic Musicianship is endorsed by the School of Music:

'All musicians, whether performers, compos ers, scholars or teachers, share common pro fessional needs. Every musician must to some extent be a performer, a listener, an historian, a composer, a theorist, and a teacher. For this rea son, certain subject matter areas and learning processes are common to all baccalaureate de grees in music

'Basic musicianship is developed in studies which prepare the student to function in a vari ety of musical roles which are supportive of his/her major concentration. All undergraduate curricula, therefore, provide the following.

1. A conceptual understanding of such musi cal properties as *sound, rhythm, melody harmony, texture* and *form* and opportu nities for developing a comprehensive grasp of their interrelationships as they form the cognitive affective basis for lis tening, composing and performing.
2. Repeated opportunities for enacting in a variety of ways the roles of listener (analysis), performer (interpretation), composer creation), scholar (research), and teacher.
3. A repertory for study that embraces all cultures and historical periods.

Major Requirements

For advisement purposes, all students register ing in a music major program will enroll through the College of Fine Arts. All music degree programs require a minimum of 126 hours of graduation In addition to the major requirements listed below, General Studies and other academic requirements are listed on pages 43 46 of this *Catalog*.

Placement Examination. All students who enroll in an undergraduate music degree program are required to perform an entrance audition in their primary performing medium (instrument or voice). Audition forms and spe cific audition requirements for each instrument or voice may be obtained upon request by writ ing the School of Music. Official dates for these auditions will be set for each academic year. Students may request to audition on other dates if necessary or may send a tape recording if distance prohibits coming to the campus. Entering students must also take placement tests in theory and piano at the time they enter the University. This includes transfer students who have completed four semesters of theory and piano at another institution; they are required to reach a minimum level of achievement indicated on the Theory Placement Exam and Piano Placement Exam.

Bachelor of Arts Degree Curriculum in the Music Program—Consists of 50 semester hours. The following courses are required:

Music Theory MTC 125, 221, 222, 223, 320, 327, 422

Music History. MHL 341, 342

Major Performing Medium Eight semester hours (MUP 111/311)

Class Piano MUP 131, 132, 231, 232 (unless waived by proficiency examination)

Recital Attendance Six semesters of MUP 100

Note: The remaining hours in music will be selected by the student in consultation with his/h er advisor. Areas of study may include music history, ethnomusicology and music theory. At least 23 semester hours, 12 in field of specialization, must be upper division

Bachelor of Music Degree Curriculum in the Music Program—Consists of 84 semester hours. This curriculum offers fields of special ization in choral general music, instrumental

music, performance, music therapy, and theory and composition Choral general music and in strumental music majors are provided for stu dents wishing to meet certification require ments for teaching in the public schools. The following requirements are included in each field of specialization:

Choral-General Music

(Note This degree program ma include a teaching minor in instrumental music.

Music Theory MTC 125, 221, 222, 223, 327, 431

Music History MHL 341, 342

Conducting MUP 209, 339

Music Education. MUE 313, 315, 480

Major Performing Medium: Eight semester hours of MUP 111 and 8 semester hours of MUP 311 to obtain a proficiency level neces sary to meet the graduation recital requirement. MUP 495 completes the requirement.

Minor Performing Medium. A proficiency equal to six semesters of study in keyboard or voice whichever is not the major performing medium . Students wishing to extend their pro ficiency beyond this level may continue to study in MUP 321

Ensemble Eight different semesters of partici pation including at least six semesters of MUP 352 and/or MUP 353, four of which must be at Arizona State University.

Recital Attendance: Six semesters of MUP 100

Instrumental Music

Instrumental Concentration

Note. It is strongly recommended that this degree program include a minor in choral music or a minor in jazz education

Music Theory MTC 125, 221, 222, 223, 327

Music History MHL 341, 342

Conducting MUP 210, 340

Music Education MUE 315, 317, 318, 327, 328, 336, 337, 338, 481, 482

Class Piano: MUP 131, 132, 231, 232 (unless waived by proficiency examination

Major Performing Medium Eight semester hours of MUP 111 and 8 semester hours of MUP 311 to obtain a proficiency level neces sary to meet the graduation recital requirement. MUP 495 completes the requirement.

Ensemble Eight different semesters of participation, four of which must be at Arizona State University For wind and percussion players, two of the four ASU semesters must be in marching band. String players must have a minimum of six semesters of MUP 345. Wind and percussion players must have a minimum of six semesters of MUP 361.

Recital Attendance Six semesters of MUP 100

Recommended Minors Choral-General Music (13 hours). MUE 480, MTC 431, MUP 339, 350 or 352/353 (two semesters), and voice (4 hours). Or Jazz Education 13 hours). MUP 141-142, MUP 217 218, MUP 386, MUP 341, MUP 235 236, and MUP 379 (if MUP 142 is waived).

Instrumental Music

String Concentration

Music Theory MTC 125, 221, 222, 223, 327, 433

Music History MHL 341, 342

Conducting. MUP 210, 340

Music Education: MUE 315, 317 or 318 (whichever does not include the major instru ment), 485, 486, MUP 121 (4 hours, a string instrument in the area other than the major instrument), MUP 121 (2 hours, a third string instrument), MUP 121 (2 hours, a fourth string instrument)

Class Piano MUP 131, 132, 231, 232 (unless waived by proficiency exam).

Major Performing Medium Eight semester hours of MUP 111 and 8 semester hours of MUP 311 to obtain a proficiency level neces sary to meet the graduation recital requirement. MUP 495 completes the requirement.

Ensemble Eight different semesters of partici pation, four of which must be at Arizona State University. Must have a minimum of six semes ters of MUP 345.

Recital Attendance Six semesters of MUP 100

Recommended Electives MUE 313 and MUP 481

Performance

Keyboard Concentration

Music Theory MTC 125, 221, 222 223, 320 or 321, 327, 425 (or 428)

Music History MHL 341, 342, 447

Repertoire and Pedagogy MUP 451 or 452, 481 or 482

Conducting: MUP 209 or 210 or 211

Major Performing Medium: Sixteen semester hours of MUP 127 and 16 hours of MUP 327

to attain a proficiency level necessary to meet the graduation recital requirements. A half recital (MUP 495) and a full recital (MUP 496) are required.

Ensemble: Eight semester hours within a minimum of six different semesters, of which two semesters of accompanying and two semesters of chamber music are required.

Recital Attendance: Six semesters of MUP 100

Performance

Orchestral Instrument Concentration

Music Theory: MTC 125, 221, 222, 223, 320, 327, 425

Music History. MHL 341, 342, 447

Repertoire and Pedagogy: MUP 451 or 481

Conducting. MUP 210, 340

Major Performing Medium. Sixteen semester hours of MUP 127 and 16 hours of MUP 327 to attain a proficiency level necessary to meet the graduation recital requirements. A half recital (MUP 495) and a full recital (MUP 496) are required.

Class Piano: MUP 131, 132, 231, 232 (unless waived by proficiency examination

Ensemble Eight semester hours of large ensembles within a minimum of six different semesters, plus four semester hours of small ensembles within a minimum of four different semesters.

Recital Attendance Six semesters of MUP 100

Performance

Voice Concentration

Music Theory: MTC 125, 221, 222, 223, 320, 327, 425

Music History MHL 341, 342, 447

Repertoire and Pedagogy: MUP 451, 481. Two credits selected from MUP 453, 454 or a repeated enrollment of MUP 451.

Diction: MUP 250, four semester hours of diction for singers English, Italian, German, French.

Conducting MUP 209

Major Performing Medium Sixteen semester hours of MUP 127 and 16 hours of MUP 327 to attain a proficiency level necessary to meet the graduation recital requirements A half recital (MUP 495) and a full recital (MUP 496) are required.

Class Piano. MUP 131, 132, 231, 232 (unless waived by proficiency examination)

Ensemble Four different semesters of large ensembles, plus five semester hours of ensembles within five different semesters to be selected from large and/or small ensembles.

Recital Attendance. Six semesters of MUP 100

Additional Requirements: Sixteen semester hours of credit in more than one foreign language, chosen from French, German or Italian. A student may elect one year of one language, and either one or two semesters of the other(s), chosen in conference with the advisor.

Performance

Guitar Concentration

Music Theory. MTC 125, 221, 222, 223, 320, 327

Music History: MHL 341, 342, 447

Repertoire and Pedagogy MUP 451, 481

Conducting. MUP 210

Major Performing Medium: Sixteen semester hours of MUP 127 and 16 hours of MUP 327 to attain a proficiency level necessary to meet the graduation recital requirements. A half recital (MUP 495 and a full recital (MUP 496) are required.

Class Piano: MUP 131, 132, 231, 232 (unless waived by proficiency examination)

Ensemble: Eight semester hours of ensemble within a minimum of six different semesters. Four of the eight credits must be MUP 379: Chamber Music Ensemble Guitar.

Recital Attendance Six semesters of MUP 100

Performance

Piano Accompanying Concentration

Music Theory MTC 125, 221, 222, 223, 320, 327, 428

Music History. MHL 341, 342, 447

Diction and Repertoire: MUP 250 (2 semesters), 451, 453, 454

Conducting MUP 209 or 210 or 211

Major Performing Medium: Sixteen semester hours of MUP 127, 8 semester hours of MUP 311, 8 semester hours of MUP 337 In addition, student will accompany two half recitals (MUP 495), one for a singer, one for an instrumentalist during the junior year. (A half solo recital may be substituted for either of the above.) During the senior year the student will accompany two full recitals (MUP 496), one vocal and one instrumental.

Ensemble Two semesters of MUP 379 (chamber music), one semester of MUP 379 (two piano ensemble); one semester of MUP 487 (piano accompanying); four semesters of MUP 388; two semesters of ensemble elective (minimum of six different semesters)

Recital Attendance: Six semesters of MUP 100

Eight hours of one Foreign Laguage: French, Italian, or German are required.

Performance

Music Theatre Concentration

Music Theory. MTC 125, 221, 222, 223, 327

Music History MHL 341, 342, 447 and 2 elective hours

Conducting· MUP 209 or 210 or 211

Major Performing Medium. Eight semester hours of MUP 111 and 8 semester hours of MUP 311 to attain a proficiency level necessary to meet the graduation requirement of a public performance of two roles, one of which must be of major proportion.

Class Piano: MUP 131, 132, 231, 232 (unless waived by proficiency examination)

Ensemble. Three semesters of MUP 370, five semesters of MUP 371 and eight semesters of MUP 373

Recital Attendance· Six semesters of MUP 100

Additional requirements. Minimum of six semester hours each in theatre and dance.

Performance

Jazz Performance Concentration

Music Theory MTC 125, 221, 222, 223, 324, 315, 316, 321, 327, 441

Music History. MHL 152, 341, 342, 352

Conducting: MUP 210

Pedagogy· MUP 341

Major Performing Medium Eight semester hours of MUP 111 and 8 semester hours of MUP 311 to obtain a proficiency level necessary to meet the graduation recital requirements. Two half-recitals (MUP 495) are required, with one in the jazz idiom.

Class Piano MUP 131, 132, 231, 232, 235, 236, 335, 336

Improvisation· MUP 141, 142, 217, 218, 417, 418

Ensemble Eight semesters including two semesters of MUP 386 and six semesters of MUP 379 (CME: Jazz)

Recital Attendance. Six semesters of MUP 100

Music Therapy

Music Theory. MTC 125, 221, 222, 223, 327, 422

Music History. MHL 341, 342

Conducting. MUP 211

Music Education MUE 211, 313, 319, 329, 335, 336, 339

Music Therapy MUE 161, 261, 361, 362, 381, 384, 385, 386, 387, 388, 441, 475, 476

Major Performing Medium: Six to eight semesters, must include at least four hours of MUP 311.

Piano Proficiency equal to four semesters of study

Voice: Two semesters of study

Ensembles Six semesters of participation with at least four semesters in large groups

Recital Attendance. Six semesters of MUP 100

Additional requirements Four semester hours of functional dance; specified courses in Science and Social and Behavioral Sciences

Note· Students must apply to the National Association for Music Therapy for registration as a Music Therapist on completion of the requirements for graduation.

Music Theory and Composition

Music Theory Concentration

Music Theory: MTC 125, 221, 222, 223, 320, 321, 323, 327, 422, 425, 428, 496, 10 hours electives in MTC courses 300 or above, to be chosen in consultation with advisor.

Music History: MHL 341, 342, 447, and three elective hours.

Conducting: MUP 211, or MUP 209 and 339 or MUP 210 and 340.

Applied Music: Twelve semester hours of study, eight of which must be MUP 111.

Class Piano MUP 131, 132, 231, 232 (unless waived by proficiency examination.)

Ensemble Eight semesters of participation.

Final Project: MTC 496

Recital Attendance Six semesters of MUP 100.

Language The equivalent of 16 semester hours of credit in one foreign language; the choice of language subject to approval of advisor

Music Composition Concentration

Music Theory. MTC 125, 221, 222, 223, 320, 321, 323 (four semesters), 327, 422, 425, 428, 429, 430, 433.

Music History MHL 341, 342, 447 and three elective semester hours

Conducting MUP 211, or MUP 209 and 339, or MUP 210 and 340.

Applied Music Twelve semester hours of study, eight of which must be MUP 111.

Class Piano MUP 131, 132, 231, 232 (unless waived by proficiency examination)

Ensemble Eight semesters of participation.

Final Project MTC 495

Recital Attendance: Six semesters of MUP 100.

Music Minor

For information concerning Music Education minors, consult with the School of Music Undergraduate Coordinator.

Graduate Programs

The School of Music offers the following graduate programs: the Master of Arts degree provides advanced studies in history and literature of music; the Master of Music degree has majors in the fields of performance (voice, keyboard, instrumental, piano accompanying, pedagogy, music theatre musical direction, music theatre performance), choral music (choral music, general music , instrumental music, and theory and composition. The Doctor of Musical Arts degree, the Doctor of Education degree in Secondary Education (Music Education), and the Doctor of Philosophy degree in Education Secondary Education (Music) are offered in cooperation with the College of Education. Consult the *Graduate Catalog*. A document on graduate degree programs in music may be obtained by writing to the School of Music.

MUSIC

General Studies Electives)

MUS 100 Fundamentals of Music Notation. (3 F S, SS
Provides nonmusic majors with sufficient symbolic literacy to begin work in the field of musical learning No credit for music majors

107 Introduction To Music. (2 F S SS
Correlation of music with literature science and art A nontechnical course in the humanities for nonmusic majors *[Satisfies General Studies Requirement HU]*

340 Survey of Music History 3 F S SS
Major periods composers and compositions in the history of music May be used to meet the music history requirement for a minor in music *[Satisfies General Studies Requirement HU]*

347 Jazz in America. 3 F S SS
Current practices employed by contemporary jazz musicians, the historical development of jazz techniques *[Satisfies General Studies Requirement HU]*

353 Survey of Afro-American Music 3 A
Afro American music traced from its origins in Africa to the present with emphasis on spiritual blues jazz gospel and classical styles *[Satisfies General Studies Requirement HU]*

354 Popular Music. 3 A
Emphasis on history, culture and performance patterns in a variety of popular music idioms *[Satisfies General Studies Requirement. HU]*

355 Survey of American Music. 2 F S SS
Growth and development of America's music *[Satisfies General Studies Requirement. HU]*

356 Survey of the Musical Theatre. 3 N
Musicals placed in the theatre viewed in terms of historical importance and relative function *[Satisfies General Studies Requirement HU]*

357 Aesthetic Perception in Music Performance. 3) F S SS
Introduces the nonmusic major to the aesthetics of performance by stressing the physical and emotional involvement in the direction motion, intensity and color spectrum of music [*Satisfies General Studies Requirement HU]*

See page 38 for special courses which may be offered by this academic unit

MUSIC EDUCATION

MUE 161 Introduction to Music Therapy. (2) F
Overview of music therapy. Orientation to mental health, special education and related therapies Required on site visits

211 Music in Recreation. 2 F
Materials methods and organizational structures appropriate for recreational music

261 Music Therapy as a Behavioral Science. 2) F
Orientation to preclinical experience with an emphasis on observation skills, assessment goal setting and professional ethics. Required off campus observations Prerequisite MUE 161

310 Music in Early Childhood Education. (3) F
dentifying and understanding musical needs of young children Methods and materials for programs development for classroom teachers

311 Music for the Classroom Teacher. 3 F, S
Development of the classroom music program in the elementary school No previous music experience or course work required Not for music majors or minors

313 Music in the Elementary School. 3 F
Methods of instruction organization and presentation of appropriate content in music For music majors only

314 Music in the Elementary School. 3 S
Selected problems in elementary school classroom music and choral program Observation and participation in school music classrooms Prerequisite MUE 313

315 Music in the Junior High School 2 A
Student characteristics curriculum and teaching strategies for choral and general music For music majors only

317, 318, 327, 328, 335, 336, 337, 338 Educational Methods for Teaching Instruments. 1 F S
Teach ng and p ay ng sk s for sch o mus c teachers nstrument s named Three hours per week

317 Educational Methods for Violin and Viola.

318 Educational Methods for Cello and String Bass.

327 Educational Methods for Trumpet and Horn.

328 Educational Methods for Trombone, Euphonium and Tuba.

335 Educational Methods for Guitar.

336 Educational Methods for Percussion.

337 Educational Methods for Flute, Clarinet, Saxophone.

338 Educational Methods for Double Reed Instruments.

319 Educational Methods for Strings. 1) F
Teach ng and p ay ng sk s for mus c therap sts and mu s c m nors Three hours per week

329 Educational Methods for Brass. 1 S
Teach ng and p ay ng sk s for mus c therap sts and mus c minors Three hours per week

339 Educational Methods for Woodwinds. 1) F
Teach ng and p ay ng sk l s for mus c therap sts and mus c minors. Three hours per week.

361 Music Therapy Theory and Practice in Psychopathology. 3 F
Inf uence of mus on behav or, pr nc p es and pract ces of mus c therapy and psych atr c c ents Prerequisites MUE 261 Mus c Therapy ma ors only

362 Music Therapy Techniques. (3) S
Organ zat on, adm n strat on and use of mus c n rehab tation w th var ous c ent popu at ons. Prerequ s tes MUE 361 Mus c Therapy majors on y.

381 Music Therapy Research. (3) S
Statist cs and research des gn appropr ate for nvest ga tions n mus c therapy

384, 385, 386, 387, 388 Therapy Pre-Clinical I-V. (1 F, S
Pa red students w prov de mus c therapy for sma groups at a commun ty agency for mental y retarded, genatrics or phys cal y d sab ed c ents for a m n mum of ten c ock hours Prerequ s tes MUE 211 and 261.

441 Psychology of Music. (3) S
Psycho og ca and phys olog ca aspects of mus c em phas z ng mus ca behav or funct on percept on and earn ng Prerequ sites Mus c Therapy majors or approva of nstructor Jun or stand ng is requ red

475 Group Process and Music Therapy. (1) F
Princ ples of group process, verba counse ng profes s ona wr ting as re ated to music therapy pract ce Pre requ s tes: MUE 362 Mus c Therapy ma ors on y

476 Internship in Music Therapy. 1 F S
A s x month res dency in an approved c n ca nst tut on

480 Choral Music Practicum. 3 S
Methods of nstruct on organ zat on and presentat on of appropr ate content n chora mus c c asses Must be majoring n secondary educat on

481, 482 Instrumenta Music Practicum. 5 5 F S
nstrumenta mus c a a means of deve op ng mus c sk s understand ngs ano att tudes n e ementary ano secondary schoo students Must be ma or ng n econd ary ed cat on

485, 486 String Practicum. 2 2 F S
A two semester course for students prepar ng to ad m n ster a str ng program and teach str ngs at the e e mentary eve

549 Foundations of Music Education. (3 A
A treatment of h stor ca perspect ves, ph losophy aesthet cs dent f ed w th mus c educat on, and learn ng theor es app ed to mus c teach ng earn ng Bas c re search and wr t ng sk s appropr ate to graduate stud es n mus c educat on

550 Studies in Music Curricula. (3 A
Scope and sequence of mus cal exper ences Deve op ment of cr ter a for the eva uat on of mus c curricula

551 Advanced Studies in Elementary School Music. 3 A
For exper enced teachers; organ zat on and content of the genera mus c c asses n kindergarten and the first s x grades of e ementary schoo Emphas s on teach ng mus c read ng and ear tra n ng to young ch dren.

552 General Music, Music Theory and Music History Classes in the Junior and Senior High School. (3) N
Organ zat on and content of schoo mus c c asses which are not performance or ented

553 Contemporary Elementary Music. 3) F
dentif cat on and deve opment of matena s and tech n ques for teach ng spec a un ts of music study to e e mentary (K 8 ch dren

560 Teaching Contemporary Music. (3) N
Strateg es for us ng contemporary mus c w th schoo mu s c c asses and organ zat ons.

564 Instrumental Music, Advanced Rehearsal Techniques. 3 A
An n depth ana ys s of instrumental techn ques n prepa rat on for a thorough discuss on of band tun ng problems and so ut ons. D scuss on of product ve conducting and rehearsa techniques for schoo mus c teachers.

566 Instrumental Literature for Schools. (3) N
Comprehens ve study and analysis of al types of nstru menta mus c

568 Choral Music, Advanced Rehearsal Techniques. 3) A
Musical and voca techniques necessary for presenta t on of chora terature Ana ysis and exper mentat on w th psycho ogical, acoust ca and other problems of rehearsa and performance.

570 Choral Literature for Schools. (3) A
Comprehensive study and analys s of chora music for the h gh schoo with spec a emphas s on octavo l tera ture

579 Psychology of Music. (3) N
The nature of musica ty and ts eva uat on A review of recent research

585 Vocal Acoustics and Production. 3) A
An n depth approach to the psycho og ca phys o ogical work ngs of the voca mechan sm

733 Contemporary Issues and Research in Music Education. 3 S
Emphas s upon recent research re at ng to mus c instruc t on at a eve s current and h stor cal ssues n chora genera and nstrumenta mus c

744 Higher Education Instruction. 3 F
Ph osoph ca and psycho og ca pr nc p es of col ege un vers ty teach ng Patterns of mus c teacher educat on and a project on of course out nes

755 Philosophy and Aesthetics in Music Education. 3 SS
Ph osophy and aesthet cs as they nf uence curriculum content and teach ng procedures

See page 38 for special courses which may be offered by this academic unit

MUSIC HISTORY

MHL 142 Music Appreciation. 1 S
Aura percept on of a var ety of mus c trad t ons genres forms, and techn ques Prerequ s te. open to mus c majors on y

152 Jazz Listening. 1 F
An ntroduct on to azz forms d oms and major nnova tors

341, 342 Music History. 3 3 F S
Western music from the Greeks to the present day Pre requ s te MTC 221 Need not be taken n sequence

352 The Evolution of Jazz. 3 F
Or g n deve opment and sty es of jazz mus c and ts ex ponents Prerequ site MTC 223

438 Music in the Classic Era. 3 N
Development of the c ass c sty e of the 18th century major works of Haydn Mozart, and Beethoven Prerequ s tes· MHL 341, 342, MTC 327

439 Music in the 19th Century. 3 N
European art mus c after Beethoven Prerequ s tes MHL 341 342 MTC 327

441 Music of the Baroque Era. 3) N
Works of major composers and sty st c tendencies of the period Prerequ s tes MHL 341 342 MTC 327

447 Music Since 1900. 3 F SS
Survey of the works by major composers and sty st c trends Prerequ sites. MHL 341, 342 MTC 327

456 History of Opera. 3 S
The deve opment of opera from ts creat on ca 1600 to present Emphas s p aced on major sty stic deve op ments and representative works Prerequis tes MHL 341 342 MTC 222

466 North American Indian Music. 3 N
Various styles of nd an mus c the Un ted States Canada and Mex co Open to mus c majors and non majors. *[Satisfies General Stud es Requirement HU]*

532 Music Bibliography. 3 N
Major h stonca and ana yt ca wnt ngs systemat c and h stonca co ect ons of mus c Read ng know edge of a fore gn anguage recommended

535 Medieval Music. (3 N
Mus c of Europe n the M dd e Ages Gregor an chant re g ous and secu ar monophony and po yphony to 1400

536 Music of the Renaissance. 3 N
Mus c n Europe, w th emphas s on sty st c concepts and changes, c 1400 1580

544 World Music I. 3 N
Mus c of tradit ona and fo k cu tures of Afnca Europe and the Amer cas

545 World Music II. 3 N
Trad t onal, fo k and art mus c of the Pacif c Near East and Asia.

547 Topics in American Music. 3 S
Se ected top cs n the h story of mus c Composers work ng in the Amer cas w th emphas s upon mus c s nce 1900

575 History of Choral Music. 3 F
Major chora works

644 Notation of Polyphonic Music 3) N
Music notation from the 15th through 17th centur es, n c ud ng prob ems of transcr pt on nto modern notat on

See page 38 for special courses which may be of fered by this academic unit.

MUSIC THEORY AND COMPOSITION

MTC 125 Basic Music Theory. 3 F S
For mus c ma or Des gned to deve op aura and nota t ona sk l s Meets da y

221 Music Theory-18th Century. 3 F S
Mus c from the 18th century w th a v ew toward develop ng students ab t es to analyze theor ze perform and create examp es w th n the sty e. Deve opment of re ated aura v sua and keyboard sk s Prerequ site MTC 125

222 Music Theory-19th Century. 3 F, S
Mus ca compos t ons chosen from the ate 18th and 19th centur es Harmon c progress ons, me od c con struct on and rhythm c deve opments, deve opment of re ated aura v sua and keyboard sk s Prerequ s te MTC 221

223 Music Theory-20th Century. 3 F S
Representat ve 20th century compos t ons w th particu ar emphas s on those e ements of me od c harmon c and rhythm c treatment wh ch break w th past convent ons Deve opment of re ated aura v sua and keyboard sk ls Prerequ s te MTC 222

315 Modern Arranging. 2) F
Techn ques n arrang ng for the contemporary jazz rad o te ev s on and stud o orchestra. Prerequ s te MTC 223

316 Modern Arranging. 2 S
Cont nuat on of MTC 315 Prerequ s te MTC 315

317 Composition for Non-Composition Majors. 2 N
Phrase and per od structure me od c compos t on and accompan ment compos t on of sma forms. Not to be e ected by compos tion majors Prerequ s te MTC 223 May be repeated once for cred t.

320 Modal Counterpoint. 2 F
Counterpo nt based on 16th century voca poly phon c style Prerequ s te MTC 221

321 Tonal Counterpoint. 2 S
Counterpo nt based on 18th century polyphonic sty e Prerequ s te MTC 221

323 Composition. 2 F S
Creat ve wr t ng n the sma ler forms nclud ng the use of harmon c textures a d contrapunta dev ces Prerequ s te MTC 223. May be repeated for cred t

324 Survey of Jazz Styles. 2 A
Large ensemb e compos t ons and recorded mprovised so os Prerequ s te MHL 352

327 Form and Analysis I. 2 F S
Organ z ng e ements n the most mportant contrapunta and homophon c mus ca forms from the Rena ssance through the 19th century. Prerequ s te MTC 223

422 Musical Acoustics. 4 F, S
Propert es of sound and tone Harmon c ser es nstru- ments the ear aud tor um acoust cs and the reproduc t on of sound A thorough know edge of mus ca notat on, ntervals scales and harmony or two years of music the ory w be assumed

425 Studies in 20th Century Theory. 3 F
Cont nued deve opment of ana yt ca techn ques and aura sk w th an exam nat on of theoret cal systems app cab e to 20th century mus c Prerequ s te. MTC 223

428 Form and Analysis II. 2 S
Organ z ng pr nc p es of the arge forms of mus ca com pos t on n the 19th and 20th centur es Prerequ site MTC 327.

429, 430 Canon and Fugue. 2 2) N
Po yphon c stud es n form and techn que Prerequ s te. MTC 321

431 Choral Arranging. 2 S
Pract ca stud es n ed t ng and arrang ng for chora or gan zat ons Preparat on of su table mater a s for young cho rs and advanced groups Study of accompan ments Prerequ s te: MTC 223

433 Orchestration. 3 N
Theoretica and pract ca study of scor ng for orchestra nstruments n various comb nat ons rang ng from sma ensemb es to symphon c orchestra and concert band Prerequ s te MTC 223.

436 Electronic Studio Techniques. 2 F S
Pnnc p es of e ectron c mus c systems and the r app ca t ons n the compos t on and record ng of e ectron c mu s c May be repeated for cred t Cannot be used to fu f l theory requ rements on graduate degrees

441 Jazz Composition. 3 F
Creative wr t ng n the sma er forms and n the d om of jazz Prerequ s te MTC 321

495 Final Project. 0 F S
A ha f rec ta of compos t ons or approva of a arge sca e compos t on or a research paper

496 Theory Project. 3 F, S SS
Superv sed nd v dua wr t ng pro ect dea ng w th mus c theory

501 Ear Training Review. (2 SS
Me od c and harmon c d ctat on Cred t cannot be app ed toward the graduate theory requ rement

520 Advanced Analytical Techniques. 2 S, SS
Analyt ca techn ques systematica y app ed to mus c Concentrat on on structura and compos t ona proce dures

523 Advanced Composition. 2 F S
Creat ve wr t ng n the larger forms for chorus orchestra and band. May be repeated for cred t.

525 Pedagogy of Theory. 3 N
Pract ces and pr nc p es of teach ng mus c theory Em phas zes most des rab e and pract ca offerings poss ble Comparat ve stud es of ex st ng pract ces

527, 528 Evolution of Musical Theory. 3 3 F, S
Theory from Pythagoras to the present Need not be tak en n sequence

553 Advanced Choral Arranging. (2 F
Chora techn ques n compos t on and arrang ng. Voca wnt ng through ana ys s of chora works Projects in both arranging and compos t on.

554 Advanced Scoring Problems. 2) N
nstrumentat on P ay ng character st cs of each nstru ment, wr t ng and arrang ng d omat c mus c for the nstru ment Projects n both s or ng and compos t on

See page 38 for special courses which may be of fered by this academic unit

MUSIC PERFORMANCE

MUP 100 Concert Attendance. 0 F S
Requ red of a mus c majors for s x semesters in each degree program w th a m n mum of seven 7) concerts attended each semester

111, 311, 511 Studio Instruct on. 2 2 2 F S
For majors n mus c degree program P acement aud t on requ red P ano organ harps chord, vo ce harp f ute, oboe c annet saxophone, bassoon, trumpet cornet, horn euphon um guitar, trombone tuba, percuss on v o n v o a ce o contrabass. May be repeated for cred t Min mum contact of one hour p us stud o c ass weekly May not be taken for aud t

121, 321, 521 Studio Instruction. (1 1, 1) F, S SS
For secondary or m nor instrument nstruct on and non majors n the univers ty P acement exam nation and au d t on requ red. P ano organ, harps chord vo ce, harp, f ute, oboe gu tar c annet saxophone bassoon, trumpet, cornet horn, euphon um trombone tuba percuss on, vi o n v o a ce o contrabass May be repeated for cred t M n mum contact of one ha f hour per week. May not be taken for aud t

127, 327, 527 Studio Instruction. (4 4, 4 or 2) F, S
For performance majors n Bache or of and Master of Mu s c degree programs on y Placement exam nat on and aud tion requ red P ano piano accompanying organ harps chord, vo ce, harp, f ute oboe clar net gu tar, saxophone bassoon, trumpet, cornet, horn, euphon um, trombone tuba percuss on vio n v ola cel o contra bass May be repeated for credit Min mum contact of one hour plus stud'o c ass weekly May not be taken for aud t

130 Beginning Group Piano. (1) F S
Provides a bas c ntroduct on to play ng p ano through mus c read ng, chords rhythm c and wr tten activit es Non mus c majors only

131, 132, 231, 232 Class Piano. (1, 1 1 1) F, S
A four semester sequence of courses des gned for those ack ng p ano exper ence and those who need p ano as a classroom too . Emphasis on keyboard tech n que s ght read ng s mp e accompaniments and mprov sat on Two hours a week. May not be taken for audit

133, 134, 233, 234 Class Voice. (1 1, 1, 1 F, S
Open to a students nterested in the deve opment of bas c sing ng techniques. Two hours a week May not be taken for aud t

141 Jazz Fundamentals. (1) F
Pr nciples, methods, and theory of jazz performance espec a y designed for the sma jazz ensemble. Two hours per week

142 Jazz Fundamentals. 1) S
Cont nuation of MUP 141 Two hours per week

209 Beginning Choral Conducting. (1) F, S
Essent a s of chora conduct'ng techniques Two hours a week.

210 Beginning Instrumental Conducting. (1) S
Essent a s of nstrumenta conduct ng techn ques Two hours per week

211 General Conducting. (2 S
Essent a s of conduct ng chora and nstrumenta music des gned for mus c therapy and theory composit on ma jors. Three hours per week

217, 218 Improvisation Workshop. (2 2) F, S
Emphas s on bas c jazz l'erature chord symbo read ng, me odic patterns ear train ng, me od c concepts and ana ys s of mprovised so os Prerequ s tes. MTC 125 one semester of MUP 111 Must be taken in sequence. May not be taken for aud t.

235, 236 335, 336 Jazz Piano. 1 1, 1, 1) F S
A four semester sequence des gned for jazz keyboard experience Emphas s w l be on chord symbo read ng, s mp e mprov sat on and vo c ng Prerequis te. MUP 132 Two hours per week

250 Diction for Singers. (1) F S
Use of phonetics n the study of song and opera tera ture Language emphasis d ffers each semester May be repeated for cred t

301 Advanced Class Piano. (1) F
Requ red for chora and general majors Prerequ s tes MUP 232 or prof c ency. Open to other music majors who have comp eted MUP 232 Emphas s on accompan ments, ensemb e p ay ng score read ng, advanced harmon zations, reperto re technique and mprov sat on Placement examinat on requ red May not be taken for aud t. Two hours per week

302 Advanced Class Piano. 1 S
Requ red for chora and genera majors Open to other mus c majors who have comp eted MUP 301 A sequen t al continuation of MUP 301 ski s wh ch i clude both group and stud o nstruct on Prerequ s tes MUP 301 or prof c ency. P acement exam nat on required. May not be taken for aud t Two hours per week.

328 Fretboard Harmony and Pedagogy. (3 S
Appl cat on of trad tiona me odic and harmon c concepts to the f ngerboard. Method books and pedagog cal ap proaches. Prerequ site. MTC 223.

337 Studio Instruction-Piano Accompanying. 2 S
Lessons for accompany ng majors on y Reperto re to be se ected from voca and nstrumenta terature.
P acement exam nat on required. One hour esson a week May be repeated for cred't

339 Choral Conducting. (2 F S
Elements of choral conduct ng techn que and nterpreta tion. Prerequis te MUP 209 or MUP 211 Three hours a week

340 Instrumental Conducting. 2) F
Fundamenta s of score read ng and nterpretat on of n strumenta mus c. Prerequ s te MUP 210 or MUP 211 Three hours a week.

341 Jazz Pedagogy. (3) S
Tra n ng and superv sed pract ce n conduct ng jazz en sembles w th emphas s on terature programming and rehearsa techn ques Prerequ s tes MUP 210 Two c ass hours and two fie d exper ence hours each week

344 Chamber Orchestra. 1 F S
Membersh p by aud t on mportant masterp eces from a penods of mus c w be performed throughout the year May be repeated for cred t

345 Symphony Orchestra. 1 F, S
Open to a students who can qual fy on the bas s of au d tions w th the d rector Over a four year per od, the stu dent s introduced to the masterp eces of symphony or chestra terature Three times a week. May be repeated for cred t

350 Choral Union. 1 F, S
Open to al students n the Un vers ty and to nterested s ngers n the commun ty by aud t on. Preparation and performance of the arger choral works Two hours per week May be repeated for credit

352 Concert Choir. (1) F S
Membersh p chosen by aud t on. May be repeated for cred t Four hours a week

353 University Choir. 1 F, S
Membersh p chosen by audit on May be repeated for cred t Four hours a week.

355 Men's Chorus. 1 F, S
Open to a male students n the Un vers ty who can qual fy on the basis of audit ons. Rehearsa and performance of music for ma e vo ces Two hours a week May be repeated for cred t

357 Women's Chorus. (1 F, S
Membersh p chosen by audit on Two hours a week May be repeated for cred t.

361 Marching and Concert Bands. 1 F S
Open to a students who can qua fy on the bas s of au d tions w th the d rector Stag ng of format ons and dri s for footba games and other events Fa l masterp eces of symphon c band terature Spr ng Meets da y. May be repeated for credit

362 Concert Bands. 1 F
N ght rehearsa s Membersh p chosen by aud tion May be repeated for credit

370 Music Theatre: Techniques. 1 F S
Exerc ses and mprov sat ons for the s ng ng actor em phas z ng body awareness, so at ons and freedom of the voca and breath mechan sms Sect on 1 Interpreta t on Sect on 2 Express on , Sect on 3 (Movement for S ngers Each sect on Three hours per week May be repeated for cred t

371 Music Theatre: Workshops. 1 F S
Development of specif c sk s for mus ca dramatic nter pretation Sect on 1 Ro e Preparat on Section 2 Sty es Sect on 3 Opera Scenes , Sect on 4 Mus ca Comedy Sect on 5 Revue Ensemb es Each sect on. One ecture demo strat on 1 laboratory per week May be repeated for cred t

372 Music Theatre· Orchestras. 1 F S
Open to a students who can qua fy on the bas s of au d t ons w th the nstructo Part cipat on in Lyr c Opera Theatre product ons Sect on 1 Orchestra Sect on 2 Chamber Orchestra Sect on 3 (Chamber Ensemb e May be repeated for cred t

373 Music Theatre: Performance. 1 F S
Open to a students who can qua fy on the bas s of au d t ons w th the nst uctor Part c pat o n Lyr c Opera Theatre product ons Sect on 1 Princ pa Ro es Sect on 2 (Chorus May be repeated for cred t

374 Music Theatre: Product'on. 1 F, S
Part c pation n yr c Opera Theatre product ons Sect on 1 Vocal Performance). Sect on 2 Techn ca Music Theatre ; Sect on 3 Prob ems in Product on to be taken concurrently w th MUP 373, Sect on 2 May be repeated for cred t

379 Chamber Music Ensembles. 1 F S
Str ng brass woodw d percuss on keyboard voca and m xed ensemb es Prerequ s te approva of nstruc tor Tw hours a week May be repeated for cred t

382 Collegium Musicum. 1 F, S
S ngers and strumenta sts spec a z ng n the perform ance of ear y and unusua mus c Prerequ s te approva of nstructor Two hours a week May be repeated for cred t

383 New Music Ensemble. 1 F, S
Rehearsa and performance of mus c wntten n the ast 20 years Prerequ s te. approva of instructor. May be re peated for cred t

384 Brass Choir. 1 F S
Spec a z ng in pub c performance of mus c wr tten for brass nstruments Prerequis te approva of nstructor. Three hours a week May be repeated for cred t

385 Percussion Ensemble. 1 F, S
Rehearsa and performance of standard and or gina re perto re for the percuss on ensemb e and re ated nstru ments. Membersh p by approva of the nstructor Two hours a week May be repeated for cred t

386 Stage Band. 1 F S
Rehearsa and performance of l terature for the stage band Membersh p by approva of the nstructor. Four hours a week May be repeated for credit

388 Piano Accompanying. (1 F, S
Accompany ng majors (others at the d scretion of nstruc tor) P ano accompan ments found n voca and nstru menta terature d scuss on of sty es and performance pract ces exper ence 'n pub i performance May be repeated for cred t Two hours a week

417, 418 Advanced Improvisation. 2 2 F S
Emphas s on ana ysis and performance of advanced azz terature, compos t on n contemporary sty es Pre requ s tes MUP 218 Must be taken n sequence May not be taken for aud t

440 Keyboard Harmony. 1 F
Performance or ented c ass emphas'z ng chord progres sions harmon zat on, f gured bass rea zat on sty st c mprov sation transpos t on, open score read ng and s ght read ng Keyboard majors on y or approva of n structor

451 Repertoire. 2 F S
L terature ava ab e for performance 'n a perform ng med a. Prerequis te jun or stand g n major performance fie d. May be repeated for cred t

452 Piano Repertoire II. 2 S
Cont nuat on of MUP 451 Piano Romantic and con temporary keyboard terature Prerequ s tes· jun or stand ng as p ano major; approva of nstructor

453 Song Literature. 2) A
Amer can Russ an Span sh, Scandinav an and contem porary song.

454 Song Literature. 2 A
Ear y ta an, Eng ish German and French art song

481 Performance Pedagogy and Materials. 2 F S
Pr nc p es and methods of performance techniques for each performance field Prerequ s te sen or stand ng or approva of nstructor May be repeated for credit

482 Piano Pedagogy II. (2) N
Cont nuation of MUP 481 P ano Prob ems and tech n ques of teach ng intermed ate to advanced p ano stu dents Prerequ s tes: jun or stand ng as p ano major ap proval of nstructor

487 Piano Accompanying. 1 F
Keyboard majors P ano accompan ments found n voca and nstrumenta terature, d scussion of sty es and per formance practices experience n pub c performance May be repeated for cred t Two hours per week. May not be taken for aud t

495 Solo Performance. 0) F S
For Bache or of Mus c degree cand dates where one ha f recita s a graduation requirement

496 Solo Performance. 0 F S
For Bache or of Mus c n Performance degree candi- dates where a fu rec ta s a graduat'on requirement Prerequ s te MUP 495

507 Group Piano Practicum. 2 F
Curncu a, matena s teach ng techn ques for group teach ng at the un versity and commun ty co ege eve s Observat on supervised teaching n group p ano

508 Studio Observation. 1 F, S
Week y observat on of stud o teach ng by various p ano facu ty Paper as f nal requ rement M M. Performance Pedagogy p ano students on y

540 Advanced Conducting. 3 F
Score preparat on and conduct ng techn ques for stru mental mus c Concentrat o on study of h stor ca ty es Requ red of D M A students n I strumenta Mus c

541 The Art Song. 3 N
Solo song from ts beg nning to the present day.

544 Chamber Orchestra. 1) F S
Membe sh p by aud t on. Important masterp eces from al periods of mus c w be performed throughout the year May be repeated for cred t.

545 Symphony Orchestra. 1 F S
Open on the bas s of aud t on w th the d rector. Master p eces of symphony orchestra terature Three t mes a week. May be repeated for cred t

550 Choral Union. 1 F S
Open to a students n the Un vers ty and to nterested s ngers n the community by aud t on Preparat on and performance of the larger chora works Two hours per week May be repeated for cred t

551 Repertoire. 2 N
L terature avai ab e for performance n a perform ng med a. May be repeated for cred t.

552 Concert Choir. 1 F, S
Membersh p chosen by aud tion May be repeated for credit. Four hours a week

553 University Choir. (1) F S
Membersh p chosen by aud tion. May be repeated for cred t Four hours a week

555 Men's Chorus. (1 F, S
Open to ma e students n the Un versity who can qua fy on the bas s of aud tion Rehearsal and performance of mus c for male vo ces Two hours a week May be re peated for cred t

557 Women's Chorus. (1) F, S
Membersh p chosen by aud t on. Two hours a week May be repeated for credit

561 Marching and Concert Bands. (1 F S
Open by audit on on y. Staging of format ons and dn s for footba games and other events (Fa l); masterp eces of symphon c band terature (Spring). Meets da ly May be repeated for cred t

562 Concert Bands. (1 F S
Membership chosen by audit on (Fa) May be repeated for credit

570 Music Theatre: Techniques. (1 F S
Exerc ses and 'mprov sat ons for the sing ng actor em phas z ng body awareness so ations and freedom of the voca and breath mechan sms Section 1 (nterpreta t on · Sect on 2 Express on), Sect on 3 (Movement for S ngers Each Sect on Three hours per week May be repeated for cred t

571 Music Theatre: Workshops. (1) F S
Deve opment of spec f c ski s for the musica -dramatic nterpretation Section 1 Ro e Preparat on Section 2 Sty es); Sect on 3 Opera Scenes)· Sect on 4 Mus ca Comedy); Sect on 5 Revue Ensembles . Each section: one ecture demonstration 1 laboratory per week May be repeated for cred t

572 Music Theatre: Orchestras. 1 F, S
Open to a students who can qua fy on the bas s of aud t ons w th the nstructor Part c pat on n Lyric Opera Theatre product ons Section 1 Orchestra), Sect on 2 Chamber Orchestra) Sect on 3 (Chamber Ensemb e May be repeated for credit

573 Music Theatre: Performance. (1 F S
Open to a students who can qua fy on the basis of au d t ons w'th the nstructor Part c pation n Lyric Opera *Theatre productions Sect on 1 Princ pa Ro es Sect on* 2 Chorus . May be repeated for cred t

574 Music Theatre: Production. (1 F S
Part c pat on n Lyric Opera Theatre product ons Sect on 1 Voca Performance); Section 2 Techn cal Mus c Theatre) Sect on 3 Prob ems 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. Prerequisite: approval of instructor. Two hours a week. May be repeated for credit.

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. Prerequisite: approval of instructor. Two hours a week. May be repeated for credit.

583 New Music Ensemble. (1) F, S
Rehearsal and performance of music written in the last 20 years. Prerequisite: approval of instructor. May be repeated for credit.

584 Brass Choir. (1) F, S
Public performance of music written for brass instruments. Prerequisite: approval of instructor. Two hours a week. May be repeated for credit.

585 Percussion Ensemble. (1) F, S
Rehearsal and performance of standard and original repertoire for the percussion ensemble and related instruments. Membership by approval of the instructor. Two hours a week. May be repeated for credit.

586 Stage Band. (1) F, S
Rehearsal and performance of literature for the stage band. Membership by approval of the instructor. Four hours a week. May be repeated for credit.

588 Piano Accompanying. (1) F, S
Piano accompanying majors (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. May be repeated for credit. Two hours per week.

595, 596 Solo Performance. (1,1) F, S
For Master of Music candidates in applied music only. May be full recital, major operatic role, solo performance with orchestra, or an ensemble or lecture recital.

727 Studio Instruction. (4 or 2) F, S
For D.M.A. candidates only. May be repeated for credit. Miminum contact of one hour per week.

796 Solo Performance. (1-5) F, S
For D.M.A. candidates only. May be repeated for credit.

See page 38 for special courses which may be offered by this academic unit.

Department of Theatre

PROFESSORS:
WRIGHT (GHALL 232), AKINS, DOBKIN, DOYLE, WITT, YEATER

ASSOCIATE PROFESSORS:
BARTZ, ENGEL, SALDAÑA, THOMSON, VINING

ASSISTANT PROFESSORS:
BARKER, RISKE, STARK

VISITING LECTURER:
GRANGER

VISITING INSTRUCTOR:
MORRIS

ADJUNCT FACULTY
ALLEN

Departmental Major Requirements

For advisement purposes, all students registering in a Theatre degree program will enroll through the College of Fine Arts. Special advisement check sheets, providing complete information regarding requirements and suggested electives, are available in the Department of Theatre office for each degree program and area of concentration.

Bachelor of Arts Degree Curriculum

Theatre–Consists of a minimum of 45 semester hours and a maximum of 60 semester hours. Within the major (including related area studies considered part of the major), only courses with a grade of "C" or higher may be applied toward graduation. The following core of course work in Theatre is required: THE 100, 225, 320, 321; THP 101, 213, 315, 330, 340, 345; at least two hours credit in THP 301, chosen from different production options; and at least three hours credit in THE 325. Theatre electives, chosen in consultation with an advisor, may be concentrated in one area of Theatre specialization or selected to provide a balanced general program. Up to 15 hours of approved course work in a related area or areas may be included in the major.

General Studies–A minimum of 54 semester hours. See pages 319-320 for approved areas of study and distribution of hours as required by the College of Fine Arts (exception: only upper-division courses in Foreign Languages may be used in fulfillment of the Humanities requirement).

Foreign Language Requirement Knowledge of one foreign language equivalent to the com pletion of two years study at the college level is required. For specific courses, see Foreign Language Department. Courses taken to satisfy the foreign language requirement may be cross listed as General Studies electives.

Bachelor of Fine Arts Degree Curriculum

Consists of 84 hours in Theatre (including ap proved related area studies considered part of the major . On the basis of persona interests and professional object ves, the student may se lect one of two curriculum options: Theatre Education or Performance/Production with an emphasis in acting, child drama, or des gn tech nology Candidates for the B F.A. degree must take the last 60 hours of course work in resi dence at ASU. Retention in the B.F A program will be determined by annual faculty review of al candidates for the degree, the review process will include consideration of the student s aca demic record, professional activities and growth, and artistic potential. A minimum of 42 hours in General Studies is required. See pages 319 320 for approved areas of study and distribution of hours as requ red by the College of Fine Arts. Some ad ustments are made in the Theatre Education option in order to meet certi fication requirements. Admission procedures and Theatre course requirements for each curricu lum option/emphasis follow.

Performance Production

Acting Students should declare an acting empha sis at the time of admission. Retention in the emphasis will be determined by audit on during the spring semester of freshman and sophomore years. Auditions fo advanced placement of transfer students and for scholarsh p applicants will be held only in spring and in late summer. Specific dates n ay be obtained from the Theatre Office The following courses are required: THE 100, 4 320, 321 325 (3 hrs.); THP 103, 104 107, 0, 13, 200, 203, 204, 207, 210, 2 3, 301 (hrs.), 30 , 310, 315, 370, 37 , 375, 376, 110, 470, 47 , 475 476, ad 498 Sen ior Pro ect); 9 hours of theatre history and liter ature; and graduation requirements selected in consultation with a B F A advisor.

Child Drama Acceptance n th s emphasis is by interview only (or submission of three etters of recommendation and a letter of intent if dis tance prohibits coming to campus), and with the approval of the faculty of the Department of Theatre. Application will normally be made at the end of the sophomore year, applications for early admission of ASU freshmen will be accepted toward the end of the second semester of full time study. Retention in this emphasis is determined at the end of each semester of the junior year. The following Theatre and Profes sional courses are required: THE 100, 320, 321, 325 (3 hrs.); THP 101, 113, 213, 311, 312, 315, 318, 330, 340, 345, 411, 418, EED 313, LIS 410. Two hours credit in THP 301 chosen from different production options; three hours of the atre history or literature; and theatre and re lated area electives selected in consultation with an advisor to complete the major require ment of 84 hours.

Design Technology Acceptance in this empha sis s by interview and portfolio review. Reten tion in the emphasis is determined at the end of each semester of the junior year. The following Theatre courses are required: THE 100, 320, 321, 325 (3 hrs.); THP 101, 213, 315, 330, 340, 345, 406, 431, 435, 440, 445, 499 (Senior Proj ect), three hours of theatre history or litera ture; and theatre related area electives selected in consultation with a B.F.A. advisor, to com plete the major requirement of 84 hours.

Theatre Education Acceptance in this option is by interview only or submission of three letters of recommendation and a letter of intent if distance prohibits coming to campus), and with the approval of the faculty of the Depart ment of Theatre. Application will normally be made at the end of the sophomore year; applica tions for early admission of ASU freshmen will be accepted toward the end of the second semester of full time study The student will also be required to meet admission standards mandated by the ASU College of Education and the Arizona Department of Education for teach er certification see page 205 .

The following Theatre Professional courses are required: THE 100, 320, 321, 325 (3 hrs.), 480; THP 101, 110, 112, 213, 270, 275, 311, 315, 330, 340, 345, 4 1, 415, 498 (Production Practicum); a minimum of two hours credit in THP 301, Summer High School Theatre Work shop; and all course/test requirements in Pro fessional Education as established by the Col lege of Education to complete the major require ments of 84 hours. For retention in the Theatre Education option a grade point average of 3.00 in the major and professional courses, and a 2.50 in graduate requirements course work in addition to an annual review is required.

Departmental Minor Teaching Field Requirements

Elementary Education Major: Minor in Theatre–Consists of 27 semester hours, includ ing: THE 100, THP 101, 213, 311, 312, 318, 411 and 418; plus one additional course in tech nical theatre

Secondary Education Major: Minor in Theatre–Consists of 24 semester hours, includ ing: THE 100, 480, THP 101, 213, 311, 315, 415 and one additional course in technical thea- tre.

Department Graduate Programs

The Department of Theatre offers programs leading to the degree of Master of Arts in Thea tre and the Master of F ne Arts in Child Drama. Consult the *Graduate Catalog* for re quirements.

THEATRE

General Stud es in Theatre
History Literature, and Theory

THE 100 Introduction to Theatre. 3) F, S
Elements and pr nc p es of the theatre Lecture and dis cuss on. *[Satisfies General Studies Requirement HU]*

225 Orientation to Theatre. (1) F
Orientat on to univers ty and department resources and procedures Career plann ng and gu dance. Research and wnting related to theatre product on Requ red for B A Theatre majors

300 Film: The Creative Process. (3 F, S SS
Elements of the theatrical f m· cinematography, sound ed ting d recting, acting, scriptwnt ng, producing and cntic sm Three ectures, 2 hours laboratory *[Satisfies General Studies Requirement HU]*

313 Theatre Design. (3) S
Survey of modern theatre des gn/techno ogy pr nc p es and e ements ntended for non majors and BFA acting students Prerequ s te THP 213

320, 321 History of the Theatre. (3 3) F S
F rst semester traces major deve opments n theatre product on from ts beg nn ng through the 17th century· second semester cont nues the survey to modern t mes. *[Satisfies General Stud es Requirements HU, H]*

325 Play Reading. 1) F S, SS
Assigned ndependent read ng programs of p ays most frequent y inc uded n the modern repertory. May be re peated for cred t n d fferent sections. Majors on y. Areas of emphas s.
a) Modern European
b) Modern Eng sh and Irish
(c) Modern Amer can
d) P ays for H gh Schoo Product on
Theatre Educat on Majors and Ch ld Drama Majors On y *[Satisfies General Studies Requirement HU]*

400 Focus on Film. 1 F S SS
Intensive study of a part cu ar f m d rector actor genre or other f m top c May be repeated for cred t Prerequ site THE 300 or ENG 360 or approval of instructor *[Sat isfies General Studies Requ rement HU]*

420 History of the American Theatre. 3 S
H story of the p ays, art sts and events n the deve op ment of Amer can theatre from co on a to modern t mes *[Sat sf es Genera Stud es Requ rements HU H]*

421 History of the English Theatre. 3 F
H tory of the p ays, art sts and eve ts n the deve op ment of the theatre n Eng and s nce the Restorat on *[Sat sf es Genera Stud es Requirements HU H]*

425 History of the Oriental Theatre. 3 N
H story and product on techn ques of theatre forms n nd a Ch a and Japan Prerequ s te s x hours of the atre h story or approva of nstructor

480 Methods of Teaching Theatre. 3) F
Methods of drama and theatre nstruct on at the sec ondary schoo eve Prerequ s te. acceptance to the Profess ona Teacher Preparat on Program

500 Research Methods. 3 F
ntroduction to graduate study n theatre

504 Studies in Dramatic Structure and Criticism. (3 F
Structura princ ples and cnt ca theory from the c ass ca penod to the present re ated read ngs n dramat c terature

510 Studies in Literature. 1 F S
Ass gned ndividual read ng programs n standard sources and masterp eces in theatre terature May be repeated for cred t n d fferent sect ons Top cs may·be se ected from the fo ow ng·
(a) Act ng D rect ng c H story
(b) Des gn Techn ca (d Cr t c sm

520, 521 Theatre History and Literature. 3 3 F S
A survey of histor ca per ods, dramat c genres and theatre terature THE 520. Beg nning 17th Century, THE 521 17th Century Present

591 Seminar. 3) A
Se ected top cs 'n ch d drama commun ty theatre and theatre h story Prerequ s te wntten approva of nstruc tor.

See page 38 for special courses which may be of fered by this academic unit.

THEATRE PERFORMANCE AND PRODUCTION

THP 101 Introduction to the Art of Acting. (3 F S SS
Lectures exerc ses and pro ects in act ng Spec a sec t ons prov ded for the nonmajor and theatre students who p an no add t ona act ng courses

103, 104 Voice Movement for the Stage I, II. 2 2 F, S
An ntroduct on to stage speech and movement tech n ques for the profess ona actor Second semester s a cont nuat on of sk deve opment Prerequ s te BFA Act ng Ma ors

107 Acting: Beginning Techniques. 3 F
An ntroduct on to the work processes and term no ogy of the profess ona actor, preparatory to further study Lectures, exerc ses and pro ects Prerequ s tes. BFA Act ng Majors

110 Acting: Beginning Scene Study. 3 F S
Rehearsa and performance of modern p ays w th em phasis on rea st c act ng sty es S x hours a week n c ud ng aboratory rehearsa per od Prerequ sites THP 101 or 107 and or wr tten approva of nstructor Spr ng semester mited to BFA Act ng Majors

113 Makeup. 3 F S
Techn ques of theatr ca make up One hour lecture 2 hours aboratory

200 Actor's Workshop. 0 F, S
Attendance at a var ety of guest ectures and perform ances, demonstrat ons of new techn ques and ind v dua act ng projects Requ red of a BFA Act ng Ma ors for s x semesters

203, 204 Voice Movement for the Stage III, IV. 2 2 F, S
The deve opment of ncreased phys ca f ex b ty voca power and variety for the profess ona actor. Second se mester is a cont nuat on of sk deve opment. Prerequ s tes THP 104 BFA Act ng Majors

207 Acting: Intermediate Scene Study. 3 F S
Rehearsa and performance of modern rea stic and non rea st c p ays Emphas s on scene structure character ana ys s and actor to actor re at onsh ps S x hours a week nc ud ng aboratory rehearsa per od Prerequi s tes. THP 110 and or wr tten approva of nstructor Fal semester m ted to BFA Act ng Majors

210 Acting: TV Film. 3 S
Spec a techn ca aspects of act ng before a camera THP 207 BFA Act ng Major or wr tten approva of n structor

213 Introduction to Technical Theatre. 3 F, S
Procedures of techn ca theatre product on and demon strat on Top cs nc ude des gn and construct on of scenery, light ng and propert es Two hours ecture; 3 hours laboratory

270 Introduction to Stage Speech. (3) A
Exerc ses and techn ques to free the voice and improve projection, resonance, and art culat on. Internationa Phonet c Alphabet and Standard Stage Speech covered Prerequisites THP 101 or approva of nstructor, non BFA acting majors on y

275 Introduction to Stage Movement. (3) A
Movement vocabu ary and phys ca tra n ng n relaxat on, alignment, cond t on ng rhythm and po se Prerequ sites THP 101 or approva of nstructor, non act ng majors on y

294 Special Topics. (1 4 A
(a) Act ng Techn ques.

301 Theatre Production. 1 4) F S, SS
Part c pat on n Un vers ty Theatre product ons Prerequi site wr tten approva of nstructor. May be repeated for credit

307 Acting: The Inner Process. 3) F
An advanced c ass for nd v dua ized work on concentra t on, persona zat on se f awareness, visua zation subst tut on, creat ng nner and outer characters. Exer cises, mono ogues and scenes Prerequ s tes THP 207, 210 BFA Act ng Major or wntten approva of nstructor

310 Acting: Advanced Scene Study. 3 S
Scr pt ana ys s and performance of modern c assics Prerequ sites THP 207 307 BFA Act ng Major or wnt ten approva of nstructor Six hours a week.

311 Creative Drama. 3 F, S SS
Theories procedures and materia s for creat ve drama in the elementary and jun or h gh schoo s Re ated drama act v t es storyte ng and chora speak ng Not open to freshmen

312 Puppetry With Children. 3 F
Construct on and man pu at on of puppets pract ce n performance sk s Emphas s on educat ona and recrea t ona uses of puppetry by and w th ch dren Prerequ s te junior stand ng or above requ red.

315 Directing: Theatre Techniques. (3) F S
Bas c too s of the d rector compos t on b ock ng, floor p ans, stage bus ness audit ons rehearsa techniques, etc Prerequ s te THP 101 213 or wntten approva of in structor.

318 Theatre for Children. (3) F
Dramat c l terature for ch ldren Experience in act ng d rect ng and product on techn ques for chi d aud ences. Prerequ s tes wr tten approval of nstructor, not open to freshmen

330 Introduction to Costuming. (3 F, S
H story of theatrica costume Laboratory experience n construct on of costumes Three lectures, 2 hours abo ratory

340 Scene Design. (3) F, S
Stud o projects n des gn ng rea st c scenery for the con temporary proscen um stage Prerequis te: THP 213 or approval of instructor.

345 Lighting Design. (3) F, S
Princ ples of modern stage ght ng Two lectures, 2 hours aboratory Prerequisite THP 213 or approval of nstructor.

370, 371 Voice for the Stage V, VI. (2, 2) F, S
Exerc ses to develop voca f exibility and power mastery of standard speech and phonet c alphabet, ntroduct on to d a ects Second semester continues ski develop- ment Prerequ s tes: THP 204, BFA Acting Major or wnt ten approva of nstructor.

375, 376 Movement for the Stage V, VI. (2, 2) F S
Tra n ng for a strong, we al gned, flexib e, expressive body Tumbl ng, m me jugg ng, combat, characterization Second semester is a continuation of ski l development. Prerequ s tes THP 204, BFA Act ng Major or wntten ap- proval of instructor Four hours a week

394 Special Topics. (1-4) A
Intermediate Act ng Techniques.

401 Theatre Practicum. (1 3) F, S, SS
Performance and product on assignments for advanced students of act ng, technical product on, and des gn Prerequ s te BFA students on y May be repeated for credit

406 Scenography. (3) N
Concepts of total design direct on. Production analys s and des gn ncorporat ng a l major visual e ements n clud ng scenery, ght ng, costumes and makeup Pre requ sites. THP 330, 340, 345, sen or stand ng and/or consent of nstructor.

410 Acting: Classical Styles. (3) A
Rehearsa and performance of period, classical and non rea stic p ays Emphasis on de very of poetic anguage. Prerequ s tes THP 310, BFA Act ng Major or wntten approva of nstructor

411 Advanced Studies in Creative Drama (3) S
App cat on of theories, techn ques, and materia s for dramat zat on Regu ar part cipation with chi dren Pre requ site THP 311 or approva of instructor.

415 Directing Workshop. 3) F, S
Rehearsa and performance of scenes and short plays May not be taken concurrent y with THP 110 Prerequ sites· THP 315 and or wntten approval of the nstructor

417 Stage Management. 3) F, S
Read ngs n stage management and partic pation as a stage manager n a Univers ty Theatre product on Pre requisite wr tten approva of nstructor

418 Advanced Studies in Theatre for Children. (3) F
Concentration on spec f c d rect ng and produc ng tech n ques n theatre for young audiences Pract ca experi

ence n directng scenes from p ays Prerequ s te· THP 318.

430 Costume Design. (3 N
Pr nc p es of costume des gn, with projects n both mod ern and per od styles Prerequ s te THP 330.

431 Costume Construction. 3 A
Uses of mater a s and techn ques for stage costumes w th actua construct on of period appare Prerequ s te· THP 330

435 Advanced Technical Theatre. 3 N
Select on of mater a s, draft ng of work ng draw ngs too *operation, and construct on techn ques Two ectures* 2 hours aboratory Prerequ s tes THP 213 340 345 and approva of nstructor

440 Advanced Scene Design. 3) A
Advanced stud o pro ects n des gn ng nonrea ist c scenery for a var ety of stage forms Prerequ s te THP 340 or approva of structor.

441 Scene Painting. (3 A
Stud o projects n pa nt ng stage scenery Prerequ s te THP 340 or approval of instr ctor

445 Advanced Lighting Design. 3 N
Spec a zed techn ques n stage ght ng Two ectures 2 hours aboratory Prerequ s te THP 345 or approva of nstructor

450, 451 Theatre Organizat on and Management. 3, 3 F, S
Box off ce pub c ty product on budget ng and house management procedures Second semester nc udes study of organ zat ona structure phys ca fac t es and f nanc al p ann ng for theatre compan es at an adm n stra t ve eve

460 Dramatic Composition for the Stage and Screen. 3 A
Fundamenta s of and pract ce n wr t ng for the theatre the mot on p cture and te ev s on Prerequ s te wr tten approva of nstructor

461 Playwrights Workshop. 3 F, S
Staged readings and d scuss on of comp eted works and works n progress by advanced students of p aywr t ng Prerequ te THP 460 o wr tten approva of nstructor May be repeated for cred t

470, 471 Voice for the Stage VII, VIII. 2, 2 F S
Voca techn q e and anguage sk s for the c a s ca and non rea st c theatre Second semester nc udes ad vanced d a ects and requ res kn w edge of nternat ona Phonet c A phabet Prerequ s tes THP 371 BFA Act ng Major r wr tten approva f nstruct r

475, 476 Movement for the Stage VII, VIII 2 2 F, S
Movement techn ques for the ass ca and non rea st c theatre Seco d seme ter s a cont nuat on of sk deve opment Prerequ s tes THP 376 BFA A t ng Ma o or wr tten approva of nstructor

494 Spec al Topics. 1 4 A
Top cs may be e ected fr m t e fo ow ng·
- a Advanced Act ng ech ques
- b Curr cu um and Superv s on of Ch d Drama n the Schoo
- c Puppetry n Performance
- d Storyte ng
- e Advanced Scene Pa t ng
- f Costume Des gn
- g Draft ng for Theatre
- h L ght ng Des gn I I
- (r Techn ca Theatre I
- (j Propert es and Dress ngs Des gn and Construction
- k Rendenng
- l Scene Design II
- (m Video and ndustr a Scene Design

498 Pro-Seminar. 1 7 A
Top cs may be se ected from the fo ow ng w th written approva of instructor.
- a Sen or Project. Acting
- (b Ch dren s Theatre Tour
- c Theatre n Educat on

506 Scenography. 3 N
Concepts of total des gn d rection Product on ana ysis and des gn ncorporat ng a major v sual e ements nc ud- ng scenery ght ng, costume and makeup Prerequi s tes THP 330 340 345 sen or stand ng and or consent of nstructor

511 Creative Drama Workshop. 3 A
Read ngs n textua mater a s for creat ve drama, a terna t ve methods and matenals for drama w th ch dren and spec a popu at ns, practicum nc uded Prerequ s tes: THP 311 and/or approva of nstructor

512 Puppetry Workshop. 3 F
Survey of puppetry n educat on puppetry as an art form des gn and performance

515 Problems in Directing. 3 A
Ana ys s of common direct ng problems Top cs nc ude creat ng the ensemb e conceptua unity metaphor non tera strateg es organ zationa respons b ties of the di rector Prerequ s tes THP 215 315 415 and/or approva of the nstructor.

518 Directing Practicum. 4 A
A study of recent product on pract ces and pract ca ex per ence n d rect ng and produc g an ent re p ay or mu s ca fo young aud ences Prerequ s tes THP 318 418 p us approva of nstructor

584 Internship. 1 3 A
F e d research and on s te tra n ng n ch d drama, com mun ty theatre and product on techn ques. Prerequis te wr tten approva of nstructor

594 Conference and Workshop in Child Drama. 3) A
Prerequ s te appr va of nstructor

611 Creative Drama Seminar 3 A
Exam nat on of current theory and pract ces n the f e d Prerequ s tes THP 311 511 p us approva of nstructor

618 Directing Practicum. 2 A
Pract ca experience n d rect ng and produc ng an ent re play or mus ca for young a d ences Prerequ s tes THP 518 and approva of nstructor

684 Internship. 3 6 F S
F e d e ea ch n c eat ve drama ch dren s theatre, puppetry and s enography Prerequ s te approva of nstructor

See page 38 for special courses which may be offered by this academic unit

College of Law

Paul Bender, LL.B.
Dean

Purpose

The prime function of the College of Law is to *train men and women for the practicing legal* profession and related professional assignments. In addition, the College has the responsibility to contribute to the quality of justice administered in our society.

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. Graduates enter many branches of the legal profession as well as careers in government, business, finance, industry and education.

To fulfill the requirements for a J.D. degree, a student must satisfy all of the following: (1) Admission to the College as a candidate for the degree and satisfaction of any conditions imposed at the time of admission or prior to graduation during the law course. (2 Satisfaction of residency requirements for the College of Law. (3) Successful completion of a minimum of 87 hours of academic credit of which 60* must be graded with a cumulative weighted average of 70 or better and no more than eight credit hours of D (60 69) grade work after the first year can be applied toward the 87 hours. (4) Completion of all required College courses (5) Completion of the degree requirements within five years of entry into law school. (6) Completion of one substantial paper

Except in the case of a transfer student, a student must be in residence at the College as a full time student for a minimum of six semesters or their equivalent. A semester in residence is earned where a student has been enrolled in a minimum of ten hours of course work. A transfer student must complete the work of at least three semesters in the College immediately preceding the granting of a degree.

The College of Law and the Department of Economics offer a joint degree program in which participating students can earn the J.D. degree and an M.S. in Economics, usually in three and one half years of study. Additional information about the program is available from the Department of Economics or the College of Law.

Admissions

First year students are admitted only for the fall semester. The formal requirements for admission to the College of Law are: (1) An undergraduate degree from an accredited four year college or university (B.S., B.A., or equivalent). (2) A score on the Law School Admission Test (administered by the Law School Admissions Services, Box 2000, Newtown, PA 18940, in centers throughout the country).

To be assured of consideration completed applications, college transcripts on all completed course work, the Law School Data Assembly Service Report and the Law School Admission Test score, including a typed two page personal statement should be received by the College of Law no later than March 1.

Each year many more students apply than can be accepted. The College of Law receives about eight applications for each of the 150 places to be filled in the entering class. Accordingly, the admission process is selective. An attempt is made to identify those applicants whose

* Students who wish to be eligible for membership in the Order of the Coif, an honor society open to the top 10% of each graduating class, must complete at least 75% (66 hours of their law studies in graded classes.

credentials evidence abilities to think clearly, read and synthesize complicated materials, write well and make a significant contribution to the educational program of the law school.

Two main factors considered in the admissions process are the cumulative undergraduate grade point average (GPA) and the LSAT score. In combination, these give a starting point for detailed examination of the file When the combination of these two items is high, the likelihood of admission is also high.

The selection process is often not strictly mathematical since other matters often bear upon the validity of the GPA or LSAT and the capability of the candidate. Therefore, the College of Law, through an Admissions Committee comprised of faculty and student members, may review such factors as an improved grade trend, the college or university attended, course selection patterns, the rigor of the academic program undertaken, distribution of college grades, a change in performance after an absence from college, unusual writing ability as evidenced by publication, a unique cultural background, performance despite educational or economical disadvantage, employment experience, graduate study, significant community/collegiate activities and Arizona residency.

Affirmative Action. The College of Law has an affirmative action admission policy, and applications from members of minority groups are encouraged. Under the program, special consideration is given in admissions and financial aid decisions to qualified members of cultural, ethnic or racial groups who have not had a fair opportunity to develop their potential for academic achievement, who lack adequate representation within the legal profession, and who would not otherwise be meaningfully represented in the entering class. Groups usually qualifying have been Blacks, Native Americans and Chicanos.

Course of Study

The program of study in the College of Law is designed for full time students. In the first year of the three-year program, the course of study is prescribed and incorporates the time proven techniques of legal education. This first year gives the student by the 'case method," by the 'problem method,' by 'moot court and through other techniques an intensive exposure to the basic legal processes.

As a part of the program, each first year student is assigned to a small section. Also, in the Legal Research and Writing program, first year students prepare legal briefs and memoranda and receive feedback through the use of practice examinations The focus of the program is on the development of writing and organizational skills necessary for success in law school and the practice of law. The second and third years contain a wide range of courses varying in format as well as subject matter, allowing students to pursue both the basic subjects of law study as well as more specialized interests. By offering the student great freedom in the selection of subjects, the educational experience is in sharp contrast to the curriculum of the first year. In addition, the College has a number of faculty-supervised clinical education programs and a program of supervised externships.

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.

Grading

College of Law courses are graded under the following numerical scale:

99 90 A, Distinction
89 80 B, Excellent
79 70 C, Good
69-60 D, Deficient
59 50 F, Failure

A grade of 60 or above is required to receive credit for any course.

Most limited enrollment courses are taken for credit without a numerical grade. Students are limited in the number of credits which may be taken without a numerical grade, having to complete 60 hours of numerically graded courses. In non numerically graded classes performance below 70 is so recorded.

Retention Standards. To be eligible to continue in the law school, a student must maintain a cumulative weighted average of 70 or better at the end of each semester, or summer session. However, any student whose average for the first semester of the first year falls below 70 is placed on probation, except that an average below 65 disqualifies such a student from

further attendance. Any student who fails to achieve a 70 average in any one semester, regard less of cumulative average, is automatically placed on probation. Continuation of enroll ment by probationary students shall be upon such terms and conditions as the College may impose.

A student whose cumulative average falls below the required level or whose semester average is less than 70 in the consecutive semes ters will be dismissed but may apply to the Office of the Dean for readmission. The Office of the Dean shall refer the application to a fac ulty Committee on Readmission. Where the academic average deficiency is slight and evi dence of extenuating circumstances is convinc ing, readmission may be granted on a probation ary status after a review of the reasons contrib uting to unsatisfactory performance and a find ing that there is substantial prospect for accept able academic performance. Continuation in school thereafter may be conditional on achiev ing a level of performance higher than the over all 70 average.

Special Honors at Graduation. At the time of graduation, students with academic distinc tion in the study of law may be awarded the re spective designations cum laude, magna cum laude and summa cum laude The College also bestows membership in the Order of the Coif upon students in the top 10% of the class. Re cipients of these awards are selected by the Law Faculty on the basis of academic performance.

Law Building and Law Library

The John S. Armstrong Law Building is in the central campus near other colleges of the Uni versity and the Hayden Library. The Law Build ing provides every modern facility for legal edu cation and has been described by experts on planning law buildings as setting a new stan dard in functional design.

With an 'open stack' policy of accessibility to all law students and a rated seating capacity of three fourths of the total student body, the Law Library contains a substantial collection of law and law related books. The modern facility has shelf capacity for approximately 200,000 volumes. The goal is to make the Arizona State University Law Library one of the most out standing in the country.

Center for the Study of Law, Science and Technology

The Board of Regents has recently established a Center for the Study of Law, Science and Tech nology to be operated by the College of Law.

Accreditation

The College is fully accredited by the American Bar Association and by the Association of American Law Schools.

Information

Further detailed information concerning the course of study, admission practices, expense and financial assistance will be found in the Bul letin of the College of Law. Requests for the Bulletin and for application forms shou d be addressed to the Admissions Office, College of Law, Arizona State University, Tempe, AZ 85287

Law

PROFESSORS:
BENDER (AH 102D), ALTMAN, ARTERIAN FURNISH, BARTELS, BERCH, BROWN, CALLEROS, ELLMAN FURNISH, GUERIN, KADER KARJALA, KAYE, LESHY LOWENTHAL, MATHESON, MISNER, MORGAN, MORRIS, PULASKI, ROSE, SCHROEDER SPRITZER STANTON

ASSOCIATE PROFESSORS:
AIKEN HALL TESON, WE NSTEIN WINER

CLINICAL PROFESSORS:
DALLYN, WEEKS

DIRECTOR:
LEGAL RESEARCH & WRITING AND ACADEM C SUPPORT GROUP, R. BERCH

LAW 515 Contracts I. 3) F
Contract doctrines and the r ro e n the jud c a process. Judic a doctr nes and, where app cab e, the Un form Commercia Code are stud ed n the context of contracts cover ng emp oyment persona and fam ly arrangements bu id ng and construction, the sa e of goods oans, assignment of wages and accounts rece vab e

516 Criminal Law. 3) F
Legis at ve and judic a formu at ons designed to dea with ant socia act vity the substant ve e ements of par t cu ar crimes, prob ems n the adm'nistrat on of cr m na aw and the penal system

517 Torts. 4) F
Protect on through the jud c al process of persona ity, property and re ational nterests aga nst phys ca appro priat onal and defamatory harms

518 Civil Procedure. (3 F
The nature of jud c a power, viewed n the context of h s torical development and const tutional grants and m ta t ons

519 Legal Research and Writing I. (2 F
Techn ques of research use of the aw brary prepara t on of ega memoranda

520 Contracts II. (3) S
Continuation of 515

521 Criminal Procedure. (3) S
The nature of the criminal procedural system with special focus on constitutional protections for the accused

522 Constitutional Law I. (3) S
Role of courts in the federal system distribution of powers between state and federal governments, rule of procedure investigation of constitutional questions

523 Property. (4) S
Law of real and personal property, various legal and equitable estates in land, life estates, remainders, concurrent interests executory interests, limitations on creation of future interests Modern concepts of property

524 Legal Research and Writing II. (2) S
Continuation of 519.

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) F, S
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) A
Federal tax consequences of forming, operating, terminating or transferring partnerships

603 Conflict of Laws. 3) A
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, underlying federal and constitutional issues.

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
Obtaining and exchanging information in advance of trial, isolating the area of controversy, disposing of cases or issues without trial, defining the scope of litigation in terms of parties and subject matter and the relationship between successive litigations. Litigation through appeal, including jurisdiction, right to jury, selection of jury, withdrawing case from jury instructing jury, verdicts, judgments, appellate review

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. 3) A
Topics in criminal procedure with emphasis on legal constraints on grand jury investigations, police practices, pretrial release pre-trial hearings, prosecutorial discretion and plea bargaining

611 Estate Planning I. (3) A
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 non-legal problems which can and do arise and may encounter because of a situation as a family member.

613 Federal Courts. (3 A
Federal judicial system relationship of federal and state law· jurisdiction of federal courts and their relation to state courts.

614 Labor Relations. 3) A
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 will be 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 wills and wills 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

619 Trusts and Estates II. (2, 3 A
Continuation of 618

620 Civil Rights Legislation. (2 3 S
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 A
Property r ghts of husband and w fe the Ar zona commu n ty property system homestead

625 Constitutional Law II. 3 A
Fundamenta protect on for person property po tica and soc al rights.

627 Corporate Taxation. 3 A
Problems n taxab ty of the corporat on corporate d str but ons and corporate reorgan zat ons

628 Creditor-Debtor Relations. 3 A
Creditors remed es n sat sfaction of c a ms and debtors' protect on and re ef under bankruptcy other aws

629 Criminal Trial Process. 3 A
Cr m na court procedure from pre tria mot ons through sentenc ng nc uding d scovery jury se ect on jury com position exam nat on of w tnesses m sconduct of counse cont nuances m str a s jury nstruct ons and jury de berat ons

630 Employment Discrimination. 2 A
Focus on Tit e V I of the C v R ghts Act of 1964 wh ch forbids d scr m nat on n emp oyment based upon race rel g on, nat ona ong n or sex The substance and proce dura aspects of Tit e V I are covered n deta nc ud ng coverage, administrat ve procedures burdens of proof spec a prob ems of re g ous and sex d scrim nation statutory and court created defenses sen ority systems and remed es

631 Environmental Law. 3 A
Litigat on, adm n strat ve law and leg s at on re ating to prob ems of env ronmenta qua ty Topics covered may nc ude a r and water po ut on tox c substances pest c des and rad at on

632 Indian Law. (3) A
nqu ry into ega problems spec a to Amer can Ind ans and tr bes

633 Insurance. (3) N
Current trends n the bus ness of nsurance ro e of gov ernment in the insurance f e d.

634 Judicial Remedies. (3) A
The nature and m ts of njunctive restitut onary and com pensatory remedies for the protect on of persona property po tical and civi rights

635 Juvenile Justice System. 3) N
Special prob ems n the juven e system.

636 Land Use Regulation. (3 N
Lega problems in the regu ation and control of land de velopment by state and loca governments Adm n strat on of zon ng, subdivis on and other p ann ng contro s ssues of fa rness and procedure n the ut l zation of such contro s

637 Lawyering Process. (3 N
Roles and respons b ties of awyers, as advocates nego t ation, w tness exam nation d rect and cross and ar gument

638 Legal Profession. 2) F S
Organized bar d str but on of egal services in modern soc ety, economics of the profess on, profess ona can ons of eth cs for the bar and jud c ary and prob ems n pol c ng the profess on

639 Natural Resource Law. 3 A
Examines the const tut onal bas s for federa and man agement and the d fferent kinds of pub c ands manage ment schemes (e g parks forests, w d fe refuges em phas z ng acqu s t on of r ght to, and regu at on of, the d f ferent uses of pub c ands and resources e g m n ng, grazing timber w d fe hab tat, recreation

640 Securities Regulation. 2 A
Selected prob ems ar s ng under the major statutes con cerned w th regu at ng the securit es market

641 State and Local Government. 2,3 N
Lega prob ems nvo ved n the organ zat on and adm n s trat on of governmenta un ts nc ud ng the c ty county, town v age schoo d str ct a d spec a d str ct.

643 Water Law. 3 A
Acqu s t on of water r ghts water use contro s nterstate co f ct

644 Intellectual Property. 3 N
The protect on of nte ectua property and encourage ment of creat v ty trade va ues, t ade secrets, patents copyrights, perform ng arts and v sua arts

701 Arizona Criminal Code. 2 3 N
n depth study of the substant ve aw and sentenc ng prov s ons of the 1978 Ar zona Cr m na Code.

704 Corporate Finance. 2, 3 N
App cat on of egal mater a s, train ng and judgment to prob ems of sma and arge sca e corporate enter pr ses Prob ems nc ude se ection of the cap ta struc ture, pub c offerings of corporate securit es reorgan zat ons of solvent corporate enterprises and corporate d sso ut on

707 Corrections and Sentencing. 2 3 N
Just ficat ons for pun shment, the effect of pun shment upon the nd v dua and soc ety statutory bas s for sen tenc ng n Ar zona and the ro e of the awyer n the sen tenc ng process

709 International Human Rights. (2, 3 N
nternat ona ru es and procedures govern ng the protec t on of human r ghts.

714 Law and Social Science. (2 3) N
nvest gat on of the use of soc a sc ence research and methods n the ega system Top cs nc ude psycho ogy of eye witness dent f cat on soc a psycho og ca stud es of dec s on making stat st ca ev dence of discr mina t on econometnc studies of the deterrent effects of cap tal punishment, and c n cal pred ct ons of v olent be hav or

715 Professional Sports. 2 3) N
Un que ega problems relat ng to profess ona sports nc ud ng the r re at onsh p to ant trust aws, the nature of the p ayer contracts and assoc ated tax prob ems

717 Legislative Process. (2, 3) N
Exp ore both the ega and the pract ca context w thin wh ch the legislat ve process operates w th a major com ponent of the course be ng a eg s at ve draft ng project.

720 Problems in Evidence. 2 3) N
An exam nat on of the use (and abuse) of stat st ca meth ods n prov ng facts and n study ng rules of ev dence and procedure. Prerequ s te or corequ s te LAW 605.

721 Education and the Law. (2 3) N
Current ega problems affecting nst tut ons of h gher edu cation faculty, students and govern ng boards

727 Federal Income Tax Policy. (2, 3 N
Advanced cons deration of federa persona ncome tax policy w th reference to se ected prob ems nc ud ng the ncome she ter ng process. Prerequ s te LAW 606

733 Negotiation, Mediation and Counseling. (3 N
Explores a ternat ve mode s of negot ated d spute resolu t on as we as the roles of awyer and c ent n the nego t at on process Extens ve use of s mu at on exerc ses.

735 Estate Planning II. 2 3 N
Preparat on of actua estate p ans and mp ement ng e gal documents for a var ety of typ ca pr vate c ents. Both

tax and nontax elements in preparation of the plans will be considered. Prerequisite: LAW 611.

736 Planning for the Business Client. (2, 3) A
Planning transactions involving business organizations with special emphasis on income tax and corporate considerations.

737 Planning Private Real Estate Developments. (2, 3) N
Legal aspects of real estate development, including negotiation, legal devices for financing, promotion of sales, leasing problems and compliance with legal controls, as well as creation of private controls over land use.

738 Practice Court. (2, 3) A
Students act as lawyers in conducting a case through all stages of trial, from commencement of the action to final judgment.

740 Problems of Litigation. (2, 3) N
Current developments in the fields of practice, procedure, and evidence.

742 Equality in Modern Society. (2, 3) N
Discrimination, its social and legal effects and remedies. *Focus on constitutional, statutory and private organizational attacks upon discrimination on the basis of race, religion, sex or other classifications.*

745 The Supreme Court. (2, 3) N
Intensive examination of selected current decisions of the U.S. Supreme Court.

751 Problems in Labor Law. (2, 3) N
Advanced questions in the collective bargaining area

761 Selected Problems in Antitrust. (2, 3) N
Analysis of the private enforcement techniques in antitrust. Review and analysis of the various defenses, procedural problems and damage issues.

767 Selected Problems in Developing Nations. (2, 3) N
The effect of law in social change and development through agrarian reform, industrial development, economic integration. Emphasis on Latin America.

768 International Business Transactions. (2, 3) N
Problems and policy considerations involved in international trade; tariffs, international monetary controls, development loans, etc.

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*; 5 credit hour maximum.

771-779 Internships in Law. (1-6) F, S
Civil, defender or prosecutor placement 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; 3 credit hour maximum.

781, 782, 783 Individual Study. (1-3) F, S
With the approval of a faculty member, a student may research a legal subject of special interest and prepare a paper suitable for publication.

784 Moot Court Competition. (1-3) S
Successful participation and completion of a national moot court competition.

785 Externship. (1-12) S, F, SS
Supervised, practical lawyering in an external placement proposed by the student or established by a sponsoring agency and approved by the law school. 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

College of Nursing

Janelle C. Krueger, Ph.D.
Dean

Purpose

The faculty of the College of Nursing acknowl edges 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 pur pose of the College of Nursing is to provide educational programs that prepare professional nurses to meet the nursing care needs of individ uals, groups and communities. To achieve this purpose, the College offers three programs, the Baccalaureate, the Graduate and the Continuing Education programs. Within the context of a liberal education, the degree programs prepare professional nurses who: a) understand and re spond to changing health and social needs and services; b) influence nursing practice and health care through leadership and participation in professional and sociopolitical activities; and c) utilize scientific knowledge to advance pro fessional nursing practice. The Continuing Edu cation program provides opportunities for nurses to improve and expand their nursing practice to meet the health care needs of various pop ulations and to further their own professional development.

Organization

The College of Nursing is organized as fol lows:

Baccalaureate Program

The baccalaureate program is a generic four year curriculum leading to the Bachelor of Science in Nursing degree. All students seeking the Bache lor of Science in Nursing degree are admitted to the generic baccalaureate program, including graduates of Diploma and Associate Degree in Nursing programs. Several program modifica tions and options including evening sections are offered to accommodate Registered Nurses who wish to pursue a Bachelor of Science in Nursing degree. Interested Registered Nurses are encouraged to plan a program of study with a College of Nursing advisor.

Graduate Program

The faculty in the College of Nursing offer a program leading to a Master of Science degree with a major in Nursing. Concentrations are available in one of the following areas:

- Adult Health Nursing with the tracks of:
  - Adult Health Nursing
  - Critical Care Nursing
  - Neuroscience Nursing
- Community Health Nursing
- Community Mental Health Psychiatric Nursing
- Parent Child Nursing with the tracks of:
  - Childbearing Family
  - Nursing of Children

Continuing Education Program

This program presents a variety of non credit of ferings on the main ASU campus, ASU West Campus, and at off campus locations. These offerings are designed to assist practicing profes sional nurses to maintain and enhance their com petencies, to broaden their scientific knowledge base and to further develop their skills in the changing health care environment. Programs are organized in response to both the nursing care needs of the population and the learning needs of nurses engaged in a variety of professional roles and clinical specialties. Workshops, conferences, institutes, short evening courses and special programs are offered at times convenient to the working professional. Some offerings are multidisciplinary and are open to other than Registered Nurses.

In addition, to meet continuing education needs and interests, registered nurses may also choose to enroll as unclassified students in se lected nursing credit courses offered by the College of Nursing. Registered nurses who want

more information about the degree programs or the courses that may be taken by unclassified students should contact the Nursing Student Services Office (602/965 2987).

For descriptions of current continuing education offerings, please contact the Continuing Education Program, College of Nursing (602/965-7431).

Offerings from all programs are available on the main ASU campus and ASU West Campus.

Program for Health and Nursing Research

The College of Nursing Program for Health and Nursing Research supports the conduct and development of research in all phases of nursing with a special emphasis on clinical nursing problems, health promotion, illness prevention and the impact of health technology on the quality and cost of health care. Program efforts are directed toward strengthening the research productivity of faculty, students and nurse researchers in clinical settings. The College strives to develop research excellence in an effort to form a research base for improving health care through the contributions of nursing theory, clinical nursing practice, and the biomedical, behavioral and social sciences.

General Information

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, and the Western Council on Higher Education for 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 issues or questions relating to the College of Nursing should contact the College of Nursing Student Services Office.

Scholarships and Financial Aid. For information regarding scholarships and loans, see page 19 of this *Catalog*. Information about scholarship and loan funds for nursing students may be obtained from the University Financial Aid Office, College of Nursing Office of Student Services, or the Associate Dean for Academic Programs.

Student Activities. All ASU students are members of the Associated Students of ASU and participate in those campus activities which are of interest to them. The Associated Students of ASU is the student government for the University. Associated Students has a strong presence at the University in a variety of ways. It is the official representative of the student body in matters of governance and budgeting.

Nursing College Council. The council is a member of ASASU (Associated Students, Arizona State University) and serves as the governing body of all student activities in the College. The council consists of the officers of the Baccalaureate Student Nurses' Organization, Graduate Nurse Organization and Student Nurses' Association. Nursing College Council provides for communication, cooperation and understanding among undergraduate students, graduate students, and faculty as well as representing the College in University and non University affairs.

Baccalaureate Student Nurse Organization. The Baccalaureate Student Nurse Organization (BSNO) is the coordinating body for nursing students in the baccalaureate program. It is responsible for providing information to faculty and students on student affairs and for coordinating student faculty affairs. All nursing students are members of this organization.

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.

Student Nurses Association. SNA is a professional nurse organization. By being a member of SNA the student belongs to the National Student Nurses Association which is a counterpart of the American Nurses Association for registered nurses. NSNA provides means for financial assistance, career planning, a voice in Washington, an opportunity for involvement and low cost comprehensive malpractice insurance

Sigma Theta Tau. Beta Upsilon chapter of Sigma Theta Tau was chartered at Arizona State University 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.

Learning Resources. The College of Nursing offers learning resources which include the University's Hayden Library, the Noble Science and Engineering Library, and the College of Nursing's Learning Resources Center.

Clinical Facilities. Learning experiences with patients and families are provided under the supervision of qualified faculty with the cooperation of a variety of federal, state, county, private health and other agencies. The College of Nursing has contracts with more than 80 different agencies in the Phoenix metropolitan area, and also operates its own unique sponsored nurse managed clinic in a community setting. Thus a variety of clinical laboratory facilities is available to students in this significant component of the programs.

Degrees

Master of Science. The College of Nursing offers a program leading to a Master of Science degree which requires 40 semester hours. Requirements for this program are given in the *Graduate Catalog* Persons interested in applying for admission to the program should write to the Arizona State University Graduate College for a catalog and application form.

Bachelor of Science in Nursing. The completion of the four year curriculum in nursing leads to a Bachelor of Science in Nursing degree. The purpose of the program is to prepare beginning professional nurses who possess the theoretical foundation and the clinical competence to function in various health care settings. The graduate is prepared to deliver nursing care services to individuals, families and communities. The baccalaureate program provides a foundation for graduate studies in nursing at the master's level.

The program objectives for the baccalaureate curriculum are directed toward preparation of graduates with generalist abilities. Based on theoretical and empirical knowledge from nursing, the humanities, physical, biological, and behavioral sciences, the graduates are prepared to:

1. Provide comprehensive client care, in concert with individuals, families and other health team members, by utilizing skills of observation and assessment, decision making, intervention and evaluation.
2. Assume responsibility for the provision of nursing care and accountability for identifying and evaluating outcomes of that care
3. Apply the scientific process and utilize research findings in the delivery of health care.
4. Assume a leadership role in the promotion, maintenance and restoration of health through teaching and collaborative planning within the interdisciplinary team.
5. Continue professional development in response to trends in health care, changing nursing roles, and the impact of these and other health issues on the consumer.

The baccalaureate program in nursing includes 64 hours in nursing, 65 hours in other prescribed courses and 3 hours free electives for a total of 132 hours for graduation. The prescribed courses include the 35 credits of General Studies required by the University (pages 43 46) for graduation as well as course work that is either pre- or corequisite to nursing courses.

Course requirements for the Bachelor of Science in Nursing include:

General Studies/Pre- or Corequisites

	Semester Hours
English Proficiency ENG 101 (3) and ENG 102 (3) *or* ENG 105 (3)** ** Students who complete ENG 105 (3 have satisfied the English proficiency requirement and do not have to take any additional English credits	6
Literacy and Critical Inquiry Core One 3 credit course from ASU General Studies intermediate literacy requirement; NUR 403 (3), identified as the advanced literacy and critical inquiry requirement.	6
Numeracy Core MAT 117 (3) and select one 3 credit course from ASU General Studies numeracy requirement in the statistics category.	6
Humanities and Fine Arts Core Select two 3 credit courses from the ASU General Studies program requirements. One must be an upper-division course	6
Social and Behavioral Sciences Core PGS 100 (3); SOC 101 3) OR SOC 301 (3), PGS 341 (3) OR CDE 232 (3); SOC 415 (3) OR FAS 331 (3) In addition, select one 3 credit course which has cultural awareness as its basic content.	15
Humanities and Social and Behavioral Sciences Elective Select one upper-division 3 credit course from the ASU General Studies program list in Humanities and Social and Behavioral Science courses.	3

Historical and Global Awareness
If this requirement was not satisfied in Humanities and Social and Behavioral Sciences, select one course in each area from the ASU General Studies program requirements

Natural Sciences 26
BIO 181 (4), BIO 182 (4), CHM 231 4), CHM 361 (3), FON 141 (3), OR FON 444 3 MIC 201 (3), MIC 202 (1), ZOL 360 (4)

Nursing Core Courses 64

**	NUR 119	Introduction to Nursing and Health 3
*	NUR 204	Pharmacological Therapeutics for Nursing 3
**	NUR 211	Nurse Client Relationships 3
**	NUR 213	Basic Clinical Skills 2
**	NUR 214	Health Assessment in Nursing Practice 3
***	NUR 223	Nursing Process and Hospitalized Adult 6
*	NUR 308	Pathophysiology 3
**	NUR 311	Gerontological Nursing 3
***	NUR 327	Comprehensive Nursing Care of Children 4
***	NUR 328	Childbearing and Gynecological Nursing 4
***	NUR 329	Psychiatric/Mental Health Nursing 6
***	NUR 330	Care of Acute and Chronically Ill Adult 4
*	NUR 403	Research in Nursing Practice 3
*	NUR 406	Leadership and Management in Nursing 2
*	NUR 407	Contemporary Issues in Nursing and Health 2
***	NUR 427	Community Health Nursing Concepts 3
***	NUR 428	Management of Clients in Acute Care Settings 4
***	NUR 429	Community Health Nursing Clinical 4
***	NUR 430	Home Health Care 2

* Nursing theory only
** Nursing theory and laboratory/observation
*** Nursing theory and clinical learning

Core courses are regularly reviewed. To determine whether a course meets one or more General Studies Core course credit requirements, see the *General Studies Course Guide* available prior to registration for courses. (See pages 43 46 for specific requirements.)

Key to General Studies Core Credit Abbreviations

L1	Literacy and Critical Inquiry Core Courses (Intermediate level)
L2	Literacy and Critical Inquiry Core Courses (Upper division)
N1	Numeracy Core Courses (Mathematics)
N2	Numeracy Core Courses (Statistics and Quantitative Reasoning
N3	Numeracy Core Courses Computer Applications)
HU	Humanities and Fine Arts Core Courses
SB	Social and Behavioral Science Core Courses
S1	Natural Science Core Courses (Introductory)
S2	Natural Science Core Courses (Additional Courses)
G	Global Awareness Courses
H	Historical Awareness Courses

Admission Requirements

Students are admitted directly to the major as freshmen In addition to meeting the University requirements for admission, students are required to have one year each of high school physics and chemistry. Two years of high school chemistry are recommended.

State Board of Nursing Requirement. Students must have a high school diploma or GED certificate to be eligible to write the State Board Examination for licensure as a Registered Nurse.

CPR Certification. All students entering the professional nursing courses must be certified in cardiopulmonary resuscitation (CPR) as evidenced by a current CPR card. This certification must be maintained while in the program. CPR is taught in the College in the course NUR 119, and is also available outside the College of Nursing.

Student Health. Students enrolled in the professional nursing major are responsible for fulfilling the requirements of the current health policies of the College of Nursing. The student is responsible for providing proof to the Student Services Office of having met these requirements prior to enrollment in NUR 211 Nurse Client Relationships. The policy includes:

a. College of Nursing Health History Inventory and Records of Physical Examination.
b. Proof of rubella immunity.
c A tuberculin skin test is required annually while in the nursing major. A nursing stu

dent may not participate in any clinical experience without meeting this requirement.

ASU Health Requirements. All University students must meet University health requirements, including proof of measles (rubella) inoculation if born after January 1, 1957. Admission may be denied or canceled for any applicant who has been shown by the University to have either an uncompensated psychiatric illness or a physical illness which can be hazardous to the safety of other persons (see page 23).

Insurance Requirements

Liability Insurance Students are covered by University Liability Insurance while they are participating in any clinical learning experience sponsored by the University. They are not covered in any activity outside of school requirements, in non lab courses, or when a felony is involved.

Health and Accident Insurance: It is strongly recommended that all students carry their own health and accident insurance. Each student is personally liable for any accident or illness during or outside of school activities.

Student Employment. Students intending to pursue the professional nursing major on a full time basis should expect to spend approximately 45 hours per week in class and study. Thus any additional activities or employment should be kept at a minimum.

Student Transportation. Students are responsible for their own transportation to and from health agencies and other selected experience settings, such as home visits to clients.

Comprehensive Assessment Tests. All students who will take the professional licensing examination (NCLEX State Board Exam) are required to take a comprehensive assessment test prior to graduation. Arrangements for taking the test and payment of fee must be made during the student's final semester.

Transfer Students. Any student enrolled in good standing at any NLN accredited baccalaureate school of nursing, or having been enrolled in good standing within the past two years, may apply for admission with advanced standing. Transfer students must complete the application process at least one full semester before the anticipated date of admission. Transfer students must submit official transcripts, a catalog from the institution of transfer, and course outlines in order that course equivalencies may be assessed. A grade point average of 2.50 is required for admission. All other admission requirements are the same as outlined for the basic student.

Admission of Registered Nurses. Registered nurses have alternatives available to them in the completion of the baccalaureate degree. They are encouraged to work closely with an advisor in planning their program of study. NUR 306 Professional Development for RN's is required. This course builds on the knowledge and skills of the student by promoting professional development. All other admission requirements are the same as outlined for the basic student. In addition, registered nurses must submit a photostatic copy of the current license to practice nursing.

Readmission. Student who have not been in continuous enrollment must petition for readmission to the major. Along with the petition, students must provide the following documents:

a. Proof of current enrollment or readmission to ASU.
b. Transcripts from all colleges attended.
c. Applications for Admission to the Professional Nursing Major.
d. Health History/Physical Examination.

Academic Standards Progression/ Retention

Academic. Progress into the upper division nursing courses is contingent on achieving at least a "C" in all required courses and a cumulative grade point average of 2.50.

Probation and disqualification is in accordance with University policies.

Health. Students who appear to lack the degree of physical and mental health necessary to function successfully as a professional nurse may be required to have a health examination and the results made available to the Standards Committee of the College of Nursing. Students whose health, behavior, and/or performance have been questioned will be reviewed for continuation in clinical nursing courses by the Standards Committee. The student may appear in person before the Committee and personally present information relevant to the Committee's review. Additional information may also be presented in writing without personal appearance. The decision of the Committee is final.

Professional. Professional behavior and appearance is required during all clinical nursing course activities. Academic dishonesty is not tolerated in any courses and will be subject to

specific College of Nursing policies and procedures.

Grading Policy for Nursing Courses

Within the baccalaureate program, grades are assigned to reflect levels of achievement in relation to course objectives. Students who do not complete a required nursing course satisfactorily, receiving a grade of 'D' or 'E' (failing) or a mark of "W" (withdrawal, are not eligible to progress in the professional nursing major. Receiving a grade of 'D' or 'E' necessitates repeating the course in its entirety. A required nursing course may be repeated only once.

Any petition for curriculum adjustment, course substitution, overload, readmission to a nursing course or readmission to the professional nursing major must be approved by the Baccalaureate Standards Committee.

Withdrawal is in accordance with the withdrawal policy of the University. Students who withdraw from required nursing courses must complete the form, 'Interruption in Curricular Progression. This should be done in conjunction with the appropriate faculty member. In addition, students are responsible for completing the University withdrawal procedure. Two withdrawals from any single nursing course constitute ineligibility to continue in the nursing major without an approved petition from the Baccalaureate Standards Committee.

An incomplete in a required nursing course must be satisfactorily removed before progression in the nursing major is permitted. A grade of 'I' is not allowed in clinical practice courses.

Audits and Pass/Fail grades are not acceptable for courses in the minimum 132 semester hour requirement for graduation.

Academic Advisement

Students are responsible for meeting the degree requirements and seeking advisement regarding their program status progress. This includes having transcripts of all transferred credit courses sent to University Registrar and the College of Nursing. Advisor signatures are required on various University registration forms for validation. All nursing students are assigned a faculty advisor. The faculty advisor assists students with program planning, registration, preparation of needed petitions, verification of graduation requirements, referrals to University and/or community resources and assistance with career planning.

Nursing

PROFESSORS:
KRUEGER (NURS 457), BRANSTETTER, JOHNSON, LUDEMANN, MUHLENKAMP, MURPHY, STEFFL, TAYLOR, ZORNOW

ASSOCIATE PROFESSORS:
BRUNER, GRONSETH, KNUDSEN, KOMNENICH, MILLER, NORTH, ROBERTS, THEOBALD

ASSISTANT PROFESSORS:
BAGWELL ELL SON FELLER F NCH GARR TY, KATZMAN, K LLEEN, KURTH, LUDLOW, MELVIN, MOORE, MULHOLLAND, OLSON, PERRY, RICHARDS SEHESTED, SHERIDAN, STENGEL, TOBIASON, WURZELL

INSTRUCTORS:
ADAMS, ANDERSEN BASSETT, BECK, BROERMAN, COHEN CROMWELL, ENTZ, ESPARZA, FLYNN, FRITZ, GALE HULL KASTENBAUM, KEHRER KLEINER, KRUSE, RADIN, SM TH, STILLWELL, THORNE, WILLIAMS

NURSING

NUR 119 Introduction to Nursing and Health. 3) F, S
Bas c nurs ng ph osophy process and sk s inc ud ng hea th promot on content as re ated to nurs ng practice. 2 1 2 hours ecture 1 1 2 hours lab Prerequ s te: B O 181

204 Pharmacological Therapeutics for Nursing. (3) F S
Drug c assif cat ons and prototypes Psychophys o og c pr nc p es of drug action Know edge bas c to safe admin strat on n nurs ng practice Prerequ s tes. NUR 119, BIO 182 CHM 361 MIC 205 or approva of nstructor.

211 Nurse Client Relationships. 3 F S
Focus on the therapeut c relat onsh p and ts app cat on to nurs ng Concepts of anx ety oss and gr ef w be emphas zed. 2 hours ecture, 3 hours ab Prerequ sites NUR 119 PGS 100 SOC 101 or 311 ENG 102

213 Basic Clinical Skills. 2 F, S
Sc ent f c pr nc p es, nurs ng concepts and se ected psychomotor sk s for c n ca nursing pract ce 1 hour ec ture 3 hours ab. Prerequ s te NUR 119

214 Health Assessment in Nursing Practice. 3) F, S
Introductory know edge and sk i s for systematic phys ca psychosoc a nutr t ona and developmenta nursing assessment for c ents over fe span 2 hours ecture 3 hours ab Prerequ s tes CDE 232 or PGS 361 NUR 211 prerequ s te or concurrent or RN or approva of nstructor.

223 Nursing Process and Hospitalized Adult. (6) F, S
Theor es concepts and pract ce n app cat on of the nurs ng process n care for the hosp ta zed adu t w th se lected med ca surg cal prob ems 2 hours ecture 9

hours lab. Prerequ sites NUR 211, B O 182 , MIC 205 CHM 361 and concurrent enro ment with NUR 204, 213, 214

306 Professional Development for Registered Nurse Students: Process, Roles and Function. (4) F, S
Phi osoph cal and theoretica bases for profess ona nurs ng practice. Nurs ng process for dec s on mak'ng. Profess ona ssues va ues and norms Prerequ sites BIO 182 CHM 361, ZOL 360

308 Pathophysiology. (3) F, S
Focuses on concepts exp icat ng a terat ons n hea th states. A psychophys'olog ca v ewpo nt provides the un fying framework. Prerequ s tes B O 182 CHM 361 ZOL 360.

311 Gerontological Nursing. (3) F, S
Provides perspective of b opsychosoc al geronto og cal content app cab e to nurs ng practice and research 2 hours lecture, 3 hours lab Prerequ s tes FAS 331 or SOC 415, FON 141, NUR 308, 329

327 Comprehensive Nursing Care of Children. (4) F S
Nursing concepts and pract ce in car ng for wel and hos p tal zed ch ldren n a variety of c n cal settings. 2 hours lecture, 6 hours ab. Prerequis tes NUR 223, CDE 232 or PGS 341 Concurrent or prerequis te· FAS 331, SOC 414

328 Childbearing and Gynecological Care. (4) F S
Nurs ng concepts and practice n the reproduct ve and perinatal per ods Inc udes the mpact on fam ly members and the r relat onsh ps 1 1 2 hours ecture 7 1 2 hours lab. Prerequ s te. NUR 223 Concurrent or prerequ s te. FAS 331 or SOC 415

329 Psychiatric/Mental Health Nursing. (6) F S
Guided nurs'ng exper ences w th nd v dua s and groups based on theory and research. 3 hours ecture 1 hour lab Prerequ sites· NUR 223 and CDE 223 or PGS 341 Co-requisite: FAS 331 or SOC 415

330 Care of Acute and Chronically Ill Adults. (4) F, S
Nurs ng concepts and practice n car ng for hosp ta ized adu ts with comp ex acute and chron c med ca surgical problems Theoret cal bases and related nursing management Prerequ s tes· 308 NUR 327, 328, 329 (one may be concurrent)

403 Research in Nursing Practice. (3 F S
Components of the research process. S gn ficance of re search to the mprovement of nurs ng pract ce and devel opment of the profess on Prerequ s tes· MAT 117 or 115; NUR 223 and 3 hours stat st cs. *[Satisfies General Studies Requirement L2]*

406 Leadership and Management in Nursing. (2) F, S
Se ected theoret ca frameworks for organ zat on man agement and leadersh p in nurs ng Prerequ's'te: NUR 403 or Registered Nurses

407 Contemporary Issues in Nursing and Health. (2) F, S
Se ected contemporary ssues influencing nurs ng and the health care system Prerequ s te: NUR 403.

427 Community Health Nursing. (3 F, S
Introduction to pub c health theory and princ'ples of commun ty hea th nurs ng pract ce Prerequ s te NUR 327, 328, 329, 330 or approva of nstructor.

428 Management of Clients in Acute Care Settings. (4) F S
Application of principles of nurs ng management and leadersh p n acute care settings 1 hour lecture, 9 hours lab Prerequ site or concurrent NUR 330, 406 407

429 Community Health Nursing Clinical (4) F S
C n ca experience in commun ty health nurs ng ro es and eadersh p strateg es in a var ety of settings 12 hours lab and conference Prerequ site or concurrent· NUR 427

430 Home Health Care. (2) F, S
Issues, trends and pract ce n the development and de ivery of home hea th care 1 hour ecture 3 hours ab Prerequ site or concurrent· NUR 427 429 or approva of nstructor

431 Introduction to Cardiovascular Nursing. (3) F, S, SS
Se ected aspects of card ovascu ar nursing. D agnost c eva uat on, h story and physical assessment, med ca and surg ca ntervent ons prevent ve and rehab litative management Prerequ site NUR 213, 223 or approva of nstructor

432 Cardiovascular Nursing Laboratory. (1) F, S, SS
Experiences to accompany NUR 431 Observat on, di rect care, dec's on mak ng and p anning for c ents n vari ous stages of card ac d sease. 3 hours aboratory Prerequ s tes: NUR 213 223 or approval of nstructor NUR 431 concurrent

433 Abnormal Stress in the Maternity Cycle. (2 3) F, S
Cl n ca nurs'ng n h gh nsk obstetrics Abnormal stress es for pregnant women effects n newborns and appro priate nurs ng interventions. 2 hours lecture, 3 hours ab opt ona . Prerequisite: NUR 328† or approval of nstruc tor.

434 Cultural Variations of Health and Illness. 2-3) F, S
Hea th I ness bel efs behav ors and intervent ons n se ected ethn c cultures Integrating scient fic and fo k med c ne in nurs ng pract ce. 2 hours ecture, 3 hours ab optiona Prerequisite: approva of nstructor

435 Nursing of Children with Developmental Disabilities. (2 3) F, S
Congenital and acqu red phys ca and menta deve op mental d sorders. Eva uat on of ch d and fam ly C inica nurs ng in ped atric commun ty sett ngs. 2 hours ecture; 3 hours lab opt ona Prerequ site: NUR 327 or approval of nstructor

438 Aging and Mental Health. (3) S
Exp ores and assesses psychosocial and mental hea th aspects of ag ng geropsychiatric theory and geronto og ca research appl cable to pract ce Prerequ s te: 12 hours in nurs ng major and/or approval of nstructor

439 Aging and Mental Health Practicum. (1) S
Opt ona cl n ca pract cum for students enrol ed 'n NUR 438. 3 hours per week

440 Introduction to Computer Applications in Health Care. (3) F, S, SS
Emphas s on applicat ons wh ch mpact most d rectly on nurses n staff pos't ons. Prerequ s te Sen or stand ng 'n nursing major or approval of nstructor

457 Third-World Women. 3) F
Econom c, socio po tica , and demograph c context for understand ng the ro es of th rd wor d women 'n hea th, fam y, work, educat on and commun ty Prerequ s te 6 hours of soc a sc ence credit or approva of nstructor *[Satisfies General Studies Requ rement. SB G]*

494 Special Topics. 1 4) F S SS
Advanced study and/or superv sed pract ce n an area of nursing. Lecture and ab to be arranged. Prerequ site. 12 hours n the nurs ng major and/or approva of nstructor

500 Research Methods. 3) F S
Research methods nc uding research conceptua zat on and des gn. Prerequ s te graduate evel nferent a statis tics course; may be taken concurrent y

501 Perspectives of Adult Health Nursing. (2) F, S
Prov des students with an overv ew of theories con cepts and research re evant to the nurs ng care of adults

502 Adult Health Nursing: Theory I - Health Restoration. 2) F
Eva uates theories, mode s, concepts and research ap p cab e to the care of adults requ ring nurs ng nterven tion for restorat on of health Concurrent pract cum re- qu red.

503 Adult Health Nursing: Theory II - Health Promotion. (2) S
Eva uates theories, mode s, concepts and research ap p icab e to the care of adu ts requ r ng nurs ng nterven t ons for promot on maintenance of hea th Concurrent practicum requ red

504 Critical Care of the Adult: Theory I. (2) F
Theoretica know edge essentia to the care of cr tical y I adu ts Behav oral and phys o og ca concepts are ad dressed Prerequ s te or concurrent NUR 582 Concur rent pract cum requ red

505 Critical Care of the Adult: Theory II. (2) S
Theoretica know edge essentia to the care of cr t cal y I adults. Mu t p e organ system dysfunct ons are ad dressed Prerequis te NUR 504 concurrent pract cum requ red

506 Neuroscience Nursing Theory. 2 S
Theoret ca bas s for assessment and management of disorders of the nervous system Prerequ s tes NUR 507 584 approva of nstructor Concurrent pract cum required

507 Therapeutics of Neurological Dysfunction. (2 S
D agnost c and therapeut c reg mens of care for pat ents with neuro og cal dysfunct on Prerequ s tes NUR 506 584 perm ssion of nstructor Concurrent pract cum re qu red

511 Public Health and Community Health Nursing Perspectives. (2) F S
Ana ys s of contemporary pub c hea th and commun ty hea th nursing ssues, research and conceptual/theoret ca foundations

512 Community Health Nursing: Theory I. 2 F
Ana ys s of theor es research approaches for the study of commun ty hea th nurs ng, commun ty hea th program deve opment and fam y hea th care Concurrent pract cum requ red.

513 Community Health Nursing: Theory II. 2) S
Ana yze ssues theories and research re evant to com mun ty hea th nurs ng eadersh p program p ann ng eva uat on, management of hea th care systems Prerequ s te: NUR 512. Concurrent pract cum requ red

521 Community Mental Health Psychiatric Nursing Perspectives. 2) F S
Compar son of nurs ng theories w th psych atnc psycho log ca theories App es to pract ce n menta hea th psy ch atr c sett ngs and prov des bas s for mult p e ro es

522 Community Mental Health Psychiatric Nursing: Theory I. (2) F
Ana ys s of ssues theor es and research n restorat on and promot on of mental health. Emphas zes develop ng conceptual framework for psych atr c nurs ng Concur rent pract cum requ red.

523 Community Mental Health Psychiatric Nursing: Theory II. (2 S
Th s course ass sts the student to cr t ca y ana yze is sues theories and research relevant to community men ta hea th nurs ng Prerequ s te NUR 522 . Concurrent practicum requ red

531 Perspectives of Parent-Child Nursing. 2 F, S
Overview of concepts theories and research re evant to ch dbear ng fam es and ch dren

532 Nursing of Children: Theory I. (2) F
Analys s of concepts, theor es, and research related to nursing care of we l ch' dren Focuses on hea th, c ent, and environment Concurrent pract cum required

533 Nursing of Children with Special Needs: Theory II. 2) S
Analys s of concepts, theor es, and research related to nursing care of ch ldren with special prob ems or at r sk. Prerequis te. NUR 532 Concurrent pract cum required.

534 The Childbearing Family: Theory I. (2) F
Analys s of concepts, theor es, and research related to nurs ng care of ch ldbear ng fam es Focuses on hea th, c ent and env ronment Concurrent practicum required.

535 Childbearing Family with Special Needs: Theory II. (2) S
Ana ys s of concepts theor es, and research related to nurs ng care of ch ldbearing fam es with special needs and h gh r sk Prerequ s te NUR 534 Concurrent prac t cum required

551 Theory Development. (3 F S
Purpose s to prov de the student w th opportun ties to analyze, eva uate and deve op concepts re evant to nurs ng

552 Contemporary Issues: Health Care and Nursing. 3 F S
Ana ysis of hea th po cy econom cs and program plan n ng for nurs ng hea th profess ona s Emphasizes pol t ca soc ocultura and demograph c factors

562 Health Promotion. 2 F
F rst d dact c nurse c n c an course Focuses on hea th care concepts and strateg es to promote and ma ntain hea th of the ch d adult and or fam ly Prerequ site Per m ss on of nstructor

563 Health Management. 2) S
Second didact c nurse cl n c an course Ana ys s of com mon se f m t ng hea th prob ems w th ntegrat on of hea th assessment for c n cal dec s on mak ng Prerequ s te approva of nstructor

568 Nursing Leadership Perspectives. (2) F
Cr t ca ana ys s of h stor ca , contemporary and futurs t c pro ect ons of concepts theor es sty es and issues n nurs ng leadersh p ro es

571 Teach ng in Nursing Programs. 2 S
Ana ys s of theor es, ssues and research related to teach ng n nurs ng. Focuses on the process of teach- ·ng earn ng.

576 Computer Applications in Health Care. 3) F, S
Ana ys s of current and deve op ng computer appl ca t ons n hea th care Emphas s on nurs ng app cat ons in adm n strat on educat on, and pract ce Prerequ s tes. NUR 440 or equ va ent graduate stand ng n nurs ng or re ated f e d.

578 Gesta t Therapy I. 3 F S
An ntroduct on to theory and methodo ogy of Gesa t ther- apy ts uses for menta hea th promot on and restorat on

579 Gestalt Therapy II. (3 F, S
Focus s on further development of Gesta t therapy and ts application n work'ng with var ous c ent popu at ons Prerequ s te. NUR 578.

580 Practicum. 1 4 N
Supervised clinica app ication of theoretical concepts. Prerequis te· Approva of nstructor.

581 Family Systems Theory in Health Care. 3) F S
Crit ca ana ys s of ssues and research re evant to fam y systems theory Emphas s on relat onsh p between theory and pract ce

582 Advanced Human Physiology. 3) F
Ana yzes major theory and concepts of human phys ol ogy nterre ationsh p of physio ogy and health is ex- p ored

583 Pathophysiology. 3 S
Manifestation of a tered human phys o ogy and disease. Systems theory s used to ana yze the re ationsh ps of d sease and phys ology

584 Human Neuroanatomy, Physiology, Pathophysiology. (3) S
Norma neuroanatomy neurophys o ogy ncluding embry o ogy Pathophysio ogica bas s of nervous system dys funct on. Prerequ s te approval of instructor Concur rent with NUR 506, concurrent pract cums

585 Stress Reduction. 3 F
Theory applicat on and eva uat on of m nd/body re axa t on methods nc ud ng physio og ca effects. Research f ndings emphas zed Da y student pract ce. Prerequ s te: Graduate stand ng or approval of nstructor

588 Qualitative Methods in Nursing Research. (2) SS
Prov des an ntroduct on to the use of qua tat ve ap- proaches, d scovery procedures analys s interpretat on of data and contr but on to theory bu d ng

591 Seminar (Electives). 2 4 N
Advanced top cs nc ud ng curricu um deve opment cu tura perspect ves hea th promot on, ch d menta hea th, etc

598 Special Topics (Electives). (2 4) N
Specia study nc uding ssues n hea th care and organ zat ons management in nursing eth ca ssues, va ues care of the acute y , etc Prerequ s te approva of n structor n se ected course

599 Thesis. (1 6 F S, SS
Research proposal deve opment, data co lect on and ana ysis, thes s wr ting and thes s ora defense. 6 hours requ red.

680 Practicum (Electives). 1 4) N
C n ca app cat on of theor es, concepts and princ ples such as hea th management hea th ma ntenance etc Prerequ s te: approva of nstructor

680 Advanced Nursing Practicum I, II. 2 6 F, S
C n ca app cat on of theor es concepts, and princ ples Conferences nc uded Tracks w th n the areas of concen trat on nc ude·

1 Adu t Hea th Nurs ng
2 Cr t ca Care Nurs ng
3) Neurosc ence Nurs ng
4 Commun ty Hea th Nurs ng
(5 Commun ty Menta Hea th Psych atr c Nurs ng
6 Nurs ng of Ch dren
(7 Ch dbear ng Fam y

Prerequis tes adm ss on to graduate program and ap prova of nstructor

The following courses, described in the 1985-87 ASU Catalog, will be offered through the semesters noted below. These courses are open only to Nursing students eligible to graduate under the requirements of the 1985-87 or earlier Catalog. Students wishing to register for one or more of these courses listed below must receive approval from the College of Nursing

219 Health Promotion and Self Care Competencies. 2) F, S SS
Fa 1988

303 Nursing Process, Roles and Functions. 2) F S
Spr ng 1989

304 Pharmacology for Nursing. (3 F S
Spring 1989

305 Development of Professional Nursing. 2 F S
Fa 1989

313 Basic Competencies in Nursing Practice. 2 F, S
Spr ng 1989

314 Health Assessment. (3) F, S
Spring 1989

323 Care of the Hospitalized Adult I. (5) F, S
Spring 1989

327 Care of the Well and Hospitalized Child. 3 F S
Fa 1989

328 Parent-Infant Nursing. (3) F S
Fa 1989

329 Mental Health Nursing. 5 F, S
Fa 1989

403 Nursing Research. 2) F S
Spr ng 1990

426 Care of the Hospitalized Adult II. 4 F, S
Spring 1990

427 Community Health Nursing. 4) F S
Spring 1990

429 Community Nursing of Populations at Risk. 4) F S
Fa 1990

See page 38 for special courses which may be offered by this academic unit.

HUMAN DEVELOPMENT

HDE 395 Overview of Aging. 3 F
Mu t d scip nary ntroduction to geronto ogy Exp ores the character st cs exper ences, prob ems and needs of o der persons Cross sted as SOC 348

586 Origins of Human Behavior. 3 F
Cr t ca exam nat on of theor es ssues, and research to the deve opmenta period of nfancy through ado es cence. Prerequis te. Course n ch d deve opment or equ va ent

588 Development in Adulthood and Aging. 3 S
Crit cal exam nat on of theor es and research of adu t hood and ag ng

College of Public Programs

Nicholas L. Henry, Ph.D.
Dean

Purpose

The College of Public Programs offers a wide range of undergraduate and graduate course work, both on and off campus, to full time students and as part of continuing education Each academic unit of the College not only assumes responsibilities in preparing its own majors, but, in addition, the units provide a variety of service courses for the rest of the University. The College is committed to providing excellence in teaching, research, and public service. Consequently, the units work closely with numerous public, quasi public, and private agencies at the national, regional, state and local levels.

Organization

The College of Public Programs is composed of five academic units: the Department of Communication, the Walter Cronkite School of Journalism and Telecommunication, the Department of Leisure Studies, the School of Public Affairs, and the School of Justice Studies. Each academic unit is administered by a Chair/Director.

The general administration of the College is the responsibility of the Dean, who is responsible to the University President through the Vice President for Academic Affairs.

Degrees

Baccalaureate Degrees. The College of Public Programs offers academic instruction in four areas. Successful completion of a four-year program of 126 semester hours as specified by the respective academic unit leads to the following bachelor's degrees:

Communication:
Bachelor of Arts (B.A.)
Bachelor of Science (B.S.)

Justice Studies:
Bachelor of Science (B.S.)

Journalism and Telecommunication:
Bachelor of Arts (Journalism) (B.A.)
Bachelor of Arts (Broadcasting) (B.A.)
Bachelor of Science (Journalism) (B.S.)
Bachelor of Science (Broadcasting) (B.S.)
(The Bachelor of Science (B.S.) program is under review by the faculty and is not available for students entering under this *Catalog*).

Leisure Studies
Bachelor of Science (Recreation) (B.S.)

Specific degree requirements are explained in detail under the respective school or department program information section.

Graduate Degrees. Master's degree programs are offered by five academic units of the College of Public Programs. Specific requirements, as listed under the respective school or department section, lead to the following graduate degrees:

Communication:
Master of Arts (M.A.)

Justice Studies:
Master of Science (M.S.)
Concurrent M.A. Anthropology/
M.S. Justice Studies
Doctor of Philosophy (Ph.D.)

Journalism and Telecommunication:
Master of Mass Communication (M.M.C.)

Leisure Studies:
Master of Science (Recreation) (M.S.)

Public Affairs:

Master of Public Administration (M P A.)

College of Public Programs:

Doctor of Public Administration (D.P.A.)

The D.P.A. degree program is interdisciplinary in nature and is offered by faculty from various colleges. The program is administered by an executive committee appointed by and responsible to the Dean of the Graduate College. The purpose of the program is to prepare skilled professional public administrators for high-level positions in the public sector

Doctor of Philosophy in Justice Studies.

A Ph.D. degree program in Justice Studies reflects a law and society perspective and integrates philosophical, legal, and ethical approaches with social science and policy science methodologies. This program is interdisciplinary in nature and participating faculty are appointed by the Dean of the Graduate College to serve as members of the Arizona State University Committee on Law and Social Sciences. Students may develop an individualized area of substantive specialization through consultation with their program committee and/or choose from the areas of concentration identified with the program. The areas of concentration are: Criminal and Juvenile Justice; Dispute Resolution; Law, Policy and Evaluation; Law, Justice and Minority Populations; Women, Law and Justice.

Information on all graduate degree programs in the College of Public Programs is detailed in the *Graduate Catalog*

Adult Development and Aging Program. This program is an interdisciplinary research unit which emphasizes the analysis and understanding of the distinctive problems of elderly populations. This unit places special emphasis on the aged in the Southwest Besides its research activities, the program offers a Certificate in Gerontology and carries out many community service projects.

Admission

Freshmen: Any incoming freshman (0 24 semester hours who meets the minimum University admission requirements as detailed on pages 22 28 will be admitted to any chosen undergraduate academic unit of the College as a *pre major* in that respective academic unit.

Major Status Admission. Entry to any undergraduate academic unit of the College with status as a major requires the completion of at least 56 semester hours with a minimum cumulative grade point average of 2.50, plus whatever additional requirements the respective school/department may impose. When a student has completed course work at Arizona State University, the grade point average is computed on Arizona State University courses only, and must be based on a *minimum* of nine (9) semester hours of courses with grade options of "A,' 'B,' 'C, 'D, or 'E."

Most upper division courses in the College are not open to pre majors. Pre majors should check the *Catalog* course listing in their major field to determine which 300 and or 400 level courses are open to pre majors.

Students should refer to the information section of the *Catalog* with reference to their preferred area of study for retention requirements and/or continued enrollment in their major courses.

Transfer Students. Any person applying for admission or transfer to an academic unit of the College will be admitted as a major of that unit if the student has met the specific requirements as listed in the information section for the respective department/school.

Transfer Credit. In most cases, course work successfully completed at a regionally accredited four year institution of higher education will be accepted into the College of Public Programs respective academic unit.

Course work successfully completed at an accredited two-year institution of higher education (community or junior college) will transfer as lower-division credit up to a maximum of 64 semester hours.

Successful completion is defined for purpose of transfer as having received a grade comparable to an A, B, or C at ASU The acceptance of credits will be determined by the Director of Admissions and the utilization of credits toward degree requirements will be at the discretion of the individual academic unit.

Advisement. A student who has been admitted to the College of Public Programs will be assigned an academic advisor from the faculty of the academic unit that the student has selected as his/her major area of study. Questions on advisement should be directed to the student s academic advisor or to the Student Services Office of the College of Public Programs.

Course Load. A normal course load per semester is 15-16 semester hours The maximum number of hours for which a student can register is 18 semester hours unless an overload petition has been filed and approved by the Depart

ment/School Standards Committee and the Undergraduate Programs Committee of the College.

Overload petitions are not ordinarily granted to students who have a cumulative grade point average of less than 3.00 and do not state valid reasons for the need to register for the credits. Students who register for semester hours in excess of 18 and do not have an approved overload petition on file will have courses randomly removed through an 'administrative drop' action.

University Course Requirements

General Studies Requirements. All undergraduate students in the College of Public Programs are required to complete the University General Studies requirements in order to be eligible for graduation in any of the undergraduate curricula offered by the College.

Core courses are regularly reviewed. To determine whether a course meets one or more General Studies Core course credit requirements, see the *General Studies Course Guide* available prior to registration for courses. (See pages 43-46 for specific requirements.

Key to General Studies Core Credit Abbreviations

L1	Literacy and Critical Inquiry Core Courses (Intermediate level)
L2	Literacy and Critical Inquiry Core Courses (Upper division
N1	Numeracy Core Courses (Mathematics)
N2	Numeracy Core Courses Statistics and Quantitative Reasoning)
N3	Numeracy Core Courses (Computer Applications)
HU	Humanities and Fine Arts Core Courses
SB	Social and Behavioral Science Core Courses
S1	Natural Science Core Courses (Introductory)
S2	Natural Science Core Courses (Additional Courses)
G	Global Awareness Courses
H	Historical Awareness Courses

College Course Requirements

In addition to the University General Studies requirements, the College of Public Programs requires the following:

Humanities and Fine Arts. Zero to three (0 3) semester hours minimum for a total of nine (9) semester hours when combined with University General Studies.

Architecture
Architectural Philosophy and History, APH
Architectural Communication, AVC

Art.
Art History, ARH
Studio Art, ART

Communication:
COM 210, 222, 225, 241, 243, 271, 274, 341, 344, 420, 422, 441, 442, 443, 474

Dance:
Dance History, DAH
Dance Performance, DAN

English
ENG (other than Freshman Composition). Reading courses from community colleges NOT included.

Foreign Languages:
FLA, CHI, FRE, GER, GRK, ITA, JPN, LAT, RUS, SPA

Interdisciplinary Humanities:
Humanities, HUP, HUM

Music:
General Music Electives, MUS
Music History and Literature, MHL
Music Theory and Composition, MTC
Music Performance, MUP

Philosophy: PHI, HPS

Religious Studies: REL

Theatre
History, Literature, and Theory, THE
Theatre Performance and Production, THP

Social and Behavioral Sciences. Nine to twelve (9 12) semester hours minimum for a total of eighteen (18) when combined with University General Studies.

To satisfy the above College requirements, students may choose from the University General Studies list or supplement from the following

Anthropology (Cultural): ASB

Business
Administrative Services, GNB
Advertising, ADV
Decision and Information Systems, DIS
Economics, ECN
Finance, FIN
Management, MGT
Marketing, MKT
Quantitative Business Analysis, QBA
Transportation, TRA

Communication
All Communication courses *other* than listed above under Humanities and Fine Arts requirements

Design Sciences DSC
Engineering
Chemical and Bio Engineering, CHE
Civil Engineering, CEE
Electrical and Computer Engineering, EEE
Engineering Core, ECE
Mechanical and Aerospace Engineering, MEE
Geography (Physical): GPH
Geology. GLG
Mathematics. MAT, STP
Physics: AST, PHS, PHY
Psychology. PSY
Zoology: ENT, ZOL
Students may not use courses from their major department/school to satisfy the above College course requirements.

English Proficiency. Students must demonstrate reasonable proficiency in written English by achieving a grade of C or better in both ENG 101 and ENG 102, or in ENG 105 or its equivalent. Should a student receive a grade lower than 'C' in any of the courses, it must be repeated until specified proficiency is demonstrated. Transfer students from colleges outside Arizona should consult the College Student Services Office in Wilson Hall to assure completion of this requirement.

Writing Competence Requirement. In addition to English 101 and 102, or their equivalent, one of the following courses in written composition is required of all undergraduate majors: ENG 200, ENG 211, ENG 301, ADS 233, or JRN 201. This course may be counted as fulfilling the University Literacy and Critical Inquiry requirement if it is on the University approved list.

Communication Requirement. One of the following courses is required for all undergraduate majors: COM 100, 225, 230, 241, or 259. It may be included within the University General Studies requirements, the College of Public Programs requirements, or department/school degree program where appropriate.

Computer Science Requirement. One of the following courses is required for all undergraduate majors: CSC 180, 181, or 183. It may be included within the General Studies distribution al requirement or department/school degree program where appropriate.

Foreign Language Requirement. The School of Journalism and Telecommunication is the only academic unit of the College that has a foreign language requirement in order to successfully complete work for the Bachelor of Arts degree in either journalism or broadcasting. Refer to the degree requirement section of the School of Journalism and Telecommunication for detailed information.

Limitation on Physical Education Activity Hours. No more than eight hours of physical education activity courses may be counted within the minimum 126 hours required for graduation

Department/School Course Requirements

Students should refer to their respective Department/School for additional or more specific requirements.

Special Credit Options

Undergraduate Credit for Graduate Courses. In order to enable undergraduate students to enrich their academic development, the Graduate College and the individual academic units of the College of Public Programs will allow qualified students to take graduate level courses for undergraduate credit. In order to qualify for admission to a graduate level course, the student must have senior status (87 or more semester hours successfully completed) and a cumulative grade point average of 3.00 or higher. In addition, permission to enroll must be given prior to registration and must be approved by the instructor of the course, the student s advisor, the department chair/school director, and the Dean of the College in which the course is offered.

Academic Standards and Retention

Good Standing. Any pre major or major student of the respective academic units of the College will be considered in good standing if the student maintains a cumulative grade point average of 2 00 or higher in all courses taken at Arizona State University.

Probation. Any student who does not maintain good standing status as described above may be placed on probation. A student on academic probation is required to observe any limitations or rules the College may impose as a condition for retention.

Disqualification, Reinstatement, and Appeals. The terms of disqualification, reinstatement, and appeals are identical with those of the University as set forth on page 42 of this *Catalog*.

All academic discipline action is the function of the Student Services Office, Wilson Hall, Room 232, under the direction of the Dean of

the College. Students who are having academic problems should contact this office for advise ment.

Honors Program. The College of Public Pro grams provides an Honors Program for under graduates of exceptional ability. This program includes special courses taught by outstanding faculty and limited in class size, special advise ment, preferential preregistration, and the prep- aration of a senior Honors thesis

Admission to the Honors Program. Entering freshmen in the top 5% of their high school graduating class and those who have a 27 or higher ACT composite score or a 1250 or higher SAT combined score are eligible to apply for admission to the program. Continuing and trans fer students who have completed between 15 and 60 hours with at least a 3.25 GPA also may apply for admission to the program. However, only ASU course work is used to determine the GPA for Honors retention and graduation.

Accelerated Degree Programs. Selected aca- demic units within the College of Public Pro grams provide inter and intradisciplinary programs leading to the completion of the bac calaureate degree and the master's degree within a five year period. These are not new degree pro grams, but rather than articulation of required course work which will allow the student with exceptional ability to obtain both the undergrad uate and graduate degree in a shorter than normal time frame. Completion of the master's degree should require two semesters and inter mediate summer course work beyond the bacca laureate degree.

Admission Requirements. To be successful in this program, students must have graduated from a recognized high school and achieved one of the following: (1) graduated in the upper 5% of their high school graduating class; (2) attained an ACT composite score of 27 or higher, (3) a combined SAT score of 1250 or higher.

In addition, students are required to maintain a minimum cumulative grade point average of 3.25 in order to continue participation in an ac- celerated degree program option.

Students wishing to enter this program but not possessing the above requirements may choose to enter the program late during their un dergraduate studies Such students must have achieved and maintained a minimum grade point average of 3 40 at Arizona State University. These students must also recognize that they may require longer than the expected five years to complete both degrees.

Program options. *Interdisciplinary* Accelerated Degree Program options include but are not limited to:

Bachelor s Degree in Communication
Master of Mass Communication
Bachelor's Degree in Communication
Master of Public Administration
Bachelor s Degree in Journalism/Telecom munication - Master of Arts in Commu nication
Bachelor's Degree in Journalism/Telecom munication - Master of Science in Justice Studies
Bachelor's Degree in Journalism/Telecom munication Master of Public Administration
Bachelor s Degree in Justice Studies - Master of Public Administration
Bachelor's Degree in Leisure Studies
Master of Public Administration

Accelerated *Intradisciplinary* options are also available within the academic units of Commu nication, Journalism/Telecommunication, Jus tice Studies, and Leisure Studies.

Master's Degree Requirements. Participa- tion in an Accelerated Degree Program option in no way implies a guarantee of admission into any graduate degree program. The student must make application and meet all requirements for regular admission to the selected Master s Pro gram as defined in the Arizona State University *Graduate Catalog* for the respective College of Public Programs discipline.

Interested students should consult the Ari zona State University *General Catalog* and sep- arate curriculum checksheets for individual de partment/school accelerated program require- ments. For further information, students may call or write the College of Public Programs Student Services Office, Wilson Hall 203.

Graduate Requirements. Besides completing the regular University, College and departmen tal graduation requirements for the major, Hon ors students must complete at least 60 hours of resident course work at ASU with a 3.40 cu mulative GPA; complete at least 18 hours of specially designated Honors course work, in cluding 6 upper-division hours out of the ma- jor; and write a senior Honors thesis under the supervision of a thesis committee, subject to oral defense and designated approvals.

For further information about the program, students should call or write the College Stu dent Services Office, Wilson Hall 203.

Department of Communication

PROFESSORS:
GOYER (STAUF 412), ARNOLD, DAVIS, GUDYKUNST, JA N KASTENBAUM, PERR LL, K VALENTINE

ASSOCIATE PROFESSORS:
BANTZ, BULEY CRAWFORD DAVEY HECHT, MAYER MERRILL, REINARD, C. VALENTINE

ASSISTANT PROFESSORS:
GUNDERSEN (ASU WEST CAMPUS) PETRON O, ROBB NS, SUNNAFRANK

LECTURERS:
CURTIS, OLSON (Director of Forensics) WILL AMS (ASU WEST CAMPUS)

General Information

The Department of Communication exists to ad vance the understanding, skills, and evaluations associated with message related human behav ior, for the purpose of improving communica- tive interactions. We direct our teaching, re search, and service to the continued develop ment of a knowledge base and application of principles of communication which impact hu man relationships in virtually every context and academic area. Courses of study are de- signed to provide students with relevant pro grams adapted to individual academic and pro- fessional goals.

Communication Pre-Major Requirements. All students admitted to the University are eli gible for acceptance to the Department of Com munication in a pre major status.

Communication Major Requirements. Under- graduate students may be admitted to Communi cation major status after meeting all of the fol lowing requirements:

(1) Completion of at least 56 semester hours with a minimum cumulative grade point average of 2.50. The grade point average is computed on ASU courses only, and must be based on a *minimum* of nine semester hours of courses with grade op- tions of A, B, C, D, or E.
(2) Completion of University core course re quirements (see pages 43-46 with a mini mum grade of 'C in each.
(3) Completion of all College of Public Pro- grams core course requirements (see pages 364 365) with a minimum grade of 'C ' in each.
(4) Completion of 12 hours of Department of Communication core course requirements (COM 100, 207, 225, 308) with a mini mum grade of ' C' in each.

Degree Requirements

Bachelor of Arts and Bachelor of Sci- ence Degree Curricula. Of the minimum re quired 54 hours (12 hours of departmental core courses, plus the 42 hours noted below), at least 30 hours must be 300/ 400 level courses. In addition to University, College, and Depart ment core course requirements, all majors must complete a combination of required and option al courses consisting of at least 42 hours as fol lows:

(1) *18* hours consisting of three (3) pairs from the following list of five (5) pairs of courses:

COM 263:	Elements of Intercultural Communication
COM 363:	Intercultural Communication Processes
COM 110:	Elements of Interpersonal Communication
COM 410.	Interpersonal Communication Theory and Research
COM 241:	Introduction to Oral Interpre tation
COM 443:	Interpreter s Theatre: Theory and Practice
COM 250:	Introduction to Organiza tional Communication
COM 450:	Theory and Research in Or ganizational Communication
COM 321:	Rhetorical Theory and Research
COM 421.	Public Address

(2) A minimum of *24* additional hours of graded course credit in Interest Area courses, at least 12 of which must be in the Department of Communication, with at least 6 of the 12 at the 400 level, and all courses outside the department at the 300/400 level. A maximum of 6 hours of 'Y ' credit may be counted toward the major. Curriculum Check Sheets are available from youradvisor.

In addition to the above listed requirements, students seeking the Bachelor of Arts or Bache

lor of Science degree must satisfy the Univer sity General Studies requirements as noted:

	Bachelor of Arts	Bachelor of Science
I. Literacy and Critical Inquiry (6 [1] a) 200 level (3) (b) 300 400 level 3) COM 308, 321[2]	6	6
II Numeracy (6 [1] (a) Mathematics (3) (b) Statistics/Quantitative Reasoning *or* Compu ter Applications 3) COM 408[2]	6	9 [3]
III. Humanities and Fine Arts (6 9)[1,4]	9	9
IV. Social and Behavioral Sciences (6 9)[1,4]	18	18
V. Natural Science (8)	8	8
VI. Awareness Areas (6) (a) Global (3 COM 263,[5] 371 (b Historical (3)	9	6
Total:	56	56

[1] University General Studies Hourly Requirements
[2] May count toward major's credit hour require ments
[3] Must include 3 hours from each area (Mathe matics, Statistics, and Computer Applications).
[4] Total minimum of 15 hours in III and IV com- bined.
[5] Also satisfies core requirement in IV

Students may not use courses included in the major to fulfill General Studies requirements. Consult your advisor for current information concerning College of Public Programs and De partment of Communication lists of courses ap plicable to General Studies requirements.

Bachelor of Arts in Education. The Second ary Education curriculum *major* in Communica- tion consists of 36 hours in Communication (in cluding COM 480) and a minimum of 24 hours in a single additional approved academic minor. The student must complete all University, Col lege of Public Programs and Department of Communication core courses, and at least one course in each of the designated areas in the de- partment. At least 18 hours of the major must be in upper division courses; an additional 6 hours of Communication activity courses (COM 281 or 382 which involve non graded credit only) must be completed. Specific courses to complete the major are selected by the student in consultation with the student's advisor. Students should consult the College of Education to ascertain the General Studies re- quirements for this degree.

Secondary Education curriculum *minor* in Communication consists of 24 semester hours in Communication, including the departmental core courses, plus COM 480. At least 9 of the additional hours must be in upper division course work.

Communication Internships. Internships con- sist of supervised field experiences and are avail able to qualified upper level undergraduate (COM 484) and graduate (COM 584) students. Internships must receive prior approval from the departmental Coordinator of Internship Pro- grams *before* student registration for the course. Internships may be taken once or re- peated for credit up to a total of 12 hours, but not more than 6 hours may be applied toward the major.

Departmental Graduate Programs

The Department of Communication offers pro grams leading to the degree of Master of Arts. Consult the *Graduate Catalog* for requirements.

COMMUNICATION

COM 100 Introduction to Human Communication. (3) F, S, SS
A top cs or ented ntroduction to bas c theories, d men s ons, and concepts of human commun cative nteraction and behavior *[Satisfies General Stud es Requirement: SB]*

110 Elements of Interpersonal Communication. (3) F S SS
Demonstration and pract ce of commun cative tech- n ques n estab sh ng and ma ntain ng nterpersonal re- at onships

172 Introduction to Manual Communication. (3) F, S Amer can S gn Language (ASL) nguist c pr nc p es, ex press ve recept ve sk l s term no ogy, cu tura aspects, soc o educat ona trends and s gn systems

200 Human Communication Systems. (3) N Human communicat on processes and systems, major areas of theory and research and the scient f c bases of human commun cation behav or

207 Introduction to Communication Inquiry. (3) F, S, SS
Bases of nqu ry nto human commun cat on, nc uding 'n troduct on to notions of theory ph osophy, problems, and approaches to the study of commun cat on. Prerequ s te: COM 100 *[Satisf es Genera Stud es Requirement. L1]*

210 Issues in Interpersonal Communication. (3) F S Exp oration of theoret ca , eth ca and ph osophical ap- proaches to communicat on n human re at onsh ps Pre requisite COM 110.

215 Listening. (3 F, S
Study of theory and practice of effect ve stening behav ors nc uding ntensive sk l exerc ses

222 Argumentation. 3 A
Ph osoph ca and theoret ca foundat ons of argumenta t on, nclud ng a compar son of mode s of advocacy and ev dence *[Sat sf es Genera Stud es Requ rement L1]*

225 Public Speaking. 3 F S, SS
Verba and nonverbal commun cat on in p atform speak ng D scuss on and pract ce n voca and phys ca de very and n purposefu organizat on and deve opment of pub c commun cat on Not open to freshmen *[Sat sfies General Stud es Requ rement L1]*

230 Small Group Communication. 3 F, S, SS
Princ p es and processes of sma group commun cat on, att tudes and sk s for effect ve part c pat on and eader sh p n sma groups sma group prob em solving and dec s on mak ng *[Sat sf es Genera Stud es Require ment SB]*

241 Introduct on to Oral Interpretation. 3 F, S SS
The commun cat on of terary mater a s through the mode of performance Verba and nonverba behav or, in terface of nterpreter w th terature and aud ence and rhetor ca and dramatic ana ys s of terary modes

243 Interpreters Theatre Workshop. 3 S
Students w create and pract ce ensemb e nterpretation of terature us ng a var ety of med a in d verse sett ngs

250 Introduction to Organizational Communication. 3 F S
ntroduct on to the study of commun cation n organ za t ons nc ud ng dent f cat on of vanab es, ro es, and pat- terns nf uenc ng commun cat on n organ zat ons Prereq u s te. COM 207 *[Sat sf es General Stud es Requ re ment. SB]*

251 Interview ng. 3 F, S
Pr nc p es and techn ques of nterv ew ng nc uding prac t ce through rea and s mu ated nterviews n information a persuas ve and emp oyee re ated s tuat ons Not open to freshmen

259 Communication n Business and the Professions. 3 F S SS
Interpersona group and pub c commun cat on in bus ness and profess ona organ zat ons Not open to fresh men and not ava ab e for cred t toward the major

263 Elements of Intercultural Communication. 3) F, S
Bas c concepts, pr nc p es and sk ls for mprov ng com mun cat on between persons from d fferent m nor ty rac a , ethn c and cu tura backgrounds *[Satsf es Gener al Stud es Requirements SB G]*

271 Voice Improvement. 3 F S
ntens ve persona and group exper ence to mprove normal voca usage nc ud ng art culat on and pronunc a tion

272 Intermediate Manual Communication. 3 F S
Emphas s on ncreas ng vocabu ary and speed, deve op ment of greater f uency n ASL, nclud ng f nger spe ng and non verba commun cat on Survey of deafness Prerequ s te COM 172

274 General Semantics. 3 A
Ana ys s of re at onsh p of anguage to rea ty. nature of mean ng leve s of abstract on app cat on of general semant cs to everyday contexts

275 Nonverbal Communication. 3 F, S SS
The effects of space t me body movement, env ronment objects and vo ce qua ty on human commun cat on and nteract on

281 Commun cation Activities. 1 3 F S, SS
Non-graded part c pat on n forens cs or nterpretat on cocurr cu ar act v t es, or for students enro ed n SED 433 (max mum 3 cred ts each semester) Prerequ site approva of nstructor

294 Special Topics. 3 F, S, SS
Prerequ s te approva of nstructor.

308 Empirical Research Methods in Communication. 3 F S
Exam nat on of emp r ca research methods n commu n cat on, nc ud ng experimental survey descriptive and other quant tat ve approaches Prerequ s te COM 207 *[Satisfies Genera Stud es Requirements L2 N2]*

312 Communication, Conflict and Negotiation. (3) A
Theories and strateg es of commun cat on re evant to the management of conf cts and the conduct of negotia t ons Prerequ s te COM 100 or approval of nstructor.

316 Women and Communication (3 A
ntroduct on to gender re ated commun cat on. Verba , nonverba , and para ngu st c d fferences and sim lar t es are exam ned w th n soc a , psycho ogica , and historic perspect ves.

320 Communication and Consumerism. (3) F S
Critica eva uat on of messages des gned for pub c con sumpt on Perce v ng, eva uating, and respond ng to po i t cal, soc a and commerc al commun cat on *[Satisfies General Stud es Requirement· SB]*

321 Rhetorical Theory and Research. (3) F S
H stor ca deve opment of rhetor ca theory and research n commun cation from c ass ca ant qu ty to the present Prerequ s te COM 207. *[Satisf es Genera Studies Re quirements L2, HU]*

325 Advanced Public Speaking. (3 F S
Soc al and pragmatic aspects of pub c speaking as a commun cative system strateg es of rhetorical theory and the presentat on of forms of publ c communication. Prerequ s te COM 225 or approval of nstructor.

329 Persuasion. 3) A
Var ab es wh ch nf uence and modify att tudes and be hav ors of message rece vers, inc ud ng ana ysis of the ories research and current prob ems Prerequisite· COM 207 or approva of instructor *[Satisfies General Studies Requ rement SB]*

331 Large Group Decision-Making. 3 F, S
Theory, methods and nd v dua communicat ve behav ors re evant to large group nteract on systems Pub c d scuss on and parl amentary procedure n var ous types of pub c and de berat ve assemb es Prerequis te COM 230 or approva of nstructor

341 Interpretation in Social Contexts. 3) N
Adaptat on and performance of terature n situations of cr s s and confl ct notab y n pr sons, menta hospitals and centers for the aged Prerequ s te· COM 241 or ap- prova of nstructor

344 Oral Traditions in Literature. (3) N
L terary forms evo v ng from oral myths egends, folk ta es and fab es Prerequ s te COM 241 or approval of nstructor. *[Satisf es General Studies Requ rement. HU]*

363 Intercultural Communication Processes. (3) F, S
Processes and prob ems of commun cat on between peop e from d fferent racia ethn c and cultural back grounds n both domest c and nternational settings Pre requis te COM 263 or approva of nstructor *[Satisfies General Stud es Requ rement. SB]*

371 Language, Culture, and Communication. (3) A
Cu tura nfluences of anguage on commun cat on nc ud ng soc a funct ons of anguage, b ngua sm, bicul tura sm and b d a ectism Prerequ s te· COM 263 or ap prova of nstructor *[Satisf es General Studies Require ment: G]*

372 Advanced Manual Communication. (3) F S
ASL and Engl sh concepts and id'omat c express ons; emphas s on ASL princip es Practice n bu ld ng f uency in Ameslan preparation for nterpret ng Prerequisite COM 272.

382 Classroom Apprenticeship. (1-3) F S, SS
Non graded cred t for students extend ng the r experi ence with a content area by ass sting with c assroom su pervis on in other COM courses (max mum 3 cred ts each semester . Prerequ s te. approva of nstructor.

394 Special Topics. (3) F S, SS
Prerequ site approva of nstructor.

408 Quantitative Methods in Communication Research. 3 N
The use of descr pt ve and nferentia statist cs n commu nication research Prerequisite COM 308 or approva of instructor *[Satisfies Genera Studies Requirement N2]*

410 Interpersonal Communication Theory and Research. (3) A
Survey and ana ys s of major research top cs para digms, and theor es dealing with message exchanges between and among soc al peers Prerequ s tes COM 110 and 207 or approvai of nstructor *[Satisfies General Studies Requirement SB]*

414 Crisis Communication. 3) N
Ro e of communication n cr sis deve opment and nter vention Prerequisite approval of nstructor

417 Communication and Aging. 3) N
Dynam cs of ag ng as t re ates to commun cat on Prereq u site approval of nstructor.

421 Public Address. 3) N
Critical study of s'gn f cant speakers and speeches of the past and present Prerequ site COM 321 or approva of nstructor *[Satisfies General Studies Requirement. HU]*

422 Advanced Argumentation. (3) N
Advanced study of argumentat on theories and research as appl ed to pub c forum, adversary, scho arly and e- gal settings. Prerequ s te COM 222 or approva of n structor

425 Legal Communication. (3) N
The lega setting as a communicative event, featuring d s cussion of jury se ect on, ega nterviewing negotiat ons and jury behavior. Prerequ s te· approva of nstructor

430 Leadership in Group Communications. 3) N
Theory and process of eadersh p in group commun ca tion, emphas z ng ph' osophica foundat ons, contem porary research, and app icat ons to group s tuat ons. Prerequis te. COM 230 or 331 or approval of instructor *[Sat sfies General Studies Requirement SB]*

441 Interpretation as Literary Criticism. (3) N
Commun cat on of iterature through the med um of per formance. Problems of content, structure, and sty e n poetry, drama and prose Prerequ s te. COM 241 or ap proval of instructor

442 Interpretation and the Mass Media. 3) N
The re at onsh p of modern med a (rad o, TV and f lm) to ora interpretation and iterature. Prerequisite COM 241 or approva of nstructor.

443 Interpreters Theatre: Theory and Practice. (3 N
Studies in visua perception aud'ence psycho ogy the ory and criticism; pract ce n d rect ng, ana yzing script- ing, and stag ng of literature Prerequ s te: COM 243 or approval of instructor.

444 Interpretation of Shakespeare. (3) N
Ana ys s and solo performance of scenes from Shake speare Emphasis on current trends n the critic sm and nterpret ve performance of Shakespearean terature. Prerequ s te: COM 241 or approva of nstructor

445 Chamber Theatre. 3 N
Theory and pract ce n ana yzing scripting, and stag ng prose f ct on as group performance. Prerequ site COM 241 or approval of nstructor.

450 Theory and Research in Organizational Communication. 3 F S
Cr t ca rev ew and ana ysis of the dominant theories of organ zat ona commun cat on and the r coro lary re search strateg es Prerequ sites COM 250 and 308 or approva of nstructor *[Satisfies General Stud es Re qu'rement SB]*

451 Quality Circles Facilitation. 3) A
Princ ples mp ementat on p ans and concepts n fac litat ng 'Qua ty C rc es and s m ar emp oyee teams n vo ving patterned communicat on Prerequ sites· COM 230 250 and 308, or approva of nstructor.

453 Communication Training and Development. (3 N
Exam'nat'on of the procedures and types of commun cation training and deve opment n bus ness ndustry and government Prerequ s tes COM 250 and 308 or approva of nstructor

456 Political Communication. (3 A
Theory and research re ated to po it ca campa gn com mun cat on The persuas ve process of pol tica cam pa gn ng, the ro e of the med a the cand date and mage creat on. Prerequ s tes COM 250 and 308, or approva of nstructor *[Satisfies General Studies Requirement· SB]*

457 Communication and Information Diffusion. (3) N
Role of commun cat on in d ffusion of innovat ons. Princ p es for effect ve use of commun cat on for planned change n various soc a systems Prerequ sites. COM 250 and 308, or approva of nstructor *[Satisfies General Studies Requirement SB]*

472 Development of Language as Communicative Behavior. (3) N
Deve opment of anguage and 'nterpersonal commun ca t ve behav ors of chi dren through ado escence, nclud- ng expressive and recept ve competenc es and interac tions with others Prerequ site approva of nstructor *[Sat sf es General Stud es Requirement SB]*

480 Methods of Teaching Communication. 3) N
Analys s organ zat on and presentat on of textua and other c assroom matena s Prerequ s te· approval of in structor

484 Communication Internship. (1 12 F, S, SS

494 Special Topics. (1 3 F, S SS
Prerequ site: approva of instructor

500 Research Methods in Communication. 3) A
Cr t cal analys s of systems of 'nqu ry n commun cation focus ng on the identif cation of var ab es and ap proaches to conduct ng research n communication Pre requ s te approva of nstructor

504 Theories and Models in Communication. (3 A
Theory construct on, metatheoret ca concerns, mode s, construct def n t on, and comparative ana ysis of current theor es n commun cation Prerequ s te approva of n structor

508 Quantitative Research Methods in Communication. (3) A
Empir ca research des gns, measurements, and stat st ca strateg es and techn'ques 'n analyzing and evaluat ing exper menta and descr ptive research n commun ca tion Prerequ s te· COM 500 or approval of nstructor.

509 Qualitative Research Methods in Communication. (3) A
Qualitative research methods, including interviewing, field methods, and other non-quantitative techniques for analyzing communication. Prerequisite: COM 500 or approval of instructor.

510 Interpersonal Communication Theory and Research. (3) N
Contemporary theories and research in interpersonal communication. Prerequisite: approval of instructor.

512 Death, Society and Human Experience. (3) N
Examines dying, death, and bereavement, from both individual and socio-cultural perspectives in terms of options for communication and action.

521 Rhetorical Criticism of Oral Discourse. (3) N
History and significance of rhetorical theory and criticism in the analysis of oral discourse. Prerequisite: COM 500 or approval of instructor.

529 Theories of Persuasion. (3) N
Analysis of representative theories and models of persuasive processes and their implications for communicative behavior. Prerequisite: approval of instructor.

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. Prerequisite: approval of instructor.

541 Research Perspectives in Interpretation. (3) N
Supervised research in the historical and contemporary relationships between the interpreter, the text, and the audience. Prerequisite: approval of instructor.

555 Communicative Processes in Organizations. (3) N
Systematic analysis of communicative interactions between organizational structure, information flow, and human behaviors in the organizational setting. Prerequisite: approval of instructor.

563 Intercultural Communication. (3) N
Analysis of contemporary theory and research concerning the effects of a variety of cultural variables on communication between people. Prerequisite: approval of instructor.

575 Language and Message Systems. (3) N
Sign/symbol systems; personal, functional, and contextual aspects of message systems; measurement of "meaning." Prerequisite: approval of instructor.

584 Communication Internship. (1-12) F, S, SS

See page 38 for special courses which may be offered by this academic unit.

School of Justice Studies

John R. Hepburn, Ph.D., Director

PROFESSORS:
HEPBURN (WILSON 323), ALTHEIDE, HAYNES, JOHNSON, KENNEDY, LAUDERDALE, MUSHENO

ASSOCIATE PROFESSORS:
BORTNER, BRUNS, CAVENDER, DATESMAN, HERNANDEZ, SCHADE, SHUMAN

ASSISTANT PROFESSORS:
FERRARO, JURIK, MELICHAR, ZATZ

Purpose and Philosophy

The School provides an interdisciplinary setting for studying justice from a social science perspective: the just distribution among people of benefits and burdens, including rights, desserts, and needs. The curriculum focuses on criminal, juvenile, civil and administrative regulations; and the individual and group behavior that these regulations are designed to influence. The study of justice includes diverse conceptions such as social justice, economic justice and the growing concern with victimology as well as the exploration of liberty and responsibility.

Degrees

Bachelor of Science. The curriculum for the Bachelor of Science degree in Justice Studies provides interdisciplinary, social science courses relevant to law and justice for students working in the justice field, those anticipating justice-related careers (including the legal profession), and interested non-majors.

Master of Science. The faculty in the School of Justice Studies offer a program leading to the Master of Science degree with a major in Justice Studies. The study of justice is an interdisciplinary problem-oriented 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, and entailing a critical examination of the systems which 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. Information on the Master of Sci ence with a major in Justice Studies is detailed in the *Graduate Catalog*

Concurrent M.A. Anthropology/M.S. Justice Studies. Graduate students in the School of Justice Studies and the Department of An thropology are able to receive a concurrent Mas ter of Science degree in Justice Studies and Master of Arts in Sociocultural Anthropology. The principal purpose of the program is to pre pare individuals with combined and complemen tary knowledge and skills for basic and applied research and administrative and educational ac tivities related to justice studies and anthropol ogy.

Students will have to be admitted separately to each program, following the guidelines set forth by the Graduate College, Department of Anthropology and School of Justice Studies. Additional information on the M.A. in Socio cultural Anthropology and the M.S. in Justice Studies may be obtained from each department.

Doctor of Philosophy in Justice Studies. Studies reflects a law and society perspective and integrates philosophical, legal, and ethical approaches with social science and policy science methodologies. The central focus of the pro gram is the conceptualization and implementa tion of law and justice in society. The Ph.D. de gree program aims to prepare scholars for place ment in the growing number of colleges and universities with interdisciplinary, justice related programs (e.g., law and society, crimi nal justice, women s studies) The program is interdisciplinary in nature and administered by a university committee. Specifically, participat- ing faculty are appointed by the Dean of the Graduate College to serve as members of ASU's Committee on Law and Social Sciences and its Executive Board. Students may develop an in dividualized area of substantive specialization through consultation with their program com- mittee and/or choose from the areas of concen tration identified with the program. The areas of concentration are:

Criminal and Juvenile Justice
Dispute Resolution
Law, Policy and Evaluation
Law, Justice and Minority Populations
Women, Law and Justice

Information on the Ph.D. in Justice Studies is detailed in the *Graduate Catalog*

Doctor of Public Administration. Justice Studies is an area of concentration within the Doctor of Public Administration (D.P.A.) de gree program, an interdisciplinary program of- fered by faculty from various academic units. The Justice Studies concentration is designed to prepare skilled professionals for high level posi- tions in justice agencies. The D.P.A. degree pro gram is administered by an executive committee appointed by and responsible to the Dean of the Graduate College. For more details, see the description of the D.P.A. program in the *Grad uate Catalog*.

Admission to Undergraduate Program

The Bachelor of Science in Justice Studies is an upper-division program. Upon admission to the University, Justice Studies students will be classified as pre-majors. Major status is re quired for graduation and Justice Studies stu- dents may earn Major status by:

1 earning a minimum of 56 semester hours
2 earning a minimum cumulative grade point average of 2.50 (calculated on semester hours earned at Arizona State University
3) completing, with a grade of C or better, the following courses. JUS 100, JUS 200, JUS 301, JUS 302, JUS 303, ENG 101 and ENG 102 (or ENG 105 , and the College of Public Programs Writing Competency Requirement.

Upon completion of these requirements, the School of Justice Studies will administratively assign the pre major to Major status.

Academic Advisement. Justice Studies stu- dents admitted as pre majors are advised by the School's academic advisor. All students are en couraged to seek advisement in order to formu late an appropriate educational plan. Justice Studies Majors may also be advised by the School s faculty.

A comprehensive discussion of degree require- ments for the Bachelor of Science in Justice Studies is contained in the School s *Undergrad uate Advisement Guide*, available in Wilson 342 and via requests by mail or phone (602/965- 7727). Every Justice Studies undergraduate re ceives the *Advisement Guide* as well as an eval uation of transfer work, if any, by the School s advisement staff upon admission to the Univer sity.

Degree Requirements

The School of Justice Studies awards a Bachelor of Science upon the successful completion of a curriculum consisting of a minimum of 126 sem- ester hours including University General Stud ies Requirements, College of Public Programs Requirements, Justice Studies courses, and

electives. Additionally, the student must fulfill the following:

1. Earn Major status.
2. Accumulate a minimum of 50 semester hours of upper division courses.
3. Complete a minimum of 30 semester hours, including 24 in Justice Studies courses, at Arizona State University.
4. Earn a grade of C' or better in all Justice Studies courses taken at Arizona State University
5. Meet the University's residency and scholarship requirements. A comprehensive discussion of degree requirements for the B S in Justice Studies is contained in the School's *Undergraduate Advisement Guide.* (See ' Academic Advisement.')

General Studies Program. To assure breadth and depth of their education, all Justice Studies undergraduates must complete the University General Studies Requirements, and additional fundamental requirements prescribed by the College of Public Programs and the School of Justice Studies For descriptive information on these requirements, refer to:

University General Studies, pages 43 46, this *Catalog*

College Requirements, pages 364 365, this *Catalog*

School Requirements, *Undergraduate Advisement Guide* (see ' Academic Advisement')

Justice Studies Program. The required Justice Studies component consists of 54 semester hours, of which 15 must be taken in a Related Field approved by the School. JUS 100, 200, 301, 302, and 303 are required for all degree candidates. Through advisement, a group of Justice Studies courses may be recommended to ensure a comprehensive exposure appropriate to the student's interests. For specific information in this area, refer to the *Undergraduate Advisement Guide.* (See Academic Advisement.')

Electives. Students are encouraged to utilize the unique opportunities afforded by the University to pursue personal educational interests, whether in the form of a broad sampling of other disciplines, or the deeper probing of a single field.

Transfer of Community College Credits. Credits transferred from accredited community colleges will be accepted as lower-division credits up to a maximum of 64 semester hours. The acceptance of credits will be determined by the Director of Admissions, and the applicability of credits toward degree requirements will be determined by the School of Justice Studies.

Special Program Option. Justice Studies participates in the accelerated degree program of the College of Public Programs, by which eligible students may complete a master's degree on an accelerated schedule. See the description provided by the College of Public Programs (page 366).

JUSTICE STUDIES

JUS 100 The Justice System. 3) F, S, SS
Overview of the ustice system Roles of aw enforcement personnel, the courts, and correctiona agencies Philosophical and theoretical views in historical perspective *[Satisfies General Studies Requirement SB]*

200 Concepts and Issues of Justice. (3) F, S SS
ssues relating to justice policies, perspectives, techniques roles, nstitutional arrangements, management, uses of research, innovative patterns *[Satisfies General Studies Requirement. SB]*

301 Research in Justice Studies. (3 F S, SS
Oriented toward an understanding of research elements e , errors in reasoning hypotheses, scales of measurement, vanables, sampling and reliability Prerequisite JUS 100 or JUS 200 or approval of instructor

302 Basic Statistical Analysis in Justice Studies. (3) F, S, SS
Introduction to the fundamentals of statistics, a description of the purpose and process of evaluative research in justice studies. Prerequisites. JUS 100 or JUS 200 and MAT 106, or approval of nstructor. *[Satisfies General Studies Requirement N2]*

303 Justice Theory. (3) F, S SS
A conceptual examination of the justice system. ntegration of contemporary thought nto an operational frame of reference Prerequisite· JUS 100 or JUS 200 or approval of nstructor

306 The Police Function. 3) F, S, SS
Alternative objectives strategies, programs nstitutional arrangements roles perspectives, and interagency relationships of the police Prerequisite. JUS 100 or JUS 200 or approval of instructor.

308 The Adjudication Function. (3) F S
Objectives, processes, settings, roles, and perspectives of the courts prosecution, and defense. Prerequisite. JUS 100 or JUS 200 or approval of nstructor.

310 The Correctional Function. (3) F, S, SS
Alternative correctional objectives strategies, programs, institutional arrangements, roles, perspectives and interagency relationships. Prerequisite JUS 100 or JUS 200 or approval of nstructor

311 Prevention of Delinquent and Criminal Behavior. 3) F, S
Theories of prevention individual group and community approaches: intervention at appropriate stages contemporary law enforcement and correctional practices Prerequisite JUS 100 or JUS 200 or approval of nstructor

320 Community Relations in the Justice System. (3 F S
Relationship between the justice system and the community served Focus on social stratification interest groups, and racial ethnic minorities Prerequisite· JUS 100 or JUS 200 or approval of instructor

329 Domestic Violence. (3) F, S
Legal aspects of domestic violence in context of historical, theoretical, and treatment aspects of domestic vio

lence, nc uding ch ld abuse women batter ng ncest manta rape and e der y abuse Prerequ s te JUS 100 or JUS 200 or approva of instructor

340 Juvenile Justice. (3 F S
A crit ca exam nat on of the h story and deve opment of the juven e court and the juven e justice system. Pre requ s te JUS 100 or JUS 200 or approva of nstructo .

360 Law and Social Control. 3) F S SS
Resolution of social ssues through the app cat on of aw as an agent of soc al contro Nature, sanct ons and lim ts of aw Categories of law and schoo s of jurispru dence Prerequis te JUS 100 or JUS 200 or approva of nstructor *[Satisf es General Stud es Requ rement. SB]*

394 Special Topics. 1 3 F S, SS
Topics chosen from various f elds of just ce stud es Pre requ s te JUS 100 or JUS 200 or approva of nstructor

404 Imperatives of Proof in the Justice System. 3 F, S
Prob ems and means of estab sh ng dent ty and fact relation to arrest detent on, adjud cat on sentencing and correct onal case management Prerequ s te· JUS 100 or JUS 200 or approva of nstructor

422 Women and Crime. 3) F S, SS
An n depth ana ys s of the nvo vement of women n crime and in the criminal justice system Prerequ s te JUS 100 or JUS 200 or approva of nstructor

435 White Collar Crime. (3 F S
Overview of major ssues n bus ness, profess ona and officia rule vio at ons. nc udes consumer fraud secur ties v olat ons, uneth ca profess onal sm, po it ca corrup t on Prerequ s te. JUS 100 or JUS 200 or approva of n structor

440 Organization and Administration of the Justice System. (3) F, S SS
System w de analys s of organ zat ona structures Man agement and adm n strat ve po cies of just ce agen cies~law enforcement courts, and correct ons Prerequ site· JUS 100 or JUS 200 or approval of nstructor

461 Substantive Criminal Law. 3 F S, SS
Criminal ab lity. Cr mes against persons, property and society. Governmenta sanct ons of nd v dual conduct as formu ated by eg s atures and the courts. Prerequi site JUS 100 or JUS 200 or approva of nstructor

462 Procedural Criminal Law. (3 F S
The crim na process. Const tut ona and ega prob ems assoc ated with crim na procedures. Due process of aw Prerequisite. JUS 100 or JUS 200 or approva of nstruc tor

463 Discretionary Justice. 3) F, S SS
Use of d scret onary author ty throughout a phases of the just ce system Cross purpose effect of d scret onary justice Const tut ona m tat on on and jud c a rev ew of discretionary author ty Prerequ site JUS 100 or JUS 200 or approva of nstructor *[Satisf es General Stud es Requirements L2, SB]*

469 Political Deviance and the Law. (3 F, S SS
An exam nat on of the controvers es created by po t ca and deviant behavior nclud ng a crit ca v ew of aw as an agent of socia contro Prerequ s te JUS 100 or JUS 200 or approval of instructor *[Sat sf es General Stud es Requ rement SB]*

474 Legislation of Morality. (3 F S
Understand ng basic quest ons and contemporary s sues re ated to law and moral ty Process of creat ng and enforc ng mora ity statutes (e g , prost tution Prerequi s te. JUS 100 or JUS 200 or approva of nstr ctor.

484 Internship. 3 or 6) F S SS
Ass gnments n a just ce agency des gned to further the student s ntegrat on of theory and pract ce P acements are arranged through consu tat on w th students and agenc es May be taken for a tota of up to 12 hours cred it of wh ch a max mum of s x sha be app ed to the ma or Prerequ s tes JUS 100 or JUS 200 and Major Status

494 Special Topics. 1 3 F, S, SS
Top cs chosen from var ous f e ds of just ce stud es Pre requ s te JUS 100 or JUS 200 or approva of nstructor

498 Pro-Seminar. 1 3 F S
Smal group study and research for advanced students May be repeated for c ed t up to a max mum of n ne hours, no more than three app ed to the major Prerequ s tes. JUS 100 or JUS 200 Major Status m n mum cumu at ve GPA of 3.00 and approva of nstructor

499 Independent Study. 1 3 F S SS
Or g na study or nvest gat on n the advanced student s f e d of nterest under the uperv s on of a facu ty mem ber May be repeated f r cred t up to a max mum of s x hours, a app ed to the major Prerequ s tes JUS 100 or JUS 200, Sen or Status m n mum cumu at ve GPA of 3 00 m n mum GPA n JUS cour es of 3 00 and approv al of nstructor

500 Justice Research Methods. 3 F S SS
Theor es and methods of research w th emphas s on de ve opment of des gns most re evant to just ce data and prob ems

501 Justice System, Theory and Issues. 3 F, S
Ana ys s of the just ce structure and process w th n var ous theoret ca f ameworks sues such as d scret on, d vers on and p ea negot at ons

502 Primary Management in Justice Agencies. 3 S
Concepts of modern management and the r app cat on to just ce re ated agency superv s on and management

503 Crime and Social Causation. 3) S
Theor es of dev ance and c me as they re ate to soc a po c es and spec f c respon e of the u t ce comp ex.

509 Statistical Problems in Justice Research. 3 F, S
Methodo og ca prob ems of research des gn and stat st ca methods spec f to just ce stud es.

510 Understanding the Offender. 3 F
Survey of earn ng persona ty and b o og ca theor es of causat on a d the r re evance to understand ng cr m nal and de nquent behav or

514 Justice Policy. 3 F
Assessment of the po t cs of ust ce po cy as we as an understand ng of the bas c too s ava ab e to soc a sc en t sts for ana yz ng the formu at on mp ementat on and eva uat on of ust ce po cy

520 Qualitative Theory and Data Collection. 3 F S
The bas c theoret ca rat ona e and perspect ves for us t ce re ated qua tat ve research, e g symbo c nterac t on sm Techn ques for data co ect on e g , ethno graphy depth nterv ew ng

521 Qualitative Data Analysis and Evaluation. 3 F, S
Ana ys s of a qua tat ve data e g f e d notes depth nter v ew transcr pts docume t ana y s cod ng and retr eva w th a m crocomputer, qua tat ve eva uat on

530 Justice Educat on. 3 F
Deve opment a d ph sophy of just ce educat on and tra n ng Prob ems f curr cu um deve opment and eva uat on Exam nat o and eva uat on of teach ng methodo ogies and instruct ona a ds

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.

550 Survey Research in the Public Sector. (3) S
Design and implementation of survey research methods with an emphasis on public sector applications.

560 Women and Crime. (3) F
Nature and extent of female crime, causation theories, and the treatment of females in the law and justice system.

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.

610 Law and the Social Sciences. (3) S
Normative conceptualizations of law; law and the administrative state; impacts of law on society; discretion, street-level bureaucrats and the living law.

620 Justice Research and Methods. (3) F
Concept development, research design, data collection strategies, legal research, and building computer data bases 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.

See page 38 for special courses which may be offered by this academic unit.

Walter Cronkite School of Journalism and Telecommunication

PROFESSORS:
BENNETT (STAUF A231B), ANDERSON, CRONKITE, MILNER
ASSOCIATE PROFESSORS:
CRAFT, ELLIS, HOY, LENTZ, SILVER, SMITH, SYLVESTER
ASSISTANT PROFESSORS:
BRAMLETT-SOLOMON, GALICIAN, LEIGH
PROFESSORS EMERITI:
BROWN, CROWDER

Major Requirements

Freshmen enrolling in the Walter Cronkite School of Journalism and Telecommunication and students transferring from other departments within the University must complete a minimum of 30 semester hours with at least a 2.25 cumulative grade point average before they will be permitted to enroll in School courses beyond the 100 level.

All students intending to take School courses beyond the 100-level must complete an English proficiency exam with a passing score. The exam will be administered by the School.

To become a major in either Journalism or Broadcasting, a student must complete at least 56 semester hours with a minimum cumulative grade point average of 2.50. A 2.25 cumulative grade point average must be maintained in order to continue to enroll in courses in the School. The student must become a major (2.50 GPA) by the time 86 semester hours is reached, otherwise the student is disqualified from taking courses in this School.

Most upper-division courses in the School are not open to pre-majors. A pre-major should check the *Catalog* listings to determine which 300 and 400 level courses are open to pre-majors.

To ensure students receive a broad academic background, no more than 36 semester hours in courses in the major may apply to the 126 semester hours required for graduation. At least 18 hours of School courses, including one writing course, must be taken at Arizona State University. A student must make a "C" or higher grade in all courses taken in the major and in

the required related field area. Specific areas that may be used to fulfill the related field re quirement are listed on the curriculum check sheets for each major available in the School. Courses elsewhere in the university which dupli cate or are closely related to School subject mat ter may be restricted by the School.

The journalism news-editorial and broadcast ing sequences are accredited by the American Council on Education for Journalism and Mass Communication.

Bachelor of Arts Degree Requirements

All students are required to complete 16 semes ter hours of a foreign language, or the equiva lent to the 202 level.

Broadcasting–Consists of 42 semester hours of credit of which 30 must be in School courses and 12 in a related field. Students must take a required core of courses consisting of MCO 110 and 402 and TCM 200†, 201†, and 235†. The student must choose a major professional em phasis area. These include: Broadcast Journal ism, Production Analysis, Broadcast Station Op erations, Telecommunication Management and Telecommunication Promotion/Advertising.

These courses are in addition to other degree requirements. (See Degree Requirements, page 47.)

Journalism–Consists of 42 semester hours of credit of which 30 must be in School courses and 12 in a related field. Students must take a required basic core, consisting of MCO 110 and 402 and JRN 201†, 301†, 313†, and one of the following: MCO 314, 412† or JRN 421†. The student must choose a major professional empha sis area. These include; News Editorial, Public Relations or Photojournalism.

These courses are in addition to other degree requirements. (See Degree Requirements, page 47.)

Bachelor of Science Degree Requirements

(The Bachelor of Science program is under re view by the faculty and is not available as an op tion for students entering under this *Catalog*

Related Field Each student is required to com plete a 12 credit hour related field (or minor) This is to complement the courses taken in the major emphasis areas.

See the curriculum check sheets for each ma jor for the full details and suggested related field areas.

Major Teaching Field Requirements

Bachelor of Arts in Education Degree Curriculum

Journalism–Consists of 45 semester hours of credit. Courses MCO 110, 402†, JRN 201†, 301†, 313†, 351 and 480† are required. An additional 27 hours, including 15 hours in School course offerings, must be taken on approval by the advisor in consultation with the student. The remaining courses may be in closely related fields.

Minor Teaching Field Requirements

Journalism–Consists of 24 semester hours of credit. Courses MCO 110, JRN 201 , 301†, 313†, 351† and 480† are required. The remain ing courses are to be selected in consultation with a journalism advisor.

General Studies

The student should carefully check the Univer sity requirements on General Studies found on pages 43-46.

The School of Journalism and Telecommuni cation has certain requirements beyond the Uni versity General Studies which require the stu dent accumulate a total of 54 semester hours. The student is advised to check carefully the ap propriate School curriculum check sheet to be sure courses taken will move the student to- ward graduation with the least amount of delay and difficulty

In addition to the University General Studies requirements, the School of Journalism and Telecommunication requires the following.

Humanities and Fine Arts. Three to six (3 6) semester hours minimum for a total of twelve (12) semester hours when combined with Uni- versity General Studies.

Social and Behavioral Sciences. Nine to twelve (9 12) semester hours minimum for a total of eighteen (18) when combined with Uni versity General Studies.

Science and Math. A total of twelve (12) se mester hours as required by the University.

Additional courses may be taken in each of the groups and or from the electives listed to complete the total of 54 semester hours re quired by the School.

Within the program there are specific course requirements. Students will be required to take one course in each of the following· Political science (either POS 110 or 300), history, eco nomics, communication (Applied Speech), com puter science, two natural (physical) science lab

courses, English composition (beyond freshman level), English literature, philosophy, psychology, mathematics (numeracy requirement) and statistics.

Graduate Program

Master of Mass Communication Degree.

The curriculum for the M.M.C. degree is designed to help students achieve intellectual and professional growth, to prepare students for positions in the mass media, and to provide a background to enable those currently in the media to advance their careers. Information on the Master of Mass Communication program is detailed in the *Graduate Catalog*.

MASS COMMUNICATION

MCO 110 Introduction to Communication (3) F, S, SS*
Organization, functions and responsibilities of the media and adjunct services. Primary emphasis on newspapers, radio, television and magazines. Not open to students with credit for MCO 120. Prerequisite: completed first Freshman English course with "C" grade.

120 Media and Society. 3) F, S
Role of newspapers, magazines, radio, television and motion pictures in American society. Not open to students with credit for MCO 110. Designed for non-majors. *[Satisfies General Studies Requirement: SB]*

314 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. *[Satisfies General Studies Requirements: SB, H]*

402 Communications Law. 3 F, S, SS
Legal aspects of the rights, privileges and obligations of the press, radio and television.

421 News Problems. 3) S
Trends and problems of the news media, emphasizing editorial decisions in the processing of news. Prerequisite: nine hours of mass communication journalism/telecommunication courses, or approval of instructor.

430 International Communication. (3 F, S
Comparative study of communication and media systems. Information gathering and dissemination under different political and cultural systems. *[Satisfies General Studies Requirement: G]*

450 Visual Communication. 3 N
Theory and tradition of communication through the visual media with emphasis on the continuity of traditions common to modern visual media. *[Satisfies General Studies Requirement: HU]*

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
Identification of research problems in mass communication. Overview of questionnaire construction. Attention to survey, historical, content analysis, experimental, 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, normative statements.

530 Media Ethics. (3) S
Ethical conventions and practices of print and electronic media as they relate to the government and private sectors of the society.

JOURNALISM

JRN 201 Journalism News Writing. (3) F, S, SS
Writing news for the print media. Prerequisites: MCO 110 or 120, successful completion of English proficiency requirement and demonstrated typing ability of 30 words per minute.

301 Reporting. (3) F, S
Fundamentals of news gathering, interviewing and in depth reporting. Prerequisite: JRN 201†.

313 Introduction to Editing. (3) F, S*
Copyediting and headline writing. Electronic editing on video display terminals. Prerequisite: JRN 301†.

340 Magazine Writing. (3) F, S
Writing and marketing magazine articles for publication. Prerequisite: JRN 301† or approval of instructor.

351 Photojournalism I. (3) F, S
Taking, developing and printing pictures for newspapers and magazine production on a media deadline basis. Students should have their own cameras. Prerequisite: JRN 201† or approval of instructor.

401 Public Relations Techniques. (3) F, S
Theory and practice of public city, public relations and related techniques and procedures. Prerequisite: JRN 301† or TCM 315 or approval of instructor.

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) 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†.

422 Business Reporting. (3) N
Analyzing and reporting economic and consumer affairs. Prerequisites: three hours of economics, JRN 301†.

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 w th emphas's on the photo essay and ustrat'ons n black and wh te and co or 2 lectures 2 hour ab Prerequisite JRN 451†

460 Print Media Management. (3 F, S
Prob ems and funct ons nvolved n the management and market ng of a newspaper or magaz ne. Interact on of management w th the organ zation and community. Pre requ site JRN 201† or approva of nstructor.

480 Methods of Teaching Journalism. (3) F
Methods of nstruction, organ zat on and presentation of appropnate content in journa sm. Prerequis'te: six hours of journal sm at 300 evel and above or approval of nstructor

TELECOMMUNICATION

TCM 200 Fundamentals of Radio-Television. (3 F, S SS
Structure of te ecommunicat ons in the U S history, regu lat on, organ zat on w th emphas s on broadcasting Re lat onsh p to advert sing, research and government agen c es. Prerequ s te MCO 110 or 120

201 Broadcast News Writing. (3) F, S SS
Wnt ng for e ectronic media news and continuity. Prereq u sites: MCO 110 or 120, successful completion of Eng sh profic'ency requ'rement and demonstrated typ ng ab lity of 30 words per m'nute.

235 Studio Techniques. (3 F, S
Introduct on to the theory, techn ques and operat on of te ecommun cat on product on equipment, aud o and video One lecture 4 hours stud o Prerequ s te TCM 200†.

300 Videography. (3) F S*
Bas cs of v deo continu ty as used n telecommun cation news and nformation Prerequis tes TCM 201†, 235† and 315

315 Broadcast News Reporting. (3) F S*
News and nformation practices of networks stations and ndustry Advanced pract ce n writ ng, reporting and ed ting Prerequ s tes: TCM 201†, 235†

332 Broadcast Programming. 3) F S, SS
Programm ng theory and eva uat on, regulation eth cs and respons b lit es, and basics of aud ence psycho graphics and effects Prerequ s tes TCM 200†.

336 Television Production. (3) F S*
P anning and ana yz ng the telev's on product on proc ess. One ecture 4 hours studio. Prerequ s tes: TCM 235†.

343 Broadcast Announcing. (3 F, S
Techn ques of radio and telev s on announc ng Prerequ sites TCM 201†, 235†

431 Advanced Writing for Telecommunication. 3 F, S
Technique and pract ce n non news wr t ng for te ecom municat on nc uding broadcast, ndustnal and educat on a areas Prerequ s te TCM 201†

433 Broadcast Station Operations. (3) F S
Operat ona procedures n the departments of a rad o or telev s on stat on. Prerequ s tes: TCM 332† May be re peated for cred t

435 Cable TV and Emerging Telecommunication Systems. (3) F, S
Structures and ut ization of cab e ndustnal and nstruc tional te evision and satel te and v deocassettes Prereq uisite TCM 200

437 Television Directing. (3) S
Aesthet'cs of v deo d rect ng for broadcast cab e ndus try, and educat on One ecture 4 hours stud o Prerequ s te TCM 336†

472 Broadcast Station Management. (3) S
Management pr nc p es and pract ces nc ud ng organ zat on procedures pol cies, personnel prob ems and financ a aspects of stat on management Prerequ s te TCM 200 and 332†

See page 38 for special courses which may be of fered by this academic unit.

* Majors only.

Department of Leisure Studies

PROFESSORS:
CHEATHAM, HALEY (GHALL 204)
ASSOCIATE PROFESSORS:
ALL SON, KNOPF
ASSISTANT PROFESSORS:
DIFFENDERFER, ROBERTSON, TEYE, VIRDEN
PROFESSOR EMERITUS:
GREEY

Departmental Major Requirements

Freshmen enrolling in the Department of Lei sure Studies and students transferring from other departments within the University must complete a minimum of 56 semester hours with a minimum of 2 50 cumulative grade point aver age before being officially admitted to the Bach elor of Science program in Recreation with major status. As part of this minimum require ment, the students must successfully complete REC 160 and ENG 101-102 or ENG 105 (or the English Proficiency Examination) with a grade of 'C' or better

Transfer students who have completed 56 se mester hours or more at another institution must remove any of the above course or scholas tic deficiencies prior to being admitted with ma jor status to the Bachelor of Science program in Recreation.

The student must maintain a minimum 2.50 cumulative GPA to continue to enroll in profes sional core courses in the Department.

The student must complete the University General Studies Requirements and the College of Public Programs course requirements in ad- dition to major requirements General Studies

courses may not be used concurrently toward the General Studies requirement and related requirements within the major core.

Bachelor of Science Degree Curriculum

Consists of 69 74 semester hours of course work including related studies. The following courses are core major courses required of all undergraduate majors:

		Semester Hours
REC 120	Social Psychology of Play	3
REC 160	Leisure and Society	3
REC 210	Urban Leisure Systems	3
REC 330	Theory and Principles of Recreation Programming	3
REC 364	Recreation for Special Populations	3
REC 462	Administration of Leisure Services	3
REC 463	Senior Internship	12
	Total	24

REC 160, 210, 330, 462, and 463 are to be taken in sequence; only REC 210 and REC 330 may be taken concurrently.

The remaining courses will be reflective of the professional emphasis area selected by the student in consultation with his/her assigned departmental advisor The five (5) professional emphasis areas in the department follow:

Outdoor Recreation. This area of emphasis prepares students for the planning and management responsibilities in agencies which have as their primary mission the provision of outdoor recreation opportunities Students are provided a basic understanding of human behavior, environmental concerns, and policy issues which impact outdoor recreation systems Students are prepared for employment in various regional, county and state park agencies In addition, federal agencies such as the U.S. Forest Service, the Bureau of Land Management, the National Park Service and private outdoor recreation organizations offer potential employment for outdoor recreation students.

Therapeutic Recreation. This area of emphasis is designed to prepare students for work with groups exhibiting special societal needs. These special populations include youth and adult criminal offenders, substance abusers, the mentally retarded, mentally ill, physically handicapped or physically disabled groups. Career placement in this area typically include the following. hospital and school settings, urban park and recreation departments, correctional facilities, rehabilitation programs, and gerontological and adult development centers.

Tourism and Commercial Recreation. This emphasis provides a broad based academic approach to the travel and tourism field that features economic, social, environmental, and policy issues at the state, regional, national, and international levels. Commercial recreation delivery is also examined from a variety of conceptual and applied perspectives. Furthermore, by addressing the practical aspects of the tourism industry, as well as conceptual foundations, this emphasis endeavors to familiarize the student with current professional problems and opportunities National and international career placements and settings include state and national offices of tourism, visitors and convention bureaus, airlines, hotels and resorts, commercial recreation agencies, tour operators and travel agencies, transportation services, and tourism consulting establishments

Urban Recreation. This area of emphasis is designed to provide the student with competencies necessary to function in leadership, supervisory or administrative positions within a variety of community, leisure and human service agencies. Agency settings include park and recreation departments, public human service agencies, regional and county park and recreation departments and quasi public service agencies.

Youth Agency Administration/American Humanics. This concentration prepares students to serve with professionals in the field of voluntary youth and human service agency management. This includes agencies such as Boy Scouts of America, Girl Scouts of the USA, Big Brothers/Big Sisters, 4 H, Camp Fire, Boys Clubs of America, Girls Clubs of America, United Way, YMCA, YWCA, Junior Achievement, American Red Cross and numerous other youth and human service agencies. Academic course work in the areas of fund raising, volunteerism, agency management and administration is supplemented with a co curricular program. This program is aided by current agency professionals who offer workshops, seminars, field trips, and cooperative education experiences. This emphasis is one of 14 nationally select youth agency administration programs affiliated with American Humanics, Inc., the nation's largest not for profit educational organization committed to the training and job placement of students with in this career field The Arizona State University American Humanics program is annually ranked among the top three of the fourteen pro-

grams in the United States Successful comple tion of the program results in national certifica tion for qualified students.

Additionally, 200 hours of recreation leader ship experience are required prior to doing Sen ior Internship (REC 463). Students are not per mitted to take additional course work during the Senior Internship placement period

A student must attain a grade of 'C' or bet ter in all courses within the major including the related area. Specific courses which may be used to fulfill the related requirements are listed in a brochure available in the Depart ment.

LEISURE STUDIES

REC 120 Social Psychology of Play. 3) F, S
An ntroduct on to the psycho og ca soc al, and cu tural foundat ons of p ay and le sure behav or *[Sat sfies General Studies Requirement. SB]*

150 Outdoor Pursuits. (3) F, S
Theories and pract ca app cations re ated to outdoor recreation pursu ts Interdisc pl nary approach to w der ness ssues and ph losoph es, cu minat ng n an outdoor experience. Fie d trip requ red.

160 Leisure and Society. (3) F, S
Ana ysis of the human relationsh p to e sure. H storical survey of ph' osoph ca psycholog ca and soc oeconom ic bases for deve opment of systems that prov de eisure programs *[Satisfies General Studies Requirement· SB]*

210 Urban Leisure Systems. 3) F, S
Systemat c overv ew of 'nterre ated public, private and commerc a urban e sure serv ces Prerequ site· REC 160. Recreation majors only

300 Fund Raising. (3 F
Methods techn ques and d rected exper ence n fund ra s ng for vo untary youth and human serv ces agen c es Budget control and accountab l ty

305 Introduction to Travel and Tourism. (3) F, S, SS
An exam nation of the components of the trave and tour sm ndustry at the state nat onal, and g obal leve s

310 Volunteerism. 3) F
Adm n strat on of vo unteer serv ce programs Study and analys s of the volunteer personne process

320 Youth and Human Service Workshop. (1 F, S
Forum for exchange between students and profess ona agency personne Var able top cs guest speakers Pre requ s te approva of nstructor

330 Theory and Principles of Recreation Programming. (3) F, S
Foundat ons for effective program p ann ng Theory and princ ples re ated to varied settings and types of activity. Formal p ann ng process. Prerequ s tes: REC 160†, 210† Recreat on majors only

340 Outdoor Survival. (3) F S
nterd scip nary approach to outdoor survival, nc ud ng attitudes, psycho og cal stress, physiolog ca stress preparat on hypothermia, navigation, f ora and w ldlife Field trips requ red.

350 Recreation Planning and Design. (4) F
Des gn and deve opment of le sure and recreat ona re sources w th a focus upon man and h s env ronment.

360 Recreation Resource Management and Policy. (3) S
Management and dec s on making n recreat on re source agenc es Po cy ana ysis and use conf cts Pre requ s te Recreation majors on y.

364 Recreation for Special Populations. (3) F S
Concepts methods, settings nvolv ng recreationa serv ices as app ed to spec a groups in Amer can soc ety e.g , youthfu and adult offenders, a coho cs drug ad d cts menta y retarded menta y , and phys ca y hand capped May nc ude f e d exper ence

370 Outdoor Recreation Systems. 3) F
Introduct on to outdoor recreat on resource delivery sys tems h story of w derness and outdoor recreat on resources the role of outdoor recreation n soc ety, out door recreat on agencies, related env ronmental ssues Prerequ s te junior stand ng or approva of nstructor.

372 Tourism Destination Development. (3) F
Applicat on of econom c and reg ona development con cepts/theories to destinat on product deve opment

380 Outdoor Education. 3) F, S
Ut zat on of the outdoors to fac l tate earn ng and enjoy- ment of the natura env ronment Techn ques of organ z- ng outdoor educat on programs Off campus weekend requ red

400 Therapeutic Recreation. (3) S
Princ p es pract ces of program deve opment evalu at ons, professiona ro es and support serv ces re ated to therapeut c recreat on serv ce Off campus abs Pre requ s te. REC 364† Recreat on majors on y

420 American Humanics Institute. (1) F S
Mini ntens ve nationa management nst tute for volun tary youth and human service agency personnel Out of- state conference required. Prerequ s te: approva of instructor

430 Youth Agency Administration. (3) S
Ana ys s of administrat ve structure, dec s on making and program de very with n vo untary youth and human serv ce agencies

440 Areas and Facilities. (3) S
Pub ic private and commercia recreat on areas and fac - ties. Survey of des gn, funct on, aesthetics and re ation sh ps.

450 Recreation and Aging. (3) F
Organ zed recreat on serv ces and fac t es for the aged Soc oeconomic cons derations affecting del very of com prehens ve eisure services to the e der y Off campus aboratory Prerequ s te approva of nstructor.

458 International Tourism. 3) F, S
A g oba exam nat on of internat ona tour sm and ts sig n ficance as a vehic e for social and econom c develop ment *[Satisfies General Studies Requ rement. G]*

460 Issues in Therapeutic Recreation. (3) S
Contemporary prob ems/ ssues confront ng the thera peut c recreat on fie d profess ona deve opment pro grams and serv ces, egislat on, phi osoph ca and re- search ssues Off campus aboratories Prerequisites REC 364 Recreat on majors on y

462 Administration of Leisure Services. 3) F, S
Bas c principles of adm n stration and the r appl cat on to successfu adm nistration pract ces Analys s of adm nis trative funct on, structure and po cies Prerequisite: REC 330† Recreat on majors on y

463 Senior Internship. (6 or 12) F S SS
Superv sed gu ded experience n selected agenc es Pre requ sites REC 330†, 462† sen or stand ng Recreation majors only

470 Camp Organization and Administration. (3) F
Organ zation and adm n strat on of camps Preparat on for camp management; cons'deration of budget, camp site and personne

500 Research Methods. 3) S
ntroduction to recreation research methods w th em phas s on methodo og ca quest ons research ssues and techniques relevant to contemporary soc al research.

540 Recreation Services for the Aged. (3) S
An app ed orientat on to the soc a psychological the ories of recreation and the aged.

552 Philosophical and Current Issues in Leisure. (3) F
An analys s of fundamenta ph osoph cal concepts and contemporary ssues and prob ems confronting the e sure services profession

555 Social and Psychological Aspects of Leisure Behavior. (3) F
An emp rical and theoret ca ana ysis of soc a , cu tural, and psycholog ca foundat ons of e sure behav or

558 Integrative Seminar. (3) F, S
Advanced exp oration and assessment of current trends w thin the leisure studies f e d Th s course has vanab e top cs nc ud ng but not mited to Cross cu tura analys's of e sure; urban recreat on, p ann ng and resources; soc ocu tural d mensions of tour sm development; w derness management Prerequ s te REC 552

569 Commercial Recreation and Tourism. (3) F
Procedures n determ'n ng public needs, init at ng enter prise promot ng activ ty and eva uat ng the total project in terms of both proprietor and pub c

570 Outdoor Recreation Planning. (3) S
Plann ng for adm n strat ve dut es n varied recreation set tings. Prerequ s tes: REC 370 or equ valent

See page 38 for special courses which may be of fered by this academic unit.

School of Public Affairs

PROFESSORS:
HALL (WILSON 206), BECKER, CAYER DANEKE, ERIBES, HENRY, KARNIG, KELLY, MUSHENO, MUSHKATEL, PALUMBO, PERRY, WESCHLER, WIGAND

ASSOCIATE PROFESSORS:
BROWN, MANKIN, McCLAIN, MERRILL, NIGG, WILSON

ASSISTANT PROFESSORS:
HERZIK, PIJAWKA

LECTURERS:
DeBOLSKE, FERRALL

PROFESSOR EMERITUS:
SACKTON

The faculty in the School of Public Affairs of fer a graduate program leading to the profession al degree, Master of Public Administration (MPA). The MPA program has been recognized to be in conformity with standards developed by the National Association of Schools of Pub lic Affairs and Administration. The faculty also participate in the interdisciplinary degree program leading to the Doctor of Public Administration. Consult the *Graduate Catalog* for information about these programs. The basic aims of the School are: (1) to offer professional education programs leading to graduate degrees in public administration and to encourage mid-career education for public administrators by offering evening course work at the state government complex; (2) to maintain a research program designed to identify problems, disseminate information and propose solutions to ma jor public problems; (3) to provide a high level of public service in meeting needs in Arizona and the nation.

PUBLIC AFFAIRS

PAF 500 Research Methods I. (3) F, S
Presentation of mu tivariate stat stics, computer app ca t ons and introduct on to major research design ssues Prerequ site an approved course n statist cs

500 Research Methods II. (3) F, S
Advanced treatment of des gn and measurement ssues w th emphasis on appl ed research projects by students Prerequisite PAF 500 I

501 Statistics in Administration. (3) F, S
App cation of stat stical methods to prob ems n f nance personne , survey and plann ng

502 Computers in Administration. (3 N
Expenence 'n use of computer technology for publ c adm n'strat on problem so ving.

503 Organization Theory. 3) N
Organ zation theories and current research emphas s with app cation to pub ic adm n strative organ zat ons.

504 Comparative Administration. (3) N
Literature on comparative public adm n stration theory Bureaucrac es and the'r mpact on the po tica deve op ment process Selected nat ons w l be stud ed.

505 Intergovernmental Relations. (3) N
Evolution, growth present status and character stics of the U S federal system of government Federa state re- at ons state-local relations, reg ona sm counc ls of government nterstate cooperation, grants n aid, and rev enue sharing

506 Regional Cooperation, Programs and Associations. (3) N
Inter and intrastate regional po tica and adm nistrative cooperative devices and bod es.

507 Bureaucracy and Public Affairs I. (3) F S
Analyses of the conceptual and contextua elements of public adm nistration and pol cy

508 Bureaucracy and Public Affairs II. (3) F, S
Analyses of publ c adm n'stration concepts app ied to management situations nclud ng personne , finance, budgeting, decision mak ng and imp ementat on.

509 Organization Change and Development. (3) N
Exp oring the nature and management of change and de velopment as a too to ach'eve organ zationa goa s, effect ng planned change.

510 Governmental Budgeting. (3) F, S
Lega , socia , econom c and polit ca nature of govern menta budgets and the budgetary process. Theories and socia consequences of budget dec s on making and practices of budget contro

511 Governmental Finance Management. (3) A
Sources of funding, management of funds and debts and general pattern of expenditures n states count es, cities, and districts Prerequisite PAF 510

512 Public Affairs Economics. (3) A
Role of economics n public affa rs w th examples from transportat on, urban form, Rio Salado project hous ng land use, flood control, growth, aspects of energy economics

520 Public Management. (3) A
The management process in government and public agenc es, w th emphasis on the execut ve eadersh p w th n the public sector.

521 Public Personnel Management. (3) A
H story of the civ l service recru tment, select on, posi t on and wage c ass f cat on motivational ana ys s, pro ductiv ty public un on sm and eth cs n the pub c serv ice.

522 Public Labor Relations. (3) A
R se of pub c unionism, managerial po cy toward union sm, conf ict reso ut on, mpact of un onism on budgets, personnel pol'cies and pub c po cy

523 Public Information Systems. (3) N
Systems analys s concepts and theory as app ed to ad m n strat on. Alternative modes of nformat on organ za tion and the r mpact on public dec s on mak ng

524 Community Conflict Resolution. (3) N
Interd'sciplinary approach to understand ng the dynam ics of community conf ict Strategic considerat ons n po icy design and advocacy, potent al reaction to conflict. Relevant models and research f ndngs generated by both case stud es and comparat ve methods

525 Public Program Management. (3) A
Governmental service programm ng: formu at ng, f nanc ing, operat ng, eva uating and report ng Ana ysis of inter agency relationships and the role and conduct of research n the programm ng process

530 Management of Urban Government. (3) A
Adm n strative practices and behavior w th n the urban po tical administrative environment Functiona areas such as c tizen participation, urban p ann ng, urban trans portation, and the confl'cts between urban po itics and administrative efficiency.

531 Comparative Urban Administration. (3) N
Development of urban governments w th n different cu tura , social and po itical m ieu. C ties with n developing countries as wel as in the deve oped countries of Europe and North America

532 Urban Planning Administration. (3) A
Historica and present day uses of urban p ann ng and procedures for its imp ementation Bas c principles and pract ces

533 Politics of Urban Planning. (3) A
Urban p ann ng po cy ssues frequently faced by ocal, state and federa government Cons derat on of the re a tionsh ps between the po t ca leader, the profess ona planner and the cit zen.

535 The City and County Manager. (3) A
The manager s role and resources n the d ffering forms of administrative eg s at've and community sectors

540 Public Policy Analysis. (3)
Theories wh ch attempt to exp a n pub c policy formula t on App cat on of soc a science to pol cy ssues.

541 Topics in Public Policy Analysis. (3 A
May be repeated for cred t Top cs may be offered from the fo lowing (a Ag ng, b) Art c) Educat on Po cy, (d) Env ronmental Publ c Po cy, e) Health, (f) National Pub ic Po cy, (g) Pub c Safety (h) Recreation (i) Trans portation (j) Welfare

542 Science, Technology and Public Affairs. (3) N
The influence of sc ence and techno ogy on governmen tal policy making; sc entists as adm n strators and adv sors; governmenta policy making for sc ence and technology government as a sponsor of research and development

543 Public Management of Land. (3) N
Descr ption and ana ys s of urban zat on processes An emphasis s p aced on the app cat on of urban theor es to develop ng urban centers w th a focus on Mar copa County

544 Preparation of Reports in Public Administration. (3) N
ntens ve pract ce n wr tten and ora presentat on of re ports to conferences covered w th problems n pub c adm n strat on. V sua a d techniques

545 Research Data Management. 3) N
Techniques and prob ems assoc ated w th data manage ment n a research env ronment Data base management systems, security and ntegr ty access bi ty and cost

546 Data Base Management Systems in Public Administration. (3) N
Concept and use of modern data base management sys tems in an adm nistrative organ zat on Advantages and d sadvantages of th s approach

547 Program Evaluation. (3) N
Various methodologies ava ab e for the evaluation of public pol c es and programs

548 Women, Politics, and Public Policy. (3) N
Exp ores how po tica phi osophy po t cs, and pub ic po cy affect and are affected by women

550 Survey Research in the Public Sector. 3 N
Des gn and mp ementation of survey research methods with an emphas s on pub c sector applicat ons Same course as JUS 550 Prerequ s tes PAF 500 and 501 or JUS 500 and 509 or equ va ent or approva of nstruc tor

551 Urban Planning Evaluation. 3) N
Concepts, pr nci p es and methods emp oyed by publ c p anners n the ana ys s of urban problems nvolving mu tip e cr ter a dec s ons Prerequ site formal graduate evel course work n stat st cs and p ann ng

552 Urban Housing Policy. (3 N
Comprehens ve cons derat on of the rev tal zat on of American c ties w th major emphas s upon the hous ng process and re ated nst tut ons and serv ces

553 Social Impacts of Planning. 3 N
Ana yzes the p ann ng needs of var ous soc a groups n urban sett ngs and the appropriate mechanisms of pub c sector p ann ng for mu t p e pub cs

554 Urban Growth Administration. 3) N
Exam nes the process of urban growth and change Part nersh p ro es p ayed by pub c and pr vate sectors n management is emphas zed

555 Environmental Policy and Management. 3 N
Analys s of env ronmenta po cy and p anning issues and princ ples re ated to the ana ysis and management of natura and urban reg ona resources

556 Urban Policy Making. (3) N
Ana ysis of the opportun ties and costs of inf uencing publ c po cy and the ro es of off c als and bureaucracies in dec s on making

560 Information Management. (3) N
Concepts and theory of nformation and information tech no ogy in public sector organizations

570 Advanced Public Policy Analysis. (3) A
Course emphas zes the structure of pol cy problems, forecasting pol cy alternat ves, opt m zing resources and reducing uncerta nty n po icy mak ng. Prerequ s te PAF 540

591 Seminar. 1 3) F, S
Top cs may be se ected from the fo ow ng. (a) Genera Pub ic Admin stration (b) Publ c F nance Adm n stration (c) Pub ic Management (d) Urban Affa rs and Urban P ann ng (e) Pub ic Policy Ana ys's, f) nformation Man agement

593 Planning Workshop. (3) N
Practical team research and f e d experience. Emphasis on the synthes s of public sector p ann ng methodolo g es, concepts and techn'ques applied to a local p an n'ng problem

600 Research Design and Methods. (3) F
Advanced methods of research design and ana ys s. Prerequ s tes: formal graduate evel course work n statist cs and in research methods.

601 Seminar: Policy Analysis and Program Evaluation. (3) S
Normat ve and conceptua ssues of po cy formu at on imp ementat on and eva uat on; empir ca approaches and methods of program eva uat on and pol cy analys s.

602 Seminar: Foundation of Public Administration. (3) F
Ethical, soc al, lega and ph osoph ca foundat ons of pub l c admin stration.

603 Seminar: Organization and Behavior in the Public Sector. (3) S
Structure, organ zat on, conduct and performance of pub l c sector nst tut ons in the adm n stration of public po cy. Prerequis te. PAF 602

See page 38 for special courses which may be offered by this academic unit.

Center for Urban Studies

The Center for Urban Studies (CUS) is an interdisciplinary research and service unit of the School of Public Affairs which seeks to promote the analysis and understanding of urban systems. Center studies are directed at improving the effectiveness, efficiency, responsiveness and equity of urban decision making. To meet its goals, the center undertakes research, conducts workshops and provides technical assistance both for local governments and citizens. The Center is a community resource.

The Center is organized to conduct high quality interdisciplinary research that is useful for public problem solving The divisions and major foci of the Center are the Advanced Public Executive Program (APEP), Division of Field Research, Division of Policy Analysis and Evaluation, and the Division of Public Opinion Research.

The demand for CUS services from state, local and community groups has been substantial. Past studies have included those on the evaluation of social service delivery; housing investment patterns; crime and police services; problems and programs of the elderly, community sentiment about governance; assessment of governmentally provided health systems; and evaluation of the impact of shifts in national domestic policy on local governments, non profit organizations, and citizens.

Advanced Public Executive Program (APEP). APEP is designed to provide the public sector executive with analytical approaches and skills that will help mobilize ideas, people, and resources in support of public programs. To meet these objectives, APEP uses interdisciplinary faculty teams to provide a series of short courses, seminars, and other training devices to help public managers become more effective and efficient

Division of Field Research. The Phoenix urban area is a virtual laboratory of public programs and issues. This division will apply techniques of field research to local public policy and organization issues. In addition to its own studies, the division assists other Center units in using field research techniques such as elite and specialized interviewing, observational research and archival analysis.

Division of Policy Analysis and Evaluation. This unit focuses on the analysis of significant public policy problems and issues, with an emphasis of providing public sector decision makers with high quality decision relevant information.

Part of the division's mission is to provide ongoing support to those agencies with which the division contracts to undertake research. The division is committed to the idea of making maximum use of data collected for public agencies beyond the demands of the initial grant or contract.

Division of Public Opinion Research. The Public Opinion Research Program provides a mechanism for assessing and reporting community sentiment and reactions to news events, public policy issues and problems of broad public interest. As such, it has established an ongoing relationship with a wide array of public and private agencies.

Morrison Institute for Public Policy

This research unit was created by a grant from the Marvin Morrison family and seeks to provide both citizens and public officials with objective information to make well-informed policy decisions.

The Institute's mission revolves around public service and research activities. These activities include the publication of occasional papers and policy reports. The Institute also sponsors conferences on policy issues and engages in contract and grant research on public policy in support of state and local governing agencies.

Office of Hazards Studies. This unit conducts hazards research in the social and policy sciences. Its goal is to encourage interdisciplinary research in the hazards field in the social, biological, physical and engineering sciences.

Activities include working with public agencies to identify needs in hazards management and provide technical assistance. The unit has also established a working paper and technical report series to be made available to researchers and public sector users.

Publications Division. The division is a resource unit created to encourage faculty research on current topics of public interest through its publications program. Its purpose is the dissemination of research on public policy and public administration to academics, public managers, officials, and concerned citizens, with a focus on issues of special importance to Arizona.

The program publishes policy, research, and management papers and a semiannual newsletter on the activities of the School of Public Affairs. The division also supports the other research units of the School by publishing their work or providing technical assistance.

School of Social Work

Jesse F. McClure, Ph. D.
Dean

The School of Social Work offers three degree programs. Doctor of Social Work (D.S.W.), a two year program leading to the degree of Mas ter of Social Work (M.S.W.) and a Bachelor of Social Work (B S.W.). The M.S.W. and B.S.W. programs are accredited by the Council on So cial Work Education for the preparation of M.S.W. and B.S.W. level Social Work practi tioners.

Degrees

Bachelor of Social Work

The School s undergraduate curriculum leads to a Bachelor of Social Work degree (B.S.W.) Dur ing the freshman and sophomore years, students concentrate on obtaining a strong background in Liberal Arts and are classified as pre majors un til they are officially admitted to the major En- trance into the social work major from the pre major is not automatic (see section on Admissions).

Junior and senior social work majors focus on social work courses in: social policy and serv- ices, human behavior in the social environment, social work direct practice, social work re search, and field instruction in community agen cies. In addition, majors take elective courses in related areas

Objectives

The undergraduate curriculum is designed to pre- pare students for beginning level social work practice, and to provide preparation for graduate training in social work. It also offers social welfare content in General Studies courses for Liberal Arts students.

In consideration of the varied cultural and ethnic composition of Arizona and the South west, the program prepares students for trans- ethnic social work and actively recruits from ethnic minority groups.

Degree Requirements

All candidates for graduation in the Bachelor of Social Work curriculum are required to present at least 126 hours of credit, of which at least 50 hours must consist of upper-division courses A cumulative grade point index of 2.00 is required for graduation.

Requirements for the Bachelor of Social Work degree:

		Semester Hours
I.	Communication Requirement	6
II.	General Studies Requirement	47
III	Social Work Core Requirement	45
IV.	Related Social Work Requirement	16
V	Electives	12
VI.	Global/Historical Awareness Areas	
	Total	126

I. Communication Requirement.

ENG 101 3 semester hours
ENG 102 3 semester hours
or
ENG 105* 3 semester hours (see page 34, 'University English Proficiency Require ment').

* Those students taking ENG 105 must complete 3 additional hours in any subject to total 126 semester hours for graduation.

II. General Studies Requirement. To meet University General Studies requirements and to assure breadth and depth to the student s educa tion, all social work students must complete a total of 47 semester hours of General Studies courses with the designated minimum semester hours in each of the following General Studies Core Areas. Students may choose the require ments for the catalog under which they entered the University or the following:

* *Literacy and Critical Inquiry*		6 semester hours
* *Numeracy*		6 semester hours
Required: A course in statistical analysis		
* Humanities and Fine Arts		6 semester hours
* *Social and Behavioral Sciences*		21 semester hours
Required		
SOC 101	Introduction to Sociology or	
SOC 301	Principles of Sociology	3 hours
SOC 341	Modern Social Problems	3 hours
POS 110	Government and Politics or POS 300 American National Government	3 hours
ECN 111	Macroeconomic Principles or	
ECN 112	Microeconomic Principles or	
FAS 354	Consumer Economics	3 hours
PGS 100	Introduction to Psychology	3 hours
HIS (topical, indigenous series)		3 hours
e.g., 362, 364, 367, 368, 369, 370, 371, 380, 422, 424, 425, 426, 428, 430)		
FAS 331 Family Relationships		3 hours
* *Natural Sciences*		8 semester hours

Core courses are regularly reviewed. To determine whether a course meets one or more General Studies Core course credit requirements, see the *General Studies Course Guide* available prior to registration for courses.

Key to General Studies Core Credit Abbreviations

L1	Literacy and Critical Inquiry Core Courses Intermediate level
L2	Literacy and Critical Inquiry Core Courses Upper division)
N1	Numeracy Core Courses Mathematics
N2	Numeracy Core Courses (Statistics and Quantitative Reasoning)
N3	Numeracy Core Courses Computer Applications
HU	Humanities and Fine Arts Core Courses
SB	Social and Behavioral Science Core Courses
S1	Natural Science Core Courses (Introductory
S2	Natural Science Core Courses (Additional Courses
G	Global Awareness Courses
H	Historical Awareness Courses

* For requirements in this area see pages 43-46, General Studies Requirement

III. Social Work Core Requirement.

		Semester Hours
SWU 271	Introduction to Social Work	3
SWU 291	Community Resources	3
SWU 301	Human Behavior in the Social Environment I	3
SWU 310	SW Practice I Skills	3
SWU 331	Social Policy and Services I	3
SWU 402	Human Behavior in the Social Environment II	3
* SWU 410	SW Practice II Systems	3
* SWU 411	SW Practice III Settings	3
SWU 412	Field Instruction I	5
* SWU 413	Field Seminar I	1
* SWU 414	Field Instruction II	5
* SWU 415	Field Seminar II	1
SWU 420	Practice Oriented Research	3
SWU 432	Social Policy and Services II	3
SWU 474	Ethnic Cultural Varibles in Social Work	3

SWU 412 and 414 each require 16 hours weekly per semester in the field. Students must file an application for field work before registration for the courses

* Majors Only

No credit will be granted toward fulfilling major core requirements in any course in the student's major unless the grade in that course is at least a 'C'.

IV. Related Areas — 16 semester hours

Although the practice model of the program is a social work generalist, related areas and electives offer students opportunity to pursue their interests in special areas of service. Students are urged to consult their advisors for specific course suggestions

V. Electives — 12 semester hours

In order to fulfill the University requirement of 126 semester hours for graduation, the student may take the 12 semester hours of electives at the School of Social Work or other departments within the University. Students are encouraged, in consultation with their advisor, to use these elective courses to supplement their particular area of concentration suggested under related areas. Economics, education, management information systems, and sociology are only a few of the academic units offering a specialized knowledge of value to the professional social work practitioner.

VI. Global Historical Awareness

A minimum of one course must be taken for each awareness area. Course may concurrently satisfy a requirement in the General Studies Core Area. For a complete listing of courses

which satisfy this area, contact Student Serv ices, West Hall Room 137.

Admissions

The Bachelor of Social Work degree program at Arizona State University is divided into the pre-social work major and the social work major.

Pre social work major consists of freshman and sophomore students who have been ad mitted to the University and have declared social work as their major, as well as students transferring to the School of Social Work from other colleges within the University and other universities or junior colleges who have not successfully completed the admission process to the program. Students transferring from other universities or community colleges as pre majors should follow the procedure outlined on pages 21 and 25 of this *Catalog*. Students transferring from another college within the University must obtain a "Change of College ' form from the School of Social Work Student Services Office, Room 137, West Hall.

Admission Procedure for Social Work Majors. (Students having 54 semester hours or more and SWU 271, 291 and 301 or 331.) Stu dents wishing to enter the social work major are required to apply for admission to the program in addition to obtaining an official certifi cate of admission to the University. A student is eligible to apply for admission to the social work major during the last semester of his/her sophomore year. It is expected that applicants will have completed 54 semester hours and the required social work courses by the end of the semester in which they are applying. Students are admitted to the major at the beginning of the term following the semester during which they applied.

Students who have been pre majors will auto matically be sent social work major application packets at the end of the semester in which they successfully completed 54 hours. Upon notification of formal acceptance at ASU, the School of Social Work Student Services Office will mail the social work major application packet to the address listed on the official certificate of admission. For this reason, students are urged to notify the School of Social Work Stu dent Services Office of any change in address. Students also may obtain social work major ap plication packets at the School of Social Work Student Services Office in West Hall 137 or re quest that they be mailed to their home address by calling 965 6081.

Applicants are reviewed for admission for the fall and spring semester. Students applying must have a certificate of admission to the Uni versity in their files by: November 1 for spring admission and February 1 for fall admission Students should allow at least four additional weeks to process their ASU application to re ceive their acceptance. All other application ma terial (i.e., application form, additional statement and two letters of reference) must be re turned to the School of Social Work Student Services Office, Arizona State University, Tempe, AZ 85287 by November 1 for spring admission or February 1 for fall admission. Failure to meet these deadlines may result in the applicant having to wait for the next admis sions process. Applicants will be notified by mail of the committee's decision within five weeks following the application deadline. Those applicants who have been denied admis sion may request a conference to discuss the deci sion and obtain guidance in the development of alternative plans.

Criteria for Admission. Admissions are based on the following criteria: (1) Overall GPA (Grade Point Average). Generally, a 2.50 cumu lative grade point average is required, but consideration is given to applicants whose grades reflect a recent or constant trend of improvement. (2) A 2.50 cumulative GPA in core so cial work courses (SWU 271, 291 and 301 or 331). (3) Applicant's educational and career goal's compatibility with the educational objectives of the School. (4) Prior to admission to the major it is recommended that students have had social work experience for a minimum of 240 hours in social work related settings. Personal life experience may be substituted. (5) References. Two references are required for each applicant. These references should be from two persons who have known the applicant in a pro fessional capacity.

Retention and Disqualification

1. A student must maintain a cumulative grade point average of 2.00 overall. A student is placed on probationary status automatically when:
   a) The GPA is less than a 2.00 at the end of any semester;
   b) A grade is ' D ' or ' E" in any major core requirement, regardless of GPA.

Students may also be put on probation for rea sons other than grades.

Probationary status for Social Work majors shall require completion of a plan written and

signed by student and advisor with copies for student, advisor, program director, field director and file which indicates when and how deficiencies will be made up. This plan must contain a provision to bring the GPA up to minimum standards by the end of the succeeding semester, or at completion of 12 hours of letter graded course work, whichever comes last. Probationary students may be denied registration in the absence of such a plan.

Once a pre major Social Work student is on academic probation, he/she remains in that status until the grade point index reaches the retention level (2.00 overall) or until he/she is disqualified from the University.

2. A student shall be terminated from the program under any one of the following circumstances:
   a) Failure to carry out the plan developed during a probationary semester;
   b) An E' grade (failure) in field practicum;
   c) Lack of acceptance of/acceptance by three or more field agencies if, in the judgment of faculty and field staff, the placements can provide appropriate field experiences without undue inconvenience to the student;
   d) Lack of adherence to professional expectations and standards (see University Code of Conduct, NASW Code of Ethics, and CSWE Curriculum Policy Statement);
   e) A student who appears to lack the degree of physical and mental health necessary to function successfully as a social worker may be required to take a medical examination and make the results available to the Committee on Academic and Professional Standards of the School of Social Work. The responsibility for reviewing and determining the qualification of students whose behavior and/or performance are in question is vested in the Standards Committee. The Committee's decision may require the dismissal or disqualification of a student from the Program.

3. A disqualified student who desires to be reinstated may submit an application for reinstatement. A disqualified student normally will not be reinstated until at least one semester has elapsed from the date of disqualification. The burden of establishing fitness is on the disqualified student, who may be required to take aptitude tests and submit to other examinations before being readmitted.

4. While students are subject to the general retention policy, they are evaluated in the School on broader criteria than mere academic average. Students are reviewed for evidence of competency for social work and are continuously evaluated as they progress in the program. Prospective social work candidates who do not meet the established criteria are guided toward a program that is compatible with their interests and abilities.

Social Work

PROFESSORS:
McCLURE (WEST HALL), COUDROGLOU, DALEY, HUDSON, LEWIS, MacEACHRON, MONTIEL, MORONEY, WONG

ASSOCIATE PROFESSORS:
ENGELHARDT, FAUSEL, KETTNER, LEYBA, MAGEL, MONTERO, N CHOLS RED HORSE, WOODMAN

ASSISTANT PROFESSORS:
ANGULO, APPLEWH TE, ASHFORD JORQUEZ LeCROY, L E NETTING, NICHOLS CASEBOLT SCHIL T, WILSON,

PROFESSORS EMERITI:
CRANMER HARWARD, LUNDBERG, POLENZ, ALDR CH, H LL

SOCIAL WORK (SWU)

SWU 271 Introduction to Social Work. 3) F S
Ana ys s of contemporary soc a we fare services and profess ona soc a work Des gned for freshmen sopho mores cons dering th s major. Prerequ s te for al other soc a work courses SOC 101 and PGS 100

291 Community Resources. 3 F S
Purpose structure and de very system of commun ty we fare agencies nc udes 40 hours observat ona ex per ence n oca agenc es Prerequisite SWU 271 or concurrent enro lment

301 Human Behavior in the Social Environment I. (3) F, S
ntroduct on to 'nterre at on of b o psycho soc ocu tura systems and their effect on behav or focused on South western ethn c and cultura groups Prerequ s tes: SOC 101 and PGS 100 *[Satisfies General Studies Requirement· SB]*

310 Social Work Practice I - Skills. 3) F, S
ntroduct on to soc a work ski ls emphasizing communi cat ve sk s· ro e p ay ng, v deo tra n ng cross cu tura nterv ew ng, commun cation patterns Prerequ sites SWU 271 291, 301.

331 Social Policy and Services I. (3) F, S
H story, ph losophy and va ues of soc al welfare; function and role of soc a welfare n society development of the soc a work profess on and pract ce. Prerequ sites junior

stand ng and SWU 271, 291. *[Satisfies General Studies Requirement: H]*

402 Human Behavior in the Social Environment II. (3) F, S
Sequel completing study of life span deve opment and behav or wh ch forms base for social work practice Pre requisites sen or stand ng and SWU 301 *[Satisfies General Studies Requirement: SB]*

410 Social Work Practice II - Systems. (3) F, S
ntroduct on to soc a work methods; major areas of knowledge va ues and sk lls bas c to the Soc al Work he p ng process focused on nd viduals, sma groups and community Prerequ sites: Soc a Work major and SWU 271 291 301, 310. Concurrent enrol ment n SWU 412

411 Social Work Practice III - Settings. (3) F S
Applications of theoret cal frameworks to socia work pract ce at individual, fami y, group and commun ty evels Prerequisites Soc a Work major and SWU 271 291, 301, 310 410 Concurrent enrol ment n SWU 414

412 Field Instruction I. (5) F S
S xteen hours a week of superv sed practice in an approved p acement and 1 1 2 hours a week f e d sem nar. Prerequ s tes: Soc a Work major and SWU 271, 291, 301, 310. Concurrent enro lment n SWU 410, 413

413 Field Instruction Seminar I. (1) F S
1 1 2 hours a week fie d-focused sem nar. Concurrent enro ment in SWU 410 412

414 Field Instruction II. (5) F, S
Sixteen hours a week of superv sed practice in an approved placement and 1 1/2 hours a week fie d sem nar. Prerequisites: Soc a Work major and SWU 271, 291, 301, 310, 410, 412 Concurrent enro ment in SWU 411 and 415.

415 Field Instruction Seminar II. (1) F S
1-1 2 hours a week f e d focused seminar Concurrent enro lment n SWU 411, 414.

420 Practice-Oriented Research. (3) F, S
Appl cation of sc entific princip es to f eld practice, problem formulation, ntervention procedures and 'mpact assessment Prerequisites. an approved course n data ana ysis techn ques or equiva ent Concurrent enro l ment n SWU 412 or 414 or approval of instructor

432 Social Policy and Services II. (3) F, S
Contemporary soc a po t ca , and econom c ssues. Spec a emphas s on poverty and inequa ty n the South west Analys s and deve opment of soc a welfare po c es and programs. Prerequ s tes sen or standing and SWU 271, 291 331.

474 Ethnic Cultural Variables in Social Work. (3) F S
A basic conceptua approach to understand ng ethn c/ cultural var ab es of Southwestern ethn c m nor ties and how these factors ntervene n soc al work practice

See page 38 for special courses which may be offered by this academic unit.

Master of Social Work

The Master of Social Work program prepares professional social workers for advanced direct practice, administrative, and community practice. The program puts major emphasis on preparing social workers capable of responding effectively to the needs of special populations in the Southwest the ethnic minority groups of the region, the aged, and rural populations in its curriculum and its practicum assignments. The M.S.W. program is accredited by the Council on Social Work Education.

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 prior to entering the concentration year. The following are the required foundation courses:

		Semester Hours
SWG 501, 502	Human Behavior in the Social Environment I, II	6
SWG 510, 511	Direct Practice I, II	6
SWG 520	Practice Oriented Research	3
SWG 531	Social Policy and Services I	3
SWG 580	Initiating Community and Organizational Change	6
SWG 541, 542	Field Practicum I, II	6
		30

In the second year students concentrate in either Direct Practice or Planning, Administration and Community Practice. Nine hours of electives are available for students either to take additional hours in their concentration or to increase knowledge and skill in such areas as health, mental health, family and child welfare, or aging. The following are the required concentration courses.

		Semester Hours
SWG 610	Direct Practice III	3
	and select one of the following.	
	SWG 611 Social Work Treatment With Individuals	3
	SWG 612 Social Work Family Treatment	3
	SWG 619 Social Work With Groups	3
	or	
SWG 680	Program Planning in Social Services	3
	and select one of the following	
	SWG 681 Social Work Administration	3
	SWG 682 Community Practice ..	3
SWG 620, 621	Field Research I, II	6
SWG 632	Social Policy and Services II	3
SWG 641, 642	Advanced Practicum/Direct Practice I, II	6
	or	

SWG 643	Advanced Practicum/Planning/	
644	Social Work Administration and Community Practice I, II	6
	Electives selected from offerings at the School of Social Work or courses offered through other departments with the approval of student's advisor	9
		30

Comprehensive Examinations. Arizona State University 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 comprehensive examination, administered by the School, prior to 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.

Tucson Component. The School of Social Work offers the full foundation year (30 credits) and some concentration year courses in Tucson. Students are required to commute to Tempe during both semesters of their concentration year. Every effort is made to schedule courses so that only one day per week is required for travel, but it is possible that two days of travel may be required to meet specialized student requests or needs. For application to the Tucson 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. This program is completed in accordance with the plan developed. At least one academic year must be taken on a full-time basis. A maximum of one year of field education can be done by special arrangement in the agency where the student is employed.

Admissions Requirements

Applications to the M.S.W. program are accepted from November 1 to April 1 preceding the fall semester to which the applicant is seeking admission. All applicants are reviewed for admission for the fall semester only.

Regular Admission. Applicants must be acceptable to both the Graduate College and the School of Social Work. Among other considerations for acceptance by the Graduate College, the applicant must have a grade point average of 3.00 (4.00 = A) in the last two years of work leading to the bachelor's degree. The applicant's score on the aptitude examination the Graduate Record Examination or Miller Analogies Test may also be considered in making decisions regarding admission.

Provisional Admission. Applicants may be granted provisional admission to the Graduate College if the Graduate College or the School of Social Work requires additional evidence of their qualifications for admission to regular status. No student may maintain provisional status indefinitely. Normally, final determination of status will be made by the time the student has completed 12 hours of approved graduate study. This classification usually applies only to the first semester. A decision is made prior to the end of the first semester regarding the student's progress. Provisional students do not enter the field until the provisional status has been removed. Otherwise, they carry the same academic load as regularly admitted students and are expected to meet the same standards for continuation in the program.

Application Procedure. The following should be submitted to the Admissions Office, Graduate College, Arizona State University, Tempe, AZ 85287. The application for admissions to the Graduate College, two transcripts from each institution where the applicant has attended previously, test scores from either the Graduate Record Examination or the Miller Analogies Test.

The following should be submitted to the Admissions Committee, Graduate Program, School of Social Work, Arizona State University, Tempe, AZ 85287: 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, and 3) three letters of reference. The reference letter forms provided by the School of Social Work must be used

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 toward the M.S.W. degree. A full report from the school at which the credit was obtained is required.

A maximum of 9 graduate semester hours earned as an unclassified student in the ASU School of Social Work may be transferred. Up to six semesters hours of prior graduate work in another ASU program or another university may transfer as elective credit if approved by the program director. A combination of credit earned as an unclassified student in other pro grams or universities may not exceed 9 semester hours.

Consideration for acceptance of prior gradu ate credits must be applied for at the time of ad mission. The grades for all transfer credit must be a 'B' or better.

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.

Waiver Exams. The number of hours required to complete the M.S.W. degree ranges from 40 to 60 semester hours, with 60 credits represent ing the standard program. Admitted students may acquire credits toward the degree by: a) transferring in credit (see policy on transfer credit) or b) waiving up to 20 hours of founda tion course work as a result of successfully passing examinations offered in April and August of the year of the student's initial entry in the Graduate Program. Waiver examinations are available for all foundation level courses.

With the exception of students transferring in the first year of graduate study from an ac credited graduate program in social work, no student may be exempted from more than 20 credits of course work by either examination or a combination of transfer credit and examina tion. In the event that the student passes exami nations in more than 20 credits of course work, the student will replace waived required courses with elective course work to complete the requisite 40 hours.

Financial Assistance. Recent federal reduc tions in support of human services and educa tional programs have severely limited the re sources available for stipends. It is therefore important that applicants have a sound financial plan for covering expenses while attending school. Financial aid information is available from Student Financial Assistance Office, Matthews Center, Arizona State University, Tempe, AZ 85287.

SOCIAL WORK (SWG)

SWG 501 Human Behavior in the Social Environment I. 3 F
A study of the major theoretica approaches to the under stand ng of nd v dua and fam ly deve opment w th n a d verse socio cu tura env ronment.

502 Human Behavior in the Social Environment II. 3 S
Exam nes human deve opment through the ife span and the behav or of ndiv'dua s and fam es n transact ons w th var ous eco og ca systems Prerequ s te· 501

510 Direct Practice I. (3) F
Bas c social work methods w th an emphasis on the prob em solv ng process as t perta ns to nd v dua s fami es and sma groups

511 Direct Practice II. 3 S
Cont nuat on of intervent ve techn ques w th indiv'duals, fami es and sma groups Prerequ s te· SWG 510

520 Practice-Oriented Research. 3) S
Acce erated course n applicat on of scient fic princip es to f e d pract ce prob em formu at on ntervent on proce dures and mpact assessment. Prerequ s tes. Soc a Work major and an approved course n statist cs.

531 Social Policy and Services I. (3) F
Conceptual, ana yt ca , and h stor ca perspect ves on the soc a we fare nst tut on Emphas s on poverty and nequa ty Princ p es of po cy ana ysis

541, 542 Field Practicum I, II. (3 3 F S
Two consecut ve semesters (480 hours) of superv sed soc'al work pract ce n an approved p acement Prereq u s tes: concurrent or pr or enro ment n SWG 510 511.

580 Initiating Community Change. (3 F
Understand ng commun ties as soc a systems Experi ences of spec al populat ons as commun ty partic pants Strateg es for ntroduc ng p anned change n commun ties

581 Initiating Organizational Change. (3 S
Exam nes human serv ce organ zat ons and the extent to wh ch they are structured and des gned to meet consum er needs. Introduces strateg es for n t at ng p anned change. Prerequ s te. SWG 580

591 Seminar. 1 3 F, S
Courses offered n spec a zed areas

605 Substance Abuse. 3 N
Psycho og ca and soc o cu tura determ nants of sub stance abuse. Overv ew of soc a po cies and treatment approaches Prerequ's tes SWG 501 502 or approva of nstructor

606 Psychopathology. (3 N
Theor es and concepts of menta hea th and i lness At tent on to the deve opment of env ronmenta nterperson a psycho socia stress factors n human behav ora dynam cs SWG 501 or approval of nstructor.

607 Social Work and Women's Development. (3 N
mpact of sex sm on growth and deve opment process poss b e outcomes Human Patho ogy/nterpersonal ntra persona dynam cs Systems supporting menta hea th and or contribut ng to menta i ness Prerequ s te· SWG 501 or approva of instructor

608 Cross Cultural Aspects of Aging. (3) N
Ag ng n context of culture and ethnic ty; comparative ana ysis se ected modern and trad t ona popu at ons. Im p icat ons for practice w th m nority aged Prerequ sites SWG 501, 502 or approval of nstructor

609 Health Aspects of Aging. 3) N
The ag ng process and hea th of the aged· chronic ness and adaptat on prevent on contro of chron c d sease d sab ty, assessment ntervent on Prerequ s tes SWG 501, 502 or approva of nstructor

610 Direct Practice III. 3 F
Ref ne and integrate know edge sk s and att tudes pro v ded n basic soc a work method Prerequ s tes SWG 510, 511

611 Social Work Treatment With Individuals. 3) S
Advanced theory and pract ce of use of socia work n tervent on w th nd vidua s Prerequ s tes SWG 510, 511, 610

612 Social Work Family Treatment. 3) S
Theory and pract ce of soc a work treatment w th fam ies Prerequ s tes SWG 510, 511, 610.

614 Social Work With Reconstituted Families. (3) N
Analyzes the psycho-soc a dynamics of fami es d s rupted by d vorce separat on or death of a parent Of fers d fferential soc a work ntervent ons. Prerequ s te: SWG 510 511 or approva of nstructor

615 Group Process in Social Work. (3) N
App cat on of sma l group theory group dynam cs knowl edge to soc al work pract ce. Understanding and app cat on of sma group theory n worker group member roles Prerequ s te: SWG 510 511 or approval of in structor.

619 Social Work With Groups. (3) S
Advanced course using soc a work groups as a d rect practice ntervent on in social work Prerequ s tes SWG 510, 511, 610

620, 621 Field Research I, II. (3 3) F S
Individua or group projects n such areas as po cy ori ented research know edge assessment for practice know edge bu d ng emp r ca research on a human serv ces prob em, program eva uat on Prerequisite SWG 520.

624 Program Evaluation in the Human Services. (3) N
Deve opment of understand ng and ski n the conduct of program and project eva uat on Prerequ s te· SWG 620 or approva of nstructor

632 Social Policy and Services II. (3) S
Deve opment of advanced know edge and ski ls in soc al welfare po cy analys s pol cy formulation, and advocacy and intervention for policy change.

633 Ethical Dilemmas in Social Work. 3) N
Eth ca d lemmas n soc a work pract ce *Ph* osoph ca aspects of crit ca soc a welfare ssues and the eth cs gu d ng profess ona act on. Prerequis te SWG 531 or approva of nstructor

634 Child Welfare Law. 3 N
Prov des soc a workers with know edge of bas c lega pr nc p es and procedures w th emphas s on fam ly re ated issues and ch dren s r ghts Prerequ s tes SWG 531 or approva of nstructor

635 Community Mental Health. 3) N
The sem nar exam nes theory deve opment in commun ty menta hea th practice with ind v dua s groups and com mun t es as we as the nkages among these elements Prereq s tes SWG 531 or approva of nstructor

641, 642 Advanced Practicum/Direct Practice, I, II. *3* 3 F S
Two consecut ve semesters 480 hours) of superv sed soc a work pract ce n an approved p acement re ated to the student's career goa Prerequ s tes. SWG 510 511 541 542 and concurrent or prior enro ment n SWG 610 and e ther 611 612 or 619.

643, 644 Advanced Practicum Planning Social Work Administration and Community Practice, I, II. 3 3) F, S
Two consecut ve semesters 480 hours) n soc al work pract ce n an approved p acement re ated to the stu dent's career goa Prerequ s tes. SWG 580 581 541, 542 and concurrent or pr or enro ment n SWG 680 and e ther 681 or 682

680 Program Planning in Social Services. 3) F
The soc al serv ces plann ng process nc udes needs assessment, goa s and object ves program des gn, budgeting, management nformat on systems and pro gram eva uation Prerequis tes SWG 580, 581

681 Social Work Administration. (3) S
Adm nistrative sk bu d ng and theory app cation w thin human service non prof t social work sett ngs Prereq u s tes SWG 580, 581, 680

682 Community Practice. (3) S
Commun ty pract ce enta ls specific sk areas includ ng program evaluat on, task oriented group technology, cit zen/consumer part cipat on and barga n ng/negot - at ng. Prerequ s tes: SWG 580, 581 680

683 Grantsmanship/Proposal Development. (3) N
Student groups deve op proposa s in co aborat on with human serv ce agenc es or community groups. dentif cation of potential fund ng sources; technical and nter- persona polit ca aspects of proposa development Pre- requisites SWG 580, 581 or approval of nstructor.

684 Contract Administration in Social Work. (3) N
Fundamenta s of contract ng from n tial conceptua za tion of the serv ce need through deve opment negot a *tion adm n stration and monitoring of contracts.*

Doctor of Social Work

The Doctor of Social Work program is designed to prepare a limited number of experienced so cial workers for leadership roles in social wel fare as administrators and as social policy ana lysts, with an applied research orientation.

Policies developed by legislative bodies, administrative regulations and judicial decisions establish the basic programs and services with which social workers are concerned. D.S.W. *graduates should be prepared to contribute to* the assessment and formulation of such polic ies, based on sophisticated analysis and under standing of the social problems for which the policies are designed. They should also be prepared to engage in leadership roles in the devel opment of viable social work programs of in tervention on behalf of populations at risk, and to contribute to the efficient and effective oper ation and administration of such programs.

Program of Study

Completion of the program will require at least 39 semester hours of course work beyond the master s degree and a minimum of 15 semes ter hours for the dissertation Each student will complete all core requirements· Research

(9 hours); Social Work Administration (9 hours); Social Policy (9 hours), Comprehensive Examinations (written and oral), Dissertation (15 hours), and 12 hours of electives. In addi tion, based on an educational assessment by the Supervisory Committee, a number of leveling' courses may be required to bring the student to an acceptable level of specific knowledge.

The following are the core requirements:

		Seme ter H urs
SWG 720	Research Methods in Social Policy and Administration	3
SWG 721	Survey Research and Selected Research Issues in Social Policy and Administration	3
SWG 722	Organizational and Evaluative Research in Social Policy and Administration	3
SWG 730	Social Policy Issues in Social Welfare	3
SWG 731	Social Welfare Policy Analysis and Development	3
SWG 732	Social Welfare Policy: Economic and Political Analyses	3
SWG 740	Theory and Practice of Social Work Administration	3
SWG 741	Social Work Administration in a Systems Context	3
SWG 742	System Redesign for Social Change	3

The remaining 12 semester hours will be ne gotiated by the student and his/her advisory committee and will reflect the student's short and long-term career interests. It is expected that in most instances these courses will be taken in other schools or departments within the University.

Admission to the D.S.W. Program

In general, an applicant to the program should hold a Master of Social Work degree from an accredited school of social work and have dem onstrated professional growth in the practice of social work, particularly in the administration of social services. Exceptions to this general requirement may be made for applicants with an advanced degree in a related field and excep tional practice or research experience in social work.

Admission to the D.S.W. program requires completion of all admission requirements and procedures set forth by the Graduate College and test scores from the Graduate Record Exam ination (verbal and quantitative). Applications are accepted up to March 1 preceding the fall semester to which the applicant is seeking ad mission. Students are admitted only in the fall semester.

Application Procedure. The following should be submitted to the Admissions Office, Graduate College, Arizona State University, Tempe, AZ 85287: The application for admis sions to the Graduate College, two transcripts from each institution where the applicant has attended previously, test scores from the Grad uate Record Examination.

The following should be submitted to the Admissions Committee, Graduate Program, School of Social Work, Arizona State Univer sity, Tempe, AZ 85287: 1) application to the Doctor of Social Work Program, 2) statement of educational and career goals in sufficient de tail to indicate compatibility with the educa tional objectives and capabilities of the School of Social Work, 3) examples of written work or published materials, and 4) three letters of reference. The reference letter forms provided by the School of Social Work must be used.

SOCIAL WORK

SWG 720 Research Methods in Social Policy and Administration. (3) F
Research methodo ogy stat stical methods and soc a data app ied to soc a we fare prob ems and admin stra tive dec sions emphas zing southwestern populat ons

721 Survey Research and Selected Research Issues in Social Policy and Administration. (3) S
Samp ng data co ect on, forecasting methodo ogy; re search and deve opment programs in southwestern settings computer methods Prerequ site. SWG 720.

722 Organizational and Evaluative Research in Social Policy and Administration. (3) F
Evaluating socia we fare organ zations, po ic es prac t ces' measuring program resu ts; mpact on target pop ulations; research methods to f t socia welfare prob ems. Prerequis te: SWG 721.

730 Social Policy Issues in Social Welfare. 3) F
H stor ca backgrounds of current pol cy ssues, aw as expression of soc al po cy eg slat ve execut ve and jud c al ro es n formulat ng po cy.

731 Social Welfare Policy Analysis and Development. 3 F
Methods of po cy ana ys s' cnt que of socia we fare po c es aga nst proposed mode s case stud es of po cy de velopment emphas z ng southwestern popu at ons Prerequ s te SWG 730

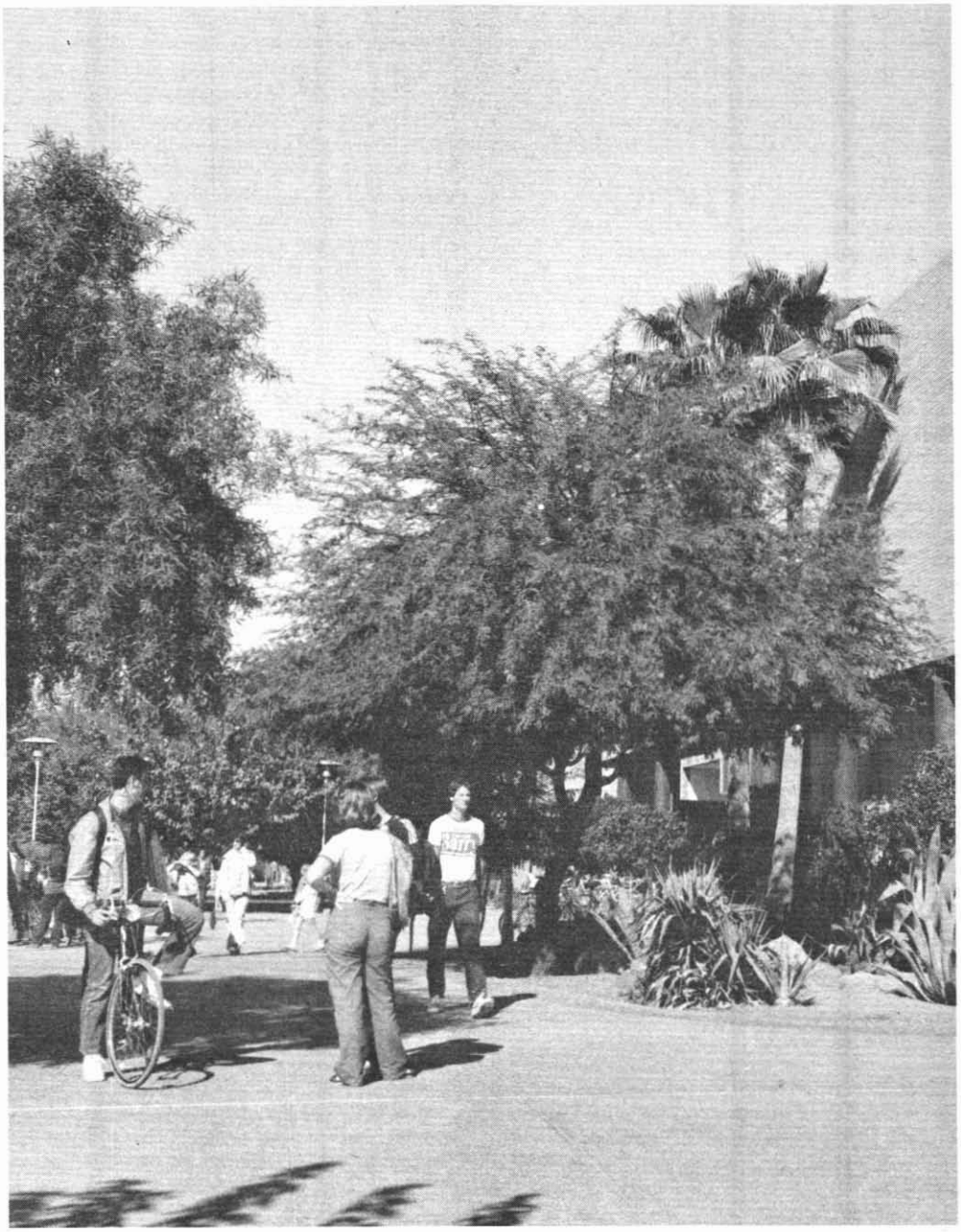
732 Social Welfare Policy: Economic and Political Analyses. (3 S
Econom c and pol tical factors nfluenc ng nat ona so cia welfare pol cies, taxes, f nancia resources and c vi rights as affect ng soc a we fare programs Prerequ s te SWG 731

740 Theory and Practice of Social Work Administration. 3 F
Organ zat ona theory and adm n strat ve pr nc p es ap p ed to soc a work adm n strat on d st nct ve features of soc a work adm n strat on, serv ng popu at ons at r sk

741 Social Work Administration in a Systems Context. (3) S
Case studies of social work administration from initial conceptualization of policy through implementation at national, state and local levels. Prerequisite: SWG 740.

742 System Redesign for Social Change. (3) F
Redesigning/improving administrative structures; relation of administrative organization to service delivery; organization change procedures; case studies emphasizing minorities and women. Prerequisite: SWG 741.

See page 38 for special courses which may be offered by this academic unit.



Arizona State University West Campus

B. Dell Felder, Ph.D.
Dean of Faculty

Objectives

Arizona State University West Campus is the Phoenix based branch campus of Arizona State University. It was established in 1984 by the Arizona Legislature to serve the educational needs of residents in western Maricopa County. The West Campus provides upper level and graduate courses leading to baccalaureate and master s degrees. Programs and services are de signed to respond to the needs of working adults and community college transfer students who are pursuing a degree, seeking career growth or furthering their knowledge

ASU West Campus, as part of the Arizona State University system, shares the common goal of excellence. Its partnership with the Main Campus is characterized by an institution wide faculty, a unified academic policy, one de gree and one administration. Because the two campuses are unified academically, admission and degree requirements are the same. Arizona State University is accredited by the North Central Association of Colleges and Secondary Schools Professional programs in the various academic units are also accredited by national boards, commissions and councils

Organization

Management of the West Campus is the respon sibility of the Vice President for ASU West Campus. The division of Academic Affairs is administered by the Dean of the Faculty. It is comprised of four mu tidisciplinary units ad ministered by Academic Directors for:

Applied Sciences, Engineering and Technology
Arts and Sciences
Business
Education and Human Services

Degree Programs

Presently, the following degree and certifica tion programs are authorized by the Board of Regents:

Applied Scienc es, Engineering and Tech nology

B.S.E.: Special Studies
B.S . Industrial Technology

For specific information for degree require ments refer to the College of Engineering and Applied Sciences section in this *Catalog*

Arts and Sciences

B.A.: English
B.A.: History
B.A.. Political Science
B S.. Political Science
B.A.: Sociology
B.S.: Sociology
B.A.: Spanish
B.A.: Communication
B.S.· Communication
B.A. Art
B.F.A.: Art
B.A.: Music
M.M.: Choral Music

For specific information for degree require ments refer to the College of Liberal Arts and Sciences and College of Fine Arts sections in this *Catalog*.

Business

B.S.: General Business
Master of Business Administration

For specific information for degree require ments refer to the College of Business section in this *Catalog*

Education and Human Services
B.S.: Nursing
M.S.: Nursing
B.S Justice Studies
B.S.: Recreation
Bachelor of Social Work
Certificate of Gerontology
B.A.Ed : Elementary Education
M.Ed.: Elementary Education
B.A Ed.: Secondary Education
M.Ed.: Secondary Education
B.A.Ed. Special Education
M.Ed.: Special Education
M.Ed.: Educational Administration and Supervision

For specific information for degree requirements refer to the College of Education, College of Nursing, College of Public Programs and the School of Social Work sections in this *Catalog*

Facilities

Construction of the permanent campus began in 1986 on a 300-acre site bounded by Thunderbird and Sweetwater Roads and 43rd and 51st Avenues in Phoenix. The first phase of the campus is projected for completion in the 1990s with the capacity to serve 10,000 students. The first building, the library, is expected to be in use by the spring of 1988 While the new campus is under construction, classes and services are offered at three facilities

ASU West Campus Alhambra
4510 North 37th Avenue
Phoenix, AZ 85019
602/279 5484

ASU West Campus Montebello
2636 West Montebello Avenue
Phoenix, AZ 85017
602/246 6060

ASU West Campus at
The American Graduate School of
International Management
Snell Learning Center, Room 15
59th Avenue and Greenway
Glendale, Arizona 85306
602/978 7760

Student Services

Student Services programs augment and support the academic programs offered at West Campus The focus of Student Services is on the quality of non residential campus life for all students and, in particular, special needs groups such as part time working adults, community college transfer students, minorities, commuters, re entry students, and the disabled. The offices of Student Services are located at the Alhambra facility and currently offer programs for:

pre enrollment
admission and orientation
academic advisement
registration
financial aid
student employment
career services
counseling
disabled student resources

Additional services will be added as the West Campus develops.

For assistance in determining eligibility, or for assistance in admission and registration, as well as advisement and other services, call, write or visit:

Student Services
ASU West Campus Alhambra
4510 North 37th Avenue
Phoenix, AZ 85019
602/279 5484

Library

The West Campus Library provides an on site collection of books and journals selected to complement course offerings and degree programs Electronic access to information and to the resources of other libraries is also provided. Highly skilled librarians are available for assistance in obtaining specialized research materials. A feature of the library is the daily delivery of materials from other ASU libraries and West Valley libraries The West Campus library collection will contain about 330,000 volumes when complete.

For more library information, call, write or visit:

ASU West Campus Library
ASU West Campus Alhambra
4510 North 37th Avenue
Phoenix, AZ 85019
602/279 5484

Faculty Offices

ASU West Campus is committed to excellence in scholarship, instruction, and student performance. The faculty and administrators have been chosen for their outstanding achievements and backgrounds. They are highly qualified to understand and meet the needs of West Campus students through administration, instruction, research and advisement.

Faculty and administrative offices are located at the Montebello facility. To contact officers or faculty, call, write or visit:

ASU West Campus Montebello
2636 West Montebello Avenue
Phoenix, AZ 85017
602/246-6060

Graduate College

Brian L. Foster, Ph.D.
Dean

The Graduate College at Arizona State University provides students with opportunities to study beyond the bachelor's degree in a wide variety of academic disciplines and professions. ASU offers more than 40 doctoral and nearly 90 master's degree programs. The Graduate College fosters an atmosphere of academic excellence and a spirit of scholarship, research, and artistic accomplishment. Its objectives are to educate future leaders in the arts, in the creation of new knowledge, and in the application of our accumulated knowledge to human affairs.

Graduate Degrees and Majors

The Council of Graduate Schools in the United States distinguishes two kinds of graduate programs: those that are primarily research-oriented, and those that are professionally oriented. The Graduate College at ASU offers three research oriented graduate degrees. Programs leading to the *Master of Arts* and *Master of Science* degrees provide an introduction to research, often preparing students to pursue the *Doctor of Philosophy* degree. The Doctor of Philosophy is the highest University award to candidates who have proven their ability by scholarship and original research.

Professional graduate programs emphasize training that leads to professional practice. In these degree programs, students develop a high order 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). The professional doctoral degree is the highest University award to candidates completing academic preparation for professional practice. Professional degrees offered through ASU's Graduate College include:

Master of Accountancy
Master of Architecture
Master of Business Administration
Master of Counseling
Master of Education
Master of Environmental Planning
Master of Fine Arts
Master of Health Services Administration
Master of Mass Communication
Master of Music
Master of Natural Science
Master of Public Administration
Master of Quantitative Systems
Master of Science in Engineering
Master of Social Work
Master of Taxation
Master of Technology
Education Specialist
Doctor of Education
Doctor of Musical Arts
Doctor of Public Administration
Doctor of Social Work

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.

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. Undergraduate deficiencies may be assigned if the under-

graduate degree is based on credits not accepted by Arizona State University, such as life experience or noncredit workshops or seminars.

Graduate College Requirements

Generally, an applicant must have a grade point average of 3.00 (4.00 = A scale), 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, including general education studies, that are similar to those required for the baccalaureate degree at Arizona State University.

Requirements of the Academic Unit

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

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 assigned deficiency courses. The letter of admission will specify the deficiencies which must be completed before the student will be awarded a graduate degree. Deficiency courses are taken in addition to those normally required for a degree.

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 will review the student's status following completion of 12 semester hours of approved graduate study. At that time, the academic unit will recommend 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 or Unclassified Admission. A student not interested in earning a degree or not yet ready to apply to a particular degree program may enroll as an unclassified or 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 while in this category may be applied toward a graduate degree if appropriate for the student's program of study

Submission of an Application

All applicants must submit a completed Application for Admission form. Applicants to a degree program must submit two official transcripts of all postsecondary academic work completed or in progress. Although courses from one school may appear on the transcript of another school, the Graduate Admissions Office requires separate transcripts from each school attended. Applicants should allow sufficient time in requesting the schools concerned to process and mail the transcripts directly to the Graduate Admissions Office.

The submission of aptitude test scores is strongly recommended for all degree applicants and is required for admission to some graduate programs. The scores, as well as the Application for Admission and the transcripts, should be sent directly to the Graduate Admissions Office. Portfolios, letters of recommendation, and statements of goals should be sent directly to the academic unit

International Applicants

Eligibility and Graduate College requirements are the same for all applicants, including an international applicant. (An international applicant is one who is not a citizen of the United States.)

If English is not the applicant's native language, the applicant must submit a test score from the Test of English as a Foreign Language (TOEFL). Some academic units also require a test score from the Test of Spoken English (TSE). All teaching assistants must take the TSE.

In addition, an international applicant must submit a Financial Guarantee Form with bank verification attached. The rules of the Immigration and Naturalization Service require the Admissions Office to verify that a student entering the United States on a student visa has sufficient financial support for the entire proposed period of study.

An international student on a student visa may not enroll as a nondegree or unclassified student. All international students must carry health insurance. Detailed information concerning international applications is contained in the Application for Admission and the Information Brochure for International Students.

Application Deadlines

The Graduate Admissions Office should receive the Application for Admission, the transcripts, and the scores at least two months before the applicant intends to enroll. International applicants should submit the Application for Admission, the transcripts, TOEFL score, and Financial Guarantee on or before January 31 in order to begin study in the Fall semester and on or before September 30 to begin study in the Spring semester. Many academic units have specific and earlier deadlines, and applicants are urged to contact the academic units regarding application deadlines.

Application Procedures

When the Graduate Admissions Office has a complete file 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 academic 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 the Dean of the Graduate College.

Academic units, which must indicate their willingness to admit applicants, frequently set higher standards than those established by the Graduate College. Denial decisions may be based on the limitations of departmental resources as well as on the relative qualifications of those competing for admission in a particular semester.

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 Arizona State University. If the applicant does not enroll in the University within one year, the admission documents may be destroyed.

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.

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 Admissions Office. The application should be submitted at least one month prior to the beginning of the semester in which the student plans to re-enter.

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.

Course Withdrawal

During the first four weeks of a semester, a student may withdraw with a mark of 'W'. Between the fourth week and up 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 will result in a grade of 'E', which is used in the computation of the grade point average. 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.

All graduate assistants and associates must enroll for a minimum of six credit 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%) 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.

Audit Enrollment

Graduate students may register as auditors in one or more courses with the approval of the supervisory committee chairperson 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, e.g., teaching assistants or students on financial aid. The mark of 'X' will be 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.

Graduate College Degree Requirements

Graduate Advisement

Advising is much more than technical support; it is an integral part of graduate education. Students' programs of study are generally tailored to meet individuals' 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 unclassified students. Advisors assist unclassified or prospective students in contacting appropriate faculty and advisors. Students may call for an appointment or stop by Wilson Hall.

Grading

The grading system applicable to graduate courses follows:

A	Excellent (4.00	W	Withdrawal*
B	Good (3.00	I	Incomplete
C	Passing (2.00)	X	Audit
D	No Graduate Credit 1.00)**	Y	Satisfactory
		Z	Course in Progress***
E	Failure (0.00)**		

* This grade is given whenever a student officially withdraws from a class.

** This grade cannot be applied toward a graduate degree but is included in the calculation of a grade point average.

*** This grade is usually given pending completion of courses such as thesis, dissertation and practicum. It may also be given in lieu of an "I" for other graduate courses where the incomplete work may take in excess of one year to complete.

A grade of 'P' (Pass) in a 400-level course may not appear on a program of study. Grades of 'D' and 'E' cannot be used to meet the requirements for a graduate degree, although they are used to compute the grade point averages. 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 grade point averages. Grades on transfer work will not be included in computing grade point averages.

Graduate course work (other than research, applied project, practicum, thesis and dissertation), reported as 'I' (Incomplete) must be completed within one year. If a grade of 'I' (Incomplete) is not removed within one year of the official ending of the course, it will automatically be changed to an 'E' (Failure).

Scholarship

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

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

Graduate Credit Courses

Courses at the 500, 600, and 700 levels are graduate credit courses. Courses at the 400 level will 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 Arizona State University within 12 credit 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. Prior to registration in the course, the student must submit a Graduate College Petition form requesting to reserve credit; the form must be signed by the student's advisor, head of the academic unit, 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 prior to 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 Arizona State University. 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 prior to admission to a graduate degree program at Arizona State University is nondegree credit. Nondegree credit taken at Arizona State University combined with nondegree credit taken at another institution may not exceed nine hours on the master's program of study. The nine hour limit does not apply to the Education Specialist and 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 Arizona State University, including (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 non collegiate institutions (e.g., government agencies, corporations, and industrial firms); (4) credits awarded by postsecondary institutions for non credit 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 Arizona State University.

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.

Foreign Language Requirement

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

Students must pass a foreign language examination specific to their particular graduate programs. The examinations are administered three times each year by the Department of Foreign Languages 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 chairperson of the student's supervisory committee has the responsibility to provide the Department of Foreign Languages with materials from which the examination will be prepared. The chairperson should submit or recommend relevant books and/or journals of approximately 200 pages in length in the desired foreign language.

A student must pass the examination in no more than three attempts.

Theses and Dissertations

Candidates for the Master of Arts and Master of Science degrees must submit a thesis or equivalent which demonstrates an introduction to research. All doctoral degree candidates must submit a dissertation, with the exception of the Doctor of Musical Arts in Solo Performance which requires three recitals and a research paper. The Doctor of Philosophy dissertation should be a valuable educational experience which 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. It 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.

The Graduate College must review the final copy of the master's thesis, Education Specialist applied project, and doctoral dissertation for format. Copies of the *Guide to Preparation of the Master's Thesis, Doctoral Dissertation or Ed S. Applied Project* are available in the Graduate College. The student should submit the copy for format review 12 working days (two weeks plus two days) prior to the oral defense.

Graduate students and their supervisory committees are encouraged to select a style manual or journal format representative of the field of study. The Graduate College allows maximum flexibility in the format of the manuscript, but certain Graduate College and library guidelines must be followed.

The student must submit two final copies of a thesis, Ed.S. applied project, or dissertation to the Arizona State University Bookstore for binding to be placed in the University Library and Archives. Doctoral candidates should also submit one copy of the title page and one copy of the abstract which does not exceed 350 words. The student is responsible for the binding fees, in addition, doctoral students must pay to have their dissertations microfilmed by University Microfilms International (UMI). The fee covers the expense of having the document sent to UMI where it is microfilmed and catalogued. Information on the dissertation will appear in various publications such as *Dissertation Abstracts International* and the annual supplement of the *Comprehensive Dissertation Index*. The University calendar found in the current *Graduate Catalog* lists deadlines for the submission of theses and dissertations for oral defenses, the last day to apply for graduation, and the last day each semester to hold an oral defense of a thesis or dissertation.

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 *Guide to Preparation of the Master's Thesis, Doctoral Dissertation or Ed.S. Applied Project*

Students should also be informed about the requirements concerning their degree program and any special requirements within the academic unit. Students are expected, as part of their obligations, to be familiar with the *Code of Conduct* which is available in the Office of Student Affairs. Violations of the *Code of Conduct* or instances of academic dishonesty, specifically cheating in examinations, laboratory

work, written work (plagiarism), forging or altering University records (i.e., attempting to gain credit for work which the student has not actually performed) will be subject to University discipline whether committed by individuals or groups.

Graduate College Policies and Procedures. For more detailed information on Graduate College policies and procedures of particular interest to students, please refer to the current *Graduate Catalog*.

Policies and Procedures of the Graduate Council Appeals Board

The Appeals Board of the Graduate Council acts as the appeals body for graduate students seeking redress on academic decisions regarding their graduate program. The Board is composed of five members of the Graduate Council, excluding ex officio Council members who hold administrative positions in the Graduate College. The membership and chair of the Board are appointed by the Dean of the Graduate College.

An appeal by a student previously admitted to a graduate degree program may result from an academic decision considered by the student to be adverse. Decisions involving Graduate College policy as stated in the *Graduate Catalog* are within the jurisdiction of the Appeals Board. Decisions involving policies of the academic unit (center, department, school, college) are not normally heard by the Graduate Council Appeals Board.

A student may seek redress by writing a letter to the Dean of the Graduate College or to the chair of the Appeals Board of the Graduate Council. Upon receipt of the letter, the Dean or Chair will inform the student as to whether the appeal concerns a Graduate College policy, and is therefore within the jurisdiction of the Board, or is a policy of the academic unit.

A student may request an opportunity to appear before the Appeals Board or waive this right. The Board may choose to interview faculty members and administrators involved in the case and review the student's complete academic record and all documents pertaining to the case. Such reviews are primarily concerned with the observance of stated procedures and policies, but may consider extenuating circumstances as related to policy.

In the event a member of the Appeals Board has been involved in a case as a member of the student's committee or as a member of the faculty offering the graduate program, he/she will be temporarily replaced on the Appeals Board for the duration of the case, and the Dean of the Graduate College or chair of the Appeals Board may select an alternate member from the remaining membership of the Graduate Council. A member of the Appeals Board may request to be excused from a case, or may be temporarily replaced, whenever there is a potential for conflict of interest. The presence of three members of the Board at a meeting is considered a quorum.

Verbatim transcripts are not kept of the Board's proceedings. Only summary notes are kept. All written documentation presented in each case is retained in the Board's files for a period of one year. Such files are available only to the complainant and respondent in the hearing and do not become part of the student's official University file. The decision of the Appeals Board is reported to members of the Graduate Council for their information. The decision is then communicated to the student in writing by the Dean of the Graduate College, with a copy to each member of the Appeals Board.

Summer Sessions

Denis J. Kigin, Ed.D.
Director

Summer Sessions

The Summer Sessions provide an opportunity for students to pursue academic work on a year round basis. Course offerings are much the same as those of the academic year. Degree candidates, both graduate and undergraduate, as well as those seeking to enhance or to refresh their subject matter interests, will find a broad selection of courses available. All campus classes are held in air conditioned classrooms and laboratories. Limited offerings are available in off-campus locations during the summer sessions.

The opportunity for international travel and study is available during the summer. These programs are directed by regular faculty members and allow students to earn graduate or undergraduate credit. The international study programs carry University credit with the approval of the academic department and college involved.

Terms. There are three Summer Sessions; one of eight weeks and two of five weeks. The eight week session and the first five week session run concurrently.

Admission to Summer Sessions. Admission to the University is a requirement for enrollment in summer sessions. However, transient students those already admitted to other colleges and universities are allowed to be admitted as unclassified undergraduates or non degree graduates. The submission of transcripts or test scores are not required for this status. Conditional admission prior to graduation from high school may be granted under the conditions as stipulated on page 24 of this *Catalog*.

Summer session courses are equivalent to the regular semester courses in content, credit awarded and expected standard of performance. As a general rule, summer session courses are taught by regular members of the Arizona State University faculty. The *Summer Session Bulletin*, a schedule of courses, is published well in advance of the start of classes and may be obtained by writing or calling the Office of Summer Sessions.

Credit and Residence Requirements. Students are permitted to earn a maximum of 6 semester hours of credit each five week session or 9 semester hours of credit in the eight week session. Hours of enrollment in any other institution or correspondence course is included in the maximum allowable course load during any given session. Students entering the University as freshmen are invited to begin their university work in the summer They should, however, seek academic advisement before registering (see pages 22 26).

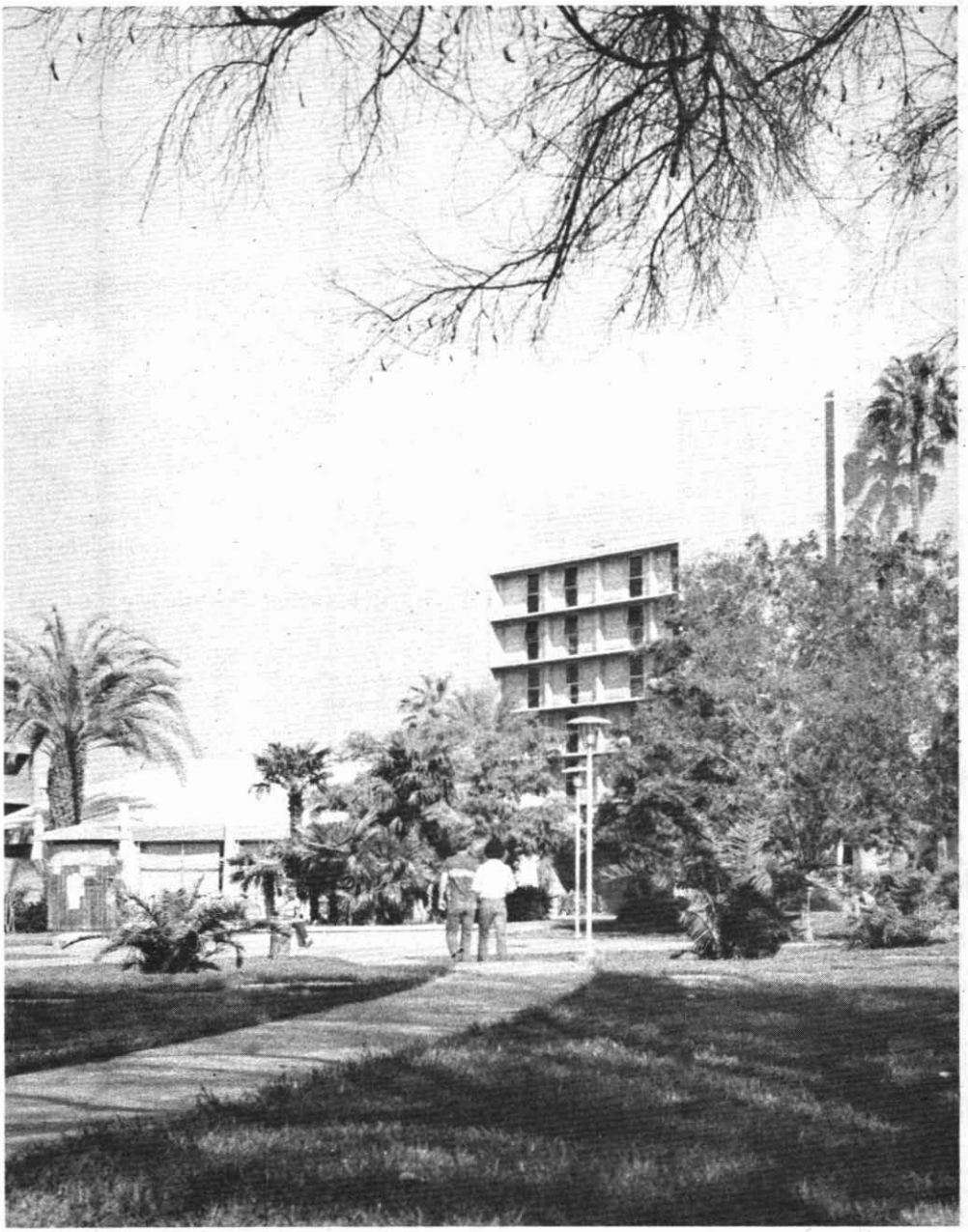
Undergraduate Enrollment. In general, applicants for admission are expected to present evidence of graduation from an approved four-year high school, or evidence of good standing in an accredited college. Students, 19 years of age or over, may be admitted as unclassified students without the above qualifications, but with the understanding that all University admission requirements must be satisfied before they can be admitted for a degree program (see pages 22-26 .

Graduate Study. Summer Sessions offer an excellent opportunity for baccalaureate degree holders to continue their professional development. Candidates for graduate degrees should pay particular attention to the requirements for graduate admission and study (see pages 398-399 and the *Graduate Catalog*).

Fees and Expenses. Summer sessions students pay only for the number of hours of actual enrollment. The per credit hour fee is set by the Arizona Board of Regents and is consistent with the fee assessed unclassified student enrollments during the academic year for stu-

dents enrolled for 1-6 hours. The summer sessions credit hour fee includes the student activity fee. Out-of-state tuition is waived for all students during the summer sessions. Textbooks and supplies may be purchased at the ASU Bookstore. Room and board for the summer are available on campus at the prevailing rates. For information, contact the Office of Residence Life at Arizona State University.

Information. Requests for the Summer Sessions *Schedule of Classes* or for other information should be addressed to the Office of Summer Sessions at Arizona State University, Tempe, AZ 85287.



International Programs

Richard S. Olson, Ph.D.
Director

Arizona State University recognizes that in a highly inter dependent world, knowledge and appreciation of other nations and cultures are es sential. This international commitment is re flected by a variety of activities in teaching, re search, and service. Arizona State University is especially active in Europe, Latin America, and Asia.

The Office of International Programs

Located within the Office of the Vice President for Academic Affairs, the Office of Internation- al Programs is responsible for promoting, facili tating, and in some instances administering uni versity programs with an international empha sis. The activities include establishing universi ty relationships with governments, founda tions, and funding agencies, securing research, teaching, and service opportun ties for faculty, and facilitating study abroad and exchange possi bilities for students The Office of Internation al Programs also works with community and state organizations to increase nternational awareness.

Area Studies

Special area studies programs are coordinated through the Center for Asian Studies (page 63), the Center for Latin American Studies, and the Russian and East European Studies Consortium (page 64). These groups publish journals, re- search reports, scholar y monographs and books in addition to coordinating educational programs within the University and abroad.

American Language and Culture Program

The American Language and Culture Program (ALCP) features an intensive, non-credit course of study designed for adult international stu dents who desire to become proficient in Eng lish as a second language for academic, profes sional, and/or personal reasons. Applicants must be 18 years of age and must possess a high school diploma or its equivalent All condi tions of the United States Immigration and Nat uralization laws pertaining to full time study in the United States must be met by all appli cants. Beginning students are required to take an English placement test prior to the beginning of classes. Certificates of achievement are awarded on completion of the course. Admis sion to the program does not constitute regular admission to Arizona State University.

Beginning, intermediate, and advanced level courses provide instruction in grammar, pronun ciation and speaking, listening comprehension, writing and composition, and reading and vocab ulary. Academic advising and orientation to Arizona and the United States are integral parts of the program.

Program wide social activities each term in clude a major field trip, a dinner, a picnic, and a cultural activity, visits to museums, historical places, and musical presentations.

Advanced level ALCP students may be per mitted to concurrently enroll in up to two ASU credit classes with the approv al of the Di rector. Several special classes are offered through the ALCP. Classes in conversation and the Test of English as a Foreign Language (TOEFL) are offered alternate terms. Also, the ALCP offers a credit bearing class in the second cycle of each semester.

The fall and spring semesters are divided into two 8 week cycles. Students may enroll for one or more cycles. An 8 week summer session of study is also offered. Inquiries concerning ad- mission requirements, enrollment and fee sched ules should be sent to the ALCP, Irish Hall,

Arizona State University, Tempe, Arizona 85287.

In addition to its intensive English program, the American Language and Culture Program administers the International Teaching Assistant Program and conducts special projects funded by the USIA and other agencies.

International Academic Programs

ASU Programs. Arizona State University provides extensive opportunities for study abroad and student exchange. Programs are operated by various units within the University, and in partnership with other universities and agencies. Currently, semester and full year programs are available in Europe, Latin America, and Asia. In addition, special summer study programs are available each year. Success overseas depends on careful advanced planning. Many programs require the ability to speak a foreign language. Students should consult their academic advisor to determine how courses taken overseas will apply to their program of study. Generally, students who participate in Arizona State University programs may apply their financial aid for overseas study, receive resident credit and achieve the most cost-effective overseas educational experience. General information about ASU's international academic program offerings is available from the Office of International Programs which will direct students to the appropriate program directors.

Non-ASU Programs. At times, continuing ASU students independently attend or participate in international academic programs sponsored by other universities and unaffiliated agencies. Students are urged to discuss plans with their academic advisors prior to beginning their studies. Questions of the foreign university's accreditation, the application of foreign courses to the program of study, the ability to apply financial aid, and the transferability of credits should be discussed. Students may be subject to readmission and must have their courses evaluated upon their return from overseas. An official English translation of all academic documents is required. Students should contact the Office of International Programs upon their return. Working with the appropriate academic and administrative offices, the Office of International Programs will facilitate evaluation of overseas course work.

Off-Campus Academic Services

John L. Edwards, Ed.D.
Executive Director

The office of Off Campus Academic Services is the academic service arm of the University in providing the opportunity for off campus credit and non credit courses. The following services and programs are available: off campus courses for academic credit, correspondence study, non-credit courses, instructional television, Elderhostel Program, ASU Sun Cities, and assistance in the development and administration of conferences.

Off-Campus Courses

As a convenience to students, off campus courses are organized and scheduled in locations conducive to enrollment in the metropolitan area and various locations in the eastern half of Maricopa County.

Credits earned off campus will be recorded on a student's permanent record in the same manner as those earned on campus and both will be equivalent in all academic considerations. Admission to and prerequisite requirements for a credit course must be the same whether the course is taught on or off the University campus. Identification of course content, method of instruction and evaluation, and selection and appointment of instructors for off campus courses remain the prerogative of the appropriate academic department with subsequent approval of the Dean of the College.

The fee for off campus courses is $60.00 per semester hour. Full time students (students registered for 7 or more hours through on campus registration) may register for *off campus resident credit courses* without the payment of additional fees. Any combination of *on campus and off campus resident credit courses* resulting in a combined registration of 7 or more semester hours requires that the student pay full time, in state registration fees, or full time out of state registration fees and the appropriate tuition (see page 17). Full time students who have paid registration fees and tuition (7 or more semester hours) *must also pay additional fees* if they enroll in off campus credit courses that commence after the 21st calendar day of the start of each semester.

Correspondence Study

College credit correspondence courses offered by Arizona State University are specifically designed for the student unable to attend classes in person. They are offered for those who are seeking to fulfill degree objectives as well as for those who wish to increase their occupational, professional and intellectual skills.

Persons desiring to enroll in correspondence study should write to the Correspondence Study Office, Off Campus Academic Services, for an enrollment form and a brochure listing the courses available. Students intending to register for a correspondence course, who are already enrolled for six hours or more in residence, must first obtain approval of the Dean of the College in which they are enrolled. Correspondence study courses may not be utilized for repeating courses in which the student previously received a grade of 'D," 'E," or 'I.

A correspondence course generally consists of eight lesson assignments for each semester hour of credit concluding with a final examination. Eight to ten hours are normally required preparing each assignment.

A student will not be permitted to take the final examination for a course in less than 7 days from date of registration for a one unit course, 14 days for a two unit course, and 21 days for a three-unit course.

Students are limited to one correspondence study course initially, with the expectation of completing that course within a calendar year. However, when one half the lessons are com

pleted in the initial enrollment, enrollment in a second course is possible. Students are limited to a maximum of two correspondence courses at any one time.

A maximum of 30 semester hours of credit earned in correspondence and or by comprehen sive examination may be applied toward the bac-calaureate degree at Arizona State University. Correspondence courses are not applicable as graduate credit toward advanced degrees.

The fee for correspondence courses is $33.00 per semester hour of credit and is payable at the time of registration. This is an additional fee re quired of full time students who have paid reg-istration fees and tuition. Tuition waivers do not apply to correspondence study fees.

Admission to Off-Campus and Correspondence Course Programs. A student may enroll in an off campus or correspondence course without making formal application for admittance to the University or to degree candi dacy. High school seniors may enroll in off campus or correspondence courses under the pro visions as stated for Conditional Admission Prior to Graduation from High School. (See page 24.)

Instructional Television Services

Television is a convenient, effective and effi cient educational delivery system. Through tele vision, it is possible to deliver selected educa tional opportunities to the adult population of Arizona. Instructional Television Services uses television as an educational delivery system capable of turning homes, businesses and schools in rural and urban communities into learning environments.

Non-Credit Continuing Education

Arizona State University recognizes its respon sibility for providing effective continuing educa tion activities. These activities, coordinated through the Office of Off Campus Academic Services, are educational in nature and in con formance with established University regula tions and policies. All non credit continuing education activities are sponsored by an academ ic department, college, or other approved agen cy of the University. Activities may be co spon sored or conducted in cooperation with outside agencies or groups when there s internal Uni versity involvement and control and the pur pose of the activity is educational.

The Office of Off Campus Academic Services provides operating assistance, encourages pro gram development, and coordinates all contin uing education activities sponsored by Univer sity administrative units and departments.

Elderhostel

Elderhostel at Arizona State University is a res idential Continuing Education Special Program which brings a small group (30-40) of older citizens to the University campus for one or more weeks. It is a new learning opportunity for persons over the age of 60. Courses unique to Arizona and the great Southwest specially designed for the participants will be offered on a non credit basis with no homework or test ing. The courses do not pre suppose previous knowledge of the subject and because of the concentrated one week format, it permits hos telers to move on to other universities within the national network. The courses at Arizona State University are taught by regular faculty and outstanding community leaders. Some local elders may participate as commuters, but the program spirit is based on the combined resi-dential and academic experiences. A wide va riety of extracurricular activities which take ad vantage of on campus opportunities will be made available to hostelers and commuters alike.

Arizona State University Sun Cities

The ASU Sun Cities educational facility is lo cated at the Bell Plaza Professional Building South, 17220 Boswell Boulevard, Sun City, Arizona, in the nation s largest retirement com munity. The courses offered are predominantly non credit and include a curriculum tailored specifically to the interests of the retirement community Each year more than 150 courses from approximately 30 disciplines are taught. A variety of weekly lectures also are available throughout the year.

Occasiona ly credit classes are offered when the demand is warranted. The credit classes are taught by ASU faculty, some local Sun Cities retired educators, retired professionals, foreign service officials and currently employed com-munity educators.

The ASU On Wheels Educational Tours program provides more than 30 single day trips and six or more multiple day tours each year. Travels are made throughout the state of Arizona and bordering states with courses in Southwest history, geology, sociology, and eco nomy offered enroute. Multiple day tours include stays at Lake Powell, Canyon de Chelly, northern Arizona/ southern Utah areas, southern Arizona, New Mexico, and Durango, Colorado.

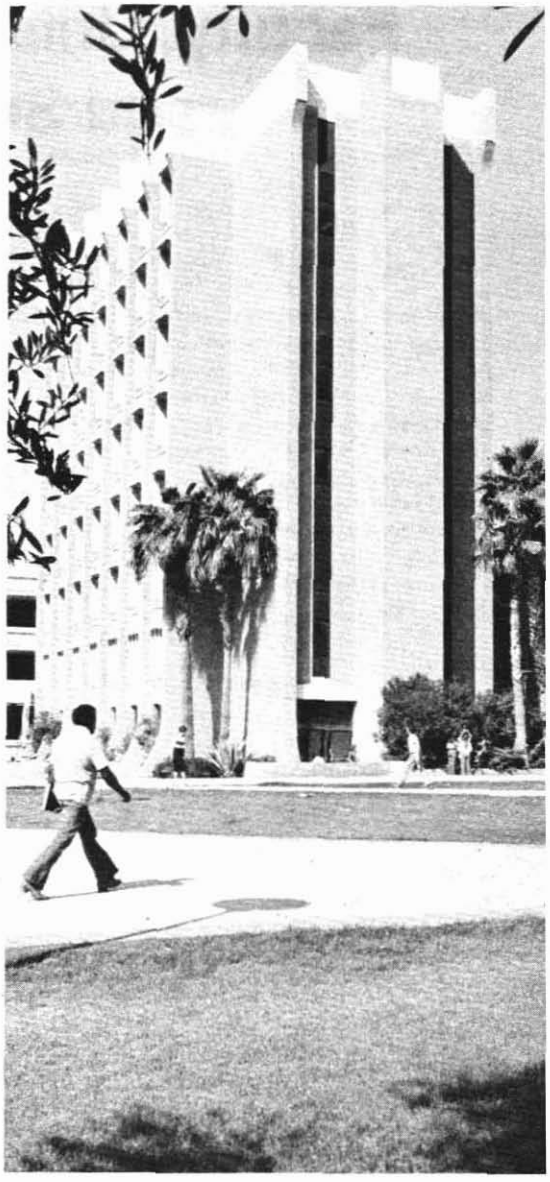
Trailblazers of the Southwest is an outreach of the ASU On Wheels, a program tailored for the special physical needs and limitations of those living in life-care centers or private homes. Shorter trips are made (within a 40-50 mile radius of the Sun Cities) and minimal walking is required at sites visited.

ASU Sun Cities has developed a Women's Studies Program designed for mature women in areas such as self-actualization, self-confidence, self-image and self-knowledge. Upon completion of two core courses and six elective courses, a certificate to Women's Studies is awarded.

Some special educational programs are offered including a two-week educational study trip to Cuernavaca, Mexico, where students stay in local residents' homes and study Spanish five hours per day in The Center For Bilingual Multicultural Studies School. This high concentration of Spanish enables the student to absorb the language at a faster pace as they apply Spanish to their daily use.

University Conference Services

The Office of University Conference Services coordinates on-and-off campus conferences, seminars and workshops sponsored by any administrative unit or academic department within the university. Working closely with each of the University's colleges, complete conference services and assistance to any campus group desirous of conducting an educational program or professional meeting are offered. Services include, but are not limited to, general conference planning, budgeting, site selection, promotion and publicity, hotel/motel liaison, and overall logistical support for any and all phases of the conference. The office also aids in the development of guidelines, checklists, and general operating procedures which serve to ensure coordination and smooth operation of continuing education activities sponsored by the various campus departments.



Faculty, University Offices and Services

The faculty listed are involved in both graduate and undergraduate instruction. Year following name indicates first appointment. Emeriti are included.

Arizona Board of Regents

Ex Officio

Evan Mecham — *Governor of Arizona*
C. Diane Bishop, B.S., M Ed , M S — *Superintendent of Public Instruction*

Appointed

To January 1988

Ralph Watkins Jr , B.A.
Tito A. Tachias

To January 1990

A.J. Pfister, B.S., LL.B
Donald G. Shropshire, B.A.

To January 1992

Edith S. Auslander, B A , M A
Herman Chanen
Jacqueline Schneider, J D — *Counsel to the Board*
Molly Corbett Broad, B.A , M.A — *Executive Director*

To January 1994

Esther N. Capin, B.A , M.A
Donald Pitt, B.S., LL.B

Student Regent

To June 1987

Felicia Martinez

General Administration

J Russell Nelson — *President of the University Professor of Finance*
B A , Pacific Un n Co lege, M B A , Ph D , University of Calif rnia, Los Angeles

Jack B. Kinsinger — *Vice President for Academic Affairs, Professor of Chemistry*
B.S Hi am C l ege M S Come l Univers ty, Ph D University of Penn ylvan a

Betty Turner Asher — *Vi e President for Student Affairs Asso iate Professor of Co unselor Education*
B A , Eastern Kentucky University M A., Western Kent cky Un versity Ed D , Univers ty of Cincin ati

Victor M. Zafra — *Vice President for Business Affairs*
B S , F S , Georgetown Univer ty M P A., Woodrow W l on School, Princeton Univers ty

Brent W Brown — *Vice President for University Relations, Associate Professor of Public Affairs*
B A , Brigham Young Un versity, M A , Ariz na State Univers ty; Ph D University of Ill no s

Gerald R McSheffrey — *Vice Pres dent for ASU West Campus Profess r of Ar hite ture*
D p Arch , University College, Lo don Dip C D Edinburgh Un versity

Henry C. Reeves — *Vice President for Research, Professor of Microbiology*
B S , Franklin and Marshall College M A , Ph D , Vande bi t Univers ty

Lawrence D Mankin — *Assistant to President for A lministr ti n Associate Pr fess r of Public Affairs*
B B.A , C ty Co lege of New Y rk, Ph D University of Il nois

Ann E. Bergin — *Assistant to the President*
B S Northwestern M A , Ariz na State Un versity

Jacqueline Weatherby — *Assistant to the President for Equal Employment Opportunity in Affirmative Action*
B.S , Arizona State University

Samuel A. Kirkpatrick — *Dean College of Liberal Arts, Professor of Political Science*
B S., Shippensburg State College, M.A., Ph D Pennsylvan a State University

Dean, College of Architecture and Environmental Design

John Kraft — *Dean College of Business, Professor of Finance*
B.S , Saint Bonaventure University, M A , Ph.D , University of Pittsburgh

Gladys Styles Johnston — *Dean, College of Education Professor of Educational Administration and Supervision*
B S , Cheyney State College M Ed. Temple University; Ph.D , Cornell Universityy

C R. Haden — *Dean College of Engineering and Applied Sciences; Director School of Engineering; Director, Engineering Research Center, Professor of Engineering*
B.S., Arlington State College, M S., California Institute of Technology, Ph.D , University of Texas

Seymour Rosen — *Dean, College of Fine Arts, Professor of Music*
B S , The Juilliard School

Paul Bender — *Dean, College of Law Professor of Law*
A.B , LL B , Harvard University

Janelle Krueger — *Dean College of Nursing; Professor of Nursing*
B S , M.S , Ph D , University of Colorado

Nicholas A. Henry — *Dean College of Public Programs; Professor of Public Affairs*
B A., Centre College, M A , Pennsylvania State University, M P A , Ph D , Indiana University

Jesse F. McClure — *Dean, School of Social Work Professor of Social Work*
A B , M S E., University of Michigan Ph.D , Brandeis University

Brian Foster — *Dean Graduate College Professor of Anthropology*
B A , Northern Illinois University, A M , Ph D , University of Michigan

Donald E Riggs — *University Librarian*
B A , Glenville State College M.A., West Virginia University, M L S University of Pittsburgh, Ed.D., Virginia Polytechnic Institute and State University

Resident Faculty

Aannestad, Per (1975) — *Associate Professor of Physics Astronomy*
B S University of Oslo, Ph D , University of California Berkeley

Aberle, Ezra (1986) — *Assistant Professor of Technology*
B S University of Illinois, M S , University of Arizona

Abraham, Willard (1953) — *Professor Emeritus of Education*
B S., Illinois Institute of Technology, M Ed , Chicago Teachers College Ph D , Northwestern University

Acevedo, Roberto M. (1964) — *Assistant Professor Emeritus of Spanish*
B A , University of California, Berkeley, M A Ph D., University of Arizona

Acharya, Raghunath (1976) — *Associate Professor of Physics*
M Sc , University of Delhi, Ph D., University of Rochester

Acker, William J (1970) — *Associate Professor of Geography*
B.S , Purdue University, M S University of Kansas, M A , Ph D , Syracuse University

Adams, Donna (1983) — *Instructor of Nursing*
B S N , University of Missouri, M S.N., Arizona State University

Adams, Karen L (1984) — *Assistant 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., Oxford University M A , Ph D , Washington University

Aguilar, John L. (1976) — *Associate Professor of Anthropology*
B A , University of California at Los Angeles M A , California State University at Los Angeles, Ph D , University of California, San Diego

Ahern, Maureen V (1972) — *Associate Professor of Spanish*
B.A., University of New Hampshire Bachelor, Doctor en Letras, Universidad Nacional Mayor de San Marcos Peru

Aiken, Jane H. (1985) ..... *Associate Professor of Law*
B.A., Hollins College; J.D., New York University; LL.M., Georgetown University

Aiken, Leona S. (1985) ..... *Associate Professor of Psychology; Associate Dean for Research, College of Liberal Arts and Sciences*
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; Director of Theatre*
B.A., Duke University; M.A., Ph.D., University of Denver

Alarcón, Justo S. (1968) ..... *Professor of Spanish*
B.A., M.A. (Theol.), Serafica (Spain); M.A. (Sociology), Laval University (Canada); M.A. (Spanish), Arizona State University; Ph.D., University of Arizona

Alcock, John (1972) ..... *Professor of Zoology*
B.A., Amherst College; Ph.D., Harvard University

Aldrich, Frank T. (1969) ..... *Associate Professor of Geography*
B.A., University of Texas; M.S., Ph.D., Oregon State University

Aldridge, Gordon (1978) ..... *Professor Emeritus of Social Work*
B.A., M.A., M.S.W., University of Toronto; Ph.D., University of Michigan

Alexander, Robert J. (1975) ..... *Professor of German*
B.A., Macalester College; M.A., Ph.D., University of Wisconsin, Madison

Alisky, Marvin (1957) ..... *Professor of Political Science*
B.A., M.J., Ph.D., University of Texas

Allen, Theodore Jr. (1959) ..... *Professor Emeritus of Engineering*
B.S.M.E., M.S.M.E., Texas A&M University

Allison, Maria T. (1984) ..... *Associate Professor of Leisure Studies*
B.S., M.S., University of New Mexico; Ph.D., University of Illinois

Alquist, Lewis R. (1984) ..... *Associate Professor of Art*
B.F.A., Florida Atlantic University; M.F.A., Cranbrook Academy of Art

Altheide, David L. (1973) ..... *Professor of Justice Studies*
B.A., Central Washington State College; M.A., University of Washington; Ph.D., University of California, San Diego

Altman, Michael L. (1972) ..... *Professor of Law*
A.B., Bowdoin College; LL.B., Boston College; LL.M., Harvard University

Alvarado, Ronald H. (1974) ..... *Professor of Zoology*
B.A., University of California, Riverside; M.S., Ph.D., Washington State University

Andersen, Sylvia (1983) ..... *Instructor of Nursing*
B.S.M., M.S.N., Brigham Young University

Anderson, John C. (1987) ..... *Assistant Professor of Accountancy*
B.S., M.S., University of Missouri at Kansas City; Ph.D., University of Tennessee

Anderson, Bruce A. (1966) ..... *Professor of Mathematics*
B.A., M.S., Ph.D., University of Iowa

Anderson, Douglas A. (1979) ..... *Professor of Journalism and Telecommunication*
B.A., Hastings College (Neb.); M.S., Kearney State College (Neb.); Ph.D., Southern Illinois University

Anderson, Gary (1975) ..... *Associate Professor of Education; Program Coordinator, Elementary Education*
B.S., M.Ed., Edinboro State College; Ph.D., University of Pittsburgh

Anderson, Mary R. (1974) ..... *Associate Professor of Engineering*
B.A., Hope College; M.S., Ph.D., University of Iowa

Anderson, Melvin S. (1967) ..... *Associate Professor Emeritus of Finance*
B.S., M.S., Oklahoma State University; Ed.D., University of Arkansas

Anderson, Sylvia (1983) ..... *Instructor of Nursing*
A.A., B.S., M.S.N., Brigham Young University

Andress, Barbara L. (1972) ..... *Professor of Music*
B.A., M.A., Arizona State University

Angulo, Julio (1981) *Assistant Professor of Social Work*
B A , University of Houston, Texas M.S W Univers tv of Calitornia, Los Angeles, Ph D Kansas State Un versity

Appleton, Nicho as R. (1972) *Professor of Education*
B A., San Francisco State University; M A , Calitornia State University, Northridge,
Ed.D , University of Massachusetts, Amherst

Applewhite, Steven (1985) *Assistant Professc r of Social Work*
B A , University of Texas, Austin, M S W , Ph D , University of Michigan

Aranda, Luis (1975) *Associate Professor of General Business*
B M , M Ed , University of Arizona, J D , Arizona State University

Arciniega, G Miguel (1979) *Asso iate Pi ofessor of Counselor Educ ation*
B S , M A , New Mexico State Lniversity Ph D , University of Arizona

Armstrong, Robert L. 1967) *Professor of Educ ation*
B A State Teachers College of Iowa M S , Un versity of Iowa; Ed.D., Lniversity of Arizona

Arner, Douglas G. (1959 *Pr ofessor of Philosophy*
B.S., Creight n Univers ty, M A , Ph D , Univers ty of M chigan

Arnold, William E. 1973) *Professor of Communication*
B S , M A Northern Il inoi Lniversity Ph D , Pennsy van a State University,
Post Doctoral Fe low in Psychol gy, F orida State University

Aronson, Jerome M. (1966) *Professor of Botany*
B A , Ph D Lnivers ty of Ca tornia, Berkeley

Arterian Furnish, Hannah (1979 *Professor of Law*
B A , Elmira Co lege, J D University of Iowa

Ashe, Robert W (1955 *Professor Emeritus of Education*
A B , M.A in Ed., Arizona State University Ed D , Un versity of So thern Californ a

Asher, Betty Turner 1982) *Associate Profe ssor of Counselor Education*
B A , Eastern Kentucky U iversity, *Vice Pre sident for Student Affairs*
M A Western Kentucky Un versity Ed D , University of Cincinnati

Ashford, Jose (1984 *Assistant Professor of Social Work*
B A., Loyola Univers ty M S W Oh o State Lniversity, Ph D Bowling Green State University

Ashley, Richard (1977) *Associate Professor of Political Science*
B.A , University of Ca ifom a, Santa Barbara M A , Ph D , Massachusetts Institute of Techn ogy

Ashoor, Samy H (1980 *Professor of Agriculture*
B S , Lniversity of Cairo M S , Univers ty of Ca ifom a, Dav , Ph.D., University of W sconsin M dison

Atsumi, Takayori P. 1968) *Pr fessor of Music*
B F A , Kunitach Musi Col e_e Japan M M , New England Conservatory f Music

Autenrieth, Bertha 1946) *Professor Emeritus of Music*
B.M , New En and Conserv at ry of Mus c, M M , Un versity of Michigan

Autore, Donald D 1959 *Professc r of Te hnology*
B S.E , University of Michigan; M S.E , Arizona State University

Avery, James P 1960) *Professor Emeritus of Engineering*
B S M E M S M E Lniver ty of Michigan, Ph D Purdue University

Ax, Leland S (1959 *Associate Professor En eritus of En ineering*
B.S.E., B.S.R E , Tri State College, M S , Kansas State College

Axelrod Morris 1972 *Pr ofessor Emeritus of So iology*
B A , Ph D Univers ty of Mi higan

Axford, Roger W 975 *Asso iate Professor of Education*
B A Nebraska Wes eyan University, M A , Ph.D , Un versity of Chicago

Backhaus, Ra ph A 1977) *Associate Pr ofessor of Agriculture*
B S , Rutgers, The State Lnversity, M.S , Ph D , Unive sity of Ca ifornia, Davis

Backus, Charles E. (1968 *Professor of Engineering,*
B S M E , Oh o University; *Assistant Dean College of Engineering and Applied Sciences*
M.S , Ph.D , University of Arizona

Badger, William (1985) *Associate Professor of Construction*
B S M E , Auburn University, M S C E Oklahoma State University; Ph D Iowa State University

Bagwell, Marilyn (1972) *Assistant Professor of Nursing*
B S N., University of California, Los Angeles M A , Arizona State University M C H , University of California

Bahadori, Mehdi N. 1985 *Professor of Architecture*
B S University of Tehran, Iran, M S , University of Wisconsin Ph D , University of Illinois Champaign Urbana

Bahr, Donald M (1967) *Professor of Anthropology*
A B , M A , Ph D , Harvard University

Bailey, James E (1974) *Associate Professor of Engineering*
B S I E M S I E Ph D Wayne State University

Baker, Georgianne R 1971) *Associate Professor of Family Resources and Human Development*
B S Marygrove College, M S , Ohio State University Ph D , Michigan State University

Balanis, Constantine (1983 *Professor of Engineering*
B S E.E , Virginia Polytechnic Institute, M S.E., University of Virginia, Ph D , Ohio State University

Balasubramanian, Krishnan 1983) *Assistant Professor of Chemistry*
M Sc Birla Institute of Technology Science India, M A Ph D , Johns Hopkins University

Baldini, Pier Raimondo 1978) *Associate Professor of Italian*
B A , San Francisco State University; M A University of British Columbia, Ph D , University of California, Los Angeles

Bantz, Charles R (1986 *Associate Professor of Communication*
M A , University of Minnesota; Ph.D , Ohio State University

Bardewyck, Loretta A. 1957) *Professor Emeritus of Nursing*
P H N., B S., University of Minnesota; M S., Cornell University

Bardrick, Richard A. (1956) *Associate Professor Emeritus of Psychology*
A.B , Ph D , University of California, Los Angeles

Barker, David (1983) *Assistant Professor of Theatre*
B S E., Duquesne University; M F A., Rutgers, The State University

Barkley, Margaret V (1963 *Professor Emeritus of Family Resources and Human Development*
B S , Millikin University, M.S , Ed D University of Illinois

Barkson, Joseph A. (1958 *Professor Emeritus of Engineering*
B S E E , University of Michigan, M S Ph D University of Illinois

Barlow, Richard B (1964) *Professor of History*
B A , M.A , Ph D , University of Pennsylvania

Barnhill, Robert (1986) *Professor of Computer Science Chair, Department of Computer Science*
B A University of Kansas, M A Ph D University of Wisconsin Madison

Barona, Andres (1986) *Assistant Professor of Education*
B S , M Ed. Texas A & M University Ph D , University of Texas Austin

Baroody, Wilson G. 1957 *Assistant Professor of English*
B A , Grand Canyon College: M A University of Arizona

Barrera, Manuel 1977) *Associate Professor of Psychology*
B S , University of Wisconsin, Eau Claire M A., Ph D , University of Oregon

Barrett, Thomas W. (1950) *Professor Emeritus of Agriculture*
B S , Brigham Young University M S Ph D , Cornell University

Barroll, Rayna (1980 *Associate Professor of Music*
B M University of Texas D M A University of Maryland

Bartels, Robert D 1981) *Professor of Law*
B A , University of Michigan J D , Stanford University

Bartz, Donna R 1968) *Associate Professor of Theatre*
B F A , M A University of Colorado

Bassett, Caroline 1985 *Instructor of Nursing*
B S N , University of Toledo M S N Medical College Ohio Toledo

Bassford, Gera d (1969 — *Associate Professor f Management*
B.S M S , Un versity c f Wyoming D B A , nd ana Un vers ty

Batalden, Stephen K 1976 — *A sc ciate Prcfessor cf Histc ry*
B.A., Augsbu g C l ege M A Ph D , University of Minne ota

Batchelor, Harold W. 1943 — *Prcfes or Emeritus cf Library Science*
B A , Univers ty of Oreg n, B S i L S , M.S Univer ty of I l ois

Baty, Wayne M 1962 — *Profess r Emeritus cf General Business*
B S in Ed Southwest M ssouri S ate C llege M A Northwe tern University
Ph.D., Univer it of Southern Cal fornia

Baumann, Victor H (1964 — *Prcfessor Emeritus of Educatic n*
B A Grinne l C lege; M A , N rthwestern Univers ty, Ed D University of Southern Calif rnia

Baxter, Harry R (1984 — *Assistant Profi ssor of Technology*
B A , New York Univers ty, M B A., Fa leigh D ckinson Univers ty, M Tech Arizona State University

Baxter, John C. (1984 — *Assistant Profes or f Agriculture*
B S , M S , Univers ty of Mary and, Ph D Colorad State Un versity

Beaklev, George C. Jr. 1956 — *Profes or f Engineering,*
B S M E , Texas Tech Un vers ty, — *Associate Dean College of Engineering and Applied Sciences*
M S M E , Un versity of Texas Ph D Oklahoma State University; P E.

Beck, Lasca (1984 — *Instructor cf Nursing*
B S N , Texas Woman s Un versity, M Ed., Ea t Texas State Un versity

Becker, R James (1965 — *Prcfessor of Public Affairs*
B S M A , Brad ey Un vers ty, Ph D , U vers ty f I l no s

Beckman James R (1980 — *Ass ciate Professc r if Engineering*
B S., M S., Un versity of Wi c nsin Ph D Un versity of Arizona

Bedient, Jack D. (1963) — *Assc iate Prcfessc r of Mathematics*
A B , A b on Co e e; M B.S , Ed D , Univer ity of Co orado

Bedworth, David D. 1963) — *Professc r of Engineering*
B S I E , Lam ar Col ege of Techno ogy, M.S I.E , Ph D , Purdue Universit

Bell James W (1966 — *Professc r of Educ ation*
A B , Washburn Universit M Ed , Ed D University of Kansas

Bell, John E. 1965 — *Profes r f Educati n*
B S University of Nebraska M A Ed D Univers ty c f Wyoming

Bell, LoAnn 1980) — *Instru tc r f Nursing*
B S., U iversit f W sc n in M S , Universit c f Minnes ta

Bell, Mary E 197(— *Asso iate Profess r Emeritus of Educ ation*
B S , Ind ana State Teachers C ege, M S , But er U iversit , Ed.D., Indiana Universit

Bellamy, Lynn 1976 — *Associate Professor of Engineering*
B S Texas A&M, M S Ph D Tu ane University

Belok, Michael V 959 — *Prcfessor f Educ ation*
B.S , Indiana Univer ty M A Ariz na State University, Ph D , Univers ty of Southern California

Beltramini, Richard F. (198(— *As ociate Professc r f Marketing and Advertising*
B S , M S , Univers ty c f I noi Ph D , Un versity of Texa , Austin

Bender, Bert A 1971 — *Assc ciate Professc r c f English*
B A , Univers ty of Wash ngto n, Ph D University of Ca f rnia Irvine

Bender Gordon L 1953 — *Prcfess r Emeritus c f Zc lc gy*
B S , Iowa State C lege M S Un ver ity c f Wisconsin, Ph D n vers ty of linois

Bender, Pau (1984 — *Pr fessor f Law, Dean College c f Law*
A B , LL B Harvard Un vers ty

Benedict, Joel A 1946 — *Pr fessc r Emeritus c f Educ ation*
B A M A Arizona State Un ver ty Ed D , Stanford Univers ty

Ben n, David B 1970 — *A s ciate Pr fessc r f Ph sics*
A B C rnell Un versity M A Ph D University f Rochester

Benin, Mary B (1979 — *Associate Professor of Sociology*
B A , Vanderbilt University M A Ph D. Un versity of Nebraska, L ncoln

Bennett, ElDean 1970) — *Professor of Journalism; Director Walter Cronkite School of Journalism and Telecommunication*
B A , Brigham Young Univers ty, M A Ph D , Mi h gan State Univer ity

Bennett, Peter A. 1984) — *Assistant Professor of Physics*
B A , University of Minnesota Ph D University of Wisconsin

Benzinger, Robert P. 1970) — *Associate Professor Emeritus of Design*
B.S M E U vers ty of Wisconsin M A E Chrys er nstitue f Engineering

Berch, Michael A. (1969 — *Professor of Law*
B A , J D Columbia University

Berman, Dav d R 1966) — *Professor of Political Science*
B A Rockford College, M A , Ph D., American nive sity

Berman, Nei S. (1964 — *Professor of Engineering*
B S Univers ty f Wiscons n M S , M A Ph D Unive s ty f Texas

Bernal, Martha E (1986 — *Professor of Psychology*
B A , Unive ity of Texas E Paso, M A , Syracuse Un versity, Ph D , nd ana Un vers ty

Bernhisel Osborn, Kristin (1986) — *Assistant Professor of Art*
B F A University of Utah Kunstgewerbe chule S hoo of Design, Sw tzerland

Bertelse , Wendle R. 1964 — *Assistant Professor of Architecture*
B Arch , Un versity of Mi higan, M Arch University of Arizona

Bessom, Richard M (1968) — *Associate Professor Emeritus of Marketing*
A B., Comell Un vers ty, M B A , Stanfo d U vers ty Ph D , U vers v of Wishington

Betz, M Austin 1974 — *Associate Professor of Education*
B S , Lock Haven State Co lege, M Ed , Pennsy vania State U ivers ty, M A T , Brown U n versity
M A Ph D , University of Ill n is

Betz, Mathew J III 1961 — *Professor of Engineering Director, Center of Advanced Research in Transportation*
B S M S , Ph D , N rthwest m niversity

Bezanson, Llewellyn W (1983) — *Assistant Professor of Engineering*
B S University of F orida, M S , C arkson Col ege of Techn logy, Ph D , C a ks n U ver ty

Bickford, William B (1966) — *Professor of Engineering*
B S M S , Kansas State niversity, Ph D University of Il in is

Bieber, Allan L 1963 — *Professor of Chemistry*
B S M S , North Dakota State n versity, Ph D Oregon State Un versity

Bininger, Robert J 1962) — *Professor of Spanish*
B A , M A Ph D , Oh o State University

Birge, Edward A (1972 — *Associate Professor of Microbiology*
B A , Ph D Un vers ty of Wiscons n, Madison

Birk, James P (1973 — *Professor of Chemistry*
B A , St John s Univers ty; Ph D , Iowa Sta e Un versity

Bitner, Mary J (1987 — *Assistant Professor of Marketing*
B A , M B A , University of Washington

Bitter, Gary G. (1970) — *Professor of Education, Program Coordinator Educational Media & Computers*
B S Kansas State Univers ty, M A , Kansas State Teachers Col ege, Ph D , Un ver ty of De ver

Bjork, Robert E. (1983) — *Associate Professor of English*
B A Pomona Col ege, M A Ph D , University of Calif rnia Los Angeles

Blackburn, Jack B. 1972) — *Professor of Engineering*
B S C.E , Oklahoma U vers ty M S C E, Ph D , Purdue Un versity

Blackham, Garth J 1962 — *Professor of Counselor Education*
B S , M.S Utah State Un ve ty; Ph D , Corne University

Blackledge, Vernon O 1969 — *Professor of Computer Science*
B S E E , Univers ty of Il ino s, M S E E , U v rs ty f Santa C ara, Ph D , Ariz na State University

Blaesser, Willard W (1968 *Professor Emeritus of Counselor Education*
B S , M A , University of Wisconsin Mad son; Ed D , George Washington University

Blakemore, Arthur E (1979) *Associate Professor of Economics*
B.S , M A., Un versity of Detro t, Ph.D , Southern I linois University

Blankenship, Robert E. (1985) *Asso iate Professor of Chemistry*
B S Neb aska Wes evan U iversity, Ph D University of California, Berkeley

Blasko, Vincent J (1980 *Associate Professor of Advertising*
B S , M B A , Arizona State University, Ph D Un versity of Texas Austin

Blaze, Douglas A (1986 *Associate Professor of Law*
B S , Dickinson Co lege J D , Georgetown Univers ty

Blechschmidt, James 1986) *Assistant Professor of Engineering*
B S , M S , Ph D , Un versity of Wisconsin, Madi n

Blosser, Janlee (1984 *Instructor of Nursing*
B.S N Goshen Co lege; M N W chita State n versity

Boatsman, James R 1986) *Peat Marwick Professor of Accountancy*
B.S M.S , Oklahoma State Univer ity, Ph D , University of Texas, Au tin

Boetto, Laurel B. 1956 *Assistant Professor Emeritus of Education*
B A n Ed , M.A. in Ed., Arizona State Un versity

Bogart, Quentin J (1970 *Asso iate Professor of Edu ation*
B A. M S , Fort Hays State Col ege, Ph D , Un vers ty of Texa Aust n

Boggs, Lohnie J 1959 65· 1966 *Professor of General Business Chair, Department of General Business*
B S , M A Ph D., Ohio State Un vers ty

Bohlander, George W. (1977) *Professor of Management*
B A , San Fran sco State College M B A , University of Southern California,
Ph D Univers ty of Califomia Los Ange es

Bohlman, Herbert M. (1964) *Associate Professor of General Business*
B S B A Drake Univers ty M B A , J D , Indiana University

Boissoneau, Robert (1980) *Professor of Health Administration and Policy*
B A Eastern Mi higan University M H A , Medi al Co lege of Virg nia, Ph D , Ohio State University

Bontrager, O R (1962) *Professor Emeritus of Education*
B S , M A , Ph D State University of Iowa

Booth, James R. (1980) *Asso iate Professor of Finance*
B S , M A Ph D , University of Alabama

Borgo, Philip E (1967 *Asso iate Professor Emeritus of Engineering*
B.S C E University of Cinc nnat M S , Ohio State University

Bortner, M A (1979) *Associate Professor of Justice Studies*
B.A , Edinboro State Co lege, M.A., Ohio Univers ty, Ph.D , Wash ngton Un versity, St Louis

Bose, Anjan (1981) *Professor of Engineering*
B Tech , Ind ana Institute of Technology M S E E , University of Califomia Ph D E E , Iowa State University

Boswell, Jacquelyn 1982) *Professor of Music*
B M E , Murray State Univers ty, M M E , Louisiana State Un versity, Ed D , Univers ty of Illinois

Bowers, Charles O (1948 *Professor Emeritus of Music*
B S n Ed , Southeast Miss uri State Co lege M M , D M A Eastman Schoo of Mus c

Bowers, Deloss H (1984) *Associate Professor of Technology*
B A , Ohic State University M S Purdue University

Bowman Russell K (1956) *Professor Emeritus of Romance Languages*
A.B A.M., Ph D , Columbia U versity

Boyd, Gertrude A. (1958) *Professor Emeritus of Education*
A B M S , Flo ida State Un versity Ed D , Co orado State Col ege

Boyd, James H 1976 *Professor of Accountancy*
B B.A , Texas Christian University, M S., Northeastern Un vers ty, Ph D Un versity f Texas, Aust n, C P A , Texas

Boyer, Jay M. (1976) *Associate Professor of English*
B A , St Louis Univers ty, M A , Ph D , State University of New York, Buffalo

Boyes, William J. 1974 *Professor of Economics, Chair Department of Economics*
B S , Idaho State University, Ph D., C aremont Graduate School

Boyle, Bernard M (1969) *Professor of Archite ture*
B Arch , U niversity of Sydney Au tral a), M Arch , M A Ph D Yale University

Brack, O M Jr 1973 *Professor of English*
B A., M.A , B y r Un versity, Ph D Un versity of Texas, Au ti

Bracker, Jeffrey S (1982 *Assistant Professor of Management*
B S , M B A , Un ver ity of Dayto · Ph.D., Geo gia State University

Brada, Josef C. 1978 *Professor of Economics*
B S , M A , ufts Univ rsity, Ph D., Un versity of M n e ota

Brady, Ward W. 1973 *Associate Profe sor of Agriculture*
B S., M S , Ph.D , C rado State U nivers ty

Bramlett Solomon Sharon (1986) *Assistant Professor of Journalism and Telecommunication*
B A M A , Men phis State University

Brand, Mark (1968) *Asso iate Professor Emeritus of Social Work*
B A M A , University of Arizona M S W , University of California, Berkeley

Brandt, Elizabeth A 1974) *Associate Professor of Anthropology*
B A , Florida State Unive ty; M A Ph D , Southern Methodist University

Branstetter, Ellamae 196) *Professor of Nursing*
B S St. Lo i Univers ty M P H Un versity of Minnesota, Ph D , n versity of Chi ago

Braun, J Jay (1973 *Professor of Psychology*
B A , Univer ty of O egon, M A , Ph D , Ohio State niversity

Braver Sanford L (1970 *Associate Professor of Psychology*
B A Wayne State Un versity, Ph D , University of Michigan

Brazel, Anthony J 1974 *Professor of Geography Director, Laboratory of Climatology*
B A M A Rutgers, Th State U iversity Ph D , University of Michigan

Breckenridge, Jack D. (1962) *Professor of Art*
B S., Univers ty of Wis onsin, Milwaukee, M.F A , U nivers ty of owa

Bremner, Andrew 1984 *Asso iate Professor of Mathematics*
B.A. M.A Oxfo d Univer ity, Ph D Cambridge University

Brenenstuh , Daniel C (1978) *Ass ciate Professor of Management*
B S , M B A Oh o Uni ersity, M S., St. Bonaventu e University, D B A Indiana University

Bresina, Bertha M. 1960 *Professor Emeritus of Home Economics*
B.S , M.S Stout State U iversity Ph D , Iowa State University

Brink, Daniel T 1976 *Asso ciate Professor of English*
B.A , Lawrence Un vers ty, M A Ph D., U ivers ty of W s ons n, Mad son

Br nk, Jeanie R 1974) *Professor of English*
B A , Northwestern University *Dire tor, Art ora Center for Medieval and Renaissance Studies*
M A Harvard University Ph D , University f Wisc nsin, Madison

Britton, Daniel R. 1976) *Associate Professor of Art*
B.F A M.F A., Un versity of Co orado

Britton, Mervin W (1956 *Professor of Music*
B S M S., Univers ty of I l ois

Broadley, Hugh T (1969 *Professor of Art*
A B Park College, M.A., Ya e Unive ty, Ph D , New York U nive sity

Brock, John H 1977 *Asso ate Professor of Agriculture*
B.S , M S , Fort Hays State Univers ty, Ph D exas A&M University

Broerman, Nancy 1983 *Instructor of Nursing*
B.S.N., Loy la Un versity, M S , Arizona State University

Brook, Weston L (1966) *Associate Professor Emeritus of Education*
B A , M A Ed D., Un vers ty of Wyom ng

Brooks, Daniel G. (1977) *Asso iate Professor of Statistics*
B.S M S , Colorado School of Mines M B A , D B A , Indiana Un vers ty

Brose, Marianna F. 1963 *Assistant Professor of English*
B A , College of W fl a and Mary; M A , Arizona State University

Brown, Alan R (1968) *Associate Professor of Education*
B A M A , Los Angeles State College; Ph.D., Un vers ty of Texa. , Austin

Brown, Brent W. (1972 *Associate Professor of Publi · Affairs; Vi e President for Univers ty Relations*
B A , Brigham Young L versity, M A , Arizona State University, Ph D , University of I l nois

Brown, Donald E (1963 *Professor Emeritus of Journalism and Telecommunic ation*
B A , M A , University of Iowa

Brown, Duane 1950) *Profe ssor Emeritus of Chemistry*
B S., Brigham Yo ng Univer ity, Ph D , Cornel Univers ty

Brown, Eddie F 1986) *Ass ciate Professor of Soc ial Work · Direct r of Community Relations*
B S , Brigham Youn_ University; M S.W , D.S W., Un versity of Utah Salt Lake City

Brown, M Gordon 1984 *Asso iate Professor of Architec ture*
B.S University of Il inois, M B A , Univers ty of Pennsy vania M.Sc Arch., University of London

Brown, Richard L (1982 *Professor of Law , Director, Law Library*
B A , Univer ity f Californ a, Los Angeles, J D Indiana Univers ty, M L L , Un vers ty of Wash ngton

Brown, Stephen W 1974) *Professor of Market ng*
B S , M B A Ph D , Arizona State U vers ty

Brown, Theodore M 1963) *Professor of Chemistry*
B.S., M S., Un versity of Toledo Ph D , Iowa State n versity

Brown, Walter C. (1966) *Professor of Technology*
B.S , Northwest Missouri State Univers ty, M Ed , Ed D , Un vers ty of Missouri Columbia

Bruner, May I 1961) *Associate Professor of Nursing*
B.S , Univers ty of Hawaii, M S , University of Colorado

Bruns, Gilbert H. 1974 *Associate Professor of Justice Studies*
B S M.Ed , South Dakota State Un vers ty; Ed.D., Ariz na State University

Bryant, Fred O 1950) *Associate Professor Emeritus of Physical Education*
B.S., Springfield Co lege, M S , University of Il ino s, Ed D , Arizona State University

Buckingham, Willis J 1969 *Assc iate Professor of English*
A B , Harvard n versity, M S , Univers ty of W s ons n, M d son, Ph D , Ind ana University

Buley, Jerry L (1973 *Associate Professor of Communi ation*
B.A., University of Co orado M A Michigan State Univers ty, Ph D , F orida State Univers ty

Burdette, Walter E. 1956) *Pr ofess or Emeritus of Tec hn l ogy*
B S , M S , Kansas State Co lege of P ttsburg, Ed D , University of M ssouri Columb a

Burdick, Richard K. (1976) *Asso iate Professor of Statist cs*
B S., University of Wyoming, M S , Ph D Texas A&M Un vers ty

Burg, B. Richard (1967) *Profes sor of History*
B A , nivers ty of Colo ado M A , Western State C l ege of Colorado Ph D. University f Colorado

Burgess, Hugh (1974 *Professor of Planning*
B.S., University f Idaho M S Arch , Columbia n versity, Arch D Rice niversity

Burgess, Paul L. 1969 *Professor of Ec on mics*
B S Ph D Un versity of Co orado, B ulder

Burgoyne, Edward E 1951 *Professor Emeritus of Chemistry*
B S , Utah State U versity, M.S , Ph D , University of W sconsin Madison

Burk, Karl W. 1949) *Asso iate Profe sor Emer itus f Te hnology*
B A in Ed M A in Ed , Arizona State University, Ed D , Bradley University

Burke, Joy Patricia 1981) *Associate Pr fes or of Education*
B A , San Jose State Unive s ty, M Ed , Ed.D., Rutgers The State Univers ty

Burke, William F. Jr. 1977) *Associate Professor of Microbiology*
B A , University of Dallas Irving, M.A , North Texas State University, Ph D , Arizona State University

Burke, William J. 1962 *Professor Emeritus of Chemistry*
A B , Ohio University, Ph D., Ohio State University

Burkett, Lee N 1974 *Associate Professor of Physical Education*
B A , M A San Diego State University Ph D , Washington State University

Burns, Elizabeth K. 1983 *Professor of Geography*
B A , Smith College, M A , Ph D , University of California Berkeley

Burrows, Veronica 1986 *Assistant Professor of Engineering*
B S , Drexel University Ph D , Princeton University

Burstein, David 1982) *Assistant Professor of Physics Astronomy*
B A , Wellesley University, Ph D University of California, Santa Cruz

Burt, Donald M 1974 *Professor of Geology*
A B , Princeton University, A M , Ph D , Harvard University

Burton, Dora 1976 *Assistant Professor of Russian*
M D , First Leningrad and Kazan Medical Institute Russia , M A Ph D , University of Washington

Burton, Foster M 1969 *Associate Professor of Construction*
B.S C E , B S , Industrial Management , Carnegie Institute of Technology,
M B A , New York University, Ph D , University of Pittsburgh

Buseck, Peter R. 1963) *Professor of Chemistry and Geology*
B A , Antioch College, M A , Ph D Columbia University

Bush, Donald J. 1975) *Associate Professor of Design*
B S Arizona State University M A , University of Notre Dame, Ph D , University of New Mexico

Bustoz, Joaquin 1975) *Professor of Mathematics*
B.A , M A Ph.D , Arizona State University

Buter, Thomas A. 1987 *Assistant Professor of Aerospace Studies*
B S M S North Carolina State University

Butler, Jay Q 1972 *Associate Professor of Finance*
B B A , M B A Un versity of New Mexico Ph D University of Washington

Byrnes, Christopher 1984 *Professor of Mathematics Research Professor of Electrical Engineering*
B S., Manhattan College M A Ph D University of Massachusetts

Cabranca, William A 1967 *Professor of Counselor Education*
B Ed , Gonzaga University, M Ed Ph D , Washington State University

Cachey, Theodore 1974 *Assistant Professor of Italian*
B A Northwestern University, M A., Ph.D , University of California, Los Angeles

Cady, Linell E 1953 *Assistant Professor of Religious Studies*
B A Newton College, M T.S Th D , Harvard University, The Divinity School

Cadzow, James A (1981) *Research Professor of Engineering*
B S E E University of Buffalo M S E E , State University of New York at Buffalo Ph D Cornell University

Cale, Timothy S 1981) *Associate Professor of Engineering*
B S , Arizona State University Ph D University of Houston

Callarman, Thomas E. 1980) *Associate Professor of Operations Management*
B B.A , West Texas State University, M B A , Arizona State University, Ph D , Purdue University

Calleros Charles R 1980 *Professor of Law*
B A., University of California Santa Cruz, J D University of California Davis

Canright, James E. 1964 *Professor Emeritus of Botany*
B A , Miami University A M Ph D , Harvard University

Capco, David G 1984 *Assistant Professor of Zoology*
B S Edinboro State College, M S , University of Houston, Ph.D., University of Texas, Austin

Carlsen, Paul A (1978) *Assistant Professor of Technology*
B A E , M.N S , Ed D , Arizona State University

Carlson, Ingeborg L. (1964) *Professor of German*
Abitur, Holder inschu e, Heidelberg, V rsemester and cand ph l , Univers ty of Heidelberg, Dr. phil , University of Erlangen Nuremberg

Carney, James D. (1967) *Professor of Philosophy*
M.A., Roosevelt University Ph D , Un versity of Nebraska Lincol

Carpenter, R. W. (1980) *Professor of Center for Solid State S ience Engineering*
B S , M S , Ph D , Univers ty of Cal forn a, Berkeley

Carr, Christopher 1985) *Assistant Professor of Anthropol gy*
B A , Univers ty of Illino s, Chicago Circ e, M A , Ph D , Un versity of Michigan

Carrigan, Larry E (1986 *Professor of Aerospace Studies, Chair Aerospace Studies*
B S , Arizona State University M.S Shippensburg State nivers ty

Carroll, Christina (1966) *Professor of Music*

Carroll, James L. (1976 *Professor of Education*
B.A , Bethel College Ph D., Un vers ty of Minnesota

Carroll, Kevin K (1975) *Assistant Professor of History*
B A , Canisius College, M.A , Ph D , Harvard University

Carroll, Steven 1984) *Assistant Professor of Statistics*
B S , Tulane University; M S , Oregon State Univers ty; M B.A., Ph.D., University of Oregon

Carson, Kenneth P. (1986) *Assistant Professor of Management*
B S , B A , Geneva Co lege, M A , Ph D , University of Akron

Carter, Lynn (1982 *Associate Professor of Computer S ience*
B.S., M S , Portland State University; Ph.D , Un versity of Colorado, Bou der

Carver, George L (1965 *Associate Professor of Classical Languages*
B.A , M A , University of Texa , S T B , St Mary s Seminary Ba timore, Ph D., St Louis University

Case, James L. (1969) *Associate Professor of Speech and Hearing Science*
B S , Weber State College, M S , Ph D , Univers ty of Utah

Castelazo, Ismael (1984) *Assistant Professor of Engineering*
Ing. Mec., Instituto Politecnico Nacionaá, Mexico City M.S , Ph D , Massachusetts Institute of Technology

Cavalliere, William A. (1946) *Assistant Professor Emeritus of Technology*
B.A. in Ed , M.A. in Ed , Arizona State University

Cavender, Gray (1977) *Associate Professor of Justice Studies*
B S , University of Tennessee; M.S., Middle Tennessee State University, Ph D , Florida State University, JD., University of Tennessee

Cayer, N. Joseph (1980 *Professor of Public Affairs*
B A , M P A , University of Colorado, Ph D , University of Massachusetts

Cazier, Mont A. (1962) *Professor Emeritus of Zoology*
B S , Ph D , University of California, Berkeley

Cerveny, Randall S. (1986) *Assistant Professor of Geography*
B.S., M A , Ph D University of Nebraska

Cesta, John R. (1975) *Associate Professor of Finance*
B S., Capital Univers ty, Columbus, Ohio; M B A Ph D , Florida State University

Chalquest, Richard R (1971 *Professor of Agriculture*
B S , D V M Washington State University, M S , Ph D Corne University

Chamberlin, Ralph V. (1986) *Assistant Professor of Phy ics*
B.S., University of Utah, Salt Lake City, M S , Ph.D., University of California, Los Angeles

Chandler, Douglas E (1980) *Associate Professor of Zoology*
B.S., University of Rochester, M.A., Johns Hopkins School of Medicine, Ph D , University of California, San Francis o

Chartier, George M. (1971 *Associate Professor of Psychology*
B.S , University of Illinois, M A., Ph.D., U vers ty of Oregon

Chasey, Eugene F (1965) *Associate Professor Emeritus of Education*
B S , Northwestern State College, M.A., Co orado State College, Ed D , University of Wyoming

Chassin, Laurie (1979 *Associate Professor of Psychology*
B A , Brown University, M.S , Ph D., Columbia University

Chaudhuri, Joyotpaul (1985 *Professor of Political Science · Associate Dean, Liberal Arts and Sciences*
B.A., Central State University, Oklahoma, M A , Ph D , University of Oklahoma

Cheatham, Glenn W (1975) *Professor of Leisure Studies; Associate Dean, College of Public Programs*
B S , M S., San Francisco State University, Ph D , University of Minnesota

Chen, Stanley S (1967) *Professor of Engineering*
Diploma, Taipei Institute of Technology China , M S , Ohio University, Ph D , University of Wisconsin, Madison

Chewning, Gene (1984 *Assistant Professor of Accountancy*
B S B A , University of North Carolina, Chapel Hill, M B A , East Carolina University,
Ph D , University of South Carolina C P A., North Carolina

Chilstowa, Xenia (1980) *Associate Professor of Dance*

Chou, Ju Hsi (1975 *Professor of Art*
B.A., University of Kentucky, M A Ph D , Princeton University

Christensen, George (1975) *Assistant Professor of Architecture*
B Arch , Illinois Institute of Technology

Christensen, Philip R (1987) *Assistant Professor of Geology*
B.S , M.S., Ph D , University of California, Los Angeles

Christian, Charles W. 1985) *Assistant Professor of Accountancy*
B.B.A., University of Georgia, J D , University of Virginia, Ph.D., University of Georgia

Christiansen, Kent M 1966) *Associate Professor of Education, Director of Student Services*
B S , M S Brigham Young University, Ph D., Mich gan State University

Christine, Ray O. (1958) *Associate Professor of Education*
A.B , A.M., Northern Colorado University, Ed D., Arizona State University

Christopher, F Scott (1986) *Assistant Professor of Family Resources and Human Development*
B S , M S , University of Nebraska, Ph D., Oregon State Univers ty

Chubrich, Robert E (1971) *Associate Professor of Speech and Hearing Science*
B A , Grinnell College, M.A , Indiana University, Ph D , State University of New York Buffalo

Church, Kathleen K. (1969 *Professor of Zoology*
B.S , M A., University of Utah, Ph D , University of California, Berkeley

Churchill, William D. (1966 *Associate Professor Emeritus of Education,*
A B , Colgate University M Ed , Alfred University; *Counselor, University Counseling Service*
Ed D , Un versity of Rochester

Chyu, Mingking (1984) *Assistant Professor of Engineering*
B S National Tsing Hwa University, Taiwan, M S , Un versity of Cincinnati, Ph D., University of Minnesota

Cialdini, Robert B. 1971) *Professor of Psychology*
B.S , University of Wisconsin; Ph D , University of North Carolina

Cichan, Michael A. 1985) *Assistant Professor of Botany and Microbiology*
B.A LaSa le University Philadelph a M S Rutgers University, NJ, Ph D Ohio State Univers ty

Clark, Geoffrey A. 1971) *Professor of Anthropology*
B A , M A , University of Arizona, Ph D., University of Ch cago

Clark, Robert C 1981 *Professor of Music*
B.Mus , Central Methodist Co lege S M M , Union Theolog cal Semi ary

Clark, William Dennis 1976) *Associate Professor of Botany*
B A Sacramento State College Ph.D , University of Texas

Cleary, Edward W. (1967) *Professor Emeritus of Law*
A B., Il inois College J D , University of Il in is S D , Yale University

Clothier Ronald R. (1955 *Associate Professor Emeritus of Zoology*
A B Fresno State College, M A , Montana State University, Ph D , Univers ty of New Mexi o

Cluff, Gordon L (1963) *Professor of Speech and Hearing Science*
B A Arizona State Univers ty, M S , Ph D Southern Il inois University

Cobas, José A. 1975) *Associate Professor of Sociology*
B A , Maryv le Co lege M A , Un versity of Tennessee, Knoxvi e, Ph D , University of Texas, Austin

Cochran, Douglas L. 1968 *Associate Professor Emeritus of Management*
B S , Oh o State University M B A , Harvard University, Ph D., University of Oregon

Cochran, Jeffery K. 1984 *Assistant Professor of Engineering*
B S E , M S.N.E , M.S.I.E., Ph.D , Purdue University

Cochran, John A 1962) *Professor of Economics*
A B , Drake Un vers ty, A.M Ph D Harvard Univers ty

Cocke, Robert D (1983) *Assistant Professor of Art*
B F A , Un versity of Arizona, M A , M F A University of Iowa

Coghlan, William A. (1982) *Associate Professor of Engineering*
B.S , Montana School of Mines M S Ph D , Stanford University

Cohen, Cecilia (1982) Assistant Professor of Nursing; Academic Advisor, Student Services
B S Boston College, M S , Arizona State University

Cohen, David (1967) *Professor of Music*
B S., M.S , The Juilliard School, D M A , University of Southern California

Cohen, Herbert G. (1977) *Associate Professor of Education*
B S , Muh enberg Col ege; M A , Hofstra Un versity, Ph D , University of Iowa

Cohn, Sanford J (1979) *Associate Professor of Education*
B.A , M Ed., Ph D., Johns Hopkins University

Colby, Arthur L (1965) *Assistant Professor of English*
B A University of Massachusetts, M.A Ph D , University of North Caro ina

Cole, Gerald A (1958) *Professor Emeritus of Zoology*
A B , Middlebury Co lege M S St Lawrence Univers ty; Ph D , Univers ty of Minnesota

Collins, James P 1975 *Associate Professor of Zoology*
B.S., Manhattan College; M S Ph D University of M ch gan

Collofello, James S. (1979) *Associate Professor of Computer Science*
A A , Joliet Jun or College, B.S M.S., Northern Illinois University, Ph D Northwestern University

Comeaux, Malcolm L (1969) *Professor of Geography*
B A , University of Southwestern Louis ana, M A Southern Il nois University, Ph D , Louisiana State University

Comfort, Joseph R 1981) *Professor of Physics*
A B , Ripo Col ege, M S Ph D , Ya e University

Conlin, David A 1948 *Professor Emeritus of English*
A B , Syracuse University, Ph D Yale Un versity

Cook, Edward A (1985) *Assistant Professor of Planning*
B S L A , Washington State Univers ty M L A , Utah State University

Cook, Jeffrey (1961) *Professor of Architecture*
B Arch , University of Manitoba Canada) M Arch , Pratt Institute

Cook, Phil A (1963) *Professor Emeritus of Education*
B A , Southwestern State College, M A Co orado State College of Educat on, Ed D , University of Kansas

Cook, Suzanne M. (1974 *Associate Professor of Management*
B B A , M B.A., D B A Texas Tech University

Corbin, Charles B (1982 *Professor of Physical Education*
B S., University of New Mexico, M S , Univers ty of I nois, Ph D., Un vers ty of New Mex co

Corder, Bruce W 1971) *Professor of Health Science Assistant Dean Pre Health Professions*
B A Lynchburg C llege, M Ed Ed D , Temple Unive sity *College of Liberal Arts and Sciences*

Cosand Walter A 1976 *Associate Professor of Music*
B M., M.M , Un vers ty of R ochester

Cota Cardenas Margarita (1981 *Associate Professor of Spanish*
B A , California State Un vers ty, Turlock M A , U vers ty of Ca fom a, Davis, Ph D , University of Arizona

Couch, Sanford C (1962) *Professor of Russian*
B A M A , Ph D , nivers ty of W sco sin Madison

Coudroglou, Aliki (1971) *Professor of Social Work*
B A., College of St Benedict, M S W , University of Minnesota, D S W , Columbia University

Cowley, Anne P (1983 *Professor of Physics Astronomy*
B.A., Wellesley College M S , Ph D Univers ty of Mi higan

Cowley, John M. (1969) *Galvin Pr fessor of Physics*
B S , M S , D S Universitv f Adelaide A stralia , Ph.D., Mas achusetts Inst tute of Techno ogy

Cox, Frank E. (1972) *Professor Emeritus of Technology*
B S M E , Purdue Univ rsity M S E , Arizo a State Universit

Cox, Steven R. (1970 *Ass ciate Pi ofessor of Economics*
B.S Univ rsity of Wis onsin, Mad s n, M.A., Ph D , Univ rsity of Mich gan

Craft, John E. (1973 *Asso iate Profess r of Journalism and Telecommunication*
B.F.A M A , Ph D , Ohio University

Cranmer, William H 1963 *Professor Emeritus of Social Work*
B A , Un versity of Akron, M S , Case Western Reserve Unive sity

Crawford, John E. (1980) *Associate Professor of Communication*
B A., Nebraska Wesleyan U iversity; M.A , Sa ramento State College, Ph D , n versity of Southern Cal forn a

Creath, J. Richard (1974 *Associate Professor of Philosophy*
B A , Knox Col ege M A Phil , M A Hist /Ph l S i , Ph D , University of Pittsburgh

Creighton, Judith M (1967 *Assistant Professor of Family Resources and Human Development*
B.S., University of A zona; M S , M C , Arizona State University Ph D , University of Arizona

Croft, Lee B 1973) *Ass ciate Professor of Russian*
B S., Arizona State Un versity, M A , University of Arizona, Ph D , Come l University

Cromwell, Sandra (1985) *Instructor of Nursing*
B S.N., Univers ty of Washington, M S N , n versity of Cal fornia, San Francisco

Cronin, John R. (1966) *Professor of Chemistry*
B A., Col ege of Wooster Ph D , University of Co orado

Cronkite, Walter (1986 *Professor of Journalism and Telecommunications*

Crosby, Lawrence A (1983) *Associate Professor of Marketing*
B S., M B.A., Ph.D , University of Mich gan

Cross, James P (1983) *Assistant Professor of Marketing*
B S , M B A Ph D , Uni ersity of Minnesota

Crosson, Stephen (1987) *Assistant Professor of Military Science*
B S , University of Southern Colorado

Crouch, Beulah (1953 *Assistant Professor Emeritus of Education*
B A in Ed , M A in Ed , Arizona State University

Crouch, Peter 1985) *Associate Professor of Engineering*
B.S , M.S., Un versity of Warwi k, Ph D , Harvard University

Crowder, Troy F. (1970 *Associate Professor Emeritus of Journalism and T lecommunication*
B A University of South Dakota, M A. University of Iowa

Crowe, Barbara J. (1981 *Associate Professor of Musi , Director, Music Therapy*
B M , M M , Michigan State University

Cullen, Ruth M. 1986) *Assistant Professor of Sociology*
B A , M unt Saint Agnes; Ph.D , Fordham University

Cummings, Lawrence T (1970 . *Asso iate Professor of Counselor Education*
B A , M A , Arizona State University, Ed.D., University of California, Lo A geles

Cuomo, Frank (1986) *Associate Professor of Construction*
B C.E., Manhattan Co lege, M C E., Polytech Institute of Brooklyn

Curran, Mark J. 1968) *Professor of Spanish and Portuguese*
B S., Rockhurst Co lege, P i D , St Louis University

Cusimano, Barbara E (1985) *Assistant Professor of Physical Education*
B.S , Oklahoma State University, M S , Ph D , Arizona State University

D'Andrea, Frank L. 1972 — *Associate Professor Emeritus of Music*
B.A., M.A., Ed.D., Columbia University

D'Angelo, Frank J. 1940 — *Professor of English*
B.S., Loyola University, New Orleans; M.A., Tulane University; Ph.D., University of Nebraska, Lincoln

Daane, Calvin J. 1963 — *Professor Emeritus of Curriculum & Instruction*
B.S., University of Wisconsin; M.A., Columbia University; Ed.D., Indiana University

Dagger, Richard K. 1976 — *Associate Professor of Political Science*
B.A., University of Missouri; Ph.D., University of Minnesota

Dahl, Richard C. 1966 — *Professor Emeritus of Law*
B.A., B.L.S., University of California; LL.B., Catholic University

Daley, Michael J. 1978 — *Professor of Social Work*
B.S., Spring Hill College; M.S.W., St. Louis University; M.S., University of Pittsburgh; D.S.W., Tulane University

Dargeish, Donald D. 1962 — *Associate Professor of Political Science*
B.A., Carleton College; M.A., Columbia University; Ph.D., University of Colorado

Dailyn, Selwyn L. 1983 — *Clinical Professor of Law, Director Criminal Clinic*
B.A., Grinnell College; J.D., University of Iowa

Daneke, Gregory A. 1982 — *Professor of Public Affairs, Business Administration and Environmental Studies*
A.A., San Bernardino Valley College; B.A., M.A., Brigham Young University;
Ph.D., University of California, Santa Barbara

Daniel, Norman E. 1970 — *Associate Professor of Transportation*
B.S., M.S., University of Tennessee, Knoxville; Ph.D., Indiana University

Dannenfeldt, Karl H. 1956 — *Professor Emeritus of History*
A.B., Valparaiso University; M.A., Indiana University; Ph.D., University of Chicago

Dantuco, Marilyn 1978 — *Associate Professor of Physical Science*
B.A., University of Illinois; M.A., Ph.D., Florida State University

Darst, Paul W. (1976) — *Professor of Physical Education*
B.S., M.S., Akron University; Ph.D., Ohio State University

Datesman, Susan K. (1979) — *Associate Professor of Justice Studies*
B.A., Kutztown State College; M.A., Ph.D., University of Delaware

Datta, Ajoy K. (1984) — *Assistant Professor of Computer Science*
B.E., P.G., Ph.D., Jadavpur University

Dauten, Joel J. (1960) — *Professor Emeritus of Finance*
B.S., M.S., Washington University, P.D., University of Iowa

Davey, William G. 1976 — *Associate Professor of Communication*
B.A., Pennsylvania State University, M.A., Columbia University; Ph.D., Indiana University

Davidson, Joseph K. (1973) — *Professor of Engineering*
B.M.E., M.S., Ph.D., Ohio State University

Davies, Charles 1986 — *Assistant Professor of Music*
B.F.A., Kearney State College; M.F.A., University of Iowa

Davis, George R. 1980 — *Associate Professor of Engineering*
B.S.E.E., M.S., University of Illinois; Ph.D., University of Arizona

Davis, Joseph M. (1975) — *Associate Professor of Finance*
B.S., University of South Carolina; M.B.A., Texas A&M University; Ph.D., University of Georgia

Davis, Keith 1958 — *Professor Emeritus of Management*
B.B.A., M.B.A., University of Texas; Ph.D., Ohio State University

Davis, Robert E. 1959) — *Professor of Communication*
B.A., M.A., Ph.D., University of Illinois

Davis, Sanford S. 1953 — *Professor Emeritus of Counselor Education*
A.B., B.S., Central Missouri State College; A.M., University of Missouri, Kansas City;
Ed.D., University of Colorado

Davy, Jeanette A. (1986) — *Assistant Professor of Management*
B.S., Viterbo College; Ph.D., University of Arizona

Deach, Dorothy F (1967) *Professor Emeritus of Physical Education*
B S , M S University of I linois, Ph D , University of Michigan

Dean, Arthur G (1971 *Associate Professor of Engineering*
B A , M S , Texas Tech University, Ph D , Texas A&M University

Debenport, Sylvia (1978) *Associate Professor of Music*
B M E B M , M.M. Ind ana University

DeBerg, Curtis L (1985) *Assistant Professor of Accountancy*
B A , Univers ty f Northern Iowa, M S , Ph D , Oklahoma State University; C P A , Iowa

DeFranco, Rosemary (1987) *Assistant Professor of Military Science*
B A , Barnard Co lege; M S J D , Syracuse University

de Kant, Ronald (1983 *Professor of Music*
A D The Jul liard School

Dellheim, Charles J. 1980) *Assistant Professor of History*
B A , Harpur Col ege, M A , Ph D , Yale University

DeMars, James R (1981 *Associate Professor of Music*
B A , Macalester College, M A , Ph D , University of M nnesota, Minneapolis

DeMarsche, Katherine Urry (1975) *Associate Professor of Art, Assistant Dean College of Fine Arts*
B A , Mills College, M F A , Univers ty of Colorado

DeMassa, Thomas A. 1966) *Professor of Engineering*
B S E E , M S E E Ph D University of Michigan Ann Arbor

de Matties, Nicholas 1974 *Associate Professor of Art*
B A , Long Beach State Un versity, M S., Illinois Institute of Technology

Demeke, Howard J. (1962 *Associate Professor Emeritus of Education*
A B , San Franc sco State College; M S , Ed D , University of Southern Californ a

Dermody, Jaime Cuevas (1984) *Assistant Professor of Finance*
B.S , Univers ty of Mary and; M B A , Ph D , University of Pennsy vania

DeSerpa, Allan C (1975) *Associate Professor of Economics*
B A , University of Santa Clara, Ph D University of California, Santa Barbara

Detrie, Thomas (1984 *Associate Professor of Art*
B F A , M F A , Louisiana Tech University

Dezelsky, Thomas L (1968 *Associate Professor of Health Science*
B S , Central Michigan U niversity, M A Univers ty of Michigan H S D , Indiana University

Díaz, Jose Luis 1984) *Assistant Professor of Agriculture*
B S Escuela Tecnica de Ingenieros Agronomos, Madrid, M.B.A., State University of New York, Buffalo; Ph.D., Texas A&M University

Dietz, Robert (1977) *Professor Emeritus of Geology*
B.S , M S , Ph D., University f Ill no s

Diffenderfer, Peter J (1986) *Assistant Professor of Leisure Studies*
B S State University of New York, Cortland, M S , Ph D , University of Oregon

Ditsworth, Richard L. 1959 *Professor of Engineering*
B S , M S , Iowa State College Ph D , Michigan State University

Dittert, Alfred E. Jr. (1967) *Professor Emeritus of Anthropology*
B A , M A , University of New Mexico, Ph D University of Arizona

Doan, Jerry (1979 *Associate Professor of Music*
B.M.E , M.M., North Texas State University; D.M A., University of Michigan

Doane, Winifred W 1977 *Professor of Zoology*
B A , Hu ter College of the City of New York, M.S , University of Wisconsin; Ph.D., Yale University

Dobkin, William E 1970) *Professor of Theatre*
A.B , Eastern Michigan University; M.A , University of Colorado, Ph D., Indiana University

Doebler, Bettie Anne 1971 *Professor of English Director, Interdisciplinary Humanities Program*
B.A , M.A. Duke University; Ph D., University of Wisconsin, Madison

Doebler, John W. 1970) *Professor of English*
B A , Duke University, M A , Ph.D , University of W scons n, Madison

Donelson, Kenneth L (1965) *Professor of English*
B A , M A , Ph D Univers ty of owa

Donnelly, Aaron V (1962) *Professor Emeritus of Engineering*
B S E.E , M S , Un versity of Iowa; M A., Columbia University, Ph D., University of Iowa

Dorman, Michael F (1976) *Pr fessor of Speech and Hearing Sc ence*
B S , University of W hington, M A , Ho l ns College Ph D , Ui versity of Co n cticut

Dorson, William J (1966 *Professor of Engineering*
B.Ch E., M Ch E , Rensse aer Polytechnic Institute Ph.D., U n vers ty of Cincinnati

Douglas, Joan S (1980 *Assistant Professor of Nursing*
B S., Stanford University, M P.H., Un ver ity of North Caro na

Dove, Rita 1981) *Asso iate Pr fessor of Er glish*
B A , Miami Un ver ty, Ohi M F A , U vers ty of Iowa

Downing, George D. r 1964 *Profess r Emeritus of Marketing*
B S E E , Iowa State Unive ity D B A , Mi higan State U iversity

Doyle, Donald P 1962 *Professor of Theatre*
B A Ariz ia State Un versit M A , N rthwestern U ivers ty, Ph D Univers ty of Minnesota

Doyle, Roy P 1959 *Professor of Education*
B A. in Ed , Arizona State University M A Ed D , Co mbi University

Drake, Jackson M (974 *Associate Professor Emeritus of Education*
B S , M.S Southern I linois University, Ed D., Columb a Univers ty

Dresskell, Nadine 1946) *Professor Emeritus of Music*
B.S. Bowling Green State U versity, M A , Co umbia Un vers ty

Driscoll, Michael F. 1971) *Associate Pr fessor of Mathematics*
B A St. John s University, M S , Ph.D., Un versity of Arizona

Dubie, Norman 1978) *Professor of English*
B.A., Goddard Col ege, M.F A , Univers ty of Iowa

Dudek, Leona M. 1960) *Assistant Pr fessor Emeritus of Education*
B Ed Nati na College of Educat on, M A n Ed , Arizona State Univer ity

Duffy, Dennis M. 1977 *Associate Professor of Engineering*
B S , M S , Ph D U iversity of Arizona

Duncan, William A (1980 *Assistant Pr fessor of Accountancy*
B S , Portland State University Ph D , University of Texas, C P A , Texa

Dundas, Mary Jane (1975 *Associate Professor of General Business*
B.A , California State Unive ty, Long Beach J D , Loyo a University, Los Ange e

Durrenberger, Robert W. 1971 *Professor Emeritus of Geography*
B S , Moorhead State Co lege, B S., Cal fornia In titute f Techn logy M.S , Univers ty of Wiscons n, Mad son, Ph D , Unive sity of California Los Ange es

Dycus Augustus M. 1959) *Associate Professor Emeritus of Botany*
B.S. Akron niversity Ph.D , Cornell University

Eck, Roger D. (1970 *Professor of De ision and Information Systems*
B S Ch.E , Clarkson College f Technology, M.B.A Un versity of New Mexico, Ph D. Tula e University

Eckert, Thomas W (1971) *Associate Pr fessor of Art*
B A M.F A Arizona State n vers ty

Edelsky, Carole (1976) *Associate Profess r of Education*
B S , Univers ty of Cin nnati, Ph D , U versity of New Mex co

Eder, James F. Jr (1975 *Associate Professor of Anthrop logy*
B S , Ca ifornia Institute f Technology, M A , Ph D Univers ty of Californ a, Santa Barbara

Edwards, John 1964) *Profe ssor of Edu ation, Executive Dire tor, Off Campus A ademi Services*
B S , Bal State Univers ty M A Ed D , A z na State Univers ty

Edwards, Mark R (1978) *Associate Professor of Agriculture*
B.S.M.E. U.S. Naval Academy, M.B.A. D.B.A. Arizona State University

Edwards, Marvin J (1959 *Assistant Professor of Technology*
B.S., M.A. in Ed., Arizona State University

Eeds, Maryann H (1975 *Associate Professor of Education*
B.S., California State University, Sacramento, Ph.D., University of Oregon

Effland, Richard W (1967 *Professor Emeritus of Law*
A.B., LL.B. University of Wisconsin; LL.M., Columbia University

Eisenberg, Nancy H 1976 *Professor of Psychology*
B.A., University of Michigan, M.A., Ph.D., University of California, Berkeley

Ekmanis, Rolfs (1963 *Professor of Russian*
B.A., M.A. University of Wisconsin Madison, Ph.D., Indiana University

Ellis, Robert H. 1962 *Associate Professor of Journalism and Telecommunication,*
B.A. Arizona State University *Associate Vice President, University Relations*
M.A., Case Western Reserve University

Ellison, Geraldine 1981) *Assistant Professor of Nursing*
B.S.N. Berea College, M.S.N., Vanderbilt University, M.A. Ph.D., Arizona State University

Ellman, Ira Mark 1978 *Professor of Law*
B.A., Reed College; M.A., University of Illinois J.D., University of California, Berkeley

Ellner, Anthony Jr. 1960) *Professor Emeritus of Architecture*
B.A., City University of New York M.A. Columbia University M.Arch Yale University

Ellsworth, Lola M 1938) *Professor Emeritus of Family Resources and Human Development*
B.S., Brigham Young University, M.A. Columbia University

Elmore, James W. (1949) *Professor Emeritus of Planning*
A.B., University of Nebraska, M.S. in Arch., Columbia University

Emery, Raymond C. 1962 *Associate Professor Emeritus of English*
B.A., M.A. University of Wyoming, Ed.D. Stanford University

Engel Glorianne (1982 *Associate Professor of Theatre*
B.F.A., University of Arizona, M.A., Ph.D., University of Pittsburgh

Engelhardt, Florence P (1965) *Associate Professor of Social Work*
B.A., College of Mount Saint Vincent, M.S.S., Fordham University

Engelhardt, Jon M. 1972) *Professor of Education College*
B.A., M.A., Arizona State University, Ph.D., University of Texas Austin *Coordinator of Teaching Centers*

English, William S. 1962) *Professor Emeritus of Music*
B.M., Washburn University M.A., Ph.D. George Peabody College

Entz, Adele 1984) *Instructor of Nursing*
B.S.N. University of Washington, M.N., University of Kansas

Erno Richard B (1957-62, 1963) *Professor Emeritus of English*
B.A., Michigan State University M.A. University of Denver Ph.D. University of Minnesota

Esparza, Delia (1982 *Instructor of Nursing*
B.S.N. University of Texas Austin, M.S. University of Colorado

Evans Donovan L. 1966) *Professor of Engineering*
B.S.M.E. University of Cincinnati Ph.D. Northwestern University

Evans, John X. (1964) *Professor of English*
B.A., Holy Cross College, M.A., Ph.D., Yale University

Evans Kenneth R 1980 *Associate Professor of Marketing*
B.A., University of California Davis, M.B.A., California State University Sacramento,
D.B.A. University of Colorado, Boulder

Eyring, LeRoy (1961) *Professor of Chemistry*
B.S., University of Arizona, Ph.D. University of California, Berkeley

Faas, Larry A (1967) *Professor of Education*
B S , Iowa State Univers ty, M A , Colorado State College, Ed D , Utah State University

Fabes, Richard A (1983 *Assistant Professor of Family Resources and Human Development*
B A , Univers ty of Colorado M S Ph D , Oklahoma State Un versity

Faeth, Stanley H. 1980) *Associate Professor of Zoology*
B.S , M S , University f Cincinnat Ph D Florida State Uni e rity

Fafitis, Apostolos 1984 *Assistant Professor of Civil Engineering*
B S Eng , Aristoto ion U iversity of Thessalonik , Greece M En South Dak ta Schoo of M nes and Techn logy
Ph D , N rthwestern Un ver ity

Fainter, Robert (1987) *Assistant Professor of Computer Science*
B S Un ver ity of N rth Caro ina M S , Ph D V rginia Po ytechn c Inst tue

Faith, Roger L (1981) *Professor of Economics*
B A , St Mary's C llege of Ca forn a; M A Ph D Unversity of Cal forn a. Los Angeles

Faltz, Leonard M (1979 *Associate Professor of Computer Science*
B S , C ty Un vers ty f New York M S Harvard Univers ty Ph D , University of Cal forn a, Berkel y

Fann, Gail L (986) *Assistant Professor f General Business*
B S , Northern Arizona Unive s ty, M Ed Ed D Arizona State U n vers ty

Farber, Bernard 1971 *Professor f Sociology*
A B. Roosevelt n versity A M Ph D., Un versity f Chi ago

Farin, Gerald (1987 *Assistant Professor of Computer Science*
B A , M A Ph D Univers ty of Braunschweig

Farmer, Frank D 1970) *Associate Professor of Mathematics*
B A , M A , U ive s ty of Cal fornia Riverside, Ph D , U nivers ty of Washington

Farness, Sherly F 1969 *Assistant Professor Emeritus of Art*
B A , M A Michigan State U nivers ty

Farrar, Roger D. 1974 *Associate Professor of Education*
B A , M S Kearney State Col eg Ed D , Univers ty of Nebraska

Farris, Martin T 1957) *Professor of Transportation*
B A , M A , Un vers ty of Montana Ph D , Ohio State Univer ity

Fausel, Donald F 1969 *Associate Professor of Social Work, Director of DSW Program*
A B S T B S.T L , St Mary's Un versity, M.S W , Fordham niversity, D S W , Columbia Univers ty

Faustini. Antony A 1983 *Assistant Professor of Computer Science*
B.S C S Ph D , Univers ty of Warw ck

Fearon, Harold E (1961 *National Association of Purchasing Management Professor*
B S , M.B A , Ind ana Univers ty,Ph D Mi higan State University *Professor of Purchasing Management*

Fehr, Fred S (1971 *Associate Professor of Psychology*
B S , U nivers ty of Wisc nsin, M A , Ph D , Wash ngton U ver ity

Feldhaus, Anne (198) *Associate Professor of Religious Studies*
B A , Manhattanvi le College Ph D., Univ rsity of Pe n yl n ia

Fe dstein, Alan 1970 *Professor of Mathematics*
B A Ar zona State University Ph D , University f Californ a, Los Ange es

Feller, Carolyn M (1972 *Assistant Professor of Nursing*
B S N M S Arizona State U nivers ty

Fellows, Rushia G. (1977 *Assistant Professor of Architecture*
B.S . Arizo a State Universit, M Arch U ivers ty of Arizona

Fenske, Robert H 1974) *Professor of Education*
B S., M S. Ph D . University of Wis onsin

Fernando, Harindra (1984) *Assistant Professor of Engineering*
B Sc , niversity of Sri Lanka, M A Ph D Johns Hopkins University
Post Doctoral, Cal fornia Institute of Technology

Ferraro, Kathleen 1982) *Assistant Professor of Justice Studies*
B A . Case We tern Reserve University, M A , Ph D Arizona State University

Ferrell, Wilfred A (1959 — *Pr fess r of English*
B A , M A Ph D , Un versity f Texa

Ferris Jean (1985 — *Assistant Pr fessor of Mu ic*
B M , Un ver ity f Mich g n, M A , Ariz a State Un versity

Ferry, David K 1983 — *Professor of Engineering, Center for S lid State Electronics*
B.S E E., M S E E Tex s Te hn lo ica College, Ph D Univers ty of Texa Aust n

Fifield, M chael E (1984 — *A sistant Pr fess r f Architecture*
B.A , Univers ty of Ca fornia, Berkele , M Arch Unive ty of Ca fornia, Los Angeles

Finch, A Joyce 1965 — *Assistant Pr fess r of Nursing*
B S N , Au u tana Col ege M S University of Colorad

Findler, Nicho as V. 1982 — *Professor f Computer Science*
B En , Ph D Budapest Un versity for Technical Sc ences

Findley, Lisa R 1984 — *A sistant Pr fes or of Archite ture*
B A Un vers ty f Ca fornia, Santa Cruz M Arch , University f California, L s Ange es

Finer, Neal (197 — *Associate Pr fessor of Education*
B A Universit of H uston, M A , Mex co C ty Co lege Un vers ty of the Americas
Ph D , Un vers t f Texas Aust n

Fink, Jonathan H 1982) — *As istant Profe sor of Geology*
B A Colby Col e e, Ph D , Stanford Unive ty

Fink, Raymond R 1958 — *Pr fessor of Art*
B A E , Sch f the Art Institute of Ch ca , M S.A.E , Illino s In t u e of Technology

Finn, Mary G. 1986 — *Assi tant Pr fess r of Ec n mics*
B A , M A , Nat nal Univers ty of re and ABD, University of Western Ontari

Firestone, Melvin M 1968 — *Asso iate Profess r of Anthropology*
B.A , Un ver ty of New Mex co M A Ph D , University of Wash ngton

F sher, Marvin M (1958 — *Pr fess r of English*
A.B., A M., Wayne Univers ty, Ph D University of Min esota

Fisher, Stuart G 1976 — *P fesse r of Z ology*
B.S , M A , Wake F re t C ege, Ph D Dartmouth Co ege

Fitch, Gregory W. (1974 — *Associate Professor of Phil s phy Cha r, Department of Philosophy*
B A , We tern Wash ngton State Col ege M A , Ph D University of Massach ett An herst

Flaherty, Richard E 1978 — *Pr fess r of Acc untancy*
B A M S Ph D Uni ersity of Kan a C P A. Kansas

Fleming, Robert C 1974 — *Associate Pr fe r of Mu ic, Ass iate Dire tor f Bands*
B.S Indiana U vers f Penns lvan a M F A Carnegie Me lon Universit Ph D , Southern I n s Univers ty

Fletcher, Grant (1926 — *Pr fes r Emeritus of Musi*
B M Illinois We ev Univer ty, M M n versity of Michigan, Ph D Eastman Schoo U ve s ty of Rochester

F etcher, Ian (1982 — *Profe s r of English*
Ph D , U vers t f Read ng, Eng and

Flores, Barbara 1980 — *A sistant Pro fes r of Education*
B A , Cal f rnia State Un ver ity, Hayward M A Ca fornia State Univers ty, Sacrament
Ph D., U ivers ty of Ariz na

Florschuetz, Leon W (1964 — *Pro fess r of Engineering*
B S M S Ph D , Univer ty f Il s

Flynn, Mary Kay 1986 — *nstru tor f Nursing*
B S N Un versity f Evansv le, M A N , University of Iowa

Flys, M chael J. 1975 — *Pr fe r f Spanish*
Licen iado en F o of fa y Letras, D octor en Fi osof fa y Letras ver dad de Madrid Spain

Foard, James H 1977 — *A. s ciate Pr fessor f Reli ious Studies*
B A , C ege of W ster, A M , Ph D Star f rd Un versity

Foley, Thomas A (1984 — *A sistant Pr fesse r of Computer S ience*
B S , M A , Ph D , Arizona State Univers ty

Foster, Brian L 1980 *Professor of Anthropology, Dean, Graduate College*
B A Northern Illinois University, A M , Ph D University of Michigan

Foster David W 1966 *Professor of Spanish*
B A., M.A , Ph D University of Washington

Fouquette, Martin J Jr 1965) *Associate Professor of Zoology*
B A M A , Ph D University of Texas

Franklin, Vincent P. (1986 *Associate Professor of History*
B A Pennsylvania State University M.A T Harvard University, Ph D University of Chicago

Frasier, James E (1963 *Professor Emeritus of Education*
B A University of Northern Colorado M A , University of Michigan; Ed D , University of Northern Colorado

Frazier Robert C 197s) *Associate Professor of Humanities Education*
B M E , Kansas City Conservatory of Music, M M , University of Denver Ph D , Arizona State University

Freund, John E. 1957) *Professor Emeritus of Mathematics*
B A , M A , University of California, Los Angeles, Ph D University of Pittsburgh

Friedman Edward 197") *Professor of Spanish*
B A , University of Virginia, M A Ph D , Johns Hopkins University

Fritz, Karen 1983 *Instructor of Nursing*
Diploma, Sioux Valley Hospital, Sioux Falls, South Dakota, B.A , Sioux Falls College
M S , University of Minnesota

Fritzemever, Joe R 1973) *Professor of Accountancy*
B B.A , Baylor University M B A D B A , Indiana University, C P A Texas

Fronske, Jeanne Otis 1975) *Associate Professor of Art*
B A DePauw University B F A , Denison University M F A Ohio State University

Frost Melvin Jesse (1965 *Assistant Professor Emeritus of Geography*
B S , Arizona State University M S Brigham Young University Ph D University of Florida

Fry, Harold (1958 *Associate Professor Emeritus of Engineering*
B S Colorado State University; M E University of Wyoming M S , University of Colorado

Fry, Maurine A (1967 *Professor of Education Assistant Academic Vice President, Personnel*
B S , M A , University of South Dakota Ph D., University of Iowa

Fuchs, Jacob 1951 *Professor of Chemistry*
B.A., New York University M S Ph D , University of Illinois

Fuchs, Rachel G 198) *Assistant Professor of History*
B A M A Boston University Ph D Indiana University

Fullerton, Bill J 1958 *Professor Emeritus of Education*
B S Northwestern State College Ed M , D Ed , University of Oklahoma

Fullinwider, S Pendleton 196" *Associate Professor of History*
B S U S Naval Academy, M S , Ph D University of Wisconsin Madison

Furnish, Dale B 1970 *Professor of Law*
B.A , George Pepperdine College J D , University of Iowa LL M , University of Michigan

Gabaldon, Diana J 1980 *Assistant Professor, Research, of Center for Environmental Studies*
B S Northern Arizona University M S , Scripps Institute of Oceanography; Ph D , Northern Arizona University

Gaffney, Philip D 195" *Professor Emeritus of Education*
B S Northern Iowa State University, M A Ph D , State University of Iowa

Gaidis, William C (1983 *Assistant Professor of Marketing*
B S , M B A California State University Long Beach Ph D University of Wisconsin Madison

Gaines, Sylvia W (1972 *Associate Professor of Anthropology*
B A M A , Ph D Arizona State University

Galat, David L 1984 *Assistant Professor of Zoology*
B S , C olorado University M S I h D , Colorado State University

Gale, Betty J 1982 *Instructor of Nursing*
Diploma Evangelical Deaconess Hospital, B S N M S. Arizona State University

Galician, Mary Lou (1982) *Assistant Professor of Journalism and Telecommunication*
B A , Long Island Un ver ty M S Syracuse U iversity; Ed D , Memphis State Un versity

Gallinger, George W. 1977 *Assistant Professor of Finance*
B A Waterloo Lutheran Co lege, M B A York In versity Ph D , Purdue Univers ty

Garcia, Eugene E (1980 *Professor of Education Director, Center for Bilingual Bicultural Education*
B A., Un versity of Utah M A , Ph D , Un ve sity of Kansas

Garcia, Margot 1984) *Assistant Professor f Planning*
B Sc , Un versity of New Mex co; M Sc Univers ty of Wisconsin Ph.D Unive sity of Ar zona

Garcia, Nelda C 1986) *Ass ociate Pr fessor of Ge neral Business*
B S , M A. Texas Woman s Univers ty, Ph D Michigan State U niversity

Garrity, Mar orie L 1975) *Assistant Professor of Nursing*
D p oma, Vassar Brothers Hosp tal B S , Un versity of Bridgeport, M S , Case We tern Reserve U niversity

Gasowski, Ronald E 1971) *Professor of Art*
B S D Univers ty f M ch gan, M.F.A , University of Wa h ngton

Geer, John G 1986) *Ass stant Professor f Political Sc ience*
B.A , Frankl and Marshal C ge M A , Ph D Pri ceton U iver ity

Gereboff, Joel 1978) *Ass iate Pr fessor of Relig us Studies*
B.A , New York U n versity Ph D Brown Unive sity

Gerking Shelby D (1974) *Professor Emeritus of Zoology*
A.B DePa w U n vers ty, Ph D., Indiana Un ivers ty

Gerlach, Vernon S 1963) *Professor f Edu ation*
B A , Way e State U versity M A U n vers ty of Min esota Ed D Arizona State U n v r ity

Gesell, Laurence E 1984 *Assistant Professor of Techn logy*
B.A , Upper Iowa U nive s ty, M P A University of San Francis o

Gieschen, Donald W. (1959 *Ass iate Professor of Philosophy*
B S Northwestern U niversity M A , Ph D U nive s ty of M n e ota

Giffin Frederick C 1967 *Professor of History*
B A De so versity M A Ph.D Emory Univers ty

Gill, George A (1966 *Assistant Pr fess or Emeritus f Education*
B S. M A , Ariz a State Univers ty

G , James D (1981 *Ass stant Professor of Marketing*
B S , M A Ph D , Univers ty t Nebraska, L ncoln

Gillingwater, Denis 1973 *Asso iate Professor of Art*
B F.A., M F.A Un vers ty of C n at

Gilsdorf, Jeanette W. (1979) *Ass ciate Professor of General Business*
A B Cre ghton Un versity Omaha, M A , Ph D U niversity of Nebraska L nco

Gisolo, Margaret 1954) *Professor Emeritus of Dance*
B S., Ind ana State Teachers C lege, M A , New York U niversity

Glanzman, Dennis L. 1977) *Ass ciate Pr fessor of Psychology*
B A , M S Ph D , University of Calif rnia, Irvine

Glass Gene V (1986 *Professor f Education*
B A., U ver ty of Nebraska, M S , Ph D., University f Wiscons n, Mad son

Glaunsinger, W liam S 1972 *Professor of Chemistry , Chair, Department of Chemistry*
B S M am U nivers ty, Ph D , Cornell U nivers ty

Gober, Patricia A 1975) *Pr fessor f Geography Chair, Departme t f Geography*
B S., Univers ty of Wisc nsin, Whitewater M S Ph D , Ohio State U v rs ty

Godlewski, Fabienna 983) *Assi tant Professor of Management Science*
B S , Bal State U ivers ty, M B A , Ph D Un vers ty of C ncinnat

Goldstein, Elliott S. 1974) *Associate Professor of Zo logy*
B S , Univers ty of Hartford, M.S , Ph D U versity of M nesota

Goldstein, Myron (1963) *Professor of Mathematics*
B S , M A Ph D University of Calif rnia, Los Angeles

Golen, Steven P (1984 — *Associate Professor of General Business*
B.S , M A , Western Kentu ky University Ph D Arizona State University

Golshani, Forouzan (1984 — *Assistant Professor of Computer Science*
B.S , Arya Mehr University of Techno ogy, M S , Ph D , Warwick University, UK

Gomez, Reynaldo A. (1980) — *Assistant Professor of Education*
B A , So thwest Texas State Un versity, M.Ed , Stephen F Austin State University, Ph D , Pennsylvania State Un versity

Goo, Benjamin 1955 — *Professor Emeritus of Art*
B F A , Univers ty f Iowa M F A Cranbr ok Academy of Art

Gooding, Elmer R 967 — *Professor of E on mics Ass stant V ce President for Academic Affairs*
B S , McPhers n C ege, M A , Ph D , U versity of Kansas

Gordon, Leonard (1967 — *Profe sor of Sociology Chair Department of Sociology*
B A , Wayne State n vers ty A M , Un v rsity of Mich gan, Ph D , Wayne State Un versity

Gordon, Richard S 1980 — *Professor of Agriculture*
A B., Un versity of R heste , M. A , Harvard Unive s ty; Ph D , Massachu etts Institute of Te hno ogy

Goss, Walter, Master Sergeant 1983 — *Senior Instructor of Military Science*

Goul, K Michael 1985 — *Assistant Professor of Decision and Information Systems*
B S M B A Ph D , Or gon State Univers ty

Gourley, David R 1967) — *Associate Professor of Marketing*
B S , Miami Un vers ty M B A , University of Toledo, D B A Indiana University

Goyer, Robert S 1981 — *Professor of C m m n cation Chair Department of Communication*
B A , DePauw U versity, M A , M ami Un ve s ty, Ph D , Ohio State University

Grace, Edward E. 1963 — *Professor of Mathematics*
B S Ph D , Un versity of North Caro na

Graf, William L 978 — *Professor of Geography*
B A , M S Ph D , Univers ty of W scons n Mad son

Graham, Denny L. (1974) — *Associate Professor of Technology*
B S , Ohio State Un versity M S De ver Un vers ty, Ph D P rdue University

Gratton, Brian J. (1983 — *Ass stant Pr fessor of History*
B A , Un versity of New Mex o, Ph D Boston Univers ty

Greathouse, Betty M (1972) — *Associate Professor of Education,*
B A , M.A , Ph D Arizona State Univers ty — *Acting Dire tor, Division of Curriculum and Instru tion*

Greeley, Ronald (1977 — *Professor of Geology, Chair, Department of Geology*
B S , M S , M ssiss ppi State Un vers ty, Ph D , Univers ty of Missouri, Rolla

Green, Gary I 980 — *Associate Professor of Information Systems*
B.A , University of Co orado, M B A , Seattle University Ph.D., U iversity of Wa h ngt n

Green, James L (1967) — *Associate Professor of English*
B A , M A Un vers ty of Kansas, Ph D Un versity of Nevada, Reno

Green, Mary E (196) — *Associate Pr fessor of English Assistant Dean for Student Academic Affairs,*
B.A Queens Co ege, New York — *College of Liberal Arts and Sciences*
M A , St John s Un vers ty New York, Ph D Univers ty of Ch cago

Greene, M dred S. 1966 — *Associate Professor of English*
A B., We les ey C le e M A T , Rad liff College, M A University of Massachu etts Ph D , Unive sity of New Mexic

Greeneich, Edwin W 1982 — *Research Associate Professor of Engineering*
A A , Diablo Va ey C l e e B S E E M S E E , Ph D Un versity of Ca form a Berkeley

Greey, George W. 1969 — *Professor Emeritus of Leisure Studies*
B A , M A , Purdue Un versity, Ph D , University of M chigan

Grier, Marvin (1957 — *Assistant Professor of Physical Education*
B A , W s onsin State C l ege, La Cr sse M.A., New York 'n vers ty

Griffith, LeRoy H (1958 — *Professor Emeritus of Education*
B.S. in Ed , M S in Ed , Drake niversity Ph D , Univers ty of Iowa

Grigsby, J Eugene (1966) *Professor of Art*
A B , Morehouse College, M A , Ohio State University, Ph D New York Univers ty

Grinder, Robert E (1973) *Professor of Education*
B S University of Calif rnia, Ed D , Harvard University

Gritzmacher, Karen A. (1986 *Assistant Profe sor of Operations Management*
B.S Carro l College, WI, M A Marquette University WI, Ph.D., Bowli g G een State University

Grobe, Edwin P (1957 *Professor of Fren h*
A B , W lliam Jewell College, M A Ph D nd ana University

Grondin, Robert O 1983) *As i tant Pr fessor f Engineering*
B S M S , Ph D. U ivers ty of Michigan Ann Arbor

Gronseth, Evangeline 1982 *Ass c ate Professor of Nursing*
B A., St Olaf College; M N Yale Univers ty, M A , Ph D , Columbia U versity

Gross, Douglas R. (1968 *Associate P fess r of Coun selor Education*
B A., M A , Western Mi hi an n versity Ph D , University of Wisconsin Mad so

Grossman, Louis H. (1966 *Professor of Management*
B A , University of Mich gan M B A , Ph D., Mi h gan State Univers ty

Gruzinska, Aleksandra 1973 *Assistant Professor of French*
Lycée Francais, Barce ona, Spain B A M A , State Un versity of New York Buffalo
Ph D , Pennsylvania State University

Gryder, Robert (1959 63, 1964 *Professor of Ge neral Business*
B A Northwestern State C llege, M Ed Lou s ana State Un vers ty, Ed D Un vers ty of North Dakota

Gudykunst, W lliam B. (1984 *Profe sor of Commun cation*
B S , M A Anz na State University, Ph D , Un versity of Minnesota

Guerin, Sanford M. (1984 *Professor of Law*
B S , Boston University, J.D , Un versity of San Francisco, LL M , New York niversit

Guilbeau, Eric J (1977 *Professor of Engineering*
B S. in Ch.E , M.S , in Ch E , Ph D n Ch E Lou s ana Tech Univers ty

Guillot, Elizabeth E. (1964 *Professor Emeritus of Sociology*
B S , Simmons College M A , Ph D , University of Pennsylvan a

Guinouard, Dona d E. 1966) *Professor of C unselor Edu ation*
B S , M S Montana State Co lege, Ed D. Washington State University

Guleserian, Theodore (1971 *Associate Professor of Philosophy*
B A , University of Californ a, Rive s de; Ph.D Y e Univer ity

Gully, Anthony Lacy (19 2 *Associate Professor of Art*
B.A , Univers ty of Californ a, Rivers de M A University of Cal forn a, Berke ey, Ph D Stanford University

Guntermann, Gail 1977 *Asso iate Professor of Spanish*
B.S , University of Montana, M.A., Univer ity of New Mex co Ph.D , Ohio State Un versity

Guntermann, Karl L. (1982) *Ari ona Ass ociation of Realtors Professor of Real Estate*
A.B., Knox Co lege, M B A , D B A , Indiana Univers ty

Gurnee, Herbert (1943) *Professor Emeritus of Psychology*
A.B , M A., Wesleyan U iversity, Ph D Harvard Unive s ty

Gust, J Devens (1975 *Professor of Chemistry*
B S., Stanford Univers ty, M S., Ph D , Princeton Un ver ty

Gutierrez, Nancy A. (1985 *Assistant Professor of English*
B A , Denison Univers ty M A Ph.D , Univer ity of Ch ago

Gwinner, Robert F 1970 *Professor of Marke ting*
B S , Univers ty of Southern M ss ssipp , M.B.A , Ph D Univer ity of Arkansas

Haberman, Donald C 1967 *Professor of English*
B.A., Rutge s, The State Univers ty, M A , Ph D , Yale University

Haberman, Lidia W 1967 *Instructor of Latin*
B A , Bryn Maw C ege, M A , Yale Un ver ity

Hackbarth, Glenn A (1976) *Associate Professor of Music*
B.M., University of Wisconsin, Madison; M M , D.M.A., University of Illinois

Haden, Clovis R. 1978) *Professor of Engineering*
B.S Univers ty of Texas, Arlington, M S , California Institute of Technology,
Ph D , University of exas, Austin

Hadley, Neil F 1966 *Professor of Zoology*
B A Eastern Mich gan University, Ph D , Universit of Colorado

Haefer, J Richard 1976) *Associate Professor of Music*
B.M , Ohio State University, M.M Univers ty of Ariz a, Ph D Un ver ty of I l nois

Haggerson, Nelson L 1961 63, 1964) *Professor of Education*
B A., Vanderb lt Univers ty; M S in Ed., New Mex co We tern Col ege;
Ph D , Claremont Graduate School

Hahn, Arthur W 1962) *Profess r of Art*
B.F.A , San Fran sco Art Institute; M A Ca ifom a State nivers ty, San Francisco

Hajicek, James 1976) *Associate Professor of Art*
B F A Kan a City Art nstitute M F.A., U vers ty of New Mex o

Hakac, John 1966) *Asso iate Professor of English*
A B , Centre Co lege, M A Ph D , University of Texas A stin

Hale, John Douglas 1956 *Professo Emeritus of Art*
B F A , M F A , U iversity of Southern California, Ph D Oh State University

Haley, Arthur J 1976) *Professor of Leisure Studies, Chair, Department of Leisure Studies*
B A , Stonehill College, M.Ed , Springf eld College, Ph D , Texas A&M University

Hall, John S 1973 *Profess r of Public Affairs Director School of Public Affairs*
B A , M A , San D ego State Univers ty, Ph D Univers ty of Oregon

Hall, Mark A 1985 *Associate Professor of Law*
B A Middle Tennessee Stat n versity J D , U n versity of Chicago

Hamilton, Robert 1980) *Professor of Music*
B M Indiana U n versity M.M , Cathol c U nive sity

Hanna, Albert Lyle 1967 *Associate Professor of Music*
B.M College of Mus c of Cincin at , Ph D I diana n vers ty

Hannley, Maureen (1980 *Associate Professor of Spee h and Hearing Science*
B A , M A , Univers ty of Arizona Ph D , Bayl r Co lege of Med ne

Hanson Hugh 1948) *Professor Emeritus of Zoology*
B.S , Kansas State Tea he Col ege, M S , Ph D University of Il in is

Hanson, Roland C (1966 *Professor of Physics*
B S , Mich gan Col ege of M ning and T chnolo y, M.S Ph D Uni ers ty of Ill no s

Happel, Stephen K. 1975 *Associate Professor of Economics*
B A , Un ve sity of Mis ouri, M A , Ph D , Duke Univers ty

Hardert, Ronald A 1966 *Associate Pr fesso of Sociology*
A B , M A , Un versity of C n innat , Ph D Indiana Univers ty

Hardt, Annanelle 1968 *Associate Professor of Education*
B.A , Southwestern Un versity A M Corne l Univers ty, Ph D n vers ty of Texas, Austin

Harned, Andrew A 1969) *Professor of Accountancy*
B A., Hasting Co lege; M A S , Ph D Unive sity of in is,
C P A I li is, North Carol na and Arizona

Harper, Pegge 1983 *In tructor of Dance*
B F A , Un versity of M ch a M F A nivers ty of North Carolina

Harris Anne E 982 *Assistant Professor of Psychology*
A B., Harvard Un versity, M A , Ph D , Ohio State Un versity

Harris, Jerry D. 1972 *Professor of Education*
B S , Il ino Stat U v rs ty Ph D , Univ rsity of M nnes ta

Harris, Joseph (1963) *Professor of Chemistry*
B.S., University of Maryland; M.A., Ph.D., Johns Hopkins University

Harris, Kathryn M., 1965 *Instructor of English*
B.A., M.A., Arizona State University

Harris, Mark, 1980 *Professor of English*
B.A., M.A., University of Denver; Ph.D., University of Minnesota

Harris, Walter, 1980 *Associate Professor of Music; Assistant Dean, College of Fine Arts*
B.S., Knoxville College; M.M., Ph.D., Michigan State University

Harris, William H., 1960) *Professor Emeritus of Marketing*
B.S., University of Denver; M.B.A., Ph.D., Ohio State University

Harrison, Jeffrey S., 1985 *Assistant Professor of Management*
B.S., Brigham Young University; M.B.A., Ph.D., University of Utah

Hartwell, L. Kay, 1975 *Associate Professor of Education*
B.S., M.A., Murray State University; Ph.D., Southern Illinois University

Hartwigsen, Gail L., 1979 *Assistant Professor of Family Resources and Human Development*
B.A., Glassboro State College; M.A., University of Connecticut; Ph.D., Michigan State University

Harward, Naomi (1956) *Professor Emeritus of Social Work*
B.D., Garrett Biblical Institute; B.A., Northwestern University; M.A., R.I.Ed.; M.A., Social Welfare, University of Chicago

Hassan, Ahmed A., 1981) *Assistant Professor of Engineering*
B.Sc., M.Sc., University of Cairo; Ph.D., University of Arizona

Hassett, Matthew J., 1966 *Associate Professor of Mathematics*
B.S., Fordham University; M.S., Ph.D., Rutgers, The State University

Hastings, Verno L. (1973) *Professor of Construction; Director, Division of Construction*
B.S.M.E., University of Nebraska; M.S.I.E., Oklahoma A&M University

Hatzell, Hilda H. (1984 *Assistant Professor of Agriculture*
B.A., University of South Florida, Tampa; M.S., University of Florida; Ph.D., Texas A&M University

Hayes Thumann, Karen, 1984 *Assistant Professor of Art*
B.S., University of Cincinnati; M.F.A., Indiana University, Bloomington

Haygood, Robert C. (1970 *Professor of Psychology*
B.S., University of Illinois, Urbana; M.S., Ph.D., University of Utah

Haynes, Peter, 1975 *Professor of Justice Studies*
B.S., University of Southampton, England; M.A., Ph.D., University of Toronto

Hazel, Jeffrey R., 1975 *Professor of Zoology*
B.A., College of Wooster; M.S., Ph.D., University of Illinois

Hecht, Michael L., 1983 *Associate Professor of Communication*
B.A., M.A., Queens College; Ph.D., University of Illinois

Hedlund, Ann (1976 *Assistant Professor of Anthropology*
B.A., University of Colorado; M.A., Texas Technical University; Ph.D., University of Colorado, Boulder

Heier, William D. (1966 *Professor Emeritus of Management*
B.S., University of Maryland; M.A., George Washington University; Ph.D., American University

Heimann, Robert A. (1952 *Professor Emeritus of Counselor Education*
B.S., Wisconsin State College; M.S., Ph.D., University of Wisconsin, Madison

Heller, Jules (1976) *Professor of Art*
B.A., Arizona State University; M.A., Columbia University; Ph.D., University of Southern California

Helms, Loyce Randel (1976 *Professor of English*
B.A., University of California, Riverside; Ph.D., University of Washington

Helmstadter, G. C., 959 *Professor of Education*
B.S., M.S., Iowa State University; Ph.D., University of Minnesota

Helton, Jon C (1973) *Associate Professor of Mathematics*
B.S , Southwest Texas State Col ege, M A , Ph.D , Univers ty of Texas, Austin

Henderson, Mark (1984 *Assistant Professor of Engineering*
B S M E , M S M E Ph D., Purdue Univers ty

Hendrick, Thomas E 1984 *Professor of Operations Management*
B S., M B A , niver s ty of Wash n ton Ph D , University of Oregon

Hendrickson Lester E 1968) *Associate Professor of Engineering*
B S M S , M h gan Te hno ogical Un versity, Ph D., University of Illino s

Hendrickson, Wil iam L. 1976) *Associate Professor of French*
B.A , Ar zona Stat n vers ty M A , University of Kansas, Ph D , Princeton University

Henkel, Ray 1966) *Assistant Professor of Geography*
B S Arizona State U versity M S Ph D , University of Wi consin Madison

Hennington, Jo Ann 1975 *Professor of General Business; Assistant Dean, College of Business*
B A , M B A Ed.D , Arizona State University

Henry, Nichola L. 1975 *Professor of Public Affairs, Dean, College of Public Programs*
B.A , Centre Co ege, M A , Pennsylvania State U vers ty; M P A , Ph D Indiana University

Henson, Dorothy A 1974) *Assistant Professor of Nursing*
B S Whitworth Col ege, M A , West Virginia College of Graduate Studies

Henze, Lura F. 1966) *Professor Emeritus of Sociology*
B.A , M A Arizona State Un versity

Hepburn, John R. 1984) *Professor of Justice Studies Director School of Justice Studies*
B.A , But er University M S., University of Kentucky, L xi gton Ph D. Un versity of Iowa

Hernandez, Armand P (1974 *Associate Professor of Justice Studies*
B A , M A , San Jose State University Ed D , University of Southern California

Herrero, Domingo 1981) *Professor of Mathematics*
M A , Un versity of Buenos Aires Ph D , Univers ty of Ch cago

Hershauer, Jame C 1969) *Professor of Decision and Information Systems*
B S , Purdue versity M B A D B A Indiana Univers ty

Hershberger, Robert G. (969 *Professor of Architecture*
A.B., Stanford niversity, B. Arch., Un versity of Utah, M Arch , Ph.D , University of Pennsylvania

Herzik, Eric 1986) *Assistant Professor of Public Affairs*
B A , Univer ity of Californ a, Irvine, M A , Ph.D., Un vers ty of North Carolina

Hestenes, David O. 1966) *Professor of Physics*
B.A., Pacifi Lutheran Co lege, M A , Ph D , University of California, Los Angeles

Hickman, David R. 1982) *Professor of Music*
B.M., Un versity f Colorado M M , Wichita State University

Higgins, Norman C (1968) *Professor of Education*
B S , Central Missouri State College, M S , Ph D , Syracuse University

Higgins, Walter T. Jr. 1967) *Professor of Engineering*
B E E , Manhattan Colleg ; M S , Ph D , University of Arizona

Hill, Bernard 1966 *Associate Professor Emeritus of Social Work*
B.S.S , City Col ege of New York, M.S.W , Tulane University

Hill, Louis A. 1958) *Professor Emeritus of Engineering*
B A , B S C.E., M.S.C E Oklahoma State University; Ph D , Case Western Reserve University

Hines, Harold C. 1952 *Professor Emeritus of Music*
B S., M S , University of Illino s

Hink, Heinz R (1958) *Professor of Political Science*
LL B , University of Berl n Germany , M A , Ph.D , University of Washington

Hinks, Robert W. (1981 *Associate Professor of Engineering*
B.Sc., University of Wales, M S E , M A , Ph D , Princeton University

Hirata, Ernest T. 1974) *Associate Professor of Technology*
B.A , San Diego State College, Ed D., Arizona State University

Hirleman, Edwin D. Jr. (1977) *Associate Professor of Engineering*
B S M E , M S M E , Ph D Purdue University

Hoffer, Warren W. 1972 *Associate Professor of Music*
B M , M.M., Un versity of Wiscons n, Mad son

Hoffman, Dennis L. (1979) *Assc iate Professor of Ec onomics*
B S , Grand Valley State Col eges, M A , Ph D Michigan State Un vers ty

Hoffman, Steven A (1985) *Assistant Professor of Botany and Microbiology*
B A C ark University Mass M A , Ph D University of Colorado

Hoffmeister, J. Ronald (1983) *Associate Professor of Finance*
B.S., Mil iken University, M.S , Ph D , University of Il inois

Hogan, Timothy D. (1970) *Professor of Economics*
A B., University of Califorma, Berke ey, M A , University of Californ a, Dav s,
Ph D , Virginia Polytechnic Institute

Holbrook, Amy K. (1975) *Assistant Professor of Music*
B.A , M A , Mills College, Ph D , University of Washington

Holloway, John R. (1969) *Professor of Chemistry and Geology*
B S , Univers ty of Oregon, Ph D , Pennsylvania State University

Holmes, Jack E. (1972) *Professor Emeritus of Political Science*
A.B., M A , University of Wyoming, Ph D , University of Chicago

Hom, Peter W (1984) *Associate Professor of Management*
B A., New York University; M A , Un versity of Califorma, Berkeley, Ph D , University of Il inois

Homa, Donald L. (1975 *Professor of Psychology*
B S , Univers ty of Iowa M S Ph D , University of Wisconsin, Madison

Hoover, Eric John (1977) *Professor of Music*
B S , Duquense University, M M , Catholic University of America

Hoover, Helene M. (1957) *Professor of F amily Resources and Human Development*
B.S. M.S , Lou siana State University, Ed D , Oklahoma State University

Hoover, Kenneth H. 1956) *Professor of Education*
B S M A , Lou siana State University, Ed D , University of Washington

Horan, John J. (1985) *Professor of Educati n Direct r C unseling Psychology Program*
A.B., M.A., University of Detro t; Ph D M chigan State University

Horowitz, Renee (1986) *Associate Professor of Technology*
B.A , Brooklyn College, M A , Ph D., Un vers ty of Colorado

Horwath, Peter (1973 *Professc r of German Chair Department of Foreign Languages*
Abitur, Realgymnasium Landshut, B A , M A Indiana niversity, Ph D , Univers ty of Michigan

Hoult, Thomas Ford 1964) *Professor Emeritus of Sociology*
A B , Univers ty of Il inois M A Whittier Co ege, Ph D , Un versity of Southern Cal forn a

Houston, Robert A (1985) *Instructor of Computer Science*
B A , University of Tol do, M S Bow ing Green State Univers ty

Houston, Sandra L (1983 *Assistant Professc r of Engineering*
B S , University of Ok ahoma, M S C E , Un versity of New Mexi o
Ph D , University of Ca ifornia Berke ey

Houston, William N. (1984) *Professor of Engineering*
Professional Degree n Geological Engineering, Colorado School of Mines,
M S C E., Ph D Un vers ty of Cal forn a Berkeley

Howell, Kenneth W 1975) *Professor of Education;*
B A , M A , Arizona State Un versity. *Program C ordinator, Department of Special Education*
Ph D , University of Oreg n

Howells, Edmund G (1960 *Assistant Profe ssor of Philosophy*
B A , Un ve sity of Utah M A Ph , Un vers ty of M ch gan, M A Eng sh Middlebury C l ege;
Ph D Stanford University

Howery, Betty I (1975) *Professor Emeritus of Music*
B S in Ed , M Mus. Ed , ED S., University of Kansas

Hoy, Frank P (1978) *Associate Professor of Journalism and Telecommunication*
B A , George Washington University, M A , American University

Hoyt, Charles D. Jr. (1962) *Professor Emeritus of Engineering*
B.S., M S , Ph D , Purdue University

Hubbard, Paul G (1950) *Professor of History*
A B , Wabash College M A , Ph D University of Illinois

Hubele, Norma J (1984) *Assistant Professor of Engineering*
B S , University of Massachusetts, M S , Ph D., Rensselaer Polytechnic Institute

Hudson, John W (1964) *Professor of Sociology*
B.S , M A , Ph D , Ohio State University

Hudson, Walter W (1986) *Professor of Social Work*
M A , Ph D , University of Chicago

Huey, Ben M. (1979) *Associate Professor of Computer Science*
B S , Harding College; M.S., Ph D , University of Arizona

Huff, Robert A (1985) *Professor of Education*
B A., University of Kansas, M A , University of Missouri, Kansas City, Ed.D., University of Oregon

Hughes, Robert G. (1986 *Assistant Professor of Health Administration Policy*
B A., Depauw University, M A Ohio State University, Ph D , Johns Hopkins School of Hygiene and Public Health

Hughston, George A. (1983) *Associate Professor of Family Resources and Human Development;*
B S M S , Brigham Young University, *Chair, Department of Family Resources and Human Development*
Ph D , Pennsylvania State University

Huizingh, William 1959) *Professor Emeritus of Accountancy*
B S B A , M B A , University of Denver; Ph.D., University of Michigan, C P A , Arizona and Colorado

Hull, Kathleen 1986) *Instructor of Nursing*
B.S.N , University of Nevada M S Ph D , Texas Womans University

Humphrey, Ted (1966 *Professor of Philosophy*
A B , M A , University of California Riverside, Ph.D , University of California San Diego

Hungate, Randall W. (1986) *Assistant Professor of Chemistry*
B S., Northern Arizona University, Ph D University of California, Santa Barbara

Hunnicutt, Harold B (1962) *Professor of Education*
B S , Ed.M , Ed D , University of Oklahoma

Hunter, Betty A (1966) *Assistant Professor of Family Resources and Human Development*
B.S , M Ed , University of North Carolina Greensboro

Huntington, Virginia R. (1962 *Associate Professor Emeritus of Accountancy*
B A , M B A , University of Kansas Ph D , University of Texas C P A Missouri and Arizona

Hurston, Clifford J. (1975) *Assistant Professor of General Business*
B S , M S , Tennessee State University, Ed D , Arizona State University

Hurtado, Albert L (1986 *Assistant Professor of History*
M A , California State University Sacramento, Ph D University of California, Santa Barbara

Huskey, Sybil 1979) *Associate Professor of Dance*
B F A M F A , University of Utah

Huston, Gerald D 1962 *Associate Professor of Decision and Information Systems*
B S C , M A Ph.D , University of Iowa

Hutt, Michael D. 1982 *Associate Professor of Marketing*
B B A , M B A , Ohio University, Ph D., Michigan State University

Hutt, Roger W 1975 *Associate Professor of General Business*
B S , M B A Ohio State University, Ph D Michigan State University

Ifflander, A. James (1981) *Assistant Professor of Finance*
B S., University of Notre Dame, M B A , Ph D , Michigan State University, C F A

Ihrig, Edwin (1979 *Professor of Mathematics*
B S , M A University of Maryland; Ph D., University of Toronto

Imdieke, LeRoy F. (1968 *Professor of Accountancy*
B S , Val ev C ty State College M A University of North Dakota Ph D , University of Illinois C P A , Illinois

Inskeep, Gordon C. (1968) *Professor Emeritus of Management*
B Ch.E , Ohio State Univers ty; Ph D Co umbia University

Ismail, Mourad E. (1978) *Professor of Mathematics*
B S., Cairo University, M.S., Ph D., University of Alberta

Jacks, Mary L 1955 *Associate Professor Emeritus of General Business*
B A , M A , Arizona State University; C.P S., Arizona

Jackson, Donald W. Jr (1972 *Professor of Marketing; Director, MBA for Executives Program*
B A , Albion Co lege, M B A , Ph D , Michigan State University

Jackson, Marvin R. Jr (1962 *Professor of Economics*
B S , M A , University of Colorado, Ph D., Un versity of California, Berkeley

Jacob, Richard J. (1963 *Professor of Physics Chair Department of Physics*
B S , Ph D , University of Utah

Jacobowitz, Ronald (1970) *Professor of Mathematics*
B A., City College of New York, M S , University of Chicago, Ph D., Princeton University

Jacobs, Bertram L (1985) *Assistant Professor of Botany and Microbiology*
B S , Rutgers University, NJ, Ph D L niversity of California, Be keley

Jacobs, H Donald (1972) *Associate Professor of Education*
B A. Ed., M A Ed , Centra Washington State College, D Ed., University of Oregon

Jacobson, Arthur 1956) *Professor Emeritus of Art*
B S , M S , University of Wisconsin Madison

Jacobson, Dean L (1974) *Professor of Engineering*
B S , M S , L niversity of Notre Dame, Ph.D., University of California, Los Angeles

Jain, Nemi C. (1976) *Professor of Communication*
B.S., M S., Agra Un versity; Ph D , M chigan State University

Jankowski, Daniel F. (1964) *Professor of Engineering*
B S.E , M.S.E., Ph D , University of Michigan

Janssen, James G. (1968) *Associate Professor of English*
B A , M A , Marquette University, Ph.D , University of Wisconsin, Madison

Jay, Bill 1974) *Professor of Art*
B.A , Equiv. Berkshire College of Art, England, M.A , M F.A., University of New Mexico

Jelinek, James J. (1953) *Professor Emeritus of Education*
B S., University of Ill no s; M A , Northwestern University Ed.D., Indiana University

Jenkins, William (1979) *Associate Professor of Art*
B A , St. Lawrence University; M.F.A., State University of New York at Buffalo

Jennings, Marianne G. (1977) *Professor of General Business*
B S., J D , Brigham Young University

Jo, Yung Hwan (1966) *Professor of Political Science*
B A , Lincoln Memorial Univers ty, M A , University of Tennessee, Knoxville, Ph D , American University

Joehnk, Michael D. (1983) *Professor of Finance*
B.S., University of Arizona, M.B A , Arizona State University; Ph.D , University of Arizona

Johnson, Alan P. (1967) *Associate Professor of English*
B.A., Amherst College, M.A , University of Michigan, Ph.D., Un versity of Minnesota

Johnson, David N (1969) *Professor Emeritus of Music*
B M , Trinity University, M M , Ph D Syracuse University

Johnson, Douglas A 1974 *Professor of Accountancy*
B.B.A., Ph.D., University of Texas C.P.A., Texas

Johnson, J. David 1982 *Associate Professor of Communication*
B.S., M.A., Ph.D. Michigan State University

Johnson, John M 1972 *Professor of Justice Studies*
B.A., Indiana University M.A. San Diego State College, Ph.D. University of California, San Diego

Johnson, Linda 1985 *Assistant Professor of Design*
B.A., M.A. Iowa State University

Johnson, Mary F 1984 *Associate Professor of Art*
B.A., Montana State University, M.F.A., University of Cincinnati

Johnson, Rosemary (1959 *Professor of Nursing*
B.S., M.P.H., University of Minnesota

Johnson, Roy M 1952-53, 1955 *Professor of Microbiology*
A.B., M.S. University of Chicago, Ph.D. University of New Mexico

Johnston, Carol S. 1986 *Assistant Professor of Family Resources and Human Development*
B.S. University of Michigan, M.A., Ph.D., University of Texas

Johnston, Gladys S 1986 *Professor of Education, Dean, College of Education*
B.S., Chevney State College, M.E.D., Temple University, Ph.D., Cornell University

Jones, Austin E (1968 *Professor of Psychology*
B.A., University of Illinois, M.S. Purdue University, Ph.D., University of Rochester

Jones, Daisy M (1963 *Professor Emeritus of Education*
B.S., M.S., Indiana State University, Ed.D., Indiana University

Jones, Marion K. 1970) *Professor of Dance*
B.A., Wayne State University, M.A., Arizona State University

Jones, Ruth (1969 *Professor of Political Science, Chair, Department of Political Science*
B.S. Indiana State University, M.A., Ph.D., Georgetown University

Jorgenson, Paul 1986 *Assistant Professor of Computer Science*
B.A., North Central College, M.A., University of Illinois, Ph.D. Arizona State University

Jorquez, James S 1980 *Assistant Professor of Social Work*
B.A., M.S.W., California State University, D.S.W. University of California

Judd, B Ira (1937 *Professor Emeritus of Agriculture*
B.S., M.S. Utah State University, Ph.D. University of Nebraska, Lincoln

Jurik, Nancy 1981 *Assistant Professor of Justice Studies*
B.A., M.A. Southern Methodist University, Ph.D., University of California, Santa Barbara

Justus, Jerry T 1968) *Associate Professor of Zoology*
B.A., Franklin College, M.A., Ph.D., Indiana University

Juvet, Richard S Jr (1970 *Professor of Chemistry*
B.S. Ph.D. University of California, Los Angeles

Kadell, Kevin (1981) *Assistant Professor of Mathematics*
B.A., California State University Sacramento, M.A., University of Maryland, Ph.D. Pennsylvania State University

Kader, David 1979 *Professor of Law*
B.A., California State University, Fresno, J.D., University of Washington LL.M., University of London

Kagy, Virginia L 1947 *Professor Emeritus of Family Resources and Human Development*
B.A., Drake University, M.S., Iowa State University, Ph.D., Johns Hopkins University

Kahn, B Winston 1966 *Associate Professor of History*
B.A., National Taiwan University China, M.A. University of Minnesota, Ph.D., University of Pennsylvania

Kaida, Tamarra 1980 *Associate Professor of Art*
B.A., Goddard College, M.F.A., State University of New York at Buffalo

Kajikawa, William M 1937 *Associate Professor Emeritus of Physical Education*
B.A., M.A., Arizona State University

Kale, Sudhir H (1984) *Assistant Professor of Marketing*
B S , University of Poona, India, M M S Jamnalal Bajaj Institute of Management Studies, Bombay, Ph D , Univers ty of Ill nois

Kamins, Martin P (1970) *Ass ciate Professor of Education*
B Ed , University of Miami M S Florida State University, Ed D., Wayne State niversity

Kaminsky, Elijah Ben Zion 1962) *Professor of Political Science*
A B , A M., Ph.D , Harvard University

Kammer, Ann E. (1986 *Professor of Zoology Chair, Department of Zoology*
B S , State University of New York, College for Teachers, A bany, M S Univer ty f New Hampshire, Ph.D., Univers ty of Cal forn a, Be ke ey

Kaplan, Robert G 1984) *Ass'stant Professor of Dance*
B M E Hartt C llege of Mus c

Kaplan, Steve (1981 *Assistant Professor of A countancy*
B.S , Arizona State University; M A S , Ph D Univers ty f Ill no

Karady, George 1986) *SRP Professor of Ele trical and Computer Engineering*
Ph D , Budape t University for Technical Scien es

Karjala, Dennis S 1978) *Professor of Law*
B S E , Princet n Un versity, Ph D , M S U vers ty of I l noi J D , Unive sity of Ca ifom a, Berkeley

Karnes, Thomas L. (1968 *Professor Emeritus of History*
A B , Colorado University A M Ph.D., Stanford University

Karnig, Albert K (1978) *Professor of Public Affairs Associate Vice Pres dent for Academic Affairs*
B A , Augustana College, M.A., Ph D University of Il no s

Karoly, Paul (1982 *Professor of Psy hology, Dire tor Clinical Training*
B A., C ty Col ege of New York Ph D , Univers ty of Rochester

Kastenbaum, Beatrice 1982) *Instru tor of Nursing*
B.S.N , University of M higan M S N , Wayne State Univers ty

Kastenbaum, Robert J (1981) *Professor of Gerontology,*
A A East Los Ange e Co lege; *Director Adult Development and Aging Studies Program*
B A Long Beach State College Ph D University of Southern California

Katzenberger, Joan N. (1984) *Instructor of Nursing*
Dip oma West Sub ban Hospital Oak Park, Ill ois, B S N Arizona State Univers ty, M S.N , Californ a State U iversity os Angeles

Katzman, Elaine Menter 1983 *Assistant Professor of Nursing*
R N B S. M S , Ph.D , Syracuse University

Kaufman, Herbert M (1973 *Profe sor of Economics*
B A State University of New Y k, Binghamton, Ph D , Pennsy van a State Un ver ty

Kaufman, Irving 1965 *Professor of Engineering*
B E Vanderb lt Unive sity, M S , Ph D Un vers ty of Il noi , rbana

Kaufman, Lucile B. 1951) *Assistant Professor Emeritus of Engineering*
B S M E M.S Un versity of Colorado, P E.

Kaufmann, William B 1968 *Ass ciate Profess of Physics*
A B M A Ph D Un versity of Cal fornia Berkeley

Kaye, David 1976 *Professor of Law*
B S , Massachus tt Institute of Techn logy M A , Harvard Unive s ty, J D , Yale Un versity

Kazmier, Leonard J 1965 *Professor of Dec sion and Inf rmation Systems*
B.A , M A , Wayne State University, Ph D , Ohio State University

Kearfott, Kimberle 984 *Assistant Professor of Engineering*
B.S , St Mary s University, M E N E U vers ty of Virgin , S D Mas husetts Institute of T chnol gy

Kearney, James R III (1968) *Asso iate Professor of History*
B A., Pomo a Col ege M A , Washington U iversity Ph D , Univers ty of W sco sin, Mad on

Keating, Thomas 1972) *Ass sistant Professor of Political Science*
B A M A , California State U versity Sacran ento, M P A. Ph D , Ind ana Un versity

Keats, Barbara W (1984) *Assistant Professor of Management*
B.A., Louisiana Tech University, M.S., Northeast Louisiana University, Ph D , Oklahoma State University

Keats, J. Bert 1984) *Associate Professor of Engineering*
B S I E , Lehigh University, M S , Ph D , Florida State University, Ph D , Oklahoma State University

Kehl, Delmar G. (1965) *Professor of English*
B A Bob Jones University, M S , University of Wisconsin, Madison, Ph.D., University of Southern California

Keim, Robert T 1979 *Associate Professor of Information Systems*
B S , M B A , Ph.D , University of Pittsburgh

Keith, Marlow F (1946 *Assistant Professor Emeritus of Technology*
B A in Ed , M A in Ed , Arizona State University

Keller, Gary 1986 *Professor of Spanish*
B.A , University of Americas, Mexico City, M A , Ph D , Columbia University, New York

Keller, Thomas 1980) *Associate Professor of General Business*
B Ed , M Ed , Ed. Spec ., Ed D., University of Toledo

Kelley, Donald G (1980 *Associate Professor of Technology;*
B S , M S Arizona State University *Chair, Department of Manufacturing Technology*

Kelly, Brian P (1986 *Assistant Professor of Architecture*
M Arch, Cornell University

Kelly, John B (1962 *Professor of Mathematics*
B.A , Columbia University, Ph D Massachusetts Institute of Technology

Kelly, Richard W (1965 *Professor of Engineering,*
B.S E., M S.E., Ph D , University of Iowa *Assistant Dean, College of Engineering and Applied Sciences*

Kelly, Rita Mae (1982) *Professor of Public Affairs and Women's Studies*
B A , University of Minnesota, M A Ph D , Indiana University

Kelly, Rob Roy (1983) *Professor of Art*
B.F.A., Minneapolis School of Art M F A Yale University

Kennedy, Thomas D. (1974) *Professor of Justice Studies*
B A , Tulane University, M.A , Ph D , Louisiana State University

Kenney, Patrick J. (1986) *Assistant Professor of Political Science*
M A , P A Ph D , University of Iowa

Kenrick, Douglas T. 1980) *Associate Professor of Psychology*
B.A , Dowling College· M.A., Ph.D , Arizona State University

Kerr, Nancy J (1968) *Professor of Education*
B S , University of Illinois, M A , Ph D , University of Houston

Kettner Peter M. (1979) *Associate Professor of Social Work; Associate Dean School of Social Work*
B A , Valparaiso University, M S.W., George Warren Brown School of Social Work, Washington University
D S W University of Southern California

Kevane, Clement J. (1956 *Professor of Physics*
B.S., Ph.D , Iowa State University

Kiesow, Milton A. (1957) *Professor Emeritus of Education*
B.S , University of Wisconsin , M A , Ph D., University of Nebraska, Lincoln

Kigin, Denis J (1958 65; 1967) *Professor of Industrial Technology, Director Summer Sessions*
B S , Mankato State University, M S , University of Wisconsin, Stout, Ed D , University of Missouri Columbia

Killen, Mary 1982) *Assistant Professor of Nursing*
B S N M S , Arizona State University, Ph D , University of Texas, Austin

Killeen, Peter R. 1968) *Professor of Psychology*
B S , Michigan State University; Ph D , Harvard University

Kim Joochul (1980 *Associate Professor of Planning*
B A University of California, Berkeley, M U P Ph D. University of Michigan

Kimler, Stephen J. (1967) *Associate Professor Emeritus of Education*
B.Ed , Milwaukee State Teachers College M Ed., Marquette University Ed D , Arizona State University

Kingsbury, Warren T (1964 *Professor Emeritus of Education*
A B Central College, Fayette, Missouri, A M , University of Missouri Ed D , New York University

Kingston, Jerry L. (1969) *Professor of Economics*
B A E , Wayne State University M S Colorado State University, Ph D Pennsylvania State University

Kinicki, Angelo J. 1982) *Assistant Professor of Management*
B B A , M B A D B A., Kent State University

Kinnier, Richard (1982 *Assistant Professor of Counselor Education*
B A , Boston College Ed M , Teachers College Columbia University Ph D , Stanford University

Kinsinger, Jack B 1982 *Professor of Chemistry, Vice President for Academic Affairs*
B S., Hiram College, M S , Cornell University, Ph D , University of Pennsylvania

Kirkman Liff, Bradford L (1981 *Associate Professor of Health Administration and Policy*
B S , M S , Carnegie Mellon University D P H University of North Carolina, Chapel Hill

Kirkpatrick, Samuel A (1984 *Professor of Political Science Dean, College of Liberal Arts and Sciences*
B S., Shippensburg State College; M A Ph D , Pennsylvania State University

Kirkwood, Craig W. (1983) *Professor of Management Science,*
S B , S M , E E , Ph D , *Chair Department of Decision and Information Systems*
Massachusetts Institute of Technology

Kistelewski, Robert V 1978 *Associate Professor of Technology*
B S.M.E M S M E University of Wisconsin Madison

Klann, Margaret L (1945 *Associate Professor Emeritus of Physical Education*
B S., University of Illinois M A , University of Northern Colorado

Kleiner, Janice E (1982) *Instructor of Nursing*
B S N California State University, Long Beach, M S.N., University of North Carolina

Kleinfeld, Gerald R. (1962) *Professor of History*
B A , New York University, M A , University of Michigan Ph D , New York University

Kliewer, Darleen 1975) *Associate Professor of Music*
B M E , Bethany College, M M Wichita State University

Klock, John W. (1960 *Professor of Engineering*
B.E , University of Southern California, M S , Ph D University of California Berkeley

Klopatek, Jeffrey M. (1981) *Associate Professor of Botany*
B S M S , University of Wisconsin Milwaukee, Ph D University of Oklahoma

Knaupp, Jonathan E (1970 *Associate Professor of Education*
B S Oregon State University, M A , Ph D , University of Illinois

Knauth, L. Paul 1979) *Professor of Geology*
B A , University of Chicago , Ph D California Institute of Technology

Kneer, Dan C 1981) *Associate Professor of Accountancy*
B S University of Evansville, M A , Ph D , University of Missouri, Columbia, C P A California, Missouri

Kniep, Willard M (1975 *Associate Professor of Education*
B S Concordia Teachers College, M A Ph D , University of Minnesota

Knight, Donald O. (1981) *Associate Professor of Engineering*
B E.E., Marquette University M S.E., Ph.D , Arizona State University

Knight, Leland W. 1978) *Associate Professor of Design*
B P A , Art Center College of Design M F A , Stanford University

Knowlton, John F (1964 *Associate Professor of Spanish*
B A Lewis and Clark College M A , Ph D University of Oregon

Knox, Robert L 1963) *Professor of Economics*
B S , M S , Oklahoma State University, Ph D , University of North Carolina

Knudsen, Frances S (1964) *Associate Professor of Nursing*
B S , University of Arizona M S , University of Colorado

Kobes, Bernard W. (1986 *Assistant Professor of Philosophy*
M A Ph D , University of California, Los Angeles

Komnenich, Pauline 1984) *Associate Professor of Nursing*
B S , Stanford Univers ty, M N , Un versitv of Washington; *Associate Dean for Research College of Nursing*
M A , Ph.D , Un versity of Arizona

Koonce, Frank W. 1978 *Assistant Professor of Music*
B M , North Carolina Schoo of the Arts M.M., Southern Methodist Un'versity

Kozacik, Dorothy Piercey 1968) *Professor Emeritus of Education*
B A , Co lege f St Francis, M A , Ariz na State U versity, Ph.D L ivers ty of Ariz na

Koz cki, Michael (1986) *Assistant Professor of Engineering*
B.S , Ph D , University of Edinburgh

Kraft, John (1986 *Profe sor of Finance, Dean C llege of Business*
B S , St Bo aventure Univers ty, M.A Ph D , University f P ttsburgh

Krahenbuhl, Gary S (1973 *Professor of Physi al Educatio,*
B S M S Northern Illinoi Un versity, *Asso iate Dean College of L beral Arts and S ien es*
Ed D., U iversity of Northern C lorado

Krause, Stephen J 1981) *Ass) iate Professor of Engineering*
B S , Northwestern Un versity M S , I i ois Institute of Techno ogy, Ph D , Un vers ty of Michigan

Kreamer, David (1986 *Assistant Pr fess r of Engineering*
B S , M S , Ph D , Unive s ty of Arizona

Kreitner, Robert J , III 1975 *Profess r of Management*
B S M B A Un versity f Nebra ka, Omaha Ph D Un versity of Nebraska, L ncol

Krinsley, David (1976) *Pr fessor of Ge logy*
Ph B , S B , S M Ph D , Un ersity of Ch cago

Kroelinger, M chael D 1980 *Asso iate Professor of Design*
B S , Unive tv of Alabama, M S , Ph D Univers ty of Tennessee

Kronengold, Eric A (19 0 *Associate Professor of Art*
B A , M A San Franc sco State University

Krueger, Janelle (984 *Professor f Nursin , Dean, College of Nursing*
Diploma, St L ke Hospital C eve and, Ohio B S , M S Ph D , U ve sity f C lorado

Krus, David J. 1975 *Pr fessor of Edu ati n Dire tor University Testing Services*
B A., M.A , Charles University Ph D , Un versity of Mi nesota

Kruse, Diane (1984) *Instru tor of Nursing*
B.S N M S , Arizona State Univers ty

Kuester, James L. 1969 *Professor of Engineering*
B.S University of Texas, Austin M E Ph D Texas A&M Un versity

Kuiper, Hendrik J. 1971 *Asso iate Professor of Mathematics*
B S , Univers ty of W sconsin, Milwaukee, M S Physics M A Math , Ph D , University of W s onsi , Madison

Kulhavy, Raymond W (1971) *Pr fessor of Education*
A.B , M A , California State Col ege, San Diego, Ph D , U versity of Il no s

Kulis, Stephen 1984 *Assistant Pr fessor of Sociology*
B A., Geor e Wa h ngton University, *Assistant Direct r, Sociology Survey Resear h Laboratory*
M A Ph D Co umbia University

Kuo, Chen Yuan (1986) *Assistant Professor of Engineering*
B.S Nationa Taiwan University M S Northwe tern Un ve ty, Ph D , Un versity of Cal fornia Berkeley

Kurth Chestine L. 1974) *Assistant Professor of Nursing*
B S N , University of Kansas, M S N , University f California, San Fran isco

Kurtz Lynn C (1967) *Associate Professor of Mathematics*
B S South Dakota S ho l f Mines and echno ogy, M.S , Ph D , University of Utah

Kyrala, Ali (1960 62, 1964 *Profess r of Physics*
B S , Massachusetts Inst tute of Techno ogy, M S., Stanford Univers ty, S M., Harvard University
D.S , Technische Hochschule Wien Austria)

Laananen, David 1983 — *Associate Professor of Engineering*
B S , Worcester Polytechnic Institute M S , Ph D., Northeastern University

Ladman Jerry R (1967 — *Professor of Economics*
B S., Ph D , Iowa State University

Laetz, Hans G (1964 — *Assistant Professor of German*
A B University of California, Berkeley A M Ph D , Stanford University

Latfitte, Bryan (1986 — *Assistant Professor of Design*
B S , University of Oregon M A , North Carolina State University

Lafford, Barbara (1980 — *Assistant Professor of Spanish*
B A , Middlebury College Vermont M A Ph D Cornell University

Lai, Richard T. 1973 — *Associate Professor of Planning*
A.B , M F A., M Arch , Princeton University, Ph D , University of Pennsylvania

Lake, Robert L (1958 — *Assistant Professor Emeritus of Mathematics*
B S South Dakota School of Mines and Technology M A , Arizona State University

Lamberts, Jacob J. 1960 — *Professor Emeritus of English*
B A , Calvin College, M A , Ph D , University of Michigan

Lamm, Robert C 1959 — *Professor of Humanities Education*
B M University of Louisville M M University of Arizona, Ph D Indiana University

LaMontagne, Lynda L (1982 — *Assistant Professor of Nursing*
A S , Los Angeles City College B S , California State University, Los Angeles
M S , D N Sc , University of California San Francisco

Landeira, Ricardo L 1962 — *Professor Emeritus of Spanish*
Bachiller Universitario , Universidad de Santiago Spain Maestro Nacional , Escuela Normal de Santiago Spain ,
Ph D , University of Colorado

Landeros, Robert (1987 — *Assistant Professor of Purchasing*
B S , Pepperdine University CA, M B A Michigan State University

Landers, Daniel M 1981 — *Professor of Physical Education*
B A , San Jose State College, M S Ph D , University of Illinois

Landers, E James (1960 — *Professor Emeritus of Zoology*
B A., M S., University of Wyoming, Ph.D , New York University

Lanier, Mary R. 1976 — *Associate Professor of Sociology*
B A , University of Chicago M A University of New Mexico, Ph D Virginia Polytechnic
Institute and State University

Lanyon, Richard I 1975 — *Professor of Psychology*
B E , University of Adelaide Australia , M A Ph D , University of Iowa

Lape, Jerry V , Lieutenant Colonel (1981 — *Assistant Professor Emeritus of Military Science*
B S U S Military Academy

LaPointe Leonard L (1984 — *Professor of Speech and Hearing Science,*
B A , Michigan State University — *Chair Department of Speech and Hearing Science*
M A , Ph D University of Colorado

Larimer John W 1969 — *Professor of Geology*
B A , M S Ph D , Lehigh University

Larish, Douglas D 1985 — *Assistant Professor of Physical Education*
B S , State University of New York Brockport, M S Ph D. University of Wisconsin Madison

Larson, George W. 1972 — *Clinical Professor of Planning*
B S L A Utah State University M S I A University of Wisconsin

Larson, Kent A , Captain 1986) — *Assistant Professor of Military Science*
B S F S , Georgetown University

Lauderdale, Pat (1981 — *Professor of Justice Studies*
B A , University of Oklahoma M A University of Texas M A , Ph D , Stanford University

Lawler, Eugene D 1967 — *Associate Professor of Technology*
B S Northern State College South Dakota M A., Arizona State University

Lawson, Anton E. (1977) *Professor of Zoology*
B.S., University of Arizona; M.A., University of Oregon; Ph.D., University of Oklahoma

Leathers, Chester R. (1957) *Associate Professor of Microbiology*
B.S., Eastern Illinois University; M.S., Ph.D., University of Michigan

Lechler, George P., III, Captain (1986) *Assistant Professor of Military Science*
B.S.C., University of Tampa; M.A., Central Michigan University

LeCroy, Craig (1984) *Assistant Professor of Social Work*
B.S.W., San Jose State University; M.S.W., Western Michigan University; Ph.D., University of Wisconsin, Madison

Lee, Idelle B. (1962) *Assistant Professor Emeritus of Education*
B.A., University of Wisconsin; M.A., Arizona State University

Lehrer, Leonard (1977) *Professor of Art; Director, School of Art*
B.F.A., Philadelphia College of Art; M.F.A., University of Pennsylvania

Leigh, Frederic A. (1979) *Assistant Professor of Journalism and Telecommunication*
B.A., University of South Dakota; M.A., University of Iowa

Lentz, Richard G. (1985) *Associate Professor of Journalism and Telecommunication*
A.B., University of North Alabama, Florence; M.A., Southern Illinois University, Carbondale; Ph.D., University of Iowa

Leonard, Donald J. (1974) *Associate Professor of General Business*
B.S., M.B.A., Nicholls State University; Ph.D., Louisiana State University

Leonard, Philip A. (1968) *Professor of Mathematics*
A.B., Boston College; M.A., Ph.D., Pennsylvania State University

Leshowitz, Barry H. (1970) *Associate Professor of Psychology*
B.S., M.A., Brooklyn College; Ph.D., City University of New York

Leshy, John D. (1980) *Professor of Law*
A.B., J.D., Harvard University

Lessard, Elizabeth C. (1969) *Professor of Dance; Chair, Department of Dance*
B.S., Georgia College; M.A., Ph.D., Texas Woman's University

Levan, Frederick D. (1965) *Associate Professor of Education*
B.S., M.Ed., Pennsylvania State University; Ed.D., Oklahoma State University

Levine, Gustav (1967) *Associate Professor of Psychology*
B.A., M.A., College of the City of New York; Ph.D., Columbia University

Lewis, Joseph Perley (1972) *Assistant Professor of General Business*
B.A., University of Arizona; J.D., University of Colorado

Lewis, Ronald G. (1981) *Professor of Social Work*
B.A., Oklahoma Baptist University; M.S.W., Our Lady of the Lake, Worden, San Antonio; Ph.D., University of Denver

Lewis, William E. (1965) *Professor of Computer Science*
B.S.E., Johns Hopkins University; *Assistant Dean, College of Engineering and Applied Sciences*
M.S., Ph.D., Northwestern University

Leyba, Raul L. (1970) *Associate Professor of Social Work*
B.A., New Mexico Western University; M.S.W., University of Denver

Lie, Cowat Yong (1985) *Assistant Professor of Social Work*
B.S.Sc., University of Singapore; M.S.W., University of Wisconsin, Milwaukee; Ph.D., University of Wisconsin, Madison

Lightfoot, Marjorie J. (1964) *Professor of English*
B.A., Brown University; M.A., Ph.D., Northwestern University

Lin, Sheng H. (1965) *Professor of Chemistry*
B.S., M.S., National Taiwan University, China); Ph.D., University of Utah

Linder, Darwyn E. (1972) *Professor of Psychology*
B.A., Macalester College; Ph.D., University of Minnesota

Linderman, Earl W. (1966) *Professor of Art*
B.S., New York State College for Teachers, Buffalo; M.Ed., Ed.D., Pennsylvania State University

Lindholm, Ernest (1971) *Associate Professor of Psychology*
B.A., University of California, Berkeley, M S , Ph D , Univers ty of Wiscons n, Madison

Lindquist, Timothy (1985) *Associate Professor of Computer Science*
B S Purdue Univers ty, M S , Ph D , Iowa State University

Lindsay, Stuart M. (1978) *Associate Professor of Physics*
B Sc , Ph D , University of Manchester, England

Lindstrom, Frederick B 1953) *Professor Emeritus of Sociology; Consultant, Department of Sociology*
A B , A M , Ph D , University of Chicago

Liskovec, Richard F (1958) *Assistant Professor of Mathematics*
B.S M.A., Kent State Univers ty

Littrell, Joseph J (1958) *Professor Emeritus of Technology*
A B Peru State Teachers College, Nebraska M A , University of Minnesota,
Ed D University of Missouri, Columbia

Liu, C H (1965) *Professor of Chemistry*
B.A , Ph D , University of Illinois

Liu, Danny D (1982) *Associate Professor of Engineering*
B.S National Taiwan Un versity, M.S , Georgia Institute of Technology, Ph D University of Southampton

Liu, Marjory Bong Ray (1973) *Associate Professor of Philosophy*
B M , Alverno College, M M , University of Southern California,
C Phil, Ph D , University of Californ a, Los Angeles

Lock, Ethan (1981) *Associate Professor of General Business*
B A , University of California, Berke ey, M B A , Arizona State University,
J D , University of North Carolina, Chapel Hill

Lockwood, Ralph G 1972) *Professor of Music*
B.M., Baldwin Wallace College M.M., New England Conservatory of Music

Logan, Earl Jr. (1963) *Professor of Engineering*
B S , M S , Texas A&M University, Ph.D , Purdue University

Lohr, Dennis E (1979) *Associate Professor of Chemistry*
B.S., Beloit College Ph D , University of North Carolina

Lombardi, Eugene P. (1957) *Professor of Music*
B Mus Ed., Westm nster College, M.A , Columbia University,
Ed S , George Peabody Co lege, D M Westminster Co lege

Losse, Deborah N (1973) *Associate Professor of French*
B A., Connecticut Col ege, M.A., Ph.D., University of North Carolina, Chapel Hill

Lounsbury, John F (1969) *Professor Emeritus of Geography*
B.S , M S , Univers ty of Illinois, Ph D , Northwestern Univers ty

Low, Stuart A. (1979) *Associate Professor of Economics*
B.S , M S , Ph D., University of Illinois

Lowe, John W (1956) *Associate Professor of Economics*
B.S , Arizona State University, M S , University of W sc nsin, Madison, Ph D., University of Florida

Lowe, Robert W. (1966) *Professor Emeritus of Romance Languages*
M A , Columbia Univers ty; Doctorat, University of Paris

Lowenthal, Gary T (1976) *Professor of Law*
A B , Harvard Co lege; J D , University of Chicago

Lu, Pao (1964) *Professor of Physics*
B S., National Taiwan University China), M S , National Tsing Hua University (China , Ph D , Iowa State University

Luchsinger, Wayne W. (1966) *Professor Emeritus of Chemistry*
B S , M S , Ph D , University of Minnesota

Luckingham, Bradford F (1971 *Professor of History*
B S , Northern Arizona Un vers ty, M.A., University of Missouri, Columbia Ph.D., University of California, Davis

Ludemann, Ruth (1984) *Professor of Nursing, Associate Dean for Academic Programs, College of Nursing*
R N., Blodgett Memorial Hospital, Grand Rapids, Michigan, B S N Teachers College Columbia University, M S N Wayne State University, Ph D , Arizona State University

Ludlow, Elizabeth A. (1972 *Assistant Professor of Nursing*
B S N University of New Mexico, M S , Arizona State University

Ludwig, Ann (1979 *Associate Professor of Dance*
B S North Dakota State University, M S , University of Kansas

Luenow, Paul F Jr. (1958 *Professor Emeritus of Spanish*
B A., M.A , University of Washington; Ph D University of New Mexico

Lukes, Eileen N. (1984 *Instructor of Nursing*
B S N University of Wisconsin, Oshkosh M S , University of Wisconsin, Milwaukee

Lundberg, Horace W. 1962 *Professor Emeritus of Social Work*
B S M S University of Utah; M S.W., University of California, Berkeley, Ph D University of Minnesota

Lundgren, Harry R (1962 *Professor of Engineering*
B S C E Purdue University, M S., Arizona State University Ph D , Oklahoma State University

Lundin, Robert F 1962 *Professor of Geology*
B A , Augustana College M S , Ph D , University of Illinois

Lusch, Robert F 1985) *Professor of Marketing*
B S., M B A niversity of Arizona, Ph.D., University of Wisconsin, Madison

Lyle, Mary G (1959 *Assistant Professor Emeritus of English*
B.A., University of Iowa, M A , University of South Dakota

Lynch, David H. 1976) *Associate Professor of General Business*
A.A , Thornton Junior College, B S., University of Illinois; M.S., Ed D , Northern Illinois University

Lytle, Robert G. 1972) *Associate Professor Emeritus of Agriculture*
B S., Western Kentucky University, M.S., Arizona State University

Maarsingh, Norma J 1964 *Associate Professor Emeritus of Physical Education*
B S M S , University of Southern California

MacEachron, Ann (1984 *Professor of Social Work*
B A , Cornell University M S W University of Pittsburgh, Ph D , Cornell University

MacKenzie, Kimberly Diane (1984) *Instructor of Nursing*
B.S.N , Arizona State University, M S , University of Arizona

MacKinnon, Stephen R. (1971 *Associate Professor of History*
B A , M A , Yale University, Ph D., University of California, Davis

Mackulak, Gerald T. (1980) *Associate Professor of Engineering*
B S I E , M S I E Ph D Purdue University

Madarasz, Richard (1984) *Assistant Professor of Computer Science*
B S., Arizona State University, M S , Ph D University of Minnesota

Maddy, Kenneth H. (1980 *Associate Professor of Agriculture*
B S Pennsylvania State University, M S University of Wisconsin Madison, Ph D., Pennsylvania State University

Magel, Donald (1978 *Associate Professor of Social Work Director of BSW Program*
A.B , Sacramento State College, M S W , University of California, Berkeley, Ph D University of Pittsburgh

Magenta, Muriel 1968) *Professor of Art*
B A , Queens College, New York, M A , M F A Ph D , Arizona State University

Magers, William D (1971) *Professor of Music*
B.A., University of California Santa Barbara, M M , D M A , University of Southern California

Maienschein, Jane 1981 *Associate Professor of Philosophy*
B A , Yale, M.A , Ph.D , Indiana University

Maisel, James 1985) *Professor of Technology*
B ENG.SC ., B E.E , Fenn College, M S E E Ohio State University

Malin, Michael C (1979 *Associate Professor of Geology*
A B , University of California Berkeley, Ph D , California Institute of Technology

Malone, Charles F 1966 *Professor of Education*
B S Emporia State Un ve ty, Kansas, M Ed , Ed D U versty of Kansas

Mamlouk, Michael S. (1984) *Asso iate Profe sor of Engineering*
B S C E , Cair Univer ity Egypt; M S C E , Ph D , Purdue Univers ty

Manera, Elizabeth S (1967) *Associate Pr fessor of Education*
B S , M A , Towson State College Ed.D Ariz na State Un vers ty

Mankin, Lawrence D (973 *Asse ciate Profe sor of Public Affairs*
B B A , City Co lege of New York, *Assistant to the President for Administration*
M A Ph.D , University of I linois

Manning, Duane (1951) *Profe sor Emeritus of Education*
B A M A , Bal State University Ed D I diana University

Manore, Melinda M. 1984) *Assistant Pr fessor of Family Res ources and Human Development*
B S , Seattle Pac fi University, M S Un versity of Oregon Ph D , Oregon State Univer ity

Maracas, George N. (1984) *Assistant Profe sor of Engineering*
B A , New York University, M E , Ph D , Corn ll University

Marcus Melvin G. 1974 *Pr fe s or of Geography*
B A University of Miam , Coral Gables M A U vers ty of Co orado, Ph D , University of Chicago

Marion, Sheila (1981) *Asso iate Professor of Dance*
B A , M.A , Univers ty of California Los Angeles

Marohnic, Charles S. 1981) *Associate Professor of Mus c Direct r of Ja"" Studies*
B A , M M , Un versity of M an i, Florida

Marsh, Paul C. 1980) *Asse ciate Professor Research Center for Env ronmental Studies*
B A , M S , University of Co nect cut, *Adjunct Asse ciate Professor of Zoology*
Ph D , University of Minnesota

Martin, John F Jr (1966) *Asso iate Professor of Anthrop logy*
B A , Be oit College, M A , Ph D , University of Chi ago

Martin, Linda J. (1980 *Associate Professor of Finance*
B A , University of Lou sv l e, M S University of Kansas, M B A D B A., Louis ana Techno og cal Un vers ty

Martin, Philip E (1983 *Assistant Professor of Phys cal Edu ation*
B S , M S., U vers ty of I l nois Urbana, Ph D., Pennsylvan a State University

Martin, Richard 1975) *Ass ciate Professor of Religious Studies*
B A University of Montana B.D , Un ve sity of Dubuque, Th M Prin eton Theological Sem nary
Ph.D., New York Univers ty

Martin, Thomas (1982 *Assistant Professor of Zoology*
B S Washington State University M S South Dakota State University Ph D , Un versity of Il n is

Martinez, Quino E 1957) *Profe sor of Spanish*
B S New Mexico Western Co eg , M A , Ge orge Peabody College, Ph D , Un ver ty of North Ca ol na

Marzke, Mary (1978) *Assistant Professor of Anthropology*
B A , Un versity of Cal fornia M A Columb a University Ph D , University of Ca fornia

Marzke, Robert F. (1969 *Ass ciate Professor of Phys cs*
A B , Princet n Univers ty, Ph D , Co umb a University

Mason, Bruce B. (1960 *Profes r f Po itical Science*
B.S , North Texas State Coll ge M A , Texas Christ an Un versity, Ph D niversty of Texas

Matheson, Alan A (1967) *Professor of Law*
B.A , M S J D , University of Utah

Matson, John H (1978 *Assistant Pr fessor of Technology*
B S n Ed , M S , Il nois State Un versity

Matt, Pamela 1980) *Instructor of Dance*
A B , Univers ty f Wash ngton, M A University of Ill n s

Matthias, Judson S (1967 *Profe sor of Engineering*
B S U S Military Academy M S , Oregon State University, Ph.D., Purdue Un versity

May, Judy 1986) *Assistant Profes r of Music*
M M The Juil ard School

Mayer, Albert J. (1968) *Professor of Sociology*
A.B., A M , Ph D , Un versity of Ch ago

Mayer, Lawrence S. (1983 *Professor of Statistics*
B.S M S , Ph D , Ohio State U niversity

Mayer, Michael (1978) *Associate Professor of Communication*
B A , M.A., Un vers ty of Wyoming, Ph D U niversity of Kansas

Mazen, S. David (1970) *Associate Professor of Counselor Education*
B A Whitworth Co lege M Ed , Eastern Washington State College, Ed D Wash ngton State University

McCarter, Joan H (1961) *Assistant Professor of Mathematics*
B S , M A , University of Arizona

McClain, Paula D (1982) *Asso iate Professor of Public Affairs*
B A , M A , Ph D , Howard U niversity

McClure, Jesse F. (1983) *Professor of Social Work, Dean, School of So ial Work*
A.B., M S W Univers ty of M chigan; Ph D , Brande s University

McCoy, Kathleen M. (19 6 *Asso iate Professor of Education*
B S , M S , Port and Stat Un vers ty, Ph D Unive sity of Oregon

McCready, Richard R 1960) *Professor Emeritus of Dec sion and Inf rmation Systems*
B.S Val ey C ty State Teache s C ol ege, M.A , Ed D , n vers ty of Northern Colorado

McDonald, John N. (1969 *Professor of Mathematics*
A B , K ngs Co ege, M S , Ph D , Rutgers, The State Univers ty

McDowell, John M (1978) *Ass ciate Pr fessor of E onomics*
B.A , M A , Ph D , U vers ty of Cal fornia Los Angeles

McEwen, Douglas R 1969 *Profe sor of Music, Director of Choirs*
B S Bow ng Green State U niversity M M , Indiana U niversity Ed D University of Northern Co o ad

McFarland, Elaine H (1973 *Associate Professor Emeritus of Health S ien e*
B A , Marietta Col ege, M N Case Western Reserve Univers ty

McGaughey, Robert W 1971 *Profess r of Zoology*
B A Augustana Co ege, M A U nivers ty of Colorado; Ph D , Bost n University

McGaw, Dick nson L. 1968) *Asso iate Professor of Political Scien e*
A.B., A M , Ph D , Ind ana Unive sity

McGinty, Tim 1983) *Ass ciate Professor of Architecture,*
B Arch , Univer ty of Kansas *Assistant Dean, College of Archite ture an l Environmental Design*
M Arch , U niversity of Penns y vania

McGowan, Patrick J. (1979) *Pr fessor of Political Science*
B A , U n versity of the South, M A Johns Hopk ns Un versity, Ph D Northwestern University

McGrath, G D 1950) *Professor Emeritus of Education*
A.B , Fi dlay College, M A Un versity of Mich gan; Ph D , University of Colorado

McHenry, Albert L. (1978) *Professor of Technology;*
B.S So thern Unive s ty, *Chair, Department of Electronics and C mputer Technology*
M S , Ph D , Arizona State University

McHugh, Kevin E. (1985) *Assistant Professor of Geography*
B S Pennsylvan a State n vers ty, M A , Arizona State U n vers ty,
Ph.D., U n versity of Ill no s at U rbana Champaign

McIntosh, Patricia G. (1983) *Assistant Professor of Architecture*
B Arch , U n versity of British C lumbia, Arch D University of Michigan

McIsaac, Marina Stock (1980 *Associate Pr fessor of Education*
B A , Pomona Col ege, M.A , Ph.D , U n versity of W sconsi

McKenzie, Patrick Bruce (1970) *Professor of Accountancy*
B S., M.S , Kan as State U n versity Ph.D. Mich gan State U vers ty, C P A , Kansas

McKlveen, John W (1974 *Professor of Engineering*
B S , U nited States Nava Academy, M E N E Ph D University of Virginia

McLeod, Lois L 1976 — *Professor of Music*
A A , Stephens Co ege

McMillan, Paul F. (1981) — *Assistant Professor of Chemistry*
B.Sc Un versity of Edinburgh, Scotland, Ph D Arizona State U n versity

McNeill, Barry W 1976) — *Assistant Professor of Engineering*
B S , M S Ph D , Stanf d Un versity

McPheters, Lee R. (1976 — *Professor of E onomics*
A B San Franci c State Un versity, Ph D , V rginia Po ytechn c Institute

McTaggart, W. Donald 197 — *Professor of Geography*
B.A , M A , University of St Andrews Scotland , Ph D , Austra an National Un versity

McWhirter, J Jeffries (1970 — *Professor of Counselor Educatior*
B A , St Mart n s Col ege M Ed , Oreg n State Un versity, M Ed , Ph D , Un vers ty of Oregon

Meissinger, Ellen Murray 1986 — *Professor of Art*
B.F A , M F A , n versity of North Carolina, Greensbo o

Meister, Arno d G 1957 — *Professor Emeritus of Phys cs*
B S , Central YMCA Col ege, Ph D , Il no s Institute of Te hnology

Melichar, Dudley W (1974 — *Assistant Pr ofessor of J ustic e Studies,*
B S., M S. in Ed , South Dakota State University — *Assistant Dean for Student Serv ices,*
Ed D , Arizona State U iversity — *College of Public Programs*

Mellon, Terry F 1984 — *Assistant Professor of Computer Science*
B S , Univers ty of Polytechnic, Ph D , U n versity of California, Irvine

Melvin, Michael (1980 — *Associate Professor of Economics*
B B A U n versity of Houst n M A San Diego State University; Ph D , Univers ty of Californ a, Los Angeles

Melvin, Nancy 1975) — *Assistant Professor of Nursing*
B S M.A , U versity of Nebraska

Mendez, Jose A (1980 — *Asso ciate Profess r of E onomics*
B A M A , University of Texas, Au tin, M A , Ph D , S uthern Methodist U n versity

Mendleson, Jack 1967) — *Asso iate Professor of Management*
B S Butler University, M B A Ind ana University D B A , Mich gan State University

Menke, Robert F 1947 — *Profe ssor Emeritus of Educ ation*
B S Oshkosh State Co ege, M A in Ed Ph.D , Northwestern University

Merbs, Charles F 1973) — *Professor of Anthropology*
B S M S , Ph D Univers ty of W sconsin, Madison

Merrill, Bruce D 1971) — *Asso iate Professor of Communication and Public Affairs*
B A , Southern Oregon Co ege, M A , Brigham Young University Ph D , University of M chigan

Metcalf, V. Alonzo 1971 — *Profe ssor of Agric ulture*
B.S M S , Univers ty of Arkansas Ph.D University of M ssouri, Columbia

Metha, Arlene (1973 — *Asso iate Professor of Education*
B A Arizo a State n ve sity M A , Ohio State Univers ty, Ph D Univers ty of Southern Californ a

Metos, Thomas H (1965 — *Professor of Educ ation,*
B S., M S., Ph.D , Univers ty of U tah — *Program C ordinator , Edu ational Admin str ation and Supervision*

Metz, John (1980 — *Asso iate Professor of Music*
B A M M , Syracus Univers ty, D M A The Jui liard Schoo

Metzger, Darryl E 1963) — *Professor of Engineering*
B S M E , M S.M.E Ph D , Stanford U nivers ty — *Chair, Department of Me hanical and Ae rospace Engineering*

Meyer, Janice Catherine (1977 — *Associate Professor of Music*
B M E. M.M.E , Un vers ty of W sconsin M M , Western M chigan D M , Northwestern U versity

Meyerson, Lee 1962) — *Professor of Psy chology*
A B , Lafayette College; A M , U niversity of California Los Ange e , Ph D., Stanford University

Michels, LeMoyne F. 1963 — *Professor Emeritus of Constr uc tion*
B.S U S M ilitary Academy

Miller, Barbara K. (1976) *Associate Professor of Nursing*
B S N , M S Ed , University of Akron, Ph D University of Texas Austin

Miller, Donald S (1981) *Associate Professor of Computer Science*
B S , Syracuse University M S , Ph D , University of Southern California

Miller, Karen A. (1984) *Associate Professor of Sociology*
B A., Univers ty of Cal fornia, Berkeley, *Director Sociology Survey Research Laboratory*
M A , Ph D Stanford Univer ity

Miller, Paul T (1947) *Professor Emeritus of Geology*
B A , Simpson College M S., Ph D , University of Iowa

Miller, Victor J. 1958) *Professor Emeritus of Agriculture*
B S , M S Ph D , University of Illino s

Miller, Warren (1954) *Professor of Political Science*
B S , M A , University of Oregon, Ph D., Maxwell School of C tizenship and Pub i Affairs, Syracuse niversity

Miller, William Edgar (1966 *Associate Professor Emeritus of Counselor Education*
B.M.E., Ed.D , University of Kansas

Miller, William H (1984) *Assistant Professor of Agriculture*
B S , M S , Ph D , Washington State University

Milner, Joe W (1967 *Professor of Journalism and Telecommunication*
B A , East Texas State Unive s ty; M A University of Ok ahoma, Ed D , University of Wyoming

Minckley, Wendell L. (1963 *Professor of Zoology*
B S , Kansas State University, M.A , University of Kansas; Ph D , University of Louisvi le

Mings, Robert C. (1971) *Associate Professor of Geography*
B.S. M A T , Indiana University; Ph D , Ohio State niversity

Minter, Marshall R Jr (1965) *Associate Professor Emeritus of Technology*
B S M E , Purdue University M S M E , University of Arizona

Misner, Robert L. (1975) *Professor of Law*
B.A , Univers ty of San Francisco, D , University of Chicago

Mitchell, Frederic F (1961) *Professor Emeritus of Education*
B A , M A , University of Arizona, Ph D Columbia University

Mittelmann, Hans Detlef (1983) *Professor of Mathematics*
Ph D , Technica Un versity, Darmstadt

Mittlelstaedt, H Fred 1987) *Assistant Professor of Accountancy*
B A., M.S , I nois State University Ph D Univers ty of I linois

Moeckel Cindy L (1987 *Assistant Professor of Accountancy*
B A , MBA Miami Univers ty, (Oxford Ohio), Ph D , University of North Carolina at Chape Hill

Moeller, Therald 1969) *Professor Emeritus of Chemistry*
B S., O egon State Co lege, Ph D , University of Wisconsin Madison

Mokwa, Michael P. (1979) *Associate Professor of Marketing*
B B A , M B A , Ph D , University of Houston

Montanari, John R (1980) *Associate Professor of Management*
B S M E , University of Dayton; M B A , Un versity of New Mexico, D B A University of Colorado

Monte, Woodrow (1979 *Associate Professor of Family Resources and Human Development*
B.S., New Mex co Institute of M n ng and Technology, M S , Ph D , Co orado State University

Montero, Darrel (1979) *Associate Professor of Social Work*
B A , Ca ifornia State University; M A , Ph D , University of California

Montiel, Miguel (1974) *Professor of Social Work, Assistant Vice President for Minority Affairs*
B S , University of Arizona, M S W , Ar zona State University D S W University of Cal fornia, Be ke ey

Moody, E. Grant (1951) *Professor Emeritus of Agriculture*
B S , Univers ty of Arizona M S , Kansas State Un versity Ph D , Purdue University

Moor, William C. (1968) *Associate Professor of Engineering*
B S , M S , Washington Univers ty, Ph D , Northwestern University

Moore, Byron C. 1968) *Professor of Education*
A B , Monmouth Col ege, M Ed Ed D., University of Arizona

Moore, Carleton B 1961) *Professor of Chemistry and Geology, Director Center for Meteorite Studies*
B S , Alfred University, Ph.D., California Institute of Technology

Moore, Elsie Gloria Jean (1981) *Associate Professor of Counselor Education*
B A , Elmhurst Col ege, M A , Ph D University of Chicago *Program Coordinator Counselor Education*

Moore, J Douglas (1969 *Associate Professor of Mathematics*
B S., M.S Idaho State Univers ty, Ph D Syracuse University

Moore, Michael (1982) *Assistant Professor of Zoology*
B A , Indiana University, M S , Ph.D., University of Washington

Moore, Patricia D. (1984) *Assistant Professor of Nursing*
B S , Loyo a University of Chicago, *Assistant Dean, Community Resources, College of Nursing*
M S Catho ic University of America, M P H D P H , Johns Hopkins University

Moore, Thomas A (1976 *Professor of Chemistry*
B A , Ph D , Texas Tech University

Moorhead, Gregory (1978) *Asso iate Professor of Management*
B S I E , M B A , Ph D , University of Houston

Moran, Dennis V (1964) *Asso iate Professor of English*
A B , Univers ty of Notre Dame; B A., M A , Oxford University, Ph D., Stanford University

Morehart, Thomas B. (1975) *Associate Professor of Finance*
B S , New Mexico State Univers ty; M S., Colorado State University, Ph D , Georgia State Un versity, C P C U.

Morgan, Miriam J (1965 *Instru tor of French*
Licence ès Lettres, University of Paris, France, M.A. French, Spanish , Arizona State Univers ty

Morgan, Owen W. 1968) *Professor of Family Resources and Human Development*
B A , Grinnell C llege M A University of Nebraska, Omaha, Ph D , University of Nebraska Lincoln

Morgan, Richard J. 1980) *Professor of Law , Associate Dean, College of Law*
B A , University of California, Berkeley D , University of Ca ifornia Los Angeles

Morgan, Thais E. 1985) *Assistant Professor of English*
B A , Smith Co lege M A Ph D , Brown Un versity

Moroney, Robert M 1981 *Professor of Social Work Director of MSW Program*
A B , M S W , Boston College M P H , Harvard Un versity, Ph.D , Brandeis University

Morris, Donald H (1962 *Professor of Anthropology*
B.A , Arizona State Un versity, M A , Ph D , University of Arizona

Morris, John P. (1968) *Professor of Law*
A.B , J D , Northwestern University

Morrison, Kenneth M (1983 *Associate Professor of Religious Studies*
B A , St Dunstan s Univers ty, M A , Ph D , Univers ty of Maine

Moulton, Gerald L (1967) *Professor of Education*
B A , Hamline University, M Ed , Ed D , University of Oregon

Mowrer, Donald E 1965) *Profes or of Speech and Hearing Science*
B.A , M.A., F orida State Un versity Ph D , Arizona State University

Moyer, Joan E. (1971 *Professor of Education Program Coordinat or Early Childh ood Education*
B S Kutztown State College, M.Ed., Pennsylvania State University Ph D University of Maryland

Muhlenkamp, Ann F. 1973) *Profe ssor of Nursing*
B.S M S , Marquette Univers ty, Ph D University of Kansas

Mulho land, Marion (1985) *Assistant Professor of Nursing*
B S State University of New York P attsburgh, M Ed , Ed D Columbia University

Mulligan, Donald E (1986 *Asso iate Professor of Construction*
B S E , M S M E , Arizona State University

Munk, Morton E (1961) *Professor of Chemistry*
B S Northwestern Un versity, M S University of Miami, Ph D , Wayne State University

Murphy, Jeffrie G. 1981) *Professor of Philosophy*
B.A., Johns Hopkins Univers ty; Ph D University of Rochester

Murphy, Juanita F. (1971 *Professor of Nursing*
A B , Oklahoma Baptist U iversity, M.S , Ph D , Case Western Reserve University

Murphy, Nina L (1924) *Professor Emeritus of Physical Education*
B S University of Arizona, M A n versity of Southern Ca fornia

Murranka, Patricia A (1977 *Associate Professor of General Business*
B A Trenton State Co lege; M A., Ride Co lege; Ed D , Utah State University

Murray, Roger N 1968) *Associate Professor of English*
B.A., B S , Moorhead State Teachers College, M A , Stanford University, Ph D , University of Iowa

Murthy, Jayathi (1984) *Assistant Professor of Engineering*
B. Tech , Indian Institute of Technology, Kanpur, India M S Washington State Univers ty,
Ph D Univers ty of Minnes ta

Musheno, Michael C (1977) *Professor of Justice Studies Public Affairs and Political Science*
B A , Lycoming Co lege; M A Ph D , American University

Mushkatel, Alvin H (1980) *Professor of Public Affairsa and P olitical Science*
B.A , Ohio State University *Director Applied Urban Research, Center for Urban Studies*
M S , Ph D , Univers ty of Oregon

Mutch, Kathleen 1984) *Assistant Professor of Computer S ience*
B S Viterbo Co lege, M S , Ph D , University of Minnesota

Muthuswamy, Ba akrishnan 1984) *Assistant Professor of Decision and Information Systems*
B Tech, awaharlal Nehru Technological University, Hyderabad M B A , University of Mysore, Mysore,
Ph D , University of South Carolina

Myers, Louis M. (1937) *Professor Emeritus of English*
B A , St Stephen s Co ege, M A., Columbia University, Ph D , University of Ca ifornia, Berkeley

Myler, Charles E Jr 1968 *Associate Profess or of Finance*
B.B A , Loyola Un versity, M B A , Harvard University, Ph D , University of Florida

Nagasawa, Richard H 1969) *Associate Professor of Sociology*
B.A , University of Hawaii, M A Ph D University of Washington

Nagrin, Daniel 1982) *Professor of Dance*
B S College of the City of New York

Nash, Leanne T. 1971) *Associate Professor of Anthropology*
B A , Univers ty of Ca ifornia Davis, M A , Ph D , University f California Berke ey

Nash, Thomas H , III (1971 *Professor of Botany*
B S , Duke Un versity M S Ph D Rutgers, The State Un vers ty

Nebeker, Helen E. 1958) *Professor of English; Associate Chair, Department of English*
B A M A , Arizona State University

Neitzel, G. Paul (1979 *Associate Professor of Engineering*
B S , Ro lins Col ege, M S , Ph D , Johns Hopkins University

Nelsen, Edward A (1975 *Professor of Edu ation*
B.S., University of W sconsin, Madis n Ph.D , Stanford University

Nelson, G. Lynn 1973 *Assistant Profess or of English*
B A , Kearney State Co ege, Ph D Univers ty of Nebraska Linco n

Nelson, Harold D. 1967) *Profess or of Engineering*
B S South Dakota Sch o of Mines and Technology, M S , Kansas State University, Ph D Arizona State niversity

Nelson, J Russell 1981 *Professor of Finance President of the University*
B A , Pacifi Un o Co lege M B A Ph D Univers ty of Ca ifornia, Los Angel s

Nelson, John C. 1967) *Associate Professor of Education*
B S M A., Arizona State Un versity, Ph.D , Geo ge Peabody Col ege

Nelson, Vanessa M (1982) *Instruc tor of Nursing*
B S N , M S Arizona State University

Nering, Evar D (1960 — *Professor of Mathematics*
B A , Indiana U n ver ity, M A , Ph D , Princeton University

Netting, Ellen (1983 — *Assistant Professor of Social Work*
B A , Duke Un versity M S W , Univers ty of Chicago, Ph D , Unive s ty of Ch cago

Ney, James W. (1969 — *Professor of English*
B A , M A Wheaton College Ph D Univers ty of Mi h gan

Nicholls, Keith 1986) — *Assistant Professor of Political Science*
B A M A , Memphis State U ve sity, Ph D , Florida State Univers ty

Nichols, Ann W. (1970 — *Associate Professor of Social Work*
A B , Stanford Unive s ty M S W , Columbia University

Nichols, Catherine G (1952) — *Professor Emeritus of Counselor Education*
A.B , M.A , Univers ty of Kentucky, Ph.D., Columbia Un versity

Nichols Casebolt, Ann 1985) — *Assistant Professor of Social Work*
B A , M S S W Ph D Univers ty of Wisconsin, Mad son

Nielsen, Michael J. (1969) — *Associate Professor of Design*
B.P D , North Caro na State University M A , Stanford Unive ty

Nielson, Gregory M (1970 — *Professor of Computer Science*
B S , M S , Ph D University of Utah

Niemeir, Wilma M (1959) — *Assistant Professor Emeritus of Mathematics*
B A New Mex co H ghlands University, M S niversity of Wyoming

Niemiera, Alexander (1986) — *Assistant Professor of Agriculture*
B S Roanoke Co le e; B S , University of Kentucky, M S , Ph D Virgin a Polytechnic nstitute and State Univers ty

Nigam, Bishan Perkash 1964) — *Professor of Physics*
B S M S Un versity of Delhi I dia ; Ph D , Univers ty of Rochester

Nigg, M. Joanne (1979 — *Associate Professor of Public Affairs,*
B A , Calif rn a State Univers ty, — *Acting Director Office of Hazards Studies*
M A Ph D Un ve sity of Californ a, L s Angeles

Nigro, Kirsten F (1986 — *Assistant Professor of Spanish*
B A , niversity of Delawa e M A Middlebury College Ph D Un versity of Ill is

Nilsen, Alleen P. 1975 — *Professor of Education, Assistant Dean Graduate College*
B A , Brigh m Y ung University, M Ed American Unive s ty Ph D U niversity of I wa

Nilsen, Don L. F. (1973 — *Professor of English*
B A Brigham Y ung University, M.A., American Un vers ty Ph D , Un versity of M chigan

Noble, Frank C (1971 — *Professor of Counselor Education*
B S , Northern Ill nois U vers ty; M Ed , Ed D , Un versity of Il n is

North, Larry W. 1980) — *Associate Professor of Nursing*
B A , Hast ngs Col ege M S , U iversity of Co o ado, Ph D , Univers ty of Arizona

Northey, William T 1959 — *Professor Emeritus of Microbiology*
B A , Univers ty f M nnes ta, M A , Ph D , University of Kansas

Northrup, John E. 1986) — *Assistant Professor of Physics*
B A., Unive sity of Colorado Bou der Ph D Univers ty of Cal f rnia, Be keley

Norton, M Scott (1973 — *Professor of Education*
B S , M E D , Ed D , University of Neb aska

O Bann n, Char es E 1964 — *Professor of Engineering, Chair Department of Civil Engineering*
B S C E U versity of New Mex co, M S Harvard Un versity, Ph D , Ok ahoma State Unive ty

O Beirne Donald E (1959 — *Profess r Emeritus of Education*
B E Whitewater State Teach e s Col ege M A , Ed D N rthwestern Univ rsity

O Brien, Carmen A. 1959 — *Associate Professor Emeritus of Education*
B.A n Ed , M A n Ed , Arizona State University

O Connor, Elinor J (1970 — *Assistant Professor Emeritus of Family Resources and Human Development*
B S , College of St. Catherine M S niversity of Iowa

O Dell, Michael A. 1980 *Associate Professor of Accountancy*
B S , M B A , Un versity of Cal fornia Los Angeles Ph.D., U versity of Texas C P A , Co orado

O Grady, E P. (1977) *Associate Professor of Computer S ience*
B S , St ou s Unive s ty, M.S . Ph.D , Univ rsity of Arizona

O Keeffe, Michael (1963 *Professor of Chemistry*
B S , Ph D Univers ty of Bristol Er gland

O Leary, T mothy J. 1978 *Associate Professor of Decision and Information S stems*
B S , Westm nster C llege, M B A , D B A , Kent State Unive sity

Odenkirk, James E. (1967) *Professor of Physical Educat on*
B S , M A , O s State University Ed D , Columbia n vers ty

Ohmart, Robert D. 1970) *Professor of Zo logy*
B S , M S New Mex co State Un vers ty, Ph D Univers ty of Arizona

Ohsfeldt, Robert L 1986 *Assistant Professor of Health Adm n stration and Po cy*
B S M A Ph D , University of Houston

Ojala, William T. (1971 *Associate Professor of English Director of Freshman English*
B S , M A , Univers ty of Mi nesota Ph D Florida State n versity

Okun, Morris A. 1976) *Pr fessor of Education, Program C ordinato , Educational Psy hology*
B A Brooklyn Co ege, M S , Ph D., Pen sylvan a Stat Un versity

Oldani, Robert W 982 *Associate Professor of Music*
B A , U ver ity of I l no s, Urbana Champaign, M A., Ph.D , Un vers ty of Michigan Ann Arbor

Olivas, Louis 1979) *Assoc ate Profess r of Gene al Business*
B.A , M A Ed D , Ariz na State Un v rsity

Oliver, Robert S. (1963 *Professor of Ar hite ture*
A B M.A., Un versity f Califo nia, Berkel y M F A Instituto Allende Mexico

Olmsted, Cameron B 1956 *Associate P fessor Emeritus of Educat on*
B A in Ed M.A n Ed., Arizo a State University Ed D , Un vers ty of Northern Col rad

Olney, Claude W. (1967) *Asso iate Professor of General Business*
B S , D , Marquette U versity

Olson, Grace P 1977 *Assistant Professor of Nu s ng*
B S N M S , Arizona State Un vers ty

Olson, Richard (1985 *Asso ciate Pr fesso of Political Science Dire tor, Internati na Pr grams*
B A Univers ty of Ca fornia, Davis, M A Universit of Ca ifornia, Los Angele Ph.D., U versity of Oreg n

Ormiston, Michael B 1984 *Assistant Profess r of E conomics*
B S Michigan State Univers ty M A Ph D Johns Hopk s Un vers ty

Osenburg, Frederic C (1946 *Professor Emeritus of English*
A B , M A , Univers ty of Michigan, Ph D Universit of I l nois

Osterhoudt, Robert G (1976 *Professor of Physica Edu ation*
B S M S , Pennsy vania State Univers ty Ph D , Unive sity of Ill no s

Ostrom, Lonnie L. 1973 *Pr fessor of Ma keting, Di ect r of Deve pment*
B B A Un versity of W scons n M S , Southern I l nois Univers ty, Ph D Universit f A aban a

Overman, G enn D. (1956) *Professo Eme itus of Marketing*
B S , Centra State Co ege M S Ok ahon a State Un versity, D B A Indiana Uni ersity

Owen, John E 964 *Professor of Soc ology*
B A Duke n v rsity A M Ph D Unive s ty of S outhern Californ a

Ozkarahan, Esen A 1982) *Associate Pr fessor of Computer S ience*
B S , M ddle Ea t Technica Universit M S New York Un ver ity Ph D Univers ty f T r nto

Packer, Mer e A (1959 *Associate Professor Eme itus of Physical Education*
B A , M A Arizona State Un versity Ed D , U versity of Northern C orad

Paddock, Char es E 1981 *Assistant Pr fessor of Information Systems*
B S , University of New Or eans M B A Ph D n versity of Houston

Padilla, Raymond V. 1982) *Associate Professor of Education, Director, Hispanic Research Center*
B A , University of Michigan, M A , Ph.D , University of California Berkeley

Pagano, Caio 1986 *Professor of Music*
B Laws, Universidade de Sao Paulo D M A Catholic University of America

Page, John B. 1969) *Professor of Physics*
B S , Ph D , University of Utah

Pai, Ammembal L (1982 *Associate Professor of Computer Science*
B E University of Mysore, M E Indian Institute of Science, Ph D Ohio State University

Paiva, Joseph C (1964 *Professor of Engineering*
B S E E University of Arizona, M S.E , Ph D University of Michigan Ann Arbor

Palmgren, Dale E 1984 *Assistant Professor of Technology*
B S , M S University of Wisconsin, Madison

Palumbo, Dennis J 1983 *Professor of Public Affairs*
M A Social Science , M A Political Science , Ph D University of Chicago

Pangrazi, Robert P 1973) *Professor of Physical Education*
B A M S , Ph D , Washington State University *Chair Department of Health and Physical Education*

Pany, Kurt J 1978 *Professor of Accountancy*
B S B A , University of Arizona, M B A , University of Minnesota Ph D , University of Illinois C P A , Arizona

Pardini, Louis J 1967 *Associate Professor of Technology*
B A , A M Idaho State University, Ed D , University of Northern Colorado

Parker, L Mayland (1955 *Professor Emeritus of Geography*
B S Brigham Young University, M S University of Utah; Ph.D , Cornell University

Parkinson Stanley R 1971 *Professor of Psychology Chair Department of Psychology*
A B University of California Berkeley, M A., Ph D , University of California Davis

Parrish, H Wayne 1967 *Assistant Professor of Education*
A B , San Diego State College M Ed Ed D , University of Oregon

Pasqualetti, Martin J 1977 *Associate Professor of Geography*
B A , University of California, Berkeley, M A Louisiana State University, Ph D University of California, Riverside

Pastin, Mark 1980 *Professor of Management: Director, Center for Private and Public Sector Ethics*
B A University of Pittsburgh A M Ph D Harvard University

Patten, Duncan T (1965 *Professor of Botany Director, Center for Environmental Studies*
B A Amherst College M S University of Massachusetts, Ph D , Duke University

Patterson Robert A. 1957 *Professor of Zoology*
B S University of Michigan Ph D Ohio State University

Paulsen, George E 1959 *Professor of History*
B A , Hobart College, M A , Rutgers The State University, Ph D Ohio State University

Peacock Simon M. 1985 *Assistant Professor of Geology*
B S , M S Massachusetts Institute of Technology, Ph D University of California, Los Angeles

Pearce Martha V 1977) *Assistant Professor of Technology*
B S , Columbia University M S , Boston University Ed D Arizona State University

Pearson, Bethyl Ann 1986) *Assistant Professor of English*
B A Albion College M Ed Wright State University M A Michigan State University

Pearson, John N (1981 *Associate Professor of Operations Management*
B S M B A , Florida Atlantic University, Ph D Georgia State University

Peck, George B (1957 *Assistant Professor of Mathematics*
B S , Arizona State University, M S , University of Illinois

Peck, Robert E. 1984) *Associate Professor of Engineering*
B S., University of California, Berkeley, M S , Ph D , University of California, Irvine

Pedrick, Willard H (1966 *Professor Emeritus of Law*
B A , Park Ridge College J D , Northwestern University

Peek, George A Jr (1964 *Professor Emeritus of Political Science*
B A M A Ph D , University of Virginia

Pei, Ker Wei (Buck 1986 *Assistant Professor of Accountancy*
B.A., National Chung Hsing University, Taipei, M.A., Southern Illinois University
Ph.D. North Texas State University

Penley, Larry E. 1985 *Professor of Management, Chair, Department of Management*
B.A., M.A. Wake Forest University, Ph.D. University of Georgia

Peranton, Daniel T. 1982 *Professor of Music*
B.M. Eastman School of Music, M.M. Catholic University of America

Perrell, Richard C. 1976 *Assistant Professor of Architecture*
B.A., Christian Brothers College

Perrin, Lester S. 1957) *Professor Emeritus of Education*
B.A., Ohio Wesleyan University, M.A., Ohio State University, Ph.D., University of North Carolina

Perritt, Norman K. (1966 *Professor of Communication*
B.S., M.A. Northwestern University, Ph.D., University of Southern California

Perry, Patsy 1985 *Assistant Professor of Nursing*
B.S., Colorado College, M.S., University of Colorado, Ph.D., University of Michigan

Perry, Ronald W. (1983 *Professor of Public Affairs*
B.Sc., M.A., Arizona State University *Director of Public Administration Program*
Ph.D. University of Washington

Peterman, Gordon G. 966) *Professor Emeritus of Construction*
B.S.C.E. University of Iowa

Peters, Kathleen A. (1967) *Assistant Professor of Family Resources and Human Development*
B.S., M.S. Kansas State University

Peterson, Edward R. (19 7) *Assistant Professor of Technology*
B.S.E.E., Fairleigh Dickinson University, M.S.E.E., Arizona State University

Peterson, John R. 1963 *Professor of Architecture*
B.A. St. Olaf College, B.Arch. University of Minnesota, M.Arch. Harvard University

Peterson, Ralph 1976) *Associate Professor of Education*
B.A., Eastern Washington State College, M.A., Ed.D., Columbia University

Petronio, Sandra G. (1986 *Assistant Professor of Communication*
B.A. State University of New York, Stony Brook, M.A., Ph.D. University of Michigan, Ann Arbor

Pettit, George R. 1964 *Professor of Chemistry, Director Cancer Research Institute*
B.S., Washington State University; M.S., Ph.D., Wayne State University

Petuskey, William T. 1983 *Associate Professor of Chemistry*
B.S., University of Utah, Sc.D. Massachusetts Institute of Technology

Pewe, Troy L. 1965) *Professor of Geology*
A.B. Augustana College, M.S., University of Iowa, Ph.D. Stanford University

Pfuhl, Erdwin H. Jr. 968 *Professor of Sociology*
A.B. Whitman College, A.M. University of Idaho, Ph.D., Washington State University

Pheanis, David C. 1975) *Associate Professor of Computer Science*
B.S., Case Western Reserve University, M.S. Ph.D. Arizona State University

Philippakis, Andrew S. (1967 *Professor of Information Systems*
B.S. Gannon College, M.B.A. Ph.D., University of Wisconsin, Madison

Phillips, Jonathan 1986) *Assistant Professor of Geography*
B.A., Virginia Polytechnic Institute and State University, M.A. University of Georgeville, North Carolina,
Ph.D., Rutgers University

Phillips, William W. (1958 *Associate Professor of History*
Ph.B. M.A., University of North Dakota, Ph.D. University of Missouri, Columbia

Pian, Richard H.J. 1959) *Professor Emeritus of Civil Engineering*
B.S.C.E. Kung Shang University, China, M.S.E. Ph.D. Cornell University

Pihlak, Madis 1986 *Assistant Professor of Planning*
B.E.S. Hon. Urban and Regional Planning, University of Waterloo, Canada
M.C.P., M.L.A. University of California, Berkeley

Pijawka, David (1982) *Assistant Professor of Public Affairs*
B.A., Brock University, M.A., Ph.D., Clark University

Pile, James (1971 *Associate Professor of Art*
B.F.A., M.F.A., University of Nebraska, Lincoln

Pimentel, David (1973 *Associate Professor of Art*
B.S.Ed., Massachusetts College of Art, M.F.A., Rochester Institute of Technology

Pinkava, Donald J. (1964) *Professor of Botany, Director, ASU Herbarium*
B.S., M.S., Ph.D., Ohio State University

Pittman, Anne M. (1952 *Professor of Physical Education*
B.S., University of Texas, M.A., New York University, Ed.D., Stanford University

Plantz, Don V. (1960) *Professor Emeritus of Economics*
B.S., M.B.A., University of Kansas, Ph.D., Indiana University

Plumer, Alice (1983) *Instructor of Nursing*
Diploma, Methodist Hospital, Indianapolis, Indiana, B.S.N., Arizona State University, M.S.N., University of Colorado

Podlich, William F. 1949 *Professor Emeritus of Education*
B.S., Maryland State Teachers College, Ph.D., University of Iowa

Poe, Jerry B. (1974 *Professor of Finance*
B.A., Drury College, M.B.A., Washington University, D.B.A., Harvard University

Polenz, G. Donald 1967 *Associate Professor Emeritus of Social Work*
B.A., Wartburg College, M.A., University of Utah, D.S.W., University of Southern California

Portnoff, Collice H. 1945) *Professor Emeritus of English*
A.B., M.A., University of California Berkeley, F.A.A.R., M.A., American Academy in Rome, Italy), Ph.D., Stanford University

Powers, Doris C. (1960 *Associate Professor Emeritus of English*
B.A., Wellesley College, M.A., Occidental College, Ph.D., University of California, Berkeley

Prather, Elizabeth 1978) *Professor of Speech and Hearing Science*
B.S., University of Nebraska; M.A., Ph.D., University of Iowa

Presson, Clark C. 1984) *Assistant Professor of Psychology*
B.A., Pomona College, M.S., Ph.D., Columbia University

Price, Thornton W. (1961) *Professor Emeritus of Engineering*
B.S., University of Illinois, M.S., Lehigh University; Ph.D., University of Illinois

Prieto, Alfonso G. (1974 *Professor of Education*
B.A., University of New Mexico; M.S.S.W., Ph.D., University of Missouri

Prisman, Eliezer Z. 1985 *Assistant Professor of Finance*
B.A., Hebrew University of Jerusalem, M.S.C., D.Sc., Technion Israel Institute of Technology

Prust, Zenas A. 1959) *Professor of Technology, Chair, Department of Industrial Technology*
B.S., University of Wisconsin, Stout, M.A., University of Minnesota, Ed.D., University of Northern Colorado

Pulaski, Charles (980 *Professor of Law*
B.A., LL.B., Yale University

Quesada, Eugene R. 1973) *Assistant Professor of Design*
B.A., Arizona State University

Quigg, John C. 981 *Associate Professor of Mathematics*
B.S., M.S., Ph.D., Drexel University

Rabiner, Donald N. 1979 *Associate Professor of Art*
B.A., Hamilton College, M.A., Ph.D., University of Kansas

Raccach, Moshe 1980 *Associate Professor of Agriculture*
B.Sc., M.S., The Hebrew University, Israel, Ph.D., Cornell University

Rader, Martha (1975 *Associate Professor of General Business*
B.S., M.B.E., University of Mississippi, Ph.D., Kansas State University

Radin, Tari (1985) *Instructor of Nursing*
B S , M S , Arizona State University, B S Ph D , University of California Davis

Radke, Judith J (1960) *Associate Professor of French*
B S , M A , University of Wisconsin Madison, Ph D University of Colorado

Radwan, A Essam (1984) *Associate Professor of Civil Engineering*
B.S C E., Cairo University Egypt, M S.C.E Ph D Purdue University

Ragan, Donal M. 1967 *Professor of Geology*
B A , Occidental College M S., University of Southern California, Ph.D. University of Washington

Rajan, Mahesh (1981) *Assistant Professor of Engineering*
B S Bangalore University, M S., Howard University, Ph D , Virginia Polytechnic Institute

Rajan, Subramaniam D. (1983) *Assistant Professor of Civil Engineering*
B Tech , (Hons Indian Institute of Technology Kharagpur, M S , Ph D , University of Iowa

Ramirez, Richard (1987) *Assistant Professor of Decision and Information Systems*
B.S University of Guadalajara, Mexico; M S , Postgraduate College, Chapingo Mexico

Randall, Virginia R (1962) *Associate Professor of English*
B A , College of New Rochelle, M A Arizona State University, Ph D Occidental College

Randhawa, Sabah (1986) *Assistant Professor of Engineering*
B S , University of Engineering and Technology, Pakistan, M S , Oregon State University, Ph D , Arizona State University

Rankin, Robert L 1971) *Associate Professor of Engineering*
B.S., University of Texas E Paso Ph D , Rice University

Rapp, James R. (1962 *Professor of Architecture*
B Arch , University of Detroit; M S. Arch , Columbia University

Rasler, Karen 1981) *Assistant Professor of Political Science*
B A , University of Florida, M A , Ph D., Florida State University

Rasmussen, David I. (1963) *Professor of Zoology*
B S , M S University of Utah; Ph D , University of Michigan

Rasmussen, Robert D. (1949) *Associate Professor Emeritus of Agriculture*
B S , Iowa State University; M S., Washington State University

Raupp, Gregory B. (1985) *Assistant Professor of Engineering*
B.S , M.S , Purdue University, Ph D , University of Wisconsin

Rausch, Jack D. 1965) *Associate Professor of Music Assistant Director School of Music*
B S , M A , Ohio State University

Rave, Wallace J. (1967) *Associate Professor of Music*
B S., Illinois State University, M M , Ph D , University of Illinois, Urbana

Rawls, William S. 1974) *Professor Emeritus of Physics*
B S , Murray State College, M.S., Tulane University, Ph D Iowa State University

Ray, William J (1968) *Professor of Education*
B.S , M.S , State University of New York, Buffalo, Ed D , Wayne State University

Reader, Mark (1967) *Associate Professor of Political Science*
A B , A M , Ph.D , University of Michigan

Reckers, M.J. Philip (1980) *Professor of Accountancy*
B S., Quincy College, M.B A , Washington University Ph.D., University of Illinois

Red Horse, John (1979) *Associate Professor of Social Work Director, Center for Indian Education*
A.B., University of the Pacific M S W University of California, Los Angeles, Ph D , University of Minnesota

Redman, Charles L. (1983) *Professor of Anthropology Chair Department of Anthropology*
B A , Harvard University; M A , Ph.D., University of Chicago

Reed, Helen (1986) *Associate Professor of Engineering*
A B , Goucher College, M S , Ph D , Virginia Polytechnic Institute and State University

Reed, William H (1968 *Associate Professor of Technology*
B S., University of Oklahoma, M.S , Arizona State University

Reeves, Henry C. (1969 — *Professor of Microbiology, Vice President for Research*
B S , Franklin and Marshall College M A , Ph D , Vanderbilt University

Regier, Philip R (1987) — *Assistant Professor of Accountancy*
B A St John's College Ph D , University of Illinois

Reich, John W. (1965) — *Professor of Psychology*
B A , M S , University of Oklahoma, Ph D , University of Colorado

Reif, William E (1970) — *Professor of Management*
B B A., M A , Ph D University of Iowa

Reiman, Etsuko Obata (1978) — *Associate Professor of Japanese*
B A , Keio University Japan, M A Seton Hall University, M A , Ph D , University of Wisconsin, Madison

Reinl, Robert L (1961 — *Professor Emeritus of Philosophy*
A B , A M Ph D , Harvard University

Reinard, John C. (1975 — *Associate Professor of Communication*
B A , M A , California State University, Fullerton, Ph D , University of Southern California

Reingen, Peter H (1982) — *Associate Professor of Marketing*
B.B A , College Cologne Germany , M B A , Ph D University of Cincinnati

Reiser, Castle O (1958) — *Professor Emeritus of Engineering*
B.S., Colorado State University Pet E., Colorado School of Mines Ph.D., University of Wisconsin, Madison

Reiss, Peter W (1976 — *Assistant Professor of General Business*
B S , J D , Marquette University M A , Arizona State University

Reneau, J. Hal (1975 — *Associate Professor of Accountancy*
B B A , M S , Texas Tech University Ph D , University of Missouri, Columbia

Reuter, Vincent G (1961 — *Professor of Operations Management*
B S C , M A Ph D , University of Iowa

Reynolds, Robert D. (1970) — *Associate Professor of Music*
B M Texas Christian University, M M , University of Texas, Austin Ph D Ohio State University

Reznikoff, Sivon C (1973 — *Professor of Design*
B A University of Southwestern Louisiana, Certificate, New York School of Interior Design
M A Louisiana State University

Rice, Glen E (1986 — *Associate Professor (Research) of Anthropology, Director, Office of Cultural Resource Management*
B A Reed College
M A , Ph D University of Washington Seattle

Rice, Margaret J (1968 — *Assistant Professor Emeritus of Communication*
A B A M University of Kansas

Rice, Ross R. (1950 — *Professor of Political Science*
M A , Ph D University of Chicago

Rice, Roy C. (1946 — *Professor Emeritus of Education*
B S , University of New Mexico M S , University of Massachusetts Ph D , University of Texas

Rice, Warren (1958 — *Professor of Engineering*
B S M S Ph D Texas A&M University

Richards, Mary L (1978 — *Assistant Professor of Nursing*
B S N M S N , De Paul University

Richardson Deane E (1970 — *Professor Emeritus of Physical Education*
B S Bradley University, M.A , Ed.D., Stanford University

Richardson, Grant L. (1953 — *Professor Emeritus of Agriculture*
B S M S , University of Arizona Ph D , Oregon State University

Richardson H D (1940 — *Professor Emeritus of Counselor Education*
Ph B , Ph M , University of Wisconsin, Ph D Northwestern University LL D , Arizona State University

Richardson Richard C Jr (1977 — *Professor of Education*
B S Castleton State College, M.S , Michigan State University; Ph D University of Texas

Rickel, Harry P (1948 — *Professor Emeritus of Music*
B M M M , University of Arizona

Rider, Wendell J (953 — *Professor Emeritus of Music*
B S Iowa State ea h rs C le e M M , Eastman School of Music, Ph D , University of Iowa

Riegelhaupt Barkin, Florence (1976 — *Associate Professor of Spanish*
B.A , State University of New York, A bany M A Ph D State Un versity of New York, Buffalo

Ringhofer, Christ an (1983 — *Associate Professor of Mathematics*
M A Ph D University of Vienna

Rios, Alberto A. 1982 — *Associate Professor of English*
B A , M F A , Univers ty of Arizona

Riske, Marc C (1985 — *Assistant Professor of Theatre*
B F A , North Dak ta State Univers ty, M F A , Wayne State University, Detroit

Risseeuw, John L. (1980) — *Associate Professor of Art*
B.S , M.A., M F A., Un versity of Wis onsin Madison

Rissing, Steven W 1981 — *Assistant Professor of Zoology*
B S Indiana Un versity, Ph D Un versity of Washington

Ritchie, Barry G. 1984 — *Assistant Professor of Physics*
B.S , Appalachian State University, M S , Ph D , University f South Carolina

Ritchie, Kathleen E. 1972 — *Instructor of Psychology*
B A , Univers ty of Arizona, M A Ariz na State Un versity

Robbins, Earl R. 1961) — *Associate Professor of Computer Science*
B.S E.E., Texas Techno ogi a Co lege M S E , Ph D , Arizona State University

Robbins, Rebecca 1985 — *Assistant Professor of Communication*
B.A , Arizona State n versity M Ed Ph D Pennsylvania State

Roberts, Caro yn 1982 — *Associate Professor f Nursing*
B Sc N , University f Western Ontario; M Ed , Teachers Co ege, Co umbia University
Ph D , Wayne State n versity

Roberts, Thomas G 1970 — *Associate Professor of Education*
B A , Wake For st University M A., Ph.D., Univers ty of N rth Caro na

Robertson, Rache D. 1981) — *Assistant Professor f Leisure Studies*
B A Univers ty of owa, M S , Un versity f Oregon, Ph D niversity of Iowa

Robinson, Daniel O 1950 — *Professor Emeritus of Agriculture*
A B , Bri ham Young University M S , Un versity of Ariz na, Ph D , Ohi State University

Robinson Helene M 1967 — *Associate Professor Emeritus of Music*
B A , Univers ty of Oregon M M Northwestern Univers ty

Robinson, Sharon E (1978 — *Associate Professor of Counselor Education*
B S M S , Univers ty f Wi ons n LaCrosse Ph.D , Ind ana Universit

Rodd, Laurel R 1975 — *Associate Professor of Japanese*
B A , DePauw Un versity M A East Tenne see State Univers ty; M A Ph D University f Mich gan

Rodman, Le ba 1984 — *Associate Professor of Mathematics*
M A , Ph D , e Av v Un vers ty

Roe, Keith B 1979 — *Associate Professor f Technology*
B S Wisconsin State C e e M A Univers ty f Michigan

Roedel, Ronald J 1981) — *Associate P fess r of Engineering*
B S E , Princet n U versity· M S Ph D , Un versity of Cal fornia Lo Angeles

Rogers, Bradley B. 1984 — *Instructor f Te hn logy*
B S , M S Montana State Un versity

Rollier, Dwayne A 1971 — *Associate Professor of Engineering*
B S M S , Oklahon a State Univers ty Ph D , Fl rida State Univers ty

Rook, Fern H 1969 — *Assistant Professor Emeritus of Te hn logy*
B A , Univers ty of C rad M A Arizona St te Univer ty

Roosa, Mark W , (1980 — *Associate Professor of Family Resources and Human Development*
B S State Univers ty M A Ph D , Mich gan State niversity

Roper, Devon J. 1966) *Associate Professor of Technology*
B S , Utah State University, M S , Arizona State University

Rosales, F. Arturo 1980) *Associate Professor of History*
B A Arizona State University, M A , Stanford University, Ph D Indiana University

Rose, Jonathan (1968) *Professor of Law*
B A , University of Pennsylvania LL.B., University of Minnesota

Rose, Seth D (1976) *Associate Professor of Chemistry*
B S University of California, Berkeley, Ph D , University of California, San Diego

Rosen, Bernice M. (1986) *Curator of Dance*
B.A., Brooklyn College M A New York University

Rosen, Seymour L (1986 *Professor of Music , Dean, College of Fine Arts*
B S , The Juilliard School

Rossi, Patrick J. (1967) *Associate Professor of Psychology*
B S , St Mary's College; M.A., San Fernando Valley State College, Ph D University of California, Riverside

Rothschild, Mary A. (1975) *Associate Professor of History*
B A., M.A , Ph.D , University of Washington

Rotolo, Douglas F., Major 1985) *Assistant Professor of Military Science*
B S., University of Arizona

Rounds, Jerald (1986) *Associate Professor of Construction*
B S C E , University of Colorado Ph.D , University of Dundee

Roux, Robert (1986) *Associate Professor of Music*
B M , Loyola University, New Orleans, M M , D M A University of Texas, Austin

Rover, R. Craig (1952) *Professor Emeritus of Education*
B.A , Upsala College, M A , St Lawrence University; Ph D Cornell University

Rowe, Kenneth L (1962 *Professor of Marketing*
B A , M A , Northern Iowa University, Ph D , Michigan State University

Rowley, James (1986) *Associate Professor of Art*
B F.A., Kansas City Art Institute, M F A , University of Utah

Roy, Asim (1983) *Assistant Professor of Management Science*
B E , Calcutta University, M S Case Western Reserve University, Ph D., University of Texas Austin

Roy, Radha R (1963) *Professor of Physics*
B Sc , M Sc Presidency College, University of Calcutta Ph.D., University of London

Roy, Ramendra P (1981) *Professor of Engineering*
B Sc , University of Calcutta, B S , University of Jadavpur,
M S , University of Washington, M.Sc , Ph.D., University of California, Berkeley

Ruch, William A (1968 *Professor of Operations Management,*
B S , M B A , D B A Indiana University *Chair Department of Purchasing Transportation, Operations*

Rucker Robert (1986 *Assistant Professor of Engineering*
B S , M S , University of Miami, M S , Ph D , Arizona State University

Ruff, Paul F. (1958) *Professor of Engineering*
B.S C E , M S C E Case Western Reserve University

Ruppé, Reynold J. 1960) *Professor Emeritus of Anthropology*
B A , University of New Mexico; Ph D , Harvard University

Russo, Nancy (1985 *Professor of Psychology, Director, Center for Women's Studies*
B.A., University of California Davis, Ph D Cornell University

Rutherford, Robert B Jr (1976) *Professor of Education*
B.S M Ed., University of Virginia Ed S Ph D , George Peabody College

Rutowski, Ronald L. 1976) *Associate Professor of Zoology*
B A , University of California Santa Cruz, Ph D , Cornell University

Ryan, Jr., Ray D. (1984) *Associate Professor of Technology*
B S., University of Wisconsin, Stout, M Ed , Ed D , University of Missouri, Columbia

Sacks, Benjamin (1963) *Professor Emeritus of History*
B.A. University of New Mexico, M.A., McGill University, Ph.D., Stanford University

Sackton, Frank J. (1976) *Professor Emeritus of Public Affairs*
B.S., University of Maryland, M.P.A., Arizona State University

Sadalla, Edward K. 1974 *Associate Professor of Psychology*
B.A., University of California, Berkeley, Ph.D., Stanford University

Sadler, William E. (1975) *Assistant Professor of Design*
B.S., M.S., Kent State University

Saeks, Richard (1983) *Professor of Engineering,*
B.S.E.E., Northwestern University, *Chair, Department of Electrical and Computer Engineering*
M.S. Colorado State University, Ph.D. Cornell University

Saldana, Johnny (1981) *Associate Professor of Theatre*
B.F.A., M.F.A., University of Texas, Austin

Salerno, Nicholas A. 1961) *Professor of English, Chair, Department of English*
B.A., M.Ed., M.A., Arizona State University, Ph.D., Stanford University

Saletta, Anne L. (1981) *Instructor of Nursing*
Diploma, St. Joseph's Infirmary, Atlanta, Georgia, B.S., M.S., Boston College

Samuels, Seymour 1981 *Associate Professor of Technology*
B.A.E., M.S.A.E., Georgia Institute of Technology

Sanders, Bevie T. 1957 *Associate Professor Emeritus of Accountancy*
B.B.A., North Texas State University, M.S., Texas A&M University, Ph.D., University of Texas,
C.P.A., Arizona and Texas

Sanderson, R. Thomas 1963) *Professor Emeritus of Chemistry*
B.S., Yale University, Ph.D., University of Chicago

Sandler, Irwin (1975) *Professor of Psychology*
B.A., Brooklyn College, Ph.D., University of Rochester

Sands, Kathleen M. 1977 *Professor of English*
B.A., Fort Wright College, M.A., Ph.D., University of Arizona

Sankey, Otto F. 1982 *Assistant Professor of Physics*
B.S., University of Missouri, St. Louis, M.S., Ph.D., Washington University

Sansone, Fred J. 1965) *Associate Professor of Mathematics*
B.S.E., M.S.E., University of Michigan, M.S., Ph.D., Rutgers, The State University

Sargent, Charles S. Jr. (1971 *Associate Professor of Geography*
B.A., University of Wyoming, M.A., Ph.D., University of California, Berkeley

Saric, William (1984 *Professor of Engineering*
B.S., Illinois Institute of Technology, M.S., University of New Mexico, Ph.D., Illinois Institute of Technology

Sater, Vernon E. (1962) *Professor of Engineering*
B.S.Ch.E., M.S.Ch.E., Ph.D., Illinois Institute of Technology

Satterlie, Richard A. (1980 *Associate Professor of Zoology*
B.A., Sonoma State University, Ph.D., University of California Santa Barbara

Satterthwaite, Lester L. Jr. 1968 *Professor of Education*
B.S., M.S., Ed.D., Indiana University

Sattler, Howard E. 1967 *Professor of Education*
B.S., M.S., Ph.D., Arizona State University

Savage, Nevin W. 1959 *Professor of Mathematics*
B.S., M.A., Pennsylvania State University, Ph.D., University of California Los Angeles

Scalise, James W. 1975 *Associate Professor of Architecture*
B.Arch., Arizona State University, M.Arch., University of California Berkeley

Schabacker, Joseph C. 1963 *Professor of Management*
B.S., Temple University, M.B.A., *Acting Academic Director, Business ASU West Campus*
Ph.D., University of California, Los Angeles

Schade, Thomas V. (1974) *Associate Professor of Justice Studies*
B.A., Hope College, M.A., Ph.D., Western Michigan University

Schall, Merri H. (1960-66; 1967) *Associate Professor of Education*
B.A., Albion College; M.S., Ed.D., Arizona State University

Schaumburg, Donald R. (1953) *Professor of Art*
B.A., in Art Ed., College of Arts and Crafts; M.F.A., Claremont Graduate School

Scheatzle, David G. (1979) *Associate Professor of Architecture*
B.S., Kent State University; M.S.E., Arizona State University

Scherer, Harold J. (1986) *Assistant Professor of Botany and Microbiology*
B.S., California Polytechnic State University, California; Ph.D., Pennsylvania State University

Schildgen, Thomas E. (1981) *Associate Professor of Technology*
B.S., Illinois State University

Schilit, Rebecca (1984) *Assistant Professor of Social Work*
A.B., M.S.W., Ph.D., University of Michigan

Schlacter, John L. (1969) *Professor of Marketing*
B.B.A., Western Reserve University; M.B.A., Ph.D., Ohio State University

Schlagenhauf, Don E. (1976) *Professor of Economics*
B.S., Marquette University; M.A., Ph.D., University of Illinois

Schluntz, Roger L. (1980) *Professor of Architecture, Director, School of Architecture*
B.Arch., University of Nebraska; M.Arch., University of California, Berkeley

Schmidt, A. fred H. (1960) *Professor Emeritus of Marketing*
B.S., University of Oklahoma; M.B.A., D.B.A., Indiana University

Schmidt, Jean M. (1966) *Professor of Microbiology*
B.A., M.S., University of Iowa; Ph.D., University of California, Berkeley

Schmidt, Peter A. (1978) *Associate Professor of Technology*
B.S., in Ed., Northern Illinois University; M.A., in Ed., Ed.D., Arizona State University

Schmidt, Randall B. (1968) *Associate Professor of Art*
B.A., Hamline University, Minnesota; M.A., University of New Mexico

Schneider, Eugene S. (1985) *Professor of Health Administration and Policy,*
B.A., C.W. Post College *Director, School of Health Administration and Policy*
Ph.D., New York University

Schoen, Robert A. (1966) *Assistant Professor of Technology*
B.S., M.S., Arizona State University *Chair, Department of Aeronautical Technology*

Schoenwetter, James (1967) *Professor of Anthropology*
A.B., University of Chicago; M.S., University of Arizona, Ph.D., Southern Illinois University

Schon, Isabel (1974) *Professor of Education*
B.S., Mankato State College; M.A., Michigan State University; Ph.D., University of Colorado

Schreier, Harold J. (1986) *Assistant Professor of Microbiology*
B.S., California Polytechnic State University; Ph.D., Pennsylvania State University

Schreiner, Susan E. (1985) *Assistant Professor of Religious Studies*
B.A., Emhurst College; M.Div., Harvard Divinity School; Ph.D., Duke University

Schroder, Dieter K. (1981) *Research Professor of Engineering*
B.S.E.E., M.S.E.E., McGill University; Ph.D., University of Illinois

Schroeder, Milton R. (1969) *Professor of Law*
B.A., Wesleyan University; J.D., University of California

Schuback, Gertrud B. (1966) *Instructor of German*
B.A., M.A., Arizona State University

Schultz, Joseph J. (1983) *Professor of Accountancy, Director, School of Accountancy*
B.S., M.B.A., Mississippi State University; Ph.D., University of Texas, Austin; C.P.A., Mississippi

Schwada, John W. (1971) *Professor Emeritus of Political Science, Past President of the University*
B.S., Northeastern Missouri State College; M.A., University of Missouri, Columbia; Ph.D., University of Texas, Austin

Schwalm, David E. (1986) *Associate Professor of English*
B.A., Carleton College; M.A., Ph.D., University of Chicago *Director, First Year English*

Schwuttke, Guenter (1983) *Professor of Engineering*
B.S., Ph.D., University of Munich, Germany

Scoular, David B. 1952) *Professor Emeritus of Music*
B.A., Texas Christian University, B M Lawrence College M A , Columbia University

Searfoss, Lyndon W. 1973) *Professor of Education Associate Dean, College of Education*
B.S , West Chester State College M A. Ph D , Syracuse University

Sebald, Hans 1963) *Professor of Sociology*
B A , Manchester College, M S , Ph D Ohio State University

Sehested, Coene R (1967 *Assistant Professor of Nursing*
B.S., University of Arkansas M S N University of Maryland

Seipp, Kenneth F. (1963) *Professor of Music*
B S , Hartwick College M M , Conservatory of Music University of Kansas City, M s Ed D , Indiana University

Selleck, Herbert H (1973 *Associate Professor Emeritus of Construction*
B S C E Iowa State University

Sen, Arunabha 1986 *Assistant Professor of Computer Science*
B.E , Jadavpur University, Ph D University of South Carolina

Senner, Wayne M (19 3) *Associate Professor of German*
B A., Portland State University, M A , University of Washington Ph.D., University of Illinois

Sensibar, Judith 1985) *Assistant Professor of English*
B A , Vassar College, M.A , Ph D University of Chicago

Seperich, George J. (19 6) *Associate Professor of Agriculture Director Division of Agriculture*
B S Loyola University, Chicago; M S , Ph D , Michigan State University

Shafer, Robert E 1966) *Professor of English Director, English Education*
B S M S , University of Wisconsin, Madison Ed D Columbia University

Shafer, Susanne M (1966 *Professor of Education*
A B Smith College, M A , Syracuse University, Ph D , University of Michigan

Shah, Jani 984 *Assistant Professor of Engineering*
B E N E D En ineering College , M S , University of Pittsburgh Ph D Ohio State University

Sharer, Jon W. (1975 *Associate Professor of Art*
B A , Roosevelt University Chicago M S Illinois Institute of Technology Ph D , Ohio State University

Shaw, Annapurna 1986) *Assistant Professor of Geography*
B A , Calcutta University M A Jawaharlal Nehru University India, Ph D niversity of Illinois

Shaw, Milton C. 1978) *Professor Emeritus of Chemical and Bio Engineering*
B S.M E , Drexel University. *and Mechanical and Aerospace Engineering*
M E Sc , S D , University of Cincinnati , Dr H C University of Louisville

Shell, Leon G 1967 *Associate Professor of Counselor Education, Dean of Student Life*
B A , University of Colorado A M Ed D University of Northern Colorado

Sheller, Don 1986 *Associate Professor of Technology*
B M E Ohio State University, M S Arizona State University

Shen, C C 1982 *Associate Professor of Engineering*
B S E E National Taiwan University, M S , State University of New York, Stony Brook Ph D , Stanford University

Sheppard, Douglas C. (1971) *Professor Emeritus of Spanish*
B A , Montana State University M A Ph D , University of Wisconsin, Madison

Sheridan, Eleanor (1973 *Assistant Professor of Nursing*
B S N , M S N Wayne State University

Sheridan, Michael F (1966 *Professor of Geology*
B A , Amherst College; M S., Ph D , Stanford University

Sherman, Thomas L 1964 *Professor of Mathematics*
B A University of California Los Angeles M S Ph D , University of Utah

Sheydavi, E. Yury 1973 *Associate Professor of Architecture*
B S.C E , University of Arizona, M S C E Arizona State University

Shin, Kwang 1983) *Assistant Professor of Engineering*
B S Seoul National University, Ph D Northwestern University

Shing, Chi Lyang (1985) *Assistant Professor of Construction*
B S , National Taiwan Institute f echnology, M.S Ph D Univers ty of Texas, A st n

Shinn, Randall A. 1978) *Associate Professor of Music*
B A , Southwestern Oklahoma State Univers ty, M M Un versity of Co orado, D M A , Un versity of Il nois

Shinn, Thelma J (1975) *Professor of English*
B.A., Central Connect cut State Co lege M A Ph D., Purd e University

Shipp, Vernon E 1966 *Assistant Professor of Art*
B S , Grand Canv n Col ege, M A , Arizona State Un vers ty

Shipper, Frank M. 1977) *Associate Professor of Management*
B S M E , West Virg n a Un v rsity M B A Ph D Un versity of Utah

Shofstall, Weldon P. 1950) *Professor Emeritus of Secondary Education*
B S. n Ed , Northeast Missouri State Teachers Col ege, M.A , Ph D , Unive sity of M ssouri

Shriver, Keith A 1982 *Assistant Professor of Accountancy*
B.S , Linf eld Co lege, M S , Arizona State Univers ty Ph D , Unive s ty of Texas, Aust , C P A Ariz na

Shrock, David L. (1974 *Professor of Transportation* Acting Associate Dean Colle e of Business
B.E E , Genera Motors Institute M B A. D B A Indiana University

Shuman, I. Gayle 1974) *Associate Professor of Justice Studies*
B S M A n Ed , Ed D , Arizona State University

Shunk, Dan L (1984 *Associate Professor of Engineering*
B S I E , M S I.E , Ph D., Purdue Univers ty

Silvaroli, Nicholas J. 1963 *Professor of Education Program Coordinator, Reading, Library Sciences*
B S. in Ed , State Un versity of New York, Fredonia, M A , State Unive s ty of New York Buffa o
Ed D , Syracuse Univers ty

Silver, Benjamin (1971 *Associate Professor of Journalism and Telecommunication*
B A , M A , University of Iowa

Simmons, Douglas J. 1963) *Assistant Professor of French*
A B , Wabash College, M A T , Harvard University
Certificat de f rancais usuel degreesupee eur; Certificat de p ononc ati n francaise, La Sorbonne France

Simon, Sheldon (1975 *Professor of Political Science Director, Center for Asian Studies*
B A University of M nnesota, M.A., Princet n Unive sity Ph D , University of M nn sota

Singhal, Avi C (1977 *Professor of Engineering*
B Sc Math Agra University, B Sc Engr B Sc Hons , St Andrews Unive sity, S t and,
S M , C E , Sc D , Massachusetts Institute of Techno ogy

Sinkov, Abraham (1964 *Professor Emeritus of Mathematics*
B S College of City of New Yo k, M S , Columbia Un versity Ph D Ge orge Washin t n University

Sirkis, Murray D (1968) *Professor of Engineering*
B S , Massachusetts Inst tute of T chnol gy, M S , Ph D , Univers ty of Ill n s Urbana

Skibo, Edward B. 1982) *Assistant Professor of Chemistry*
B.S , M S , Drexel Un versity Ph D , University of Ca ifom a, Sa Franc sco

Skinner, James S. 1982 *Professor of Physical Education*
B S , M S Ph D , Univers ty of I nois, Urbana

Skoldberg, Phyllis 1977 *Professor of Music*
B M , M M , New England C nservatory of Mus c M M E , D.M I diana Univers ty Bloomington

Smetzer, Larry R. (1986) *Associate Professor of General Business*
B S, U iversity of M ntana, M Ed , Univers ty of Nebraska, Ed D N rthern Illin is Un vers ty

Smith, A Wade 1981) *Associate Professor of Sociology*
A B , Dartmouth College, M A , Ph D , Univers ty of Ch ago

Smith, Andrew T (1978 *Associate Professor of Zoology*
A.B., Unive sity of Cal fornia, Berkeley, Ph D , University of Califo mia, Los Ange es

Smith, Arthur B Jr 1967) *Associate Professor of General Business*
B S , Hardin Simmons Univers ty M B A Ed D Un versity of Houston

Smith, Brad 1984) *Assistant Professor of Geology*
B S., Un vers ty of Wash ngton, Seatt e M A , Ph D Univers ty of Ca ifornia Berkeley

Sm th, Charles B (1964 *Professor Emeritus of General Business*
B S., Drake University, M S , New Mexico H gh ands University, Ed D , University of Northern Co orado

Smith, David B 1984) *Ass iate Professor of Accountancy*
B A Carleton College M.B A Un vers ty of Pennsy vania Ph D , Univers ty of Il ino s, C P A I l nois

Smith, David J. (1984 *Assc iate Professor of Physics, Center for Solid State Science*
B Sc , Ph D Un vers ty cf Me bourne, Australia

Smith, Georgia A F 1985) *Assistant Professor of Zoology*
B A , University f California, Santa Barbara, M P H Univers ty of M ch gan,
Ph D , Univers ty of Cal fornia, Rivers de

Smith, Ha L (1979 *Associate Professor of Mathematics*
B.A., Ph.D , Un ve s ty of Iowa

Smith, Harvey A (1977) *Professor of Mathemati s*
B S., Lehigh Univers ty, M.S , A M , Ph D , n vers ty of Pe nsy vania

Smith, Janet Kiholm (1981) *Asso iate Professor of Economics*
B.S., University of Utah M S Arizona State Univers ty, Ph D University of California Los Angeles

Smith, L. Christian (1971 *Assistant Professor of History*
B A , Union Co ege, M A Ph D , University of Illino s

Smith Lehi T 1959) *Professor of Mathematics*
B S , M A in Ed Ar zona State Univers ty, Ed.D., Stanford University

Smith Lynne (1985 *Instructor of Nursing*
B.S N , St. Olaf Co lege; M S N , University of Pennsylvania

Smith, Margo M 1963 *Associate Professor Emeritus of Music*
B M Grinne l College M A in Ed Arizona State Univers ty

Smith Marion W (1952) *Asso iate Professor of Music*
B S , in Mus Ed Cap tal Univers ty M M , American Conservatory of Music

Smith Mary Lee 1986 *Professor of Education*
B.A., M P S Ph D , Unive ty of Co orad

Smith, Ralph E. 1970) *Professor of Accountancy*
B B A Washburn University M S Ph.D U ivers ty of Kansas C P.A , Kansas

Smith, Richard L (1981) *Associate Professor of Finance, Chair, Department of Finance*
B B A Southern Methodist Un vers ty, M B.A., Washingt n Univers ty,
M.A., Ph.D., Un vers ty of Ca ifom a, Los Ange es

Smith, Richard L. (1967 *Professor of Engineering;*
B S Washi gt n University, *Chair Department of Industr a and Management Systems Engineering*
M S , Ohio State University, Ph D , Arizona State Univers ty

Smith, Ronald D (1963 *Associate Professor of History*
A B , San Diego State College, Ph D Unive s ty of Southern Ca ifom a

Smith Stanley E 197 *Associate Professor of Journalism and Telecommunication*
B A , Colgate Un ve s ty, M A , Purdue Un versity

Snow, Robert (1970 *Associate Professor of Sociology*
B S M A , Ph D , University of M nnesota

Snyder, Ernest E Jr (1958) *Professor Emeritus of Physics Science Educat on*
A B , M A Co rado State Univers ty, Ed D , New Yo k University

Snyder, Lester M Jr 1967 *Professor of Counselor Educatior*
B S M l rsville State C llege, M Ed , Western Maryland C l ege Ph D Univers ty of M chigan

So, Ronald Ming Cho (1981 *Professor of Engineering*
B Sc , University of H ng Kong M Eng M G l Univers ty; M A Ph D Princeton University

Sohie, Guy 1985) *Assistant Professor of Engineering*
Ph D , Pennsylvania State University

Somerville, Susan C 1978 *Professor of Psychology*
B A , Univers ty of New Eng and A stralia) Ph D., A stralian Nat onal University

Sommerfeld, Milton R. (1968 *Professor of Botany Chair, Department of Botany and Microbiology*
B.S Southwest Texas State College, Ph D Washington University

Sparks, Charles F., Captain (1979 *Assistant Professor Emeritus of Military Science*
B.S Oregon State University, M S , Arizona State University

Spence, John C H. 1976) *Professor of Physics*
M Sc , Ph D University of Melbourne Australia

Spinosa, Frank (1965 *Professor of Music*
B M M A , Boston University, D M A University of Illinois

Squires, Rose L (1981 *Associate Professor Emeritus of Nursing*
B S., Duquesne University; M A , Ed D , Teachers College Columbia University

St. Louis, Robert D. 1982) *Associate Professor of Management Science*
A B Rockhurst College, M S., Ph.D , Purdue University

Stadmiller, Jack E. 1963) *Associate Professor Emeritus of Engineering Communications*
B S , University of Utah M A Arizona State University

Stafford, A fred B (1958) *Professor Emeritus of Engineering*
B S E E , Carnegie Institute of Technology M A , University of Pittsburgh, Ph D University of Chicago

Stafford, Kenneth R 1957) *Professor Emeritus of Educational Psychology*
B A , M Ed Ph D University of Oklahoma

Staggs, Linda M., Major (1985 *Assistant Professor of Military Science*
B.A , Notre Dame

Stahl, Robert (1978) *Associate Professor of Education*
B A , M A Ed D , University of Florida

Stahnke, Herbert L. 1941 *Professor Emeritus of Zoology*
S.B , University of Chicago; M A., University of Arizona; Ph D , Iowa State University

Staley, Frederick A. (1970 *Associate Professor of Education*
B A , M A Western Michigan University, Ph D , Michigan State University

Staley, Thomas R 1985) *Assistant Professor of Aerospace Studies*
B S , Ohio State University, M S Troy State

Stalzer, Frank S 1955) *Associate Professor of Music*
B M Ed , University of Kansas M M Eastman School of Music

Standridge, Lanny, Colonel 1984 *Professor of Military Science*
B S., Troy State University, M S , Shippensburg State University

Stange, Jean B (1970 *Associate Professor Emeritus of Family Resources and Human Development*
B S Iowa State University, M S , University of Minnesota

Stanley, James T 1968 *Professor of Engineering*
B S , M.S Ph D , University of Illinois

Stanton, Ann M. 1980 *Professor of Law*
B A University of Minnesota, J D Ph D , Stanford University

Stark, Barbara L 1972 *Professor of Anthropology*
B A Rice University, M. Phil , Ph D Yale University

Stark, John C. 1985 *Assistant Professor of Theatre*
B S Wayne State College M F A University of Nebraska Lincoln

Starrfield, Sumner G (1972 *Professor of Physics Astronomy*
B A University of California, Berkeley; M A , Ph D., University of California Los Angeles

Steadman, Lyle B. 1971) *Assistant Professor of Anthropology*
B A , Occidental College M A , University of California, Los Angeles Ph D Australian National University

Stearns, MaryBeth 1981 *Professor of Physics*
B S University of Minnesota, Ph D., Cornell University

Steere, Caryl J 1960 *Assistant Professor Emeritus of Education*
B.A , Albion College, M A , Arizona State University

Steffl, Bernita M (1961) *Professor of Nursing*
B S N M P H University of Minnesota

Steimle, Timothy C. (1985) *Assistant Professor of Chemistry*
B S., Mich gan State University, Ph D., University of California, Santa Barbara

Steinmann, Wilbur L. (1959) *Associate Professor Emeritus of Engineering*
B S.E E , Un versity of M nnesota, M.S , University of Iowa

Stellhorn, Martin H. 1963 *Professor Emeritus of Music*
Mus B , St. Louis Institute of Music; Mus M , Northwestern Un versity Ph D , Washington University

Stengel, Jean Craig 1983) *Assistant Professor of Nursing*
B S , University of Oregon M Ed , University of M nnesota; Ph D , Arizona State Unive sity

Stephens, Nancy J. 1980) *Associate Professor of Advertising and Marketing*
B.S M.S , Univers ty of Illinois Ph.D , University of Texas Aust n

Stevenson, Harold W. (1967) *Professor Emeritus of Finance*
B S University of M nnesota, M B A , Ph D University of M chigan, C.F.A

Steverson, Norris J (1932) *Associate Professor Emeritus of Physical Education*
B A Arizona State University, M S , University of Southern California

Stewart, Donald G. (1964) *Associate Professor of Mathematics*
B A , M.S University of Utah, Ph D University of Tennessee, Knoxvil e

Stewart, Ernest I (1959 *Professor Emeritus of Health Science*
B.S., M S., Utah State University Ph D , Columb a University

Stewart, Kenneth M. 1947) *Professor Emeritus of Anthropology*
A.B., M A., Ph.D., University of California, Berkeley

Stiles, Philip G. (1969 *Professor of Agriculture*
B.S Un vers ty of Arkansas; M S., Un versity of Kentucky, Ph D , Michigan State University

Stillwell, Susan 1985 *Instru tor of Nursing*
B S Co leg of St Ter sa, M S N , University of Florida

Stock, William A 1973) *Professor of Educat on, Acting Director, Division of Psychology in Education*
B A , Blackburn College M S Ph D , Iowa State Un versity

Stocker, David Allen (1978 *Professor of Music*
B S., Concordia Teachers Col ege, M.M Ph.D , Northwestern Un versity

Stolz, Richard W (1982 *Assistant Professor of Finance*
B A , L nfield Co lege, M A , Syracuse Univers ty, Ph D , Mi higan State Univers ty

Stone, Gregory O (1986) *Assistant Professor of Psychology*
B A., Harvard University, Ph D , Univers ty of California San Diego

Stone, William J. 1967) *Professor of Physical Education*
B.S , Boston University; M S., Florida State University, Ed D., U iversity of California, Berke ey

Stoner, K. Lynn 1985) *Assistant Professor of History*
B.S , George Peabody Co lege for Teachers; M A Ph D Indiana Un versity

Stookey, John A. (1976) *Associate Professor of Political Science*
A B , M.A , Marsha l Un vers ty, Ph.D., University of Ke tucky

Stout, Minard W 1968) *Professor Emeritus of Education*
B A University of Northern Iowa M A , Ph D State University of Iowa

Stout, Robert 1978) *Professor of Education*
B A., Car eton Co lege, Northf e d, Mi n., Ph D , Un versity of Chicago

Stowe, Noel J. 1967) *Associate Professor of History,*
B A , Ph D , Univers ty of Southern Ca ifornia *Assistant Dean, Graduate College*

Strang, Eleanor L (1983) *Instructor of Nursing*
Diploma Silver Cross Hospita , B S , I l nois Wes eyan Univers ty, M S , University of M chigan

Strange, Richard E. (1974) *Professor of Music, Director of Bands*
B M E , W chita State Un versity M M E University of Col rado D M A , Boston Univers ty

Straub, Calvin C. (1961) *Professor Emeritus of Architecture*
B. Arch , Un versity of Southern Cal fornia

Strawn, Roland S (1968 *Associate Professor of Technology*
B S E E , M S E E., Un versity of I linois, Ph D Arizona State Un ve sity

Streufert, Hildegarde (1961) *Associate Professor of Design*
B S University of Minnesota, M S , Iowa State University

Strojnik, Ales (1969 *Professor of Physics*
Diplom Ing Ph D , University of Ljubljana Yugoslavia

Strom, Robert D. 1969) *Professor of Education and Family Resources and Human Development*
B.S Macalester College, M A , University of Minnesota, Ph D University of Michigan

Stuler John H (1962) *Professor of Art*
B A , M F A , Arizona State University

Stump, Edmund (19 6) *Associate Professor of Geology*
A B , Harvard University, M S , Yale University, Ph D , Ohio State University

Stumpf, Angela M (1959) *Associate Professor Emeritus of Nursing*
B S N E , Marquette University, M A , University of Chicago

Stutsman, Paul S. (1967 *Associate Professor Emeritus of Chemistry*
B.S , University of Illinois, Ph D , University of Wisconsin Madison

Stutz, Jean C. (1981) *Associate Professor of Agriculture*
B S Ursinus College M S University of Delaware Ph D , Pennsylvania State University

Sullivan, Deborah (1976 *Associate Professor of Sociology*
B S University of Massachusetts Amherst M A , University of California Irvine Ph D , Duke University

Sullivan, Howard J (1971) *Professor of Education, Program Coordinator, Educational Technology*
B S., Oregon College of Education M Ed , Ph D , University of Oregon

Sullivan, John J (1976) *Assistant Professor Emeritus of Education*
B A , Villanova University M A Ph D Arizona State University

Sundwall, Harry W. (1962 *Professor Emeritus of Education*
B S , Brigham Young University, Ph D University of California, Berkeley

Sunkett, Mark E. (1976) *Associate Professor of Music*
B M , Curtis Institute of Music M M , Temple University

Sunnafrank, Michael J (1986) *Assistant Professor of Communication*
B.A., California State University, Sacramento, M.A , Ph.D , Michigan State University

Sushka, Marie E 1984) *Professor of Finance*
B.A., Sweet Briar College, M A., Ph.D , Georgetown University

Sutton, Robert K (1986) *Assistant Professor of History*
M A , Portland State University, Ph D Washington State University

Swafford, James R (1971) *Assistant Professor of Microbiology*
B S M S , Arizona State University

Swagert, S. Laird 1971 *Professor Emeritus of Political Science*
B. in Ed., Western Illinois State Teachers College, M A , Ph D , University of Iowa

Swaim, S Daniel (1975 *Professor of Music*
B M Cincinnati College Conservatory of Music M M E Indiana University, D M A , North Texas University

Swartz, Teresa A. 1980) *Associate Professor of Marketing*
B S M B A , Clarion State College, Ph D , The Ohio State University

Sweeney, J Gray (1986) *Associate Professor of Art*
B.A., University of New Mexico, M A Ph D., Indiana University

Swigert, Diane D. (1986 *Assistant Professor of Aerospace Studies*
B A , M A Brown University, M S , University of Rhode Island

Swimmer, Alvin 1963) *Associate Professor of Mathematics*
B.S Pennsylvania State University M S , New York University Ph D , University of California, Berkeley

Swisher, Karen 1986) *Assistant Professor of Education,*
B S , M S Northern State College, *Director, Mountain States Multifunctional Resource Center*
Ed D University of North Dakota

Sylvester, Edward J. (1982) *Associate Professor of Journalism and Telecommunication*
A B , Princeton University M A , City College of New York

Szarek, Stanley R 1974) *Associate Professor of Botany*
B.S , California State University, Pomona; Ph.D , University of California, Riverside

Tambs, Lewis A. (1969 *Professor of History*
B S , Univ rsity f Ca ifom a, Berke ey, M A Ph D , Un versity of Cal fornia, Santa Barbara

Tanfield, M Jane 1986 *Assistant Professor of Architecture*
B S , Un versity College London, M Arch., Un versity of Kansas

Tate, Donald J (1958 *Professor Emeritus of General Business*
B S , Kansas State Teachers C l eLe M A , Ed D , N w York University

Tathwell, Shir ey M 979 *Instructor of Nursing*
B S , M unt St Sch la t a, M S , Univ s ty of Iowa

Taylor, Jack J. 1960 *Professor of Art*
B S in Art Ed Kutztown University, M Ed , Pennsylvania State Un versity

Taylor, Jacqueline 1984 *Professor of Nursing*
B S.N., Un vers ty of Washington, M S , University of North Carolina, Ph D Univers ty of Arizona

Taylor, Janet 1977) *Professor of Art*
B F A Cl ve and Institute of Art; M F.A , Syracuse University

Taylor, Thon as 1983) *Assistant Professor of Mathematics*
B S California State U versity Ph.D , Harvard Un versity

Taysom, E v n D. 1953 *Professor Emeritus of Agriculture*
B.S Un vers ty of Idaho M S Utah State University, Ph D , Washington State Univers ty

Tenney, Lester I. (1969 *Professor Emeritus of Finance*
B A , Univers ty of Miami M A , San Diego State Col ege, D B A , University of Southern Calif rnia

Tesón, Fernando R (1984) *Associate Professor of Law*
J D., Univers dad de Buenos Aires Argentina , LL M , Universite Libre de Bruxelles Belgi m

Teye, Victor B (1984 *Assistant Professor of Leisure Studies*
B A University of Ghana, M.A , Ph D Univers ty of Man toba

Theobald, Clarabel e (1962 *Associate Professor of Nursing*
B S , Ariz na State University, M S Un versity of Californ a, Los A ge es Ph D , Arizona State University

Thomas Keith J 1975 *Associate Professor of Education*
B S , Illino s State U versity; M A Loy la University, Ed D , University of Arizona

Thomas, M. George 1981) *Assistant Professor of Sociology*
B A , Arizona State Univers ty, M A , Ph.D , Stanford Un versity

Thomason, Leslie L 1969) *Professor Emeritus of Technology*
A B , M A , Ed D Un versity of Oklahoma

Thompson, Hamish C M 1986) *Assistant Professor of Art*
Dip oma of F ne Arts University of Cant rbury, New Zealand

Thompson, Lee P. 1955) *Professor of Engineering*
B A , Indiana Univers ty, M S , Ph D Texas A&M Univers ty; P E

Thompson, Truet B. 1959) *Professor Emeritus of Engineering*
B S , B S E E , Louis ana Polytechnic Institute, M S., Ok ahoma State Univers ty, Ph D , Northwestern University

Thomson, Jeffrey (1981 *Associate Professor of Theatre*
B.A., Rip n Col ege, M A , Univers ty of Washington M F A., Wayne State University

Thomson, Ronald G 1947) *Professor Emeritus of Physical Education*
B.S Springfield Co ege, M A , Arizona State University Ed D , University of Southern Cal fornia

Thomson, Tom R. (1961) *Professor Emeritus of Chemistry*
B A , Univers ty of Cal fornia, Berkeley M S Ph D , Kan as State University

Thorne, Anita (1983) *Instructor of Nursing*
Diploma, A egheny Genera Hosp tal B S N Ed M A University of Pittsburgh

Tice, Thomas E (1967) *Professor of Engineering*
B S E E , M S E E , Ph D , Ohio State University

Tidwell, Victor H (1971 *Professor of Accountancy*
B S., Illino s College M B A , D B A Indiana University C P A., Iowa and Arizona

Tilden, Arnold (1937 *Professor Emeritus of History*
B A , M A , DePauw University Ph D , University of Southern Californ a

Tillery, Bill W (1973) *Professor of Physics Science Education*
B S , Northeastern State College, M A , Ed D University of Northern Colorado

Tillman, Hoyt C. (1976) *Associate Professor of History*
B A , Belhaven College, M A , University of Virginia, A M , Ph D , Harvard University

Tippeconnic, John W. III 1976 *Associate Professor of Education*
B S Oklahoma State University, M A , Ph D , Pennsylvania State University

Tipton, Gary P (1969) *Assistant Professor of Chinese*
B.A , Brigham Young University; Ph D , Indiana University

Tobiason, Sarah J. (1963; 1974) *Assistant Professor of Nursing*
B.S N , Vanderbilt University, M A Columbia University

Tong, Timothy (1986) *Associate Professor of Engineering*
B S Oregon State University M S Ph D , University of California, Berkeley

Torrest, Robert S (1980 *Associate Professor of Engineering*
B S Polytechnic Institute of Brooklyn Ph D , University of Minnesota

Towe, Bruce (1984) *Associate Professor of Engineering*
B.S M.S., Ph D , Pennsylvania State University

Towill, Leslie R (1975) *Associate Professor of Botany*
B S M S , University of Wisconsin, Milwaukee, Ph D University of Michigan

Tran, Zung V. 1986 *Assistant Professor of Physical Education*
B S Clarkson University, M Ed Temple University, Ph D University of Colorado, Boulde

Trantina, Debra (1984) *Instructor of Computer Science*
B S M S , Arizona State University

Trelease, Richard N. (1971 *Professor of Botany*
B S , M S , University of Nevada, Ph D , University of Texas

rennert Robert A 1974 *Professor of History Chair Department of History*
B A , Occidental College M A Los Angeles State College Ph D , University of California Santa Barbara

Trotter, Willisam T (1987 *Professor of Mathematics Chair, Department of Mathematics*
B S. The Citadel ; M A., Ph D , University of Alabama

Tsen, Kong Tong 1984) *Assistant Professor of Physics*
B S., Fu Jen Catholic University M S , Ph D , Purdue University

Tsong, Ignatius S.T. (1981 *Professor of Physics*
B Sc , University of Leeds, M Sc Ph D., University of London Sir John Cass College

Tu, Eugenia Y 1973 *Instructor of Chinese*
B Ed , Taiwan Normal University, B A Bay or Women's College, M S , University of Arizona

Tuma, Jan J. (19 8 *Professor of Engineering*
B S , College of Engineering Prague M S Oklahoma State University, Ph D University of Colorado

Turnbow, James W (1959 *Professor Emeritus of Engineering*
B S M E , Texas Technological College, M S E M Ph D , University of Texas

Turner, Christy G., II (1966 *Professor of Anthropology*
B A , M A University of Arizona; Ph D , University of Wisconsin, Madison

Turner, Katharine C (1946 *Professor Emeritus of English*
B Ed , Illinois State Normal , M A , Ph D University of Michigan

Tyburczy, James A. (1985) *Assistant Professor of Geology*
B.A., Whitman College, Ph D , University of Oregon

Tylavsky, Daniel John 1982) *Assistant Professor of Engineering*
B.S , M S E E , Ph D Pennsylvania State University

Umberger, Emily (1982) *Assistant Professor of Art*
B A , University of Pennsylvania, M A , University of Texas , Ph D Columbia University

Umberson, George E (1977 *Professor of Music ; Director School of Music*
B.M.E , Eastern New Mexico University, M A University of Iowa, Ed D University of Northern Colorado

Underwood, Max (1985) *Assistant Professor of Architecture*
B S Un ve s ty of S uthern Californ a M Arch Princeto University

Underwood, Suzanne (1986 *Assistant Professor f Architecture*
M Ar h Prin ceton U n versity

Upchurch, Jonathan E (1982 *Asso iate Profess r of Engin eering*
B S M S U n versity of I l nois, Ph D , U n vers ty of Maryland

Uustal, Diann B. (1981 *Assistant Professor of Nursing*
B S Un vers ty of Rhode Is a d, Kingston, M S , Ed D U n vers ty f Massachusetts Amherst

Valdivieso, L Te esa (1971 *Pr ofesso of Spanish*
B A M A n Ld M A , Ph D., Arizona State U nivers ty

Valentine, Carol Ann (1975 *Asso iate Pr fessor of Commun t ation*
B A , M A., Un versity of M chigan Pl D , Pennsy vania State U nivers ty

Valentine, Kr st n B. (1976) *Professe r f Communi ation*
B S U n versity f W sconsi n, M.A , U n versity of Washington, Ph D., U n versity of Utah

Vallejo, Carlos J (1976 *Asse iate Pr ofesso of Edu atio n*
B S., Chad on Stat Teachers College, *Coordinato , Multicultural Education Pr grams*
M.A Ed D , Univers ty of Nebraska, L nc oln

Van Den Beldt, Jack R., Captain (1984) *Assistant Pr ofessor of Military Scien e*
B S , M.B A Arizona State U ver ity

Van Der Mars, Hans (1986 *Assistant Profe ssor of Phys al Educ ation*
Diploma Natu na A ademy fo Phys al Ed cation, Arnheim M S thaca Col ege, Ph D Ohio State University

Van Hook, Barry L 976 *Associate Pr fessor of General Business*
B S , Il n o s State University, M S n Ed , Ed.D , N rthern I l no s Univers ty

Van Wagenen, R. Keith (1963) *Pr ofessor of Education*
B A , Pacifi Un on Co lege; M A. in Ed Arizona State Univers ty Ph.D., U vers ty of U tah

VanderMeer, Phi p R (1985) *Assistant Pr fesse r of History*
B A , Calv n College M A , Ph D Un versity of Il n s

Varhue, Walter 1984) *Assistant Pr ofessor f Engineering*
B.S , University of Connect ut M S , Ph D., U n versity of Virg n a

Vasquez, Mary 1975 *Associate Pr ofesse r of Spanish*
B A , Florida State Un vers ty, M A Ph D U n versity of Wash n gton

Vaughan, Linda A 1982) *Ass ociate Professor of Family Resources and Human Development*
B S , U vers ty of Calif rnia, Dav s M N S , C rmel U n versity, Ph D Un versity of Ariz na

Veatch, Jeannette 1968) *Profes r Emeritus of Education*
A B , Western Michigan Un vers ty M A , Ph D , New York University

Vellenga, David B (1984 *Professor f Transportatio n*
A B , Calvin Co ege, M B A , U n v rsity of I l no s, U bana Ph D Pen ylvan a State nivers ty

Venables, John (1986 *Pr ofessor of Ph sics*
B A , Ph D n v rsity of Cambridge, E gland

Verdini, William A 976 *As ociate Professor f Management Science*
B S , Case Western Reserve U nivers ty, M B A , D B A , Kent State Univers ty

Vergis, John P. 1954) *Profe ssor Emeritus of Education*
B S , M A New Yo k U versity Ed D , U niv rsity f Southern Cal forn a

Vermaas, Willem F J. (1986 *Assistant Pr ofessor of Botany and Micr obiol gy*
Ph D Agri u tural U nivers ty, Wagen gan, Netherlands

Vernon, Mitzi (1986 *Assistant Profe ssor of Design*
B S , U n vers ty of North Carolina, Greensboro, M A , V g n a Po ytechnic Inst tute and State U n vers ty

Vestre, Norris D 1972 *Profe ssor f Psych logy*
B A , Ph D , Unive s ty f Minnes ta

Villegas, Daniel J. 1983 *Assistant Pr ofesso of Econ mics*
B A , Univers ty of S uthern Ca fornia, M S Ph D Stanford U n vers ty

Vining, David C. 1975) *Asso iate Professor of Theatre*
B.A., University of Redlands, M F A , L niversity of M nnesota

Virden, Randy J (1984 *Assistant Professor of Leisure Studies*
B S , M S , Arizona State University Ph D , Utah State University

Virgillo, Carmelo 1965) *Professor of Romanc e Lanquages*
A B., State L iversity of New York, A bany, A M , Ph D , Indiana University

Volek, Emil (1975) *Professor of Spanish*
Prom Phi , Ph D Char es University Prague Czech s ovakia

Von der Heydt, Alfred (1950 *Pr ofessor En eritus of Ger man*
D pl ma, University of Frankfurt o the Ma n Germany ; M A , Ya e University Ph D C rne l University

Voss, Howard G. 1964) *Professor of Physics*
A B , Hope Co lege, M N S Arizona State University M S , Purdue L nive s ty

Votichenko T Alexander 1956) *Assistant Prcfess r Emeritus of Philosophy*
A B , Princeton Univers ty, M A Co umb a University

Wagner, J Bruce (1977 *Pr fessc r of Chcmistr y Physic s and Mec hanic a and Aer space Engineer ing*
B S , Ph D , L niversity of V rginia

Wagner Ronald F 1962 *Professor of Art*
B S., Universit y f Wiscons n M F A., L niversity of Iowa

Walker, Bruce J (1974 *Pr ofessor of Marketing*
B A , Seatt e Un versity, M B A , D B A , L niversity of Co orado *Chair Depar tment of Marketing*

Walker, John E. (1970) *Associate Pr fessor of Education*
B A , Albion College, M A , Mich gan State Un versity Ed D , Utah State L versity

Walker, Stephen G. 1969) *Pr fessor of Political Science*
A B , Creighton University, M A , Ph D , Univers ty of Florida

Wallace, Charles E. 1958) *Professor of Engineering*
B S , Lewis and Clark Col ege, M S , Oregon State L niversity, Ph D , Stanford L n versity

Wal en, Carl J 1973) *Professor of Education*
B.A , University of Cal fornia, Santa Barba a, M A San Francisco State Co lege, Ed D , Stanford Un versity

Walsberg, Glenn E. (1978) *Associate Professor of Zoology*
B S California State University Long Beach, Ph D , L niversity of California, Los Ange es

Wamacks, Naomi W. (1968) *Associate Professor of Education;*
B A , M.A , Ed D , Arizona State University *Pr g ram Coordinator Secondary Education*

Wang, Alan P (1970 *Professor of Mathematics*
B A , Washington State University M A Ph D , University of Ca ifom a, Los Angeles

Wang, Cecelia (1971) *Pr fessor of Mathematics*
B A Immacu ate Heart Co ege, M.A , Ph D L n vers ty of California, Los Angeles

Wang, Edward Y. (1979 *Professor of Engineering*
B S , Morn ngside College M S , Purdue L nivers ty, Ph D , Tufts Un versity

Ward Jack W 1964 *Associate Professor Emeritus of Construction*
B S C E Univer ity of Idaho

Ward, James C. 1986) *Assistant Professor of Marketing*
B A , M B A , University of Minnes ta

Warnicke, Retha M 1973) *Pr fessor of History*
A B , Indiana Univers ty, M A , Ph D , Harvard L niversity

Warren, Morrison F 1968 *Professor Emer itus of Education;*
B A , M A Ed D , Arizo a State L nive s ty *Direct r of Colleg e Relations and Deve opment*

Watkins, Thomas B (1972 *Ass ciate Professor Emeritus f Technology*
B S , University of Wyoming, M.S , Arizona State L niversity

Watson, Clyde W. 1971) *Associate Professor of Art*
B F.A , Bethany College, M A , Kansas State University

Watson, George L (1969) *Associate Professor of Political Science*
B.A., Phillips University; M A. Ph D., Duke Un versity

Webb, L Dean (1978) *Professor of Education; Associate Dean College of Education*
B.A , M A.T., Ph.D , University of Florida

Weber, Sandra (1985) *Associate Professor of Construction*
B S C E , M S C E , University of Californ a, Berkeley

Weeks, Lawrence B (1983) *Clinical Professor of Law Director Civil Clinic*
A B , Harvard, J D , University of Arizona

Wegner, Artnoll L (1957) *Professor Emeritus of Physical Education*
B S., Wisconsin State College, M S., University of Wisconsin Madison, P E D , Indiana University

Weigend, Guido G (1976) *Professor of Geography*
B.S., M.S., Ph.D., University of Chicago

Weiner, Gordon M. (1968) *Assistant Professor of History*
A B , Ph D , Univers ty of Pennsylvania

Weinstein, James (1986) *Associate Professor of Law*
B.A , J D , University of Pennsylvania

Weiss, Neil A (1970) *Professor of Mathematics*
B A , M.A , Ph.D , University of California, Los Angeles

Weitz, Rose (1978) *Associate Professor of Sociology*
B A Lehman College City University of New York, M A , Ph D Yale Univers ty

Welch, H William (1967) *Professor of Engineering*
B A., DePauw University, M S , Ph.D., University of Michigan, Ann Arbor, P.E

Wells, Barrie E. (1981) *Associate Professor of Music*
B.M M M , University of the Pacif c, D M A , Univers ty of Oregon

Wells, Christine L. (1976 *Professor of Physical Education*
B S , University of Michigan, M S , Smith College, Ph D , Pennsylvania State University

Wentz, Richard E (1972) *Professor of Religious Studies*
A B , Ursinus Col ege, B D , Lancaster Theological Seminary, M Phil , Ph D , George Washington University

Weschler, Louis F. (1980) *Professor of Public Affairs*
B A , California State Univers ty, M.A., Ph.D., University of California, Los Angeles

West, Stephen G (1981) *Professor of Psychology*
B A , Cornell University, M.A., Ph.D , University of Texas

Whiffen, Marcus (1960) *Professor Emeritus of Architecture*
B A , M A , University of Cambridge

Whitam, Frederick L. (1966) *Professor of Sociology*
B A , Mi lsaps College, A M , Ph D , Indiana University

White, Harold C 1966) *Professor of Management*
B S , M S , University of Oregon Ph D , University of Florida

White, James R. (1981) *Associate Professor of Art*
B.F.A , M F A ; Ohio University

White, John P. (1963) *Professor Emeritus of Political Science*
A.B , University of Cincinnati, A M , Ph D , University of Chicago

White, Michael J. 1974) *Professor of Philosophy*
B A , Arizona State University, M A , Ph D , University of California, San Diego

Whitehurst, Harry B (1958) *Professor of Chemistry*
B A , M A , Ph D , Rice niversity

Whysong, Gary L 1974) *Associate Professor of Agriculture*
B S., M.S., Montana State University; Ph D , University of Wyoming

Wigand, Rolf T (1975) *Professor of Public Affairs*
B.B.A., M A , Texas Tech University, Ph D , Michigan State University

Wilcox, Sidney W. (1955) *Professor Emeritus of Engineering Communications*
B A , Bethany Pen el Co ege, M A , University of Oklahoma

Wild, Catherine E. (1986 — *Assistant Professor of Art*
B F A , Concordia University, Quebec, M F A University of W sconsin, Mad son

Wilkins, Wendy (1986) — *Assistant Professor of English*
B A , M A , Ph D University of Ca ifornia, Los Angeles

Wilkinson, Joseph W. 1964) — *Professor of Accountancy*
B S Carnegie Institute of Technology M B A , Stanford Univers ty, D B A , University of Oregon, P A , California

Williams, Anne 1984) — *Assistant Professor of Nursing*
B S N , Cornell University M S , University of Arizona

Williams, Frank G. (1975) — *Associate Professor of Health Administration and Policy*
B S , M A , Oregon State University, M.A , Ph D , University of Iowa

Williams, Peter (1981 — *Professor of Chemistry*
B S , Ph D , University of London King's College

Williams, Philip F. C. (1986) — *Assistant Professor of Chinese*
B A , University of Arkansas, M A , Ph D University of California, Los Angeles

Williams, Robert C. (1978) — *Associate Professor of Anthropology*
B A M A , University of Cambridge, B A , M A , Ph D , University of Michigan

Williams, Scott H. (1974 — *Associate Professor of Technology*
B S., M T., Georgia Southern College

Williamson, Madeline J (1976) — *Associate Professor of Music*
B Mus Ohio Wesleyan University, M M , Western Michigan University

Williamson, Rosemary (1986 — *Assistant Professor of Mathematics*
B S , Durham University; Ph D., Cambridge University

Willson, Loretta L. (1947) — *Assistant Professor Emeritus of Communication*
B A., University of S uth Dakota; M A , Northwestern University

Wilson, Gail Eugene (1972) — *Associate Professor of Music*
B S , Ohio State Univers ty, M M , Arizona State University

Wilson, Gloria N. (1961) — *Associate Professor of General Business*
B A., Montclair State College, M.A., Ed D , Columbia University

Wilson, Gregory P (1979 — *Assistant Professor of Construction*
B S , M S , Arizona State University

Wilson, Jeffrey R (1985 — *Assistant Professor of Statistics*
B A , University of the West Indies, M S , Ph D , Iowa State University

Wilson, L. A., II (1979) — *Associate Professor of Public Affairs, Associate Professor of Political Science; Director Center for Urban Studies*
B A., Unive sity of Nevada, Las Vegas, M A Ph D , University of Oregon

Wilson, Lee Ann (1980) — *Associate Professor of Art*
B A , Be oit Co ege, M A M Phil Ph D , Columbia University

Wilson, Lorna A (1968 — *Instructor Emeritus of French*
B Ed , Univers ty of Saskatchewan, M A , Arizona State University

Wilson, Vanessa (1986 — *Assistant Professor of Social Work*
B S , Winston Salem State University, North Car lina; M S.W , D S.W. Ohio State University Co umbus

Wilt, Glenn A Jr. (1963) — *Associate Professor of Finance*
A B., Occidental Co lege, M.B A , M ami Univers ty, Ph D , University of Mich gan C F A

Winer, Laurence H. 1983) — *Associate Professor of Law*
B A , Ph D , Boston University, J D , Yale University

Winkelman, Richard D. (1965 — *Associate Professor of Economics*
A B., So thern I linois Univers ty, A.M , Ph.D University of Illinois

Winters, Jack 1985) — *Assistant Professor of Engineering*
A B , Un ver ity of Cal fornia, San D ego, M.S , Ph D., University of California, Berkeley

Wirtz, Dorothy 1959 — *Professor Emeritus of French*
B A University of Iowa, M A Ph.D., University of Denver

Wiseman, Douglas E. (1976) — *Associate Professor of Education*
B S , M A , Eastern Michigan University, Ph.D., Un versity of Illinois

Witt, Daniel 1966) *Professor Emeritus of Theatre*
B.F.A., Art Institute of Chicago; M.A., Ph.D., University of Denver

Witt, Tom (1975 *Associate Professor of Design*
B A, M A, M F.A, Univers ty of Ca ifornia, Los Angeles

Wixted, J. Timothy 1978) *Associate Professor of Asian Languages*
B A, University of Toronto, A M, Stanford University, D Phil, Oxford University

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 *Associate Professor of Psychology*
B A, Vassar College M S, Ph D, Rutgers, The State University

Wolf, Donald J 1969) *Associate Professor of Political Science*
B.A., M A, Gonzaga University; S.T M, University of Santa Clara, Ph D Georgetown University

Wolf, George H. (1986 *Assistant Professor of Chemistry*
B A, University of California, San Diego, M S, Ph D, University of California, Berkeley

Wolf, Robert Lee (1985) *Professor of Design Chair, Department of Design*
B.S Design, Southern Illinois University, M.A Interior Design, University of Missouri,
ert. Konstindustriskolan, Goteborg Sweden

Wollam, Owen A. (1964) *Associate Professor of French*
B A M A, Montana State University, Ph D University of Washington

Wong, Paul (1979 *Professor of Social Work*
B A., M.A, Ph.D., University of California, Berkeley

Wood, Billy G. 1977 *Associate Professor of Technology*
A.B, University of California, B S in Ed., Eastern Illinois University; M S, University of Arizona

Wood, Byard D. (1970) *Professor of Engineering*
B.S M E, M.S M E., Utah State University, Ph.D., University of Minnesota

Wood, Harry (1954 *Professor Emeritus of Art*
B.A., M A., University of Wisconsin, Madison, B A, Ph D, Ohio State University

Wood, Steven D. 1975) *Professor of Decision and Information Systems*
B.S M.A, California State University, San Diego, *Associate Dean College of Business*
Ph D, University of Wisconsin, Madison

Woodhill, Marvin C 1966) *Professor of Computer Science*
B S M S, Ph D, Iowa State University

Wooding, Robert R. (1971 *Associate Professor Emeritus of Construction*
B S U S Naval Academy; B C E, M C E, Rensselaer Polytechnic Institute

Woodman, Natalie J 1969) *Associate Professor of Social Work*
B A Washington Square College of New York University, M.S S. Smith College School of Social Work

Woods, Roosevelt Jr. 1965) *Professor of Art*
B S M A n Ed, Arizona State University

Wooldridge, Charles B. (1959) *Associate Professor Emeritus of Engineering*
A B, B S, University of Kentucky M S Ph D, Purdue University

Wooldridge, Mary C (1959 *Assistant Professor Emeritus of Family Resources and Human Development*
B S, M S University of Kentucky Ph.D Purdue University

Woolf, Charles M. (1961 63; 1964 *Professor of Zoology*
B S., M S., University of Utah, Ph D, University of California, Berkeley

Woolverton, Michael W 1981) *Associate Professor of Agriculture*
B S, M B A, Kansas State University Ph D University of Missouri, Columbia

Wootten, William W (1959 *Associate Professor of History*
B A, University of Chicago M A University of Iowa, Ph D, University of Minnesota

Wootton, Richard T 1964) *Professor of Education*
B S, M S, Ed D, University of Utah

Wrase, Jeffrey M 1986 *Assistant Professor of Economics*
M A University of Wisconsin, Milwaukee ABD, Brown University

Wrenn, C. Gilbert (1965) *Professor Emeritus of Counselor Education*
A B , Willamette University M A Ph D Stanford Univers ty; LL.D , Willamette University

Wright, M. Lin (1973) *Professor of Theatre Chair Department of Theatre*
B A M A , Ph D University of Minnesota

Wu, HoFu (1984) *Assistant Professor of Architecture*
B Arch , Tankang Un vers ty, Taiwar , M Ar h , University of Illinois

Wulk, Ned W (1957) *Assistant Pr fessor Emeritus of Physical Education*
B S , Wisconsin State University M Ed , Xav er Un versity

Wurster, Stanley R 1971) *Assc ciate Professor of Education*
B.S., Lock Haven State College M S , Elmira College Ed D , New Mexico State Un versity

Wurzell, Carol A. (1965) *Assistant Professor of Nursing*
B S Chico State Col ege, M S , University of Maryland

Wyckoff, Susan 1979) *Professor of Physics Astronomy*
B A , Mount Holyoke College Ph D Case Westen Reserve

Wyndelts, Robert 19 4 *Asso iate Professor of Accountancy*
B B A M P A Georgia State U niversity; Ph D U nivers ty of Georgia, C P.A., Georgia Arizona

Wytko, Joseph R (1975) *Associate Pr fessor of Music*
B M E , West V rginia Un versity; M M , D.M , Northwestern University

Yale, Francis G (1952) *Associate Profess r Emeritus f Physics Science Education*
A B , M.A , Univers ty of Northern Colorado Ed D , Columbia Univers ty

Yamamoto, Kaoru (1972) *Professor of Counselor Education*
B S , University of Tokyo, M A Ph D , Un versity of Minnesota

Yao, Lun Shin 1981) *Professor of Engineering*
B S E , Cheng Kung niversity, M S , Unive ty of Texas; Ph D , University of California, Berkeley

Yeater, James W (1958) *Professor of Theatre*
B.A , Baker Univers ty, M A , Universit f Washington, Ph.D. University of Illinois

Yeh, Der Yun (1985) *Assistant Professor of Computer Science*
B S , M S , National Chiao Tung University, Ph D Northwestern Univers ty

Young, Dennis L. (1975) *Pr fess r of Mathematics*
B S , St Louis Un vers ty; M S , Ph.D , Purdue University

Young, Hewitt H. (1967) *Professor of Engineering*
B S M E , M S I E , Case Institute of Techno ogy, Ph D., Arizona Stat Un versity

Young, Joseph E 1979) *Associate Professor of Art*
B A , Ca fornia State C l ege, M A , University of Californ a, Los Ange es

Young, Otis E. Jr (1963) *Professor of History*
A.B., A M , Ph.D., Indiana University

Young, Paul H 1981 *Associate Professor of Technology*
B S E E , M S E E San Jose State U n versity

Youngblood, Robert L. (1972) *Associate Professor of Political Science*
B.A., W llamette University, M.A., Univer ty of Hawai , Ph D Unive sity of Michigan

Yuen, George U. (1957) *Pr fessor of Chemistry*
B S Arizona State Un versity; Ph D , University of Utah

Zacher, Robert V. (1947) *Professor Emeritus of Advertising*
B S in B A , M S B A , Un versity of Alaba a

Zaniewski, John 1986 *Assistant Professor of Engineering*
B S C E , M S C E , Ph D Univers ty of Texas, Aust

Zaslow, Bertram (1956 *Professor of Chemistry*
B A , Cornell Univers ty, M S , University of M nnesota; Ph D Iowa State U niversity

Zatz, Marjorie S (1982 *Assistant Professor of Justice Studies*
B A , U niversity of Massachusetts, M A Ph D , I diana University

Zautra, Alex (1976) *Asso iate Professor of Psychology*
B A , Antioch Co lege, M S , Ph D University of Utah

Zimmer, Carl R. (1959) *Asso iate Professor of Engineering*
B S E E , Cornell University, M S E E , Ph D , Syracuse Univers ty

Zornow, Ruth A. (1970 *Professor of Nursing*
B S Case Western Reserve Un'versity, M Ed , Ed D , Columbia University

Zsohar, Helen (1982 *Assistant Professor of Nursing*
B.S N , M.S N University of Texas; Ph D , Arizona State Un versity

Zucker, Stanley H (1975) *Professor of Education*
B A , State Univers ty of New Yo k, Stony Brook, M S , Hofstra Univers ty,
Ph D., University of Missouri Co umbia

Zwiebel, Imre (1979 *Professor of Engineering, Chair, Department of Chemical and Bio Engineering*
B S , Un versity of Mi higan, M S , Ph D , Yale University

Zygas, K Paul (1984 *Assistant Professor of Architecture*
A B , M Arch , Harvard University Ph D , Corne l Univers ty

ASU West Campus Resident Faculty

Burt, Barbara J.(1986) *Assistant Professor of Political Science*
B.A , Ph D , Un versity of Calitorn a, Riverside

Cardenas, Lupe 1986) *Assistant Professor of Spanish*
B A , M A , Ph D , Arizona State University

Eribes, Richard A. (1976) *Assistant Vice President for Planning and Facilities Development,*
B. Arch., M Arch., Ph D , University of Southern Califfornia *ASU West, Professor of Architectur*

Felder, B. Dell (1985 *Dean of Faculty, ASU West, Professor of Education*
B S , M.S , Ph D , University of Texas, Austin

Gundersen, Dennis F. (1986) *Assistant Professor of Communication*
B A Bow ing Green State University M A , Arizona State University; Ph D , University of Texas, Austin

Haas, Nancy S (1986) *Assistant Professor of Instructional Design*
B A , M Ed , Ph D , Arizona State University

Haladyna, Thomas M (1986) *Associate Professor of Educational Research and Measurement*
B.A., Ill nois State Univers ty, M A , San Jose State University, Ph D Arizona State University

Iverson, Peter (1986) *Associate Professor of History*
B A., Carleton Col ege, M A , Ph D , University of Wisconsin Madison

Knopf, Richard C (1986) *Associate Professor of Leisure Studies*
B A., M A , University of Minnesota, Ph.D., Colorado State University

McSheffrey, Gerald R. (1982) *Vice President, ASU West, Professor of Architecture*
Dipl Arch , University Col ege, London, Dipl C D. Edinburgh University

Metz, Elayne R 1986) *Assistant Professor of Music*
B A Ed , Temple University; M M., Ed D , Arizona State University

Nolen, Susan B. (1986) *Assistant Professor of Learning Theory*
B.A , Port and State University M Ed , Lewis and Clark College, Ph D , Purdue Univers ity

Novak, Gayle J. 1986) *Visiting Assistant Professor of Art*
B.F A , M F A , Arizona State Univers ty

Pyne, Stephen J (1986 *Associate Professor of History*
B A , Stanford, M A , Ph D., Un versity of Texas, Austin

Russell, Pau E (1967) *Academic Director (Acting), Applied Sciences, Engineering and Technology,*
B.S E.E , B S M E., New Mexico A & M University, *Professor of Engineering*
M S E E , Ph D , Un versity of W sconsin Madison; P E

Shirreffs, Janet H (1977) *Academic Director Act ng), Arts and Sciences,*
B S , Ithaca Col ege, M S Syracuse Univers ty, *Associate Professor of Health Science*
Ph D , Texas Woman s Univers ty

Smith, Jack (1986) *Professor of Engineering*
B S E E , M S E E , Ph D Universitv of Arizona

Svoboda, William S 1969) *Academic Director Actin') Education and Human Services*
B S M S Ed D , Universitv of Kansa. *Professor of Education*

Wi liams, Dudley A 1986 *Le turer in Communication*
B A , University of Maryla d M A n versitv f Hawai , Ph D , Univers ty ot Ohio

Wilson Daniel 1986 *Asso iate Profess r of Engineering*
B S Drexe Univers tv M S E Ph D Arizo a State Univers ty

Associated Faculty

INTERCOLLEGIATE ATHLET CS

Brock, James L 19 l *Instr t or Head Baseball Coach*
B A M A Ed D Arizona State U ve ty

Douglas Bobby E. '9 4) *Lecturer Wrestling Coa h*
B S Ok ahoma State Univ rs tv, M A , A zo a State n ve sitv

Little wood, Marv 96 *Assistant Pr fes o , Softball Coa h*
B S Miami U ve ity M S , U vers ty f C l ado

Robinson, Don R. 1966 *Instr t r of Sports Ps c iology Gymnasti s C ach*
B A niversity of Northern Co orado, M S Ea tern New Mexic Un ver ity

Robison, Ray C 1967 *Instr uc tor Assistant Trainer*
B S M rningside C lege, M S , Ind ana U ve s ty

Youn°, Troy L 1971 *Instruc tor Head Trainer*
B S Fort Hays State College M S , Indiana Universitv

V S T NG PROFESSORS

Bilimoria, Karl D. 1987 *Visiting Assistant Pr ofessor of Engineering*
B I ch Kanpur India, M S , Ph D Vir n a Polvte hnic Institute and State U versitv

Bishop Jan G. 1984 *V isiting Instruc tor of Physic al Educ ation*
B.S Ursinus Co le e. M S , Indiana Univers ty

Dess, Gregory G 1986 *Visiting A so iate Pr ofessor of Management*
B I E Georgia I s it te f Tec no ogv, M B A , Geo a State Univers ty Ph D , Universitv of Wash ngton Seattle

Eick, Harry A. (1986 *Visiting Re ear h Pr ofessor of Chemistry*
Ph D Universitv f Iowa

Ferguson, Kenneth G (1986) *Visiting As istant Professor of Philosophy*
M A Ph.D., Unive s ty f R cheste

Granger, Percy 1986 *Vis iting Lec turer of Theatre*
B A., Harva d Col e e

Hacker, Thomas O. (1986 *Distingu shed V isiting Professor of Architecture*
M A ch , Univers tv of Pennsy vania

Herald, Cherry L 1986 *V i iting Asso iate Professor of Can er Research Institute*
Pl D Arizona State U versity

Hunt Blanche Sherman 1985 *V isiting Assistant Professor of Education*
B S , State U versity f Nev York Buffalo M A Ph D , Arizona State U versitv

Islam, Obaidul 1980 *V isiting Pr fessor of Engineering*
B S M E , Univers tv f Dacca M S. Texa A&M U versity; Ph.D., A zona State Un vers ty

Kim, Kyu Yung (1986 *Visiting Assistant Professor of Finance*
B B A M B.A Seoul Nat onal n ve s ty, Ph D , University of Pennsy vania

Knight, George P (1986) *V isiting Associate Profes or of Psychology*
B A , Macalester Col ege, M A , Ph D. Un ve s ty of Ca fornia, Rivers de

Lessner, Richard (1983) *Visiting Assistant Professor of Religious Studies*
B.A., Pacific Christian, M Div , Southern Baptist Theological Seminar Ph D , Baylor University

Martinez Teson, Maria Teresa (1986) *Visiting Lecturer of Foreign Languages*
J D in Law, University of Buenos Aires, Argent na

McBrien, Edward F (1986) *Visiting Associate Professor of Electroni s and Computer Technology*
B.S.E , Fenn College; M.S.E E Cleveland State University

Morgan, Deborah H (1985) *Visiting Instructor of Physical Education*
B.A., B S , Andrews University M S George Wil iams College

Morris, Megan L. (1985) *Visiting Instructor of Theatre*
B.F.A , Univers ty of Southern Mississippi, Hattiesburg, M A , Arizona State University

Musgrave, Ted R (1985 *Visiting Assistant Professor of Chemistry*
Ph D , University of Colorado

Myers, Barton (1986) *Distinguished Visiting Professor of Architecture*
M Arch , University of Pennsylvania

Nelson, Edwin S (1983) *Visiting Assistant Professor of Religious Studies*
B A , Platte Valley Bib e Col ege, M A , Gordon Conwe l Theologica Seminary, Ph D Boston University

Predock, Antoine (1980) *Distinguished Visiting Professor of Ar hite ture*
M Arch Columbia University

Rache, Robert H. (1986) *Distinguished Visiting Professor of Economics*
B.A., Yale University, M.A., Ph D., University of Michigan

Saddler, Ivan R. (1984) *Visiting Assistant Profess or of Technology*
B S E E , University of Texas, E Paso

Scoccia, Danny (1986) *Visiting Assistant Professor of Philosophy*
Ph D., University of California, San Diego

Seely, Gilbert (1986) *Visiting Resear h Professor of Chemistry*
B.A , Harvard University, Ph D , University of California Berke ey

Sheorey, Rekha S (1984) *Visiting Assistant Professor of Chemistry*
B.S , Northern Illinois University; M A , Ph.D , Columbia University

Spritzer, Ralph S. 1986) *Visiting Professor of Law*
B S , LL B , Columbia University

Sutton, John C. (1986) *Visiting Assistant Professor of Technology*
B A , Indiana University, M A , University of Central Arkansas, Ph D , University of Tennessee

Vandenberg, Edward (1983) *Visiting Research Professor of Chemistry*
M.E , Stevens Institute of Technology

Wiggins, Harry B. (1986) *Visiting Instructor of Management*
B S., University of Vermont; M B.A , Harvard Graduate School of Business Administration

Willenberg, George K. (1980) *Visiting Assistant Professor of Chemistry*
Ph.D , Arizona State University

Wilson, Patricia Mills (1986) *Assistant Professor Visiting of Family Resources and*
B S , M Ed , Iowa State University, Ph.D , Oklahoma State University *Human Development*

Woodward, Mark R (1985) *Visiting Assistant Professor of Religious Studies*
B.A., M A , Ph.D., University of Illinois

LECTURERS

Alexander, James (1984) *Lecturer of Public Affairs*
B.A., University of Missouri; M.B A., Arizona State University

Allison, Jenene J. (1986) *Lecturer of Foreign Languages*
B.A , University of California, San Diego, M.A., Ph.D., Yale University

Cacheris, Helen J. (1982) *Adjunct Lecturer of Family Resources and Human Development*
B.S , Carnegie Mellon University, Dietetic Internship,
John Hopkins University, University of Arizona, Arizona State University

Carlson, Ron (1986 *Lecturer Invitational of English*
B.A., M A , University of Utah

Counts, Richard (1985 *Lecturer of Public Affairs*
A B , Williams Col e J.D., Univers ty of Chicago

Curtis, Marie A. (1984) *Lecturer of Communication*
B A , Texas T ch Un versity, M A , Adams State C ll ege, Ed.D , Univers ty of Arizona

DesJardin, Margaret E. (1949 *Le turer Emeritus of Dance*

Driggs, Ken 1984 *Lecturer of Public Affairs*
B A , M S Brigham Youn Universty

Ferrall, J. Eleanor (1969) *Lecturer of Public Affairs*
A B , Heidelberg C l ge, M A Arizona State University

Gerbert, Elaine 1981 *Lecturer of Japanese*
B A , Un versity of Ca ifornia, Berkel y, M A , University of Ch cago

Gibbs, Christine (1980) *Lecturer of Public Affairs*
B A , University of Ariz na M P A , Arizona State University

Heiser, Mary Lee 1981) *Lecturer of Sociology*
B S Tennessee Techno gical n versity, M A Marsha Un versity

Horw tch, Arnold M (1974 *Le turer of Humanities*
Ph B , Un versity of Chicago M A , Arizona State U iversity, M.S , Lowel Techno og cal Inst tute

Ikegami, Kazukuni (1981) *Lecturer of Architecture*
B S E , Osaka Institute of Technology, M Arch , University of Texas Aust n

Ingraham, Leonard W 1973) *Lecturer Emeritus of Education*
B S City College of City Univers ty, M A , Ed D , Teachers Co le e, Co umbia Univers ty

Jamieson, Bill Jr 1980 *Lecturer of Publi Affairs*
B.A , University of Arizo a, M.S , Georgia State Univers ty

Landrith, David 1984) *Lecturer of Public Affairs*
B A , Arizona State Un versity M P A Harvard University

Lapidus, Jayne W. (1982) *Adjunct Lecturer of Family Resources and Human Development*
B S , State Un vers ty of New York, Oneonta, M S , Arizona State Univers ty

Lea, John H (1980 *Lecturer of Management*
B S M B A , Arizona State University

Luey, Beth (1980) *Senior Lecturer of History Director Historical Editing and Publishing*
B A , Radcl ffe Co lege, A M , Harvard Un versity

Manion, Patrick W 1980) *Lecturer of Public Affairs*
B A , M P A , Arizona State Un versity

Martinelli, Phyllis C. 1984 *Le turer of Sociology*
B A , San Jose State Univers ty, M A San Francisco State Univers ty, Ph D , Arizona State Un versity

Milstein, Stanley R (1974 *Lecturer of Zoology*
B A , City Col ege New York, M A , M D , University of Iowa

Twist, Steve 1980) *Lecturer of Public Affairs*
B A , J D , A z na State Univers ty

Williams, Dudley A (1982 *Lecturer of Communication*
B A , University of Mary and, M.A , Univ rsity of Hawaii, Ph D , Oh o Univers ty

ADJUNCT AND OTHER FACULTY

Ayres, James E. 1982) *Adjunct Instructor of Anthropology*
B A Fresno State University M.A , University of Ariz na

Breunig, Robert G. (1982 *Adjun t Assistant Professor of Anthropology*
B A Indiana University Bloon ngton, Ph D , Univers ty of Kansas, Lawrence

Canby, William C , Jr. (1967) *Adjunct Professor of Law*
A B., Yale University; LL B , Un versity of Minn sota

Cheung, Susanna (1979) *Adjunct Lecturer of Family Resources and Human Development*
B S Univers ty of Wa h ngton, M A , Ariz na State University

Close, Richard A. 1985) *Adjunct Professor of Architecture*
M. A ch, Un versity of Wis onsin, Mi waukee

Coke, F Van Deren (1983 *Adjunct Professor of Art*
B A Univers ty of Kentucky, M F A Indiana Univers ty

Conaway, Mary Ellen 1985) *Adjunct Assistant Professor of Anthropology*
B A , University of Cal fornia, Riverside; M.A , n versity of Wiscons , M lwaukee,
Ph.D., Un versity of Pittsburgh

Costilow, Ralph N 1982) *Adjunct Professor of Microbiology*
B A West Virgin a Univers ty, M S , North Carol na State College; Ph D , Mich gan State Co l e

Cox, Jerry R (1984) *Adjunct Associate Professor of Agriculture*
B S., M.S New Mexico State Univers ty, Ph D , U vers ty of Wyoming

Dahlberg, Albert A. 1981) *Adjunct Professor of Anthropology*
B S , Loyola University Ch cago; D D S , Loyo a University, Chicago

Daspit, C Phill p (1981) *Adjun t Ass ciate Professor of Speech and Hearing S ience*
B S M D , Louis ana State Unive s ty

DeBano, Leonard F 1983) *Adjunct Associate Professor of Agri ulture*
B S Co orado State Univers ty, M S U tah State Univers ty, Ph D , niversity of California Berkeley

Dockstader, Frederick J 1983) *Adjunct Professor of Art*
A.B , M.A., Northern Arizona Univ rsity, Ph.D., Western Reserve University

Dover, C. J (1982) *Ad unct Pr fessor of Communication*
B.A , Kent State Univers ty, M A , Western Reserve Un versity

Downs, Catherine A (1983 *Faculty Associate of Clinical Laboratory Sciences*
B S , Arizona State Un versity, M A , Central Michigan University

Doyel, David E (1985) *Adjunct Associate Profe sor of Anthropology*
B A , University of Arizona; M A Ph D , Ca ifom a State University, Ch co

Dragos, Stephen G. (1984) *Adjun t Professor of Archite ture*
B. Arch , University of Notre Dame

Euler, Robert C (1983) *Adjunct Professor of Anthropology*
B.A , M A., Northern Arizona Un versity, Ph.D., U n vers ty of New Mexico

Ford, George H. (1981) *Adjunct Assistant Professor of Anthropology*
A.B., Kansas University, Lawrence; M A Ph D Arizona State Univers ty

Foster, Joyce (1972 *Adjunct Professor of Zo ology*
B A., M A , DePauw University Ph D , Arizona State Univers ty

Gemmill, Robert M (1983 *Adjunct Professor of Zoology*
B.A., University of Connecticut, Ph D., Cornell University

Glick, Paul C (1982) *Adjunct Professor of Sociology*
B A , Depauw Univers ty, M A , Ph D , University of W sconsin, Madison

Gustavson, Carl R (1983) *Adjunct Associate Professor of Center for Environmental Studies*
B S , M S , Ph D , University of Utah

Hecht, Frederick (1978) *Adjunct Professor of Zo ology*
B A. Dartmouth Col ege, M D , U niversity of Rochester

Hendrix, Donald Louis (1981) *Adjunct Associate Professor of Botany, Plant Physiologist,*
B A., Central Wash ngton Univers ty, *U S.D A Agricultural Research Service*
M S University of Wash ngton, Ph D , Washington State Univers ty

Hild, Nicholas R (1984) *Adjunct Associate Professor of Center for Environmental Studies*
B S , M S University of Iowa, Ph D , Union Graduate School

Horton, Paul B. 1983) *Adjunct Pr fessor of Sociology*
B.A , Kent State University, Ph D , Ohio State University

Hueffner, Debra (1986) *Faculty Associate, Audiology Supervisor of Speech and Hearing S ience*
B S , University of Iowa; M S , University of Arizona

Hunt, Chester L (1985 *Adjunct Professor of Sociology*
A B , Nebraska Wesleyan Un ve sity, M A Washington Univers ty, St L u s, Ph D , University of Nebraska, Linco n

Idso, Sherwood B. 1984) *Adjunct Pr fess r of Botany; Research Physicist, U S D S Agricultural Research Service*
B S M.S Ph D , Un versity of Minnesota

Johnson, Randall A (1984 *Ad unct Assc ciate Pr fessor of Agriculture*
B S Ca iforn a State Pclytechn c Univers ty, Pom na, M S , Ph D , Univers ty of Missouri, Colun bia

Johnston, Hubert (1986 *Co rdinator cf Rese rch and Services Projects in Social Work*
B S Cheyney State Co eg', M A , Central M chigan Univers ty, Ph D Corne l versity

Kehrer, Laura 1982) *Faculty Ass ciate of Nursing*
B S Alvcrno College, M S Arizona State Un versity

Kenney, Kathryn W 1979) *A tjunct Le turer of Speech and Hearing Science, Clinical Supervisor Speech and Hearing Clinic*
B S M.S Arizona State U ivers ty

K merer, Karen 1976 *Faculty Associate of Education*
B A , Ca iforn a State Univ rsity M A Ed D Ariz > a State Univ rs ty

Kiss nger, Leonard S 1982 *Adjunct Pr fessor of Phys s*
B S St L s Unive s ty, M S , Ph D ndiana Un versity

Koff, Theodore H. 1982) *Ad unct Assistant Professor of Social Work*
M S , Colunb a Univers ty, Ed D , University of Arizona

LaSota, John A Jr (1972 *Adjunct Profe ssor cf Law*
LL B , Un ver ty of Arizona

Lee, Sherv l (1979 *Ad unct Lecturer of Famil Resc urces and Human Development*
B S M P H Un versity of Ca ifc a at Be keley

Maresca, Robert L 1977) *Adjunct Associate Pr fessor f Speech and Hearing Science*
B S Ya e Univer ty, M D A ba y Medical

Marsh, Paul C 1981 *Adjunct Assistant Pr fessor of Zo logy*
B A , M S., Unive s ty of Connecti ut, Ph D , University of M nnesc ta

Mass, Diana 1974) *Faculty Ass ciate of Clinical Laboratory Sciences*
B S Un versity of Texas A st n, M S , Central Michigan Un versity

Maxwe l, Kenneth L (1984 *Ad un t Profe ssor of Political Science*
B A , Denisen Univers ty, M Div , Colgate Rochester Divinity Schoo , Ph D , Yale Univers ty

McCaw, Barbara K 1978) *Adjunct Professor of Zoology*
B A , M A , Stanford Un versity Ph D , University of Oreg n

Meneses, Eloise H. 1986) *Adjunct Assistant Profe ssor cf Anthropology*
B A , Un versity of Washington, Seattle; M A , Ph D , Un ve sity of San Diego, San Diego

Mennuti Louis (1987) *Fa ulty Associate cf Foreign Languages*
M A , Arizona State Un versity M A , Univers ty of Mi so n

Mintz, Sandra L (1986 *Faculty Asso iate Audiology Supervisor of Speech and Hearing Science*
B.A , Indiana University, M S University of Arizona

Mudgett Carol A. (1983 *Adjunct Assistant Professor of Anthropology*
B A , University of Nebraska, Linco n M A Ph D , University of Nebraska, Lin oln

O Hara Mays, Ellen P. 1984 *Ad ur t Assistant Profe ssor of Chemistry*
B.S Univers ty f Texas, Permian Basin Ph D , Arizona State Univers ty

Obitz, Fred (197 *Adjun t Assistant Pr fessor of Psychology*
B A , Univers ty of Co orad , M A , Ph D U vers ty of Utah

Osmon, Fred L (1983 *Adjunct Professor of Architecture*
M Arch Un vers ty f Pe nsylvan a

Parsons, Michae L (1967 *Adjunct Professor of Chemistry*
B A , M S , Kansas Stat Co eg', Ph D , Universit y of Florida

Patton, David R 1984) *Ad unct Ass ciate Professor of Agriculture*
B S West V rg n a Univers ty M S V g n a Pc ytechn c Inst tute, Ph D , n versity of Arizona

Platero Pau R. 1986 *Ad unct Assistant Professor of Anthropology*
M S , Ph D , Massachusetts Inst tute of Technology

Prather, William F. (1980) *Adjunct Professor of Speech and Hearing Science*
B A , University of California, M A , Ph D , University of Iowa

Radin, John W. (1982) *Adjunct Professor of Botany Plant Physiologist, U S D.A. Agricultural Research Service*
B S , Ph D , University of California

Raudzens, Peter A. 1986) *Adjunct Associate Professor of Speech and Hearing Science*
M D , Queen s University at Kingston, Ontario, Canada

Roberts, Lauren C. (1984) *Faculty Associate of Clinical Laboratory Sciences*
B S., St. Norbert Col ege, M.S University of Illinois at Ch cago

Saegusa, Kyoko (1981) *Faculty Associate of Foreign Languages*
B A , Japan Women s University, Tokyo, M A , Arizona State University

Sample, Tish (1978 *Adjunct Associate Professor of Anthropology*
A.B , Whitman College, M A University of California, Ph.D , Un versity of Wisconsin

Severson, Kieth E (1983) *Adjunct Associate Professor of Agriculture*
B A , University of Minnesota M S., Ph.D., University of Wyoming

Smith, Linda Wheeler (1982) *Adjunct Assistant Professor of Anthropology*
A B Oberlin College Ohio, M A , Ph D , Arizona State Univers ty

Snyder, Richard C (1979) *Adjunct Professor of Political Science*
A.B., Union College, Schenectady, M.A., Ph.D., Columbia University

Soleri, Paolo 1975) *Adjunct Professor of Architecture*
D Arch , Politecnico d Torino

Stark, Louisa R (1981 *Adjunct Professor of Anthropology*
B A , Barnard College, M A , Columbia University, Ph.D New York University

Starr, Mortimer P. (1982 *Adjunct Professor of Botany and Microbiology*
B A Brooklyn Co lege, M S , Ph D , Cornell University

Stott, Brian (1983) *Adjunct Professor of Engineering*
B.S., M.S., Ph.D., University of Manchester (Great Britain)

Sutton, Samuel J. (1975) *Adjunct Professor of Law*
B.A., B S , University of Arizona, J D., George Washington Univers ty

Von Dreele, Robert B (1971) *Adjunct Professor of Chemistry*
B S , Ph D Cornell University

Watson, Sandra L. (1986) *Faculty Associate of Clinical Laboratory Sciences*
B S , University of Nebraska Medical Center

Wehinger, Peter A. (1981) *Research Specialist, Physics*
B S , Union College, Schenectady, M S , Indiana University, Bloomington, Ph D , Case Institute of Technology

Welsh, Peter H 1986) *Adjunct Assistant Professor of Anthropology*
B.A., Northern Arizona University M A , Ph D , University of Pennsylvania, Philadelphia

Westie, Frank R (1983) *Adjunct Professor of Sociology*
B S , Central Michigan Univers ty, Ph D , Oh o State University

Whaley, Patricia 1975) *Adjunct Lecturer of Speech and Hearing Science, Director, Speech and Hearing Clinic*
B.S., M Ed , University of Georgia
B A , Be oit College Ph D , University of Arizona

Wright, Lewis J. (1986) *Adjunct Professor of General Business*
B S , Mt Un on College

Zettler, Hugo F (1977) *Adjunct Assistant Professor of Law*
B S , Arizona State University, J D University of Arizona

University Libraries

Anderson, Marcia L (1986) *Associate Librarian, Acquisitions*
A B , University of M ch gan, M S , Wayne State Un versity

Biblarz, Dora (1980) *Associate University Librarian, Collection Development*
B A , M.L S., Un versity of California, Los Angeles M A Univers ty of California Davis

Bloum, Deborah K. (1971) *Asso ıate Librarian,Reference Servıce*
B A , Cedar Crest College, M L S State University of New York, A bany

Borovansky, Vladimir R. (1968 *Librarian, Head, Noble Library*
M L S , Charles University Prague Czechoslovakia

Brownson, Charles W. (1980 *Asso iate Librarian, C ollec tıc n Dev elopment*
B A , South Dakota State Univ s ty, M A , U ve sity of O egc , M L S Univ rsity f California, Berke ey

Brunning, Denn s R. (1984 *Assistant Librarian Rcfcrence Service*
B A , University of Iowa, M A , M S Un versity of Il ino s, Urban, Champa gn

Burke, Rebecca J. (1981) *Assistar t Librarian, Gov ernment Dc cuments Service*
B A , San Jose State Univers ty M L S , Universit f Arizon

Casey, Don s (1984 *Assist int Libr ırian, Hcad G vernment Do uments Service*
B S , U ver ity of Tulsa M L S , University of Oklah ma

Conrow, Jane A. (1968) *Assistant Univ ersity Libr ırian, Spac e Manag ement and Planning*
B A M L S., Ind ana U ver ity

Corey, Constance H. (1973 *Assist int U niv ersity Librarian, Manageme nt Serv ices*
B A , Denison Univers ty, M L S Univers ty of Ari ona M B A Arizona State Univers ty

DeFato, Rosalinda (1970) *Asso iate Libr ıarıa , Referen e Servi e*
B A , St John s University, M L S , University f California, L s Ange es

Dusenbury, Carolyn A. (1980 *Librarian, Head, Reference Service*
B S. University of California, Santa Barbara; M L S , Un ve s ty f California, Los Angeles

Ferrall, J. Eleanor 1969) *Librarian, Reference Servi e*
A B , Heide berg College, M A Arizona State Un versity

Friedman, Catherine (1983) *Assistant Librarian, Reference Service*
A B , M.S , University of Illinois

Howard, Pamela F. (1986) *Assistant Librarian, Reference Servıce*
B A , San Diego State University M A M L S , Univers ty of Ca ifornia, Los Ange es

Knepp, Kenneth B. (1968 *Asse ciate Librarian Original Cataloging*
B A , University of the Pacific, B D , Garrett Theol g cal Seminary, M A , n versity ot De ve

Leibold, Anne M (1977) *Associate Librarian, Reference Service*
M A , University of Paris

Loechell, Jan L. (1987) *Assistant Librarian Science Reference Servıce*
B A , Univers ty of Colorado, Boulder; M.A., U versity of Denver

Machovec, George S. (1977) *Asso iate Librarian, Science Reference Servıce*
B.S., M.L S , Un versity ot Arizona

Marin, Christine N. (1985) *Assistant Archivist*
B A , M A , Arizona State University

McColgin, Rhonda L. (1970 *Associate Librarian, Original Cataloging*
B A , Arizona State University, M S L S , University of Southern California

McDonald, Arlys L. (1970) *Ass ı iate Librarian Head, Music Library*
B. Mus , St Mary of the Plains College, M Mus University of I inois

McGehee, Shelley (1985) *Assistant Librarian, Music Library*
B Mus , Converse Col ege M Mus , M L S Un ver ity of A abama

Milam, She la A. (1986) *Assistant Librarian, Original Cataloging*
A B , Indiana State Un versity M L S , Un vers ty of Alabama

Miller, Rosanna (1974) *Associate Librarian, Head, Map Service*
B A , M.A , Arizona State University, M L S , Univers ty of Arizona

Mulvihill, Josepha Anne (1983 *Assistant Librarian, Reference Service*
B S , University of Kansas M L S , Emporia State U versity

New, Frances Y. (1986) *Assistant Librarian, Science Reference Service*
B.S , Seattle Pacific University, M.L S. University of Arizona

Oetting, Edward 1983) *Asso iate Archivist Head, Archives and Manuscripts*
B.A , University of Michigan, M A , Un versity of Il no s· M S L.S., Wayne State University

Palais, Elliot S (1959 62, 1966) *Librarian Collecti n Development*
B.A , Bowdo n C l ege, A M L S , Un versity of Michigan

Pinckard, Mary Margaret 1982 *Associate Librarian, Head Scien e Refere n e Service*
B.S., Un vers ty of New Hampsh re M L S , University f Arizona

Potter, W liam G 1985) *Librarian Te hni al Servi es, A t mation and Systems*
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Rich, Stephen K. 1976 *Assistant Librarian Reference Service*
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Richardson, Jeanne M. 198 *Asso iate Librarian C llecti n Development*
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Ed.D , V r inia Po ytechnic Instit te a d State Un versity

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Schneberger, Lois I. (1969 *Librarian, Head Original Catalogin*
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M L S , State Un vers ty f New York at Albany

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Stern, H David 1984 *Assistant Libr rian S ience Reference Service*
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Chase, Marcelle P 1983 — *Associate Librarian, Reference International Law*
M L S , Ball State University J D University of Brussels Belgium

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APPENDIX A

MEMORANDUM

Office of the President
965-5057

Ju y 1 1986

TO : The Arizona State Un versity Community

RE · Equa Emp oyment Opportun ty and Affirmat ve Act on

Whi e Amer ca s debate over the best way to achieve equa ity n the workplace continues, Ar'zona State Un vers ty renews ts commitment to equal emp oyment opportun ty and aff rmat've act on. Continued respons ble growth of our univers ty w l resu t from enhanc ng and us ng the ab l ties of a l nd v dua s to the ful est extent practical n our collegiate environment. I am comm tted to the goa of equa emp oyment opportunity and aff rmative act on A though we continue to mprove, we st l have work to do n this important national and univers ty endeavor.

I expect al emp oyment dec s ons at Ar zona State Un versity to advance the pr nciples of equa employment opportun ty and aff rmative action. To ensure that th s expectation is carried out, am mplement ng or cont nuing the fo lowing act v ties and programs:

1 The un'vers ty wi nst tute a management deve opment program designed to assist individuals in career and organizational advancement Th s program w l help asp ring men and women of al races and ethnic groups to contribute to the univers'ty and to enhance meet ng their own personal objectives.

2 My assistant for Equal Emp oyment Opportun ty and Aff rmative Act on Jacqueline Weatherby w'l v s t during the year w'th each dean, director and department cha r to assess compliance w th our EEO AA po icy, to ass st in dent fy ng prob em areas, and to a d in the formu ation of effect ve solutions

3. Equal employment opportunity and affirmat ve act on efforts and resu ts w l continue to be incorporated nto each manager s annua object ves and annua performance eva uat on.

Through continuing substant ve efforts n affirmat ve action, the un vers ty has estabi shed a favorab e record. Our pol cy wi l cont nue to emphasize, through promotion and employ ment, the participation of women, m nority group members, hand capped persons, and d sabled and Vietnam Era veterans in management so that they may be g ven the oppor tunity to contribute to the success and exce ence of Ar zona State Univers ty.

t s my hope that a members of the university commun ty w l cont nue to approach th s responsib l ty with the sens tivity and human concern they have demonstrated in the past.

J. Russel Nelson
Pres dent

Rev sed 7 1 86
Supersedes 11 9 82

APPENDIX B

UNIVERSITY POLICY FOR STUDENT APPEAL PROCEDURES ON GRADES

Informal: This procedure must be undertaken first. Grade grievance disputes must be filed within the regular semester immediately following the issuance of the grade in dispute, whether enrolled in the University or not.

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 procedures 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 instructor (or the dean of the college in the absence of the faculty member). The dean shall have authority to take action as is deemed necessary by the case and shall so inform the student, instructor, department chair (if any) and the Registrar of action taken.

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Credits

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