humanities and fine arts under General Studies. ROTC students must also meet all other degree requirements of this college.

GENERAL INFORMATION

Definition of Terms. The terms used in this college to describe offerings are defined below for purposes of clarity.

Program of Study. This broad term describes the complete array of courses included in the study leading to a degree.

Major. This term describes a specialized group of courses contained within the program of study. Example: program of study—engineering; major—Civil Engineering.

Area of Study (Technical Electives) or Concentration. Each of these terms describes 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 preselected groups. For this reason the choice of specific technical electives for an area of study should be done with the advice and counsel of an advisor. Example: major—Mechanical Engineering; area of study—thermosciences.

Memorial Union

Michael Martin photo

Del E. Webb School of Construction

William W. Badger
Director
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PROFESSORS
BADGER MULLIGAN

ASSOCIATE PROFESSORS
BASHFORD, ERNZEN, KASHIWAGI, SAWHNEY, WEBER

ASSISTANT PROFESSORS
CHASEY KNUTSON WALSH WIEZEL

VISITING EMINENT SCHOLAR
SCHEXNAYDER

PURPOSE

Construction careers are so broadly diversified that no single curriculum prepares the student for universa entry into all fields As an example, heavy construction contrac tors usually place more emphasis on technical and engineer ing science skil s than do residential contractors developers, who usually prefer a greater depth of knowledge in manage ment and construction. To ensure a balanced understanding of the technical, professional, and philosophical standards that 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 concentrations to suit individual backgrounds, aptitudes, and objectives These concentrations are not absolute but generally match major divisions of the construction indus try.

DEGREES

Construction—B.S.

The faculty in the Del E. Webb School of Construction offer the B.S. degree in Construction Four concentrations are available: general building construction, heavy construc tion, residential construction, and specialty construction.

Each concentration is arranged to accent requisite techni cal skills and to develop management, leadership, and com petitive qualities in the student. Prescribed are a combina tion of General Studies, technical courses basic to engineer ing and construction, and a broad range of applied manage ment subjects fundamental to the business of construction contracting.

Construction—M.S.

The faculty in the school also offer the M.S. degree in Construction Details for this degree are found in the *Grad uate Catalog*

Professional Accreditation and Affiliations. The Del E Webb School of Construction is a member of the Assoc ated Schoo s of Construction, an organization dedicated to the development and advancement of construction education. The construction program is accredited by the American Council for Construction Education ACCE)

SPECIAL PROGRAMS

The Del E. Webb School of Construction maintains a cooperative agreement with community colleges within Ari zona and also with selected out of-state colleges and univer sities to structure courses that are directly transferable into the construction program at ASU

ASU 3+2 Program. The school also participates in the ASU 3+2 program with Grand Canyon University and Southwestern University. See "ASU 3+2 Programs," page 200, for details.

Student Organizations. The school has a chapter of Sigma Lambda Chi SLC), a national honor society that recognizes high academic achievement in accepted construction pro grams The school is also host to the Associated General Contractors of America (AGC) student chapter, the National Association of Home Builders (NAHB) student chapter, the National Association of Women in Construction (NAWIC) student chapter, and the Construction Women's Alliance (CWA)

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

ADMISSION

For information regarding requirements for admission, transfer, retention, qualification, and reinstatement, see "Undergraduate Admission," page 62; "Admission," page 195; and "College Degree Requirements," page 198. A preprofessional category is available for applicants deficient in regular admission requirements Vocational and craft ori ented courses taught at the community colleges are not accepted for credit toward a bachelor's degree in Construc tion.

BASIC REQUIREMENTS

Students complete the following basic requirements before registering for advanced courses: (1) all first semes ter, first year courses and the university First Year Compo sition requirement (see "University Graduation Require ments," page 83) must be completed by the time the student has accumulated 48 semester hours of program require ments, and (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 are given a one semester waiver.

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

DEGREE REQUIREMENTS

A minimum of 128 semester hours with at least 50 hours at the upper division level is required for graduation in gen eral building construction, heavy construction, residential construction, and specialty construction Students in all con centrations are required to complete a construction core of

science-based engineering, construction, and management courses.

GRADUATION REQUIREMENTS

A student must earn a grade of "C" or higher in the mathematics and physics courses listed in the program of study.

In addition to fulfilling school and major requirements, majors must satisfy the General Studies requirements as noted in the "General Studies" section, page 87 and all university graduation requirements noted in the "University Graduation Requirements" section, page 83. Note that all three General Studies awareness areas are required. Consult your advisor for an approved list of courses.

SCHOOL COURSE REQUIREMENTS

The school requires that the General Studies requirement be satisfied in the following manner:

Humanities and Fine Arts Social and Behavioral Sciences
CON 101 Construction and Culture A Built Environment *HU G H* ... 3
ECN 111 Macroeconomic Principles *SB* ... 3
ECN 112 Microeconomic Principles *SB* ... 3
HU, SB, and awareness area courses as needed ... 6

Total ... 15

Literacy and Critical Inquiry
COM 225 Public Speaking *L* ... 3
CON 496 Construction Contract Administration *L* ... 3

Total ... 6

Natural Sciences
PHY 111 General Physics *SQ* ... 3
PHY 112 General Physics *SQ* ... 3
PHY 113 General Physics Laboratory *SQ*[1] ... 1
PHY 114 General Physics Laboratory *SQ* ... 1

Total ... 8

Numeracy
MAT 270 Calculus with Analytic Geometry I *MA* ... 4
STP 226 Elements of Statistics *CS* ... 3

Total ... 7
General Studies school requirements total[3] ... 36

Both PHY 111 and 113 must be taken to secure SQ credit.

[2] Both PHY 112 and 114 must be taken to secure SQ credit.

[3] Because of the school's requirement for MAT 270, the total semester hours exceed the General Studies requirement of 35

Construction Major Requirements Common to *All* Concentrations (Except as Noted)

ACC 230 Uses of Accounting Information I ... 3
or ACC 394 ST Financial Analysis and Accounting for Small Businesses (3)*
CEE 310 Testing of Materials for Construction ... 3
CEE 340 Hydraulics and Hydrology ... 3
CEE 450 Soil Mechanics in Construction ... 3
CON 221 Applied Engineering Mechanics Statics ... 3
CON 243 Heavy Construction Equipment, Methods, and Materials ... 3
CON 251 Microcomputer Applications for Construction 3
CON 252 Building Construction Methods, Materials, and Equipment ... 3
CON 273 Electrical Construction Fundamentals ... 3
CON 323 Strength of Materials ... 3
CON 341 Surveying ... 3
CON 345 Mechanical Systems ... 3
CON 371 Construction Management and Safety ... 3
CON 383 Construction Estimating ... 3
CON 389 Construction Cost Accounting and Control *CS* ... 3
CON 424 Structural Design ... 3
CON 453 Construction Labor Management ... 3
CON 455 Construction Project Management ... 3
CON 463 Foundations ... 3
CON 495 Construction Planning and Scheduling *CS* ... 3
ECE 100 Introduction to Engineering Design *CS* ... 4
LES 305 Legal, Ethical, and Regulatory Issues in Business ... 3
or LES 306 Business Law (3) (ASU West)
or LES 380 Consumer Perspective of Business Law (3)
Science elective with lab ... 4

Total common to all concentrations ... 71

* ACC 394 ST Financial Analysis and Accounting for Small Businesses is recommended.

Advisor approved alternates transfer credits for these courses may vary from the total required semester hours indicated. Such variances do not reduce the minimum of 128 semester hours required for the degree

The course work for the first two years is the same for the general building, heavy, residential, and specialty construction concentrations.

First Semester
CON 101 Construction and Culture: A Built Environment *HU, G, H* ... 3
ECN 111 Macroeconomic Principles *SB* ... 3
ENG 101 First Year Composition ... 3
MAT 270 Calculus with Analytic Geometry I *MA* ... 4
PHY 111 General Physics *SQ*[1] ... 3
PHY 113 General Physics Laboratory *SQ* ... 1

Total ... 17

Second Semester
ECE 100 Introduction to Engineering Design *CS* ... 4
ECN 112 Microeconomic Principles *SB* ... 3
ENG 102 First Year Composition ... 3
PHY 112 General Physics *SQ*[2] ... 3
PHY 114 General Physics Laboratory *SQ*[2] ... 1
HU elective with awareness areas as needed ... 3

Total ... 17

Third Semester
CON 221 Applied Engineering Mechanics. Statics ... 3
CON 243 Heavy Construction Equipment, Methods, and Materials ... 3
CON 251 Microcomputer Applications for Construction ... 3
CON 273 Electrical Construction Fundamentals ... 3
STP 226 Elements of Statistics *CS* ... 3

Total ... 15

Fourth Semester
ACC 230 Uses of Accounting Information I ... 3
or ACC 394 ST Financial Analysis and Accounting for Small Businesses (3

NOTE: For the General Studies requirement, courses, and codes (such as L SQ C and H), see "General Studies," page 87 For graduation requirements see "University Graduation Requirements," page 83. For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses, page 60.

COM 225 Public Speaking *L* 3
CON 252 Building Construction Methods, Materials, and Equipment 3
CON 323 Strength of Materials 3
Basic science elective with lab 4

Total 16

Both PHY 111 and 113 must be taken to secure SQ credit.

[2] Both PHY 112 and 114 must be taken to secure SQ credit

[3] ACC 394 ST: Financial Analysis and Accounting for Small Businesses is recommended.

Concentration in General Building Construction

The general building construction concentration provides a foundation for students who wish to pursue careers as estimators, project managers, project engineers, and, eventually, owners of firms engaged in the construction of residential, commercial, and institutional structures. Educational focus is on building systems required for the mass development and production of large scale projects. General building construction is addressed as an integrated process from conception through delivery of completed facilities to users.

Requirements

CON 472 Development Feasibility Reports *L* 3
CON 483 Advanced Building Estimating 3
PUP 432 Planning and Development Control Law 3
or PUP 433 Zoning Ordinances, Subdivision Regulations, and Building Codes 3
REA 380 Real Estate Fundamentals 3
Upper division technical elective 3

Total 15

Concentration in Heavy Construction

The heavy construction concentration prepares students for careers related to the public works discipline. 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, and mass earth work

Requirements

CON 344 Route Surveying 3
CON 486 Heavy Construction Estimating 3
Upper division business electives 6
Upper division technical elective 3

Total 15

Concentration in Residential Construction

The residential construction concentration prepares students for careers in the residential sector of the industry. This concentration covers the specific methods and processes during the planning, production, marketing, and business related activities common to residential construction.

Requirements

CON 377 Residential Construction Production Procedures 3
CON 477 Residential Construction Business Practices 3
CON 484 Internship 3
MKT 300 Principles of Marketing 3
PUP 432 Planning and Development Control Law 3
or PUP 433 Zoning Ordinances, Subdivision Regulations, and Building Codes 3)

Total 15

Concentration in Specialty Construction

The specialty construction concentration prepares students for careers with specialty constructors, such as mechanical and electrical construction firms It emphasizes the construction process at the subcontractor level

Requirements

CON 468 Mechanical and Electrical Estimating . . . 3
CON 494 ST Cleanroom Construction . . . 3
CON 494 ST: Electrical and Mechanical Project Management . . . 3
Upper division business electives . . . 6

Total 15

CONSTRUCTION (CON)

CON 101 Construction and Culture: A Built Environment. 3 F S
An analysis of the cultural context of construction emphasizing its centrality in the evolution and expansion of built environment as expressions of ethical and historical value systems Lecture speakers *General Studies. HU G, H.*

CON 221 Applied Engineering Mechanics: Statics. 3 F S
Vectors forces and moments force systems equilibrium, analysis of basic structures and structural components, friction centroids and moments of inertia Prerequisites MAT 270 PHY 111 113

CON 243 Heavy Construction Equipment, Methods, and Materials. 3) F S
Emphasis on "Horizontal construction Fleet operations, maintenance programs, methods, and procedures to construct tunnels roads dams, and the excavation of building sites Lab, field trips

CON 251 Microcomputer Applications for Construction. 3 F S
Applications of the microcomputer as a problem solving tool for the constructor Use of spreadsheets information management and multimedia software. Prerequisite. ECE 100

CON 252 Building Construction Methods, Materials, and Equipment. (3) F S
Emphasis on "Vertical construction Methods materials codes and equipment used in building construction corresponding to the 16 divisions on "Master Format ' Lecture lab.

CON 273 Electrical Construction Fundamentals. 3 F S
Circuits and machinery Power transmission and distribution with emphasis on secondary distribution systems Measurements and instrumentation Lecture field trips. Prerequisites: PHY 112 114

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

CON 341 Surveying. 3 F, S
Theory and field work in construction and and surveys Lecture lab Prerequisite: MAT 170

CON 344 Route Surveying. (3) S
Simple, compound and transition curves in underlying reconnaissance preliminary and location surveys. Calculation of earthwork Dimensional control for construction projects Lecture lab Prerequisites CON 243 341

CON 345 Mechanical Systems. (3 F S
Design parameters and equipment related to heating and cooling systems for mechanical construction Computer aided calculations Lecture field trips Prerequisites CON 252 PHY 111 113

CON 371 Construction Management and Safety. (3 F S
Organization and management theory applied to the construction process Leadership functions Safety procedures and equipment OSHA requirement for construction Prerequisite junior standing

CON 377 Residential Construction Production Procedures. 3 S
The process used in residential construction How a house is built design permits, scheduling codes contracting site management mechanical electrical Prerequisite CON 252

CON 383 Construction Estimating. 3 F S
Drawings and specifications. Methods and techniques used in construction estimating procedures Introduction to computer software used in industry Lecture project workshops Prerequisites CON 243 and 251 and 252 *or* instructor approval

CON 389 Construction Cost Accounting and Control. (3 F S
Nature of construct on cost Deprec at on and tax theory and var able equ pment costs Cash flow theory nvestment mode s profitab ity, and ana ys's Computer app cations Fund ng sources and arrange- ments. Bui der's nsurance Prerequ s tes ACC 230 (or 394 ST F nan- c a Analys s and Account ng for Sma Bus ness) CON 251 *General Stud es CS*

CON 424 Structural Design. 3 F
Economic use of concrete stee and wood n bui d ng and eng neered structures Des gn f beams co umns, concrete formwork and con nect ons Lecture f e d tr ps Prerequ s te. CEE 310

CON 453 Construction Labor Management. 3 F S
Labor and management h story, un on, and open shop organ zat on of bui d ng and construction workers app cab e aws and government regu at ons goa s econom c power jur sd ctiona disputes, and gr ev- ance procedures Lecture, ab. Prerequ s tes· CON 371, ECN 112

CON 455 Construction Project Management. (3 F S
Study of methods coord nat ng people equ pment mater a s money and schedu e to complete a project on t me and w th n approved cost Lecture, c ass projects Pre or corequ s te CON 495

CON 463 Foundations. 3) S
Subsurface construction theory and pract ce for descr pt on, excava t ons explorat on foundat ons pavements and s opes Evaluation of specif cations and p ans of work Lecture rec tat on, f e d trips Prereq u s tes CEE 450 CON 424

CON 468 Mechanical and Electrical Estimating. 3 F
Ana ysis and organ zat on of perform ng a cost est mate for both mechan'ca and electrical construct on projects Computer usage Prerequ sites. CON 273 and 345 and 383 *or* nstructor approva

CON 472 Development Feasibility Reports. 3) F, S
ntegrat on of econom c ocation theory deve opment cost data, mar ket research data, and f nanc al ana ysis nto a feas b l ty report Com puter or entat on Prerequ s te REA 380 *Genera Stud es L*

CON 477 Residential Construction Business Practices. (3) F
Topics addressed w l nc ude deve opment market ng f nanc ng egal ssues and sa es Prerequ site CON 377 or nstructor approva

CON 483 Advanced Building Estimating. 3 F S
Concepts of pr c ng and markup development of histor c costs, fe cyc e costing change order and conceptua estimat ng and empha- s z ng microcomputer methods. Prerequ s te: CON 383

CON 484 Internsh'p. (1 12) N

CON 486 Heavy Construction Estimating. (3 F
Methods ana ys s and cost est mation for construction of h ghways br dges tunnels dams and other eng neer'ng works Lecture f e d tr ps Prerequ s tes: CON 344 383

CON 494 Special Topics. (3 F S
(a) C eanroom Construct n 3) F
(b) E ectr ca and Mechanica Project Management 3 S

CON 495 Construction Planning and Scheduling. 3 F S
Var ous network methods of project schedu ng such as AOA AON Pert bar-charting, ne-of-ba ance, and VPM techn ques M crocom- puters used for schedul ng, resource a ocation, and t me cost ana y s s. Lecture, ab Prerequ s tes: CON 383; STP 226 Pre or corequ s te CON 389 *Genera Stud es CS.*

CON 496 Construction Contract Administration. (3) F S
Survey adm n strat ve procedures of genera and subcontractors Study documentat on, c aims arb tration t gat on, bond ng nsur- ance, and ndemn f cat on D scuss ethical pract ces Lecture f e d tr ps Prerequ s tes COM 225 or ECE 300; sen or stand ng *General Studies L*

CON 533 Strategies of Estimating and Bidding. (3) F
Course w l exp ore advanced concepts of the estimating process such as mode ing and stat st ca analys s to improve b d accuracies Prerequ s te CON 483 or 486 or instructor approva .

CON 540 Construction Productivity. (3) F
Product v ty concepts Data co lect on Ana ys s of product v ty data and factors affect ng product v ty. Means for mprov ng product on and study of product v ty mprovement programs Pre- or corequ s te CON 495

CON 543 Construction Equipment Engineering. (3) S
Analys s of heavy construction equ pment productivity us ng case stud es App! es eng'neer ng fundamenta s to the p ann ng se ect on and ut l zat on of equ pment Lecture case stud es.

CON 545 Construction Project Management. 3) S
Theory and pract'ce of construct on project management. Roles of des gner owner, genera contractor, and construct on manager. Lec ture field tr ps Pre- or corequis te· CON 495

CON 547 Strategic Planning. (3) F
The bus ness p ann ng process of the construction enterpr se D ffer ences between pub c y he d and c osely held bus nesses and their exposure.

CON 561 International Construction. 3) S
An nvest gat on of the cu tural, soc a econom c, po it ca and man- agement ssues related to construct on n fore gn countries and remote reg ons

CON 565 Performance-Based Systems. (3) F
Ident fying the mu ticriter a methodo ogy n the procurement of fac - t es contractual work Prerequisite nstructor approval

CON 567 Advanced Procurement Systems. (3 S
Deve opment of multicr teria dec s on procurement model for se ect ng the perform ng contractor Prerequ site. instructor approval

CON 570 Cleanroom Construction I. (3) F
Des gn ssues for c eanroom fac l t es, the construct on s v ewpoint ncluding planning, structures mechanica and too instal at on Lec- ture, site v s ts Prerequ s te· instructor approva

CON 571 Cleanroom Construction II. (3) S
Construct on 'ssues for c eanroom fac it es 'nc ud ng schedu ng, cost estimat'ng project management, mechanical, safety certificat on and too hook-up. Lecture, site v s ts Prerequ s te: CON 570 or 'nstructor approva

CON 589 Construction Company Financial Control. 3) F
Financ a account ng and cost contro at the company leve in con struction compan es Accounting systems. Construction project profit ca cu ations Financ a ana ys s Lecture, case studies.

School of Engineering

Daniel F. Jankowski
Director
(ECG 104) 480/965-1726

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 technical educations, it also provides an opportunity for the development of many addi tional attributes, including ethical and professional charac teristics. In this era of rapid technological change, an engi- neering education serves our society well as a truly liberal education. Society's needs in the decades ahead call for engineering contributions on a scale not previously experi enced The well being of our civilization as we know it may depend upon how effectively this resource is developed.

Students studying engineering at ASU are expected to acquire a thorough understanding of the fundamentals of mathematics and the sciences and their applications to the solution of problems in the various engineering fields The program is designed to develop a balance between science and engineering and an understanding of the economic and

NOTE: For the Genera Stud es requ rement courses and codes such as L SQ C and H) see "Genera Studies" page 87. For graduation requ rements see "Un vers ty Graduat on Requirements," page 83 For an exp anat on of addit ona omn bus courses offered but not l sted n th s cata og, see C assification of Courses," page 60

social consequences of engineering activity. The goals include the promotion of the general welfare of the engi neering profession.

The courses offered are designed to meet the needs of the following students:

1. those who wish to pursue a career in engineering,
2. those who wish to do graduate work in engineering,
3. those who wish to have one or two years of training in mathematics, applied science, and engineering in preparation for some other technical career;
4. those who desire preengineering for the purpose of deciding which program to undertake or those who desire to transfer to another college or university; and
5. those who wish to take certain electives in engineer ing while pursuing another program in the univer sity.

ADMISSION

For information regarding requirements for admission, transfer, retention, disqualification, and reinstatement, see "Undergraduate Admission," page 62; "Admission," page 195; and "College Degree Requirements," page 198.

Individuals who are beginning their initial college work in the School of Engineering should have completed certain secondary school units in addition to the minimum univer sity requirements. Four units are required in mathematics A course with trigonometry should be included. The labora tory sciences chosen must include at least one unit in phys ics and one unit in chemistry. Calculus, biology, and com puter programming are recommended Students who do not meet the college's subject matter requirements may be required to complete additional university course work that may not apply toward an engineering degree. One or more of the courses CHM 113 General Chemistry, CSE 181 Applied Problem Solving with Visual BASIC, MAT 170 Precalculus, and PHY 105 Basic Physics may be required to satisfy omissions or deficiencies

DEGREES

The Bachelor of Science in Engineering (B.S.E.) degree consists of three parts:

1. university requirements (e.g., General Studies, First Year Composition),
2. an engineering core; and
3. a major.

The courses identified for each of these parts are intended to meet requirements imposed by the university and by the professional accrediting agency, Accreditation Board for Engineering and Technology, Inc. (ABET), for programs in engineering.

The B.S. degree in Computer Science consists of two parts: (1) university requirements (e.g , General Studies, First Year Composition); and (2) a major.

The courses identified for each of these parts are intended to meet requirements imposed by the university and by the professional accrediting agency, the Computer Science Accreditation Board (CSAB), for programs in computing science.

In addition to First Year Composition, the university requires, under the heading of General Studies, courses in literacy and critical inquiry, humanities and fine arts, social and behavioral sciences, mathematical studies, and natural sciences (see "General Studies," page 87). There are also requirements in historical awareness, global awareness, and cultural diversity in the United States. ABET and CSAB impose additional requirements, particularly in mathematics and the basic sciences and in the courses for the major

The engineering core is an organized body of knowledge that serves as a foundation to engineering and for further specialized studies in a particular engineering major.

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 subse quent work in the same and related subject areas; and 2) for those students who may not desire to pursue additional stud ies 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 majors available are of two types: (1) those associ ated with a particular department within the School of Engi neering (for example, Electrical Engineering and Civil Engineering) and (2) those offered as concentrations in Engineering Special Studies for example, premedical engi neering). With the exception of the Computer Science major, all curricula are extensions beyond the engineering core and cover a wide variety of subject areas within each field. Some of the credits in the major are reserved for the student's use as an area of study. These credits are tradition ally referred to as *technical electives*

Majors and areas of study are offered by the seven depart ments: Bioengineering; Chemical and Materials Engineer ing, Civil and Environmental Engineering, Computer Sci ence and Engineering, Electrical Engineering; Industrial Engineering; and Mechanical and Aerospace Engineering. The major in Engineering Special Studies is administered by the Office of the Dean. Engineering Special Studies makes use of the general structure of the engineering curric ula noted above and provides students with an opportunity for study in engineering concentrations not available in the traditional engineering curricula at ASU.

The first two years of study are concerned primarily with general education requirements, English proficiency, and the engineering core. The final two years of study are con cerned with the engineering core and the major, with a con siderable part of the time being spent on the major.

The semester by semester selection of courses may vary from one field to another, particularly at the upper-division level, and is determined by the student in consultation with a faculty advisor An example of a typical full time fresh man year schedule is shown below; depending on a particu lar student's circumstances, many other examples are possi ble

Typical Freshman Year

CHM 114	General Chemistry for Engineers *SQ*	4
ECE 100	Introduction to Engineering Design *CS*	4
ECN 111	Macroeconomic Principles *SB*	3
	or ECN 112 Microeconomic Principles *SB* (3)	
ENG 101	First Year Composition	3
ENG 102	First Year Composition	3

MAT 270 Calculus with Analytic Geometry I *MA*	4
MAT 271 Calculus with Analytic Geometry II *MA*	4
PHY 121 University Physics I Mechanics *SQ**	3
PHY 122 University Physics Laboratory I *SQ**	1
HU, SB, or awareness area course	3
Total	32

* Both PHY 121 and 122 must be taken to secure SQ credit

Well prepared students who have no outside commitments can usually complete the program of study leading to an undergraduate degree in engineering in four years (eight semesters at 16 semester hours per semester) Many students, however, 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, e.g., in chemistry, computer programming, English, mathematics, and physics, the student must complete more than the minimum of 128 semester hours. Therefore, in cases of inadequate secondary preparation, poor health, or financial necessity requiring considerable time for outside work, the undergraduate program is extended beyond four years.

DEGREE REQUIREMENTS

The degree programs in engineering at ASU are intended to develop habits of quantitative thought having equal utility for both the practice of engineering and other professional fields. In response to the opportunities provided by changing technology, educational research, and industrial input, possible improvements of various aspects of these programs are routinely considered. It is the intent of the faculty that all students be appropriately prepared in the four areas described below.

1. *Oral and written English.* Communication skills are an essential component of an engineering education. All engineering students must complete the university First Year Composition requirement (see "University Graduation Requirements," page 83), and the literacy and critical inquiry component under "Five Core Areas," page 87, of the General Studies requirement, which involves two courses beyond First Year Composition.
2. *Selected nonengineering topics.* This area ensures that the engineering student acquires a satisfactory level of basic knowledge in the humanities and fine arts, social and behavioral sciences, mathematical studies, and the natural sciences. Courses in these subjects give engineers an increased awareness of their social responsibilities, provide an understanding of related factors in the decision making process, and also provide a foundation for the study of engineering Required courses go toward fulfilling the General Studies requirement. Additional courses in mathematics and the basic sciences are selected to meet ABET requirements.

   Because of accreditation requirements, aerospace studies (AES) and military science (MIS) courses are not acceptable for engineering degree credit in fulfilling the humanities and fine arts and social and behavioral science portions of the General Studies requirement
3. *Selected engineering topics.* This area involves courses in engineering science and engineering design. The courses further develop the foundation for the study of engineering and provide the base for specialized studies in a particular engineering discipline. The specific courses are included in the engineering core and in the major. While some departmental choices are allowed, all students are required to take ECE 100 Introduction to Engineering Design and ECE 300 Intermediate Engineering Design as part of the engineering core. These courses, together with other experiences in the engineering core and in the major, serve to integrate the study of design, the "process of devising a system, component, or process to meet desired needs" (ABET), throughout the engineering curricula.
4. *Specific engineering discipline.* This area provides a depth of understanding of a more definitive body of knowledge that is appropriate for a specific engineering discipline. Courses build upon the background provided by the earlier completed portions of the curriculum and include a major design experience as well as technical electives that may be selected by the student with the assistance of an advisor. The catalog material for the individual engineering majors describes specific departmental requirements.

COURSE REQUIREMENTS

A summary of the degree requirements is as follows

First Year Composition	6
General Studies school requirements	58
Engineering core	15–19
Major including area of study or concentration *	45–49
Total	128

* The requirements for each of the majors offered are described on the following pages

The specific course requirements for the B.S. and B.S.E. degrees follow

First-Year Composition

Choose among the course combinations below	6
ENG 101 First Year Composition 3	
ENG 102 First Year Composition 3	
or	
ENG 105 Advanced First Year Composition 3	
Elective chosen with an advisor 3	
or	
ENG 107 English for Foreign Students (3	
ENG 108 English for Foreign Students (3	
Total	6

NOTE: For the General Studies requirement, courses and codes (such as L, SQ, C, and H) see "General Studies" page 87 For graduation requirements, see "University Graduation Requirements" page 83 For an explanation of additional omnibus courses offered but not listed in this catalog see "Classification of Courses" page 60.

General Studies School Requirements

Humanities and Fine Arts So ial and Beha ioral Scien es
ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* 3
HU course s . . . . . 6 or 10
SB course s . . . 3 r 7

Total 12 20

Literacy and Criti al Inquiry
ECE 300 Intermediate Engineering Design *L* . . . 3
ECE 400 Engineering Communications *L* 3
or approved department L course (3

Total . . 6

Natural Sciences Basic Sciences
CHM 114 General Chemistry for Engineers *SQ*. 4
or CHM 116 General Chemistry *SQ* (4
PHY 121 University Physics I Mechan cs *SQ*- 3
PHY 122 University Physics Laboratory I *SQ*[2] 1
PHY 131 University Physics II Electricity and Magnetism *SQ*- 3
PHY 132 University Physics Laboratory II *SQ*[3] 1
Department bas c sc ence elective 3

Total 15

Numera y Mathematics
ECE 100 Introduction to Engineering Design *CS* 4
MAT 270 Calculus w th Analytic Geometry I *MA* 4
MAT 271 Calculus w th Analytic Geometry II *MA* 4
MAT 272 Calculus with Ana ytic Geometry III *MA*. 4
MAT 274 Elementary Differential Equations *MA* . . 3
Department mathematics elective 2

Total 21
General Studies school requirements total 58

Engineering students may not use aerospace studies AES or military science MIS courses to fulfill HU or SB requirements.

- Both PHY 121 and 122 must be taken to secure SQ credit

Both PHY 131 and 132 must be taken to secure SQ credit

Engineering Core Requirement

A minimum of five of the following eight courses are required. Courses selected are subject to departmental approval. See department requirements

ECE 210 Engineering Mechanics I Statics . 3
ECE 301 Electrical Networks I 4
ECE 312 Engineering Mechanics II Dynamics 3
ECE 313 Introduction to Deformable Solids 3
ECE 334 Electronic Devices and Instrumentation. 4
ECE 340 Thermodynamics 3
or MSE 430 Thermodynamics of Materials (3
ECE 350 Structure and Properties of Materials 3
or ECE 351 Civil Engineering Materials 3
or ECE 352 Properties of Electronic Materials (4)
Choose one microcomputer microprocessor course below . . . 3 or 4
BME 470 Microcomputer Applications in Bioengineering 4
CHE 461 Process Control *CS* 4
CSE 225 Assembly Language Programming and Microprocessors Motorola 4)
or EEE 225 Assembly Language Programming and Microprocessors (Motorola) 4
CSE 226 Assembly Language Programming and Microprocessors Intel) 4
or EEE 226 Assembly Language Programming and Microprocessors (Intel (4)
IEE 463 Computer Aided Manufacturing and Control *CS* 3

CHM 345 Physical Chemistry I (3 may be substituted for ECE 340

CHM 346 Physical Chemistry II 3 may be substituted for ECE 350

GRADUATION REQUIREMENTS

To qualify for graduation from the School of Engineering, a student must have a minimum cumulative GPA of 2.00 in addition to having a GPA of at least 2.00 for the courses in the major field.

PROFESSIONAL ACCREDITATION

The undergraduate programs in Aerospace Engineering, Bioengineering, Chemical Engineering, Civil Engineering, Computer Systems Engineering, Electrical Engineering, Industrial Engineering, Materials Science and Engineering, and Mechanical Engineering are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc., Baltimore, Maryland, 410 347 7700. The Bachelor of Science program in Computer Science is accredited by the Computer Science Accreditation Commission of the Computing Sciences Accreditation Board.

ANALYSIS AND SYSTEMS (ASE)

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.

ASE 194 Special Topics. (2) F
a) MEP Academic Success

ASE 399 Cooperative Work Experience. (1) F S, SS
Usually involves two six-month work periods with industrial firms or government agencies alternated with full time semester and summer sessions students Not open to students from other colleges on campus May be repeated for credit. Prerequisites at least 45 hours completed in major area with minimum 2 50 GPA, instructor approval

ASE 485 Engineering Statistics. (3) F, S SS
Designing statistical studies for solutions to engineering problems Methods include regression design and analysis of experiments and other statistical topics Prerequisite ECE 380. *General Studies CS*

ASE 490 Project in Design and Development. 2 3) F S SS
Individual project in creative design and synthesis Course may be repeated Prerequisite: senior standing

ASE 496 Professional Seminar. 0 F S
Topics of interest to students in the engineering specialty and interdisciplinary studies

ASE 500 Research Methods: Engineering Statistics. 3) F S, SS
Designing statistical studies for solutions to engineering problems Methods include regression design and analysis of experiments and other statistical topics Prerequisite ECE 380

ASE 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

ASE 586 Partial Differential Equations in Engineering. (3) S
Development and solution of partial differential equations in engineering Applications in solid mechanics vibrations, and heat transfer Prerequisites ECE 386· MAT 242 274

ENGINEERING CORE (ECE)

ECE 100 Introduction to Engineer'ng Design. 4 F S
ntroduct on to eng neer g des gn team ng the profes on of eng neer ng computer models eng neer ng commun cat on sk s qua ity and customer sat sfact Prerequ s tes· h gh school comput ng and phys cs and a gebra courses *or* equ va ents. *General Stud es· CS*

ECE 194 Special Topics. (2 F S
a) ntroduct on to Eng neer ng Des gn 2 F
(b Introduct on to Eng neer ng Des gn I 2 S

ECE 210 Engineering Mechanics I: Statics. 3 F S, SS
Force systems res tants equ l br m d st buted forces area moments flu d stat cs nterna stresses, fr ct on energy cr terion for equ br um, and stab ty Lect re re tat n P erequ s tes ECE 100 MAT 271 or 291 , PHY 121 122

ECE 300 Intermediate Engineering Design. 3 F S SS
Eng neering des gn process o cent at ng on ncreas ng the student s ab ty to prepare we wr tten techn ca commun cat on and to def ne prob ems and generate and eva uate deas Team ng sk l s enhanced. Prerequ s tes: ECE 100 ENG 102 r 105 or 108) at east two other eng neer ng co e cou ses *Genera Stud es L*

ECE 301 Electrical Networks I. 4 F S, SS
ntroduct on to e ectr ca networks Comp nent models trans ent and steady state ana ys s Lecture ab Prerequ s te ECE 100. Pre or corequ s tes MAT 274 PHY 131 132

ECE 312 Eng neering Mechanics II: Dynamics. 3) F, S SS
K nemat cs and k net cs of part c es translat ng and rotat ng coord nate systems r g d body k nemat cs dynam cs of systems of part c es and r g d bod es, and energy and m mentum pr nc ples Lecture rec tat on. Prerequ s tes ECE 210 MAT 274

ECE 313 Introduction to Deformable Solids 3 F, S SS
Equ l br um stra n d sp acement re ations and stress stra n tempera ture re at ons App cations t f rce transm ss on and deformat ons n ax a tors onal, and bend ng of bars Comb ned load ngs Lecture rec- tat on Prerequ s tes ECE 210 MAT 274

ECE 314 Eng'neering Mechanics. 4 F S SS
Force systems res tants mo ents and equ br um K nemat cs and k net cs of part c es systems of part c es and r g d bod es Energy and momentum pr nc p es Lecture recitat n Prerequ s tes ECE 100 MAT 274 PHY 121 122

ECE 334 Electronic Devices and Instrumentat on. 4) F S SS
App cat on of electric network the ry to sem conducto c rcu ts D odes transistors amp f ers opamps d g ta og c gates and e ec tron c nstruments Lecture ab Prerequ s te ECE 3 1

ECE 340 Thermodynamics. 3 F S SS
W rk heat and energy transf rmat ons and re at onsh ps between propert es, aws, c ncepts and modes of ana ys s c mmon to a app cat ons of the modynam cs n eng neer ng Lecture rec tat on Prerequ s tes: CHM 114 or 116 ECE 210 PHY 131 Pre or corequ - s te MAT 274

ECE 350 Structure and Properties of Materials. 3 F S SS
Bas c concepts of mater al stru ture and ts re at on to properties. App cat on to eng neer ng pr blems Prerequ s tes CHM 114 or 116 PHY 121

ECE 351 Civil Engineering Materials. 3 F S
Structure and behav r of c v eng neer ng mater a s Laboratory nvest gat ons and test cr ter a Lecture ab Prerequ ite ECE 313

ECE 352 Properties of Electronic Materials. (4) F S SS
Schrod nger's wave equat on potent a barr er prob ems b ds of crysta s the band theory of so ds sem cond ctors superconductor d e ectr c and magnet c propert es Prerequ s tes CHM 114 or 116 ; MAT 274, PHY 241

ECE 380 Probab lity and Statistics for Engineer ng Problem Solv- 'ng. (3) F S
App cations or ented course w th computer based exper ence us ng stat st ca software for formu at ng and s v ng eng neer ng pr b ems 2 h urs ecture 2 hours ab Prerequ s te MAT 271. *Genera Stud es. CS.*

ECE 384 Numerical Analysis for Engineers I. 2 F S
Numer ca so ut on of a gebra c and transcendenta equat ons and systems of 'near equat ons N merica ntegrat on Curve f tt ng Error b unds and error propagat on Emphas s on use of d g ta computer Prerequ s te MAT 272 or 291

ECE 385 Numer cal Analysis for Engineers II. 2 S
Cont nuat on of ECE 384 Numer ca so ut on of part a d fferent a equat ons and m xed equat on systems ntroduct n to exper menta des gn and opt m zat on techn ques Prerequ s te ECE 384

ECE 386 Partial Differential Equations for Engineers. 2 F S
Boundary va ue prob ems separat on of variab es and Four er ser es as app ed to n t a boundary va ue prob ems Prerequ s te MAT 274

ECE 394 Spec'al Topics. 3–4 F, S
(a Conservat on Pr nc p es (4) F S
b Eng neer ng Systems 4 F, S
c) ntroduct on to Manufactur ng Eng neer ng 3 F S
d Propert es that Matter 4 F, S

ECE 400 Engineering Communications. 3 F S, SS
Plann ng and prepar ng eng neer ng pub cat ons and ora presenta t ons based on d rected brary research re ated to urrent eng neer ing t p cs Prerequ s tes ENG 102 or 105 or 108 complet on of Genera Stud es L requirement r ECE 300 sen or stand ng n an eng neering major *Genera Studies L*

SOCIETY, VALUES, AND TECHNOLOGY (STE)

STE 194 Special Topics. 2 F
a Eng neer ng f r Undecided

STE 201 Introduction to Bioengineering. 3 F
mpact of b oeng neer ng on society. Deve oping an awareness of the contr but ons of bioeng neer ng to so ve med cal and b o og ca prob lems Cross isted as BME 201 Cred t s a lowed for on y BME 201 or STE 201 Prerequ s te ENG 102 or 105 or 108 *Genera Stud es L*

STE 208 Patterns in Nature. 4 F S
Project or ented sc ence course w th c mputer tra n ng t deve op cr t ica th nk ng and techn ca sk s for student oriented sc ence essons K 12. Lecture, ab. Cross sted as PHS 208. Cred t s al owed for on y PHS 208 or STE 208 Prerequ s te. co ege eve sc ence course or instructor approva *Genera Studies SQ*

Department of Bioengineering

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PROFESSORS
GUILBEAU, TOWE

ASSOCIATE PROFESSORS
GARCIA, HE, K PKE, MASS A, P ZZICON
SWEENEY YAMAGUCHI

ASSISTANT PROFESSOR
PAN TCH

The faculty in the Department of Bioengineering offer the B.S.E. degree in Bioengineering The major builds on a broad base of knowledge with n the basic and mathematical sciences and the engineering core. The major offers gradu ates excellent career opportunities

Faculty within the department also participate in the Engineering Special Studies program n premedical

NOTE: For the Ge era Stud es requ rement courses, and codes such as L, SQ C and H see 'Genera Stud es page 87 For graduat n requ rements see Un vers ty Graduat on Requ rements page 83 For an explanat on of add t ona omn bus courses offered but not sted n th s cata g see C ass f at n of Courses page 6

engineering which is described separately in the "Programs in Engineering Special Studies" section, page 253.

This department has been part of the Department of Chemical, Bio, and Materials Engineering; the administrative change is anticipated to become effective summer 2000.

BIOENGINEERING—B.S.E.

Bioengineering (synonyms: biomedical engineering, medical engineering) is the 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. The mission of the bioengineering program at ASU is to educate students to use engineering and scientific principles and methods to develop instrumentation, materials, diagnostic and therapeutic devices, artificial organs, or other equipment and technologies needed in medicine and biology and to discover new fundamental principles regarding the functioning and structure of living systems. The overall goal of the program is to produce high quality graduates with a broad based education in engineering and the life and natural sciences who are well prepared for further graduate study in bioengineering, a career in the medical device or biotechnology industries, a career in biomedical research, or entry into a medical or other health profession school.

The program's mission is achieved by having its faculty and graduate teachers fulfill the following objectives: to provide students with a strong foundation in mathematics, the physical and life sciences, and basic engineering, and to give students a balance of theoretical understanding and ability in order to apply modern techniques, skills, and tools for problem solving at the interface of engineering with the biological and medical sciences. Students demonstrate an ability to make measurements on and interpret data from living systems, addressing the problems associated with the interaction between living and nonliving materials and systems. Students are able to design systems, devices, components, processes, and experiments with an understanding of manufacturing processes to meet real world needs for solutions to problems in the biomedical device industries, medicine, and the life sciences. Students are able to communicate effectively as bioengineers in oral, written, computer based and graphical forms. Faculty seek to instill students with a sense of commitment to professionalism and ethical responsibility as bioengineers. Students are given opportunities to interact with and gain real world experience with local and national medical device and technology industries, health care organizations, educational institutions, and constituent populations. Faculty seek to develop within our students an understanding of and positive approach toward continued lifelong learning of new technologies and relevant issues in the discipline of bioengineering. Because a depth of knowledge from at least two diverse areas of engineering and the life sciences is required in the practice of bioengineering, students desiring a career in this field should plan for advanced study beyond the bachelor's degree.

Graduate degree programs in Bioengineering are offered at ASU at both the master's and doctoral levels. For more information, consult the *Graduate Catalog*.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the B.S.E. degree in Bioengineering. A minimum of 50 upper division semester hours is required.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, majors must satisfy all university graduation requirements. See "University Graduation Requirements," page 83.

COURSE REQUIREMENTS

The course work, in semester hours, for the undergraduate degree can be classified into the following categories:

First-Year Composition

Choose among the course combinations below. 6

ENG 101 First Year Composition (3)
ENG 102 First Year Composition (3)
or
ENG 105 Advanced First Year Composition (3)
Elective chosen with an advisor 3)
or
ENG 107 English for Foreign Students 3)
ENG 108 English for Foreign Students 3)

Total 6

General Studies/School Requirements

Humanities and Fine Arts Social and Behavioral Sciences
ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* (3
HU, SB, and awareness area courses 13

Total 16

Literacy and Critical Inquiry
BME 413 Biomedical Instrumentation *L* 3
BME 423 Biomedical Instrumentation Laboratory *L* 1
ECE 300 Intermediate Engineering Design *L* 3

Total 7

Natural Sciences Basic Sciences
CHM 113 General Chemistry *SQ* 4
CHM 116 General Chemistry *SQ* 4
PHY 121 University Physics I. Mechanics *SQ* 3
PHY 122 University Physics Laboratory I *SQ* 1
PHY 131 University Physics II: Electricity and Magnetism *SQ*[2] 3
PHY 132 University Physics Laboratory II *SQ*[2] 1

Total 16

Numeracy Mathematics
ECE 100 Introduction to Engineering Design *CS* 4
MAT 242 Elementary Linear Algebra 2
or ECE 384 Numerical Analysis for Engineers I (2)
or ECE 386 Partial Differential Equations for Engineers (2)
MAT 270 Calculus with Analytic Geometry I *MA* 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 274 Elementary Differential Equations *MA* 3

Total 21
General Studies school requirements total 60

Engineering Core

ECE 210 Engineering Mechanics I Statics 3
ECE 301 Electrical Networks I 4
ECE 334 Electronic Devices and Instrumentation 4
ECE 340 Thermodynamics 3

ECE 350	Structure and Properties of Materials	3
Total		17

Major

BIO 181	General Biology *SQ*	4
BME 201	Introduction to Bioengineering *L*	3
BME 318	Biomaterials	3
BME 331	Biomedical Engineering Transport I Fluids	3
BME 334	Bioengineering Heat and Mass Transfer	3
BME 416	Biomechanics	3
BME 417	Biomedical Engineering Capstone Design I	3
BME 435	Physiology for Engineers	4
BME 470	Microcomputer Applications in Bioengineering	4
BME 490	Biomedical Engineering Capstone Design II	1 5
ECE 380	Probability and Statistics for Engineering Problem Solving *CS*	3
Technical electives		9
Minimum total		45

[1] Both PHY 121 and 122 must be taken to secure SQ credit.

[2] Both PHY 131 and 132 must be taken to secure SQ credit.

The major BME courses require a grade of "C" or higher to advance in the program and to receive a baccalaureate degree.

Bioengineering Areas of Study

Students interested in a career in bioengineering may elect to emphasize either biochemical, bioelectrical, biomaterials engineering, biomechanical, bionuclear, biosystems, molecular and cellular bioengineering, or premedical engineering in their studies.

Biochemical Engineering. This area is designed to strengthen the student's knowledge of chemistry and transport phenomena and is particularly well suited for students interested in biotechnology. Technical electives must include CHM 331 and 332 and BCH 361.

Bioelectrical Engineering. This area is designed to strengthen the student's knowledge of electrical systems, electronics, and signal processing. Students considering a career in bioelectrical phenomena, biocontrol systems, medical instrumentation, noninvasive imaging, neural engineering, and electrophysiology should consider this area of study.

Technical electives must include the following:

BME 350	Signals and Systems for Bioengineers or EEE 303 Signals and Systems 3	3
BME 419	Biocontrol Systems	3
EEE 302	Electrical Networks II	3
Total		9

Biomaterials Engineering. This area integrates the student's knowledge of materials science and engineering with biomaterials science and engineering concepts for the design of materials intended to be used for the development of medical and diagnostic devices. It emphasizes structure property relationships of engineering materials (metals, polymers, ceramics, and composites) and biological materials, biomaterial host response phenomena, technical and regulatory aspects of biomaterials testing and evaluation. Students interested in careers in the biomaterials, medical device, or biotechnology industries should consider this area of study.

Technical electives must include the following:

MSE 353	Introduction to Materials Processing and Synthesis	3
MSE 355	Introduction to Materials Science and Engineering	3
MSE 470	Polymers and Composites or MSE 471 Introduction to Ceramics 3)	3
Total		9

Biomechanical Engineering. This area is designed to strengthen the student's knowledge of mechanics and control theory. Students interested in careers related to biomechanical design, orthotic prosthetic devices, rehabilitation engineering, and orthopedic implants should consider this area of study. It also provides the fundamentals for the study of neuromuscular control and the study of human motion. From the requirements given under "General Studies School Requirements," page 207, either ECE 384 Numerical Analysis for Engineers I 2) or MAT 242 Elementary Linear Algebra (2) must be taken as the department mathematics elective.

Technical electives must include the following:

BME 350	Signals and Systems for Bioengineers or BME 419 Biocontrol Systems (3 or EEE 303 Signals and Systems 3)	3
ECE 312	Engineering Mechanics II· Dynamics	3
ECE 313	Introduction to Deformable Solids	3
Total		9

Biomedical Imaging Engineering. This area is designed to strengthen the student's knowledge of radiation interactions, health physics, medical diagnostic imaging (MRI, PET, X ray, CT), radiation protection, and nuclear instrumentation. Students considering careers in medical engineering or health physics should consider this area of study.

Technical electives must include the following:

PHY 361	Introductory Modern Physics	3
Department approved electives		6
Total		9

Biosystems Engineering. This area is designed to strengthen the background of students interested in physiological systems modeling and analysis and design and evaluation of artificial organs and medical devices. Analyzing physiological systems and designing artificial organs requires knowledge in integrating electrical, mechanical, transport, and thermofluid systems. Students considering careers in medical device industries, clinical engineering, or artificial organs should consider this area of study.

Technical electives must include the following:

BME 350	Signals and Systems for Bioengineers or BME 419 Biocontrol Systems 3	3
BME 411	Biomedical Engineering I or BME 412 Biomedical Engineering II 3	3
BME 415	Biomedical Transport Processes	3
Total		9

NOTE: For the General Studies requirement courses, and codes (such as L SQ C and H) see "General Studies" page 87. For graduation requirements see "University Graduation Requirements" page 83. For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses, page 60.

Molecular and Cellular Bioengineering. This area is designed to strengthen and integrate the student's knowledge of molecular and cellular biology, biochemistry, and biomaterials science and engineering for the design of biomolecular and cellular based hybrid medical and diagnostic devices. It is particularly suited for students interested in pursuing graduate studies in molecular and cellular bioengineering and health related biotechnology.

Technical electives must include the following:

BCH 361 Principles of Biochemistry 3
BIO 353 Cell Biology 3
CHM 331 General Organic Chemistry 3

Total 9

Premedical Engineering. This area is designed to meet the needs of students desiring entry into a medical, dental, or veterinary school. The course sequence provides an excellent background for advanced study leading to a career in research in the medical or life sciences.

Technical electives must include the following:

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

Total 8

To fulfill medical school admission requirements, BIO 182 General Biology is also required in addition to the degree requirements

Bioengineering Program of Study
Typical Four-Year Sequence

First Year

First Semester
CHM 113 General Chemistry *SQ* 4
ECE 100 Introduction to Engineering Design *CS* 4
ENG 101 First Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4

Total 15

Second Semester
CHM 116 General Chemistry *SQ* 4
ENG 102 First Year Composition 3
MAT 271 Calculus with Analytic Geometry II *MA* 4
PHY 121 University Physics I Mechanics *SQ* 3
PHY 122 University Physics Laboratory I *SQ* 1

Total 15

Second Year

First Semester
BIO 181 General Biology *SQ* 4
BME 201 Introduction to Bioengineering *L* 3
ECE 210 Engineering Mechanics I: Statics 3
MAT 272 Calculus with Analytic Geometry III *MA* 4
PHY 131 University Physics II Electricity and Magnetism *SQ*[1] 3
PHY 132 University Physics Laboratory II *SQ*[2] 1

Total 18

Second Semester
ECE 301 Electrical Networks I 4
ECE 350 Structure and Properties of Materials 3
MAT 274 Elementary Differential Equations *MA* 3
HU, SB, and awareness area courses[3] 6

Total 16

Third Year

First Semester
BME 331 Biomedical Engineering Transport I. Fluids 3
BME 435 Physiology for Engineers 4
ECE 300 Intermediate Engineering Design *L* 3
ECE 340 Thermodynamics 3
ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* (3)
MAT 242 Elementary Linear Algebra 2
or ECE 384 Numerical Analysis for Engineers I 2)
or ECE 386 Partial Differential Equations for Engineers (2)

Total 18

Second Semester
BME 318 Biomaterials 3
BME 334 Bioengineering Heat and Mass Transfer 3
ECE 334 Electronic Devices and Instrumentation 4
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
HU, SB, and awareness area courses[3] 4

Total 17

Fourth Year

First Semester
BME 413 Biomedical Instrumentation *L* 3
BME 416 Biomechanics 3
BME 417 Biomedical Engineering Capstone Design I 3
BME 423 Biomedical Instrumentation Laboratory *L* 1
HU, SB, or awareness area course[3] 3
Technical electives 3

Total 16

Second Semester
BME 470 Microcomputer Applications in Bioengineering 4
BME 490 Biomedical Engineering Capstone Design II 3
Technical electives 6

Total 13
Total degree requirements 128

[1] Both PHY 121 and 122 must be taken to secure SQ credit.

[2] Both PHY 131 and 132 must be taken to secure SQ credit

Engineering students may not use aerospace studies (AES) or military science (MIS) courses to fulfill HU and SB requirements

BIOENGINEERING (BME)

BME 201 Introduction to Bioengineering. (3) F
Impact of bioengineering on society. Developing an awareness of the contributions of bioengineering to solve medical and biological problems. Cross-listed as STE 201. Credit is allowed for only BME 201 or STE 201. Prerequisite: ENG 102 or 105 or 108. *General Studies L*

BME 202 Global Awareness Within Biomedical Engineering Design. (3) N
Introduction to ethical, legal, social, economic, and technical issues arising from the design and implementation of bioengineering technology. Lecture, critical discourse. Prerequisites: ECE 100; ECN 111 or 112; ENG 102. *General Studies L/HU*

BME 318 Biomaterials. 3) S
Material properties of natural and artificial biomaterials. Tissue and blood biocompatibility. Uses of materials to replace body parts. Prerequisite: ECE 350

BME 331 Biomedical Engineering Transport I: Fluids. (3 F, S
Transport phenomena with emphasis on biomedical engineering fluid systems. Prerequisites: MAT 274, PHY 131

BME 334 Bioengineering Heat and Mass Transfer. (3) S
App cation of the pr nc ples of heat and mass transfer phenomena to s ut on f prob e s n med c ne a d med ca device des gn Prerequ - s te ECE 340 Prerequ s te w th a grade of "C or h gher BME 331

BME 350 Signals and Systems for Bioengineers. (3) S
App cat on of pr nc p es of ca cu us and ord nary d fferential equations to mode ng and analys s of responses s gna s and s gnal transfers 'n b osystems Prerequ s tes. ECE 301 MAT 272 274

BME 411 Biomedical Eng'neering I. (3) A
Rev ew of d agn st c and prosthet c methods us ng eng neering meth odo ogy ntroduct on to transport metabo ic and autoregu atory pro- cesses in the human body Prerequ site with a grade of C" or h gher: BME 334

BME 412 Biomedical Engineering II. 3 A
Rev ew of e ectrophys o ogy and nerve pac ng appl cat ons ntroduc- t on to bi mechan cs and jo nt/ mb rep acement technology card vascular and pu monary f u d mechanics, and the app cat on of mathematica mode ng Prerequ s te nstructor approva

BME 413 Biomedical Instrumentation. (3) F
Pr nc p es of med ca nstrumentat on Stud es of med ca d agnost'c nstruments and techn ques f r the measurement of phys o og c var ab es n v ng systems. Prerequisites. ECE 300 334. Prerequ s te with a grade of C or h gher· BME 435 Corequ s te BME 423 *General Stud es. L*

BME 415 Biomedical Transport Processes. (3) A
Princ p es of momentum heat and mass transport w th appl cat ons to med ca and b o og ca systems and med'ca device des gn. Prereq u s tes MAT 274, PHY 131

BME 416 Biomechanics. 3 F
Mechan ca propert es of bone musc e, and soft t ssue. Stat c and dynamic analys s of human movement tasks such as locomotion Pre- requ s te w th a grade of "C or h gher: BME 318

BME 417 Biomedical Eng'neering Capstone Design I. 3) F
Technica regulatory, econom c ega socia , and ethica aspects of med cal dev ce systems engineer ng des gn Lecture, f e d trips Pre requ s te ECE 300 Prerequ s tes with a grade of C" or higher. BME 318 334

BME 419 Biocontrol Systems. 3 F
App icat on of near and non near contro systems techn ques toward ana ysis of neuromuscu oske eta card ovascu ar, thermal and mass transfer systems of the b dy Prerequ s tes ECE 301 MAT 274

BME 423 Biomedical Instrumentation Laboratory. (1) F
Laboratory experience with prob ems concepts, and techn ques of b omed ca nstrumentat on n stat c and dynam c env ronments. Lab Prerequ s tes ECE 300 334 Prerequisite with a grade of "C or h gher BME 435 Corequ s te BME 413 *General Stud es L*

BME 435 Physiology for Engineers. 4 F
Physi logy of the nervous, muscu ar cardiovascu ar endocr ne renal, and resp ratory systems Emphasizes use of quant tat ve methods in understand ng phys o og ca systems Lecture, ab. Prerequ sites B O 181 and CHM 116 and PHY 131 *or* nstructor approva .

BME 470 Microcomputer Applications in Bioengineering. (4) S
Use of m crocomputers f r real t me data co lect on, ana ysis and contro of exper ment nvo v ng actual and s mu ated phys o og ca systems Lecture lab Prerequ s tes ECE 100 334. Prerequ s te w th a grade f C or h gher BME 435

BME 490 Biomedical Engineering Capstone Design II. (1 5) F S
Ind v dua projects n medical systems or medica device des gn and deve opment Lecture ab Prerequ s te with a grade of "C" or h gher BME 417.

BME 496 Professional Seminar. (1 3 F, S
Profess ona and ethical aspects w th a d scuss on of respons bi t es Lecture fie d tr ps. Prerequ s te nstructor approval.

BME 511 Biomedical Engineering. (3) A
D agnost c a d pr sthet c methods us ng eng neer ng methodo ogy Transport, metabol c, and autoregu atory processes in the body

BME 512 Biomedical Engineering II. (3) A
E ectrophys' logy and nerve pac ng app cations, introduct on to bio- mechan cs and jo nt/l mb rep acement, techno ogy, cardiovascular and pu monary fluid mechanics, and mathemat ca mode ing

BME 513 Biomedical Instrumentation I. (3) F
Princ p es of med ca instrumentat on. Stud es of medical d agnost c instruments and techn ques for the measurement of phys o ogic vari ab es n ving systems.

BME 514 Advanced Biomedical Instrumentation. (3) N
Princ p es of app ied biophys ca measurements us ng b oelectric and rad o og ca approach Prerequisites ECE 334; MAT 274 or equ va ent)

BME 515 Biomedical Transport Processes. (3) N
Pr nciples of momentum, heat and mass transport w th app ications to med ca and b ological systems and med ca dev ce design Prereq- u s te nstructor approva

BME 516 Topics in Biomechanics. (3) F
Mechan ca propert es of bone musc e and soft t ssue. Static and dynam c ana ysis of human movement tasks nc ud ng n depth project. Prerequisite: nstructor approva

BME 518 Introduction to Biomaterials. (3 S
Topics include structure property relat onsh ps for synthetic and natu ral b omater a s, biocompat bi ty and uses of mater a s to rep ace body parts Prerequ s te ECE 350 or equ va ent or nstructor approval.

BME 519 Topics in Biocontrol Systems. (3) F
L near and nonl near control systems analys s of neuromusculoskele ta card ovascu ar, thermal, and mass transfer systems of the body nc ud ng n-depth project. Prerequisites: ECE 301 and MAT 274 *or* nstructor approval.

BME 520 Bioelectric Phenomena. 3 N
Study of the origin, propagat on, and nteract ons of b oelectric ty n iv ing th ngs; volume conductor problem, mathemat cal analysis of b o electric nteractions, and uses n med ca d agnost cs

BME 521 Neuromuscular Control Systems. (3) S
Overv ew of sensorimotor bra n structures App cation of nonl near, adapt ve, opt ma and superv sory contro theory to eye-head-hand coord nat on and ocomot'on

BME 522 Biosensor Design and Application. (3) A
Theory and pr nc p es of b osensor des gn and app ication n med c ne and b o ogy Pr ncip es of measurements with b osensors Prerequi site. nstructor approva

BME 523 Physiological Instrumentation Lab. (1) F
Laboratory experience with prob ems, concepts, and techn ques of biomedica nstrumentat on in stat c and dynam c env ronments Lab Pre- or corequ s tes BME 413, 435; ECE 334

BME 524 Fundamentals of Applied Neural Control. (3) A
Fundamental concepts of e ectr ca stimulat on and record ng in the nervous system w th the goal of funct ona control restorat on Pre- or corequ s te BME 435 or nstructor approva

BME 525 Surgical Techniques. (2) S
Pr nc p es of surgical techniques, standard operative procedures, fed- era regu at'ons gu de nes and state of the art methods. Lecture, ab

BME 532 Prosthetic and Rehabilitation Engineering. (3) A
Analys s and cr tical assessment of des gn and contro strateg es for state of the art med ca devices used n rehab itation eng neering Pre or corequ s te BME 416 or 516 or EPE 610

BME 533 Transport Processes I. (3) F
Unif ed treatment of momentum, heat and mass transfer from molec ular theory, and cont nuum po nts of v ew Cont nuum equat ons of microscop c and macroscop c systems and mu t component and mul- t phase systems Cross isted as CHE 533. Credit is al owed for only BME 533 or CHE 533

BME 534 Transport Processes II. (3) S
Cont nuat on of BME/CHE 533 emphasizing mass transfer Cross isted as CHE 534. Credit is a owed for on y BME 534 or CHE 534. Prerequ s te: BME/CHE 533

BME 543 Thermodynamics of Chemical Systems. (3) F
C ass ca and stat st cal thermodynam cs of nonideal phys cochem ca systems and processes; predict on of opt mum operating cond tions Cross- sted as CHE 543 Credit s al owed for only BME 543 or CHE 543

NOTE: For the Genera Stud es requ rement courses, and codes (such as L SQ, C and H) see "Genera Studies, page 87 For graduation requ rements see "Un vers ty Graduation Requ rements" page 83 For an exp anat on of add t onal omn bus courses offered but not l sted n th s cata og see "Class f cat on of Courses" page 60.

BME 544 Chemical Reactor Engineering. 3 S
React on rates thermodynam cs, and transp rt pr nc p es app ed to the des gn and peration of chemical reactors Cross isted as CHE 544 Cred t s al owed for on y BME 544 or CHE 544 Prerequ s te BME/CHE 543

BME 551 Movement Biomechanics. 3 S
Mechanics app ed to the analys s and mode ng of phys o og ca movements Computat ona mode ng f musc es tendons jo nts and the ske eta system w th appl cat on to sports and rehab tation Prerequisite· BME 416 or 516 or n tructor approva

BME 566 Medical Imaging Instrumentation. 3 N
Des gn and analys s of mag ng systems and nuc ear dev ces for med ica diagnos s therapy and research Laboratory exper ments us ng d agnost c radiology f uoroscopy u trasound and CAT scanning Lec ture ab Prerequ site: nstructor approva

BME 568 Medical Imaging. (3) N
CT SPECT PET, and MR . 3 d mens ona *in v vo* measurements nstrument des gn phys ological mode ng c n ca pr toco s reconstruct on a gor thms and quantitat n ssues Prerequ s te nstructor approva

Department of Chemical and Materials Engineering

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REGENTS' PROFESSOR
MAYER

PROFESSORS
ADAMS, BERMAN, DEY, KRAUSE, MAHAJAN, RAUPP, SATER

ASSOCIATE PROFESSORS
ALFORD, BECKMAN, BURROWS RIVERA TORREST

ASSISTANT PROFESSORS
S BEAUDOIN, CHAWLA, RAZATOS

LECTURER
D BEAUDOIN

The faculty in the Department ot Chemical and Materials Engineering offer the B.S.E degree in Chemical Engineering and in Materials Science and Engineering Each of these majors builds on a broad base of knowledge within the basic and mathematical sciences and the engineering core Each offers excellent career opportunities.

Chemical engineers desi_n and operate processes that may include chemical change. They combine the science of chemistry with the discipline of engineering in order to solve comp ex problems in a wide variety of industries. Challengin_ job opportunities exist not only in the chemical and petroleum industries, but also in the plastics, electron ics, computer, metals, space, food, drug, and health care industries. In these industries, chemical engineers practice in a wide variety of occupations including environmental control, surface treatments, energy and materials transfor mation, biomedical applications, fermentation, protein recovery, extractive metallurgy, and separations. In the envi ronmental area, chemical engineers develop methods to reduce the pollution created in manufacturing processes, devise techniques to recover usable materials from wastes, design waste storage and treatment facilities, and design pollution control strategies

Materials science and engineering uses fundamental knowledge in chemistry and physics to correlate relation ships between the structure and processing of materials and their properties Students educated in this discipline decide how to optimize existing materia s or how to deve op new advanced materials and processing techniques. Students who major in materials science and engineering will find employment opportunities in a variety of industries and research facilities which include aerospace, electronics, energy conversion, manufacturing, medical devices, semi conductors, and transportat on

This department has been known as the Department of Chemical, Bio, and Materials Engineering, the creation of a separate Department of Bioengineering is anticipated to become effective summer 2000.

CHEMICAL ENGINEERING—B.S.E.

Chemical engineers are generally concerned with transfer within and between liquid, gas, and solid phases and the chemical changes that may also occur. They design and operate processes that accommodate such changes, including the chemical activation of materials Typically this involves complex multicomponent systems wherein the interactions between species have to be considered and ana lyzed. The new challenge in chemical engineering is to apply the principles of fluid dynamics, mass transfer, solu tion thermodynamics, reaction kinetics, and separation tech niques to technological endeavors such as pollut on control within manufacturing and the environment, integrated cir cuit design, solid state surface treatments, and materials processing.

Consequently, in addition to the chemical and petroleum industries, chemical engineers find challenging opportuni ties in the plastics, sol d state, electronics, computer, metals, space, food, drug, and health care industries, where they practice in a wide variety of occupations, such as environ mental control, surface treatments, energy and materials transformations, biomedical applicat ons, fermentation, pro tein recovery, extractive metallurgy, and separations. While a large percentage of the industrial positions are filled by graduates with bachelor's degrees, there are lucrative and creative opportunities in research and development for those who acquire postgraduate education.

Subspecializations have developed within the profession. However, the same broad body of knowledge is generally expected of all chemical engineers for maximum flexibility in industrial positions. The preparation for chemical engi neering is accomplished by a blend of classroom instruction and laboratory experience

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the B.S.E. degree in Chemical Engineering. A minimum of 50 upper division semester hours is requ red.

The course work for the undergraduate degree can be classified into the following categories (in semester hours ·

First-Year Composition

Choose among the course combinations below 6
ENG 101 First Year Composition 3)
ENG 102 First Year Composition (3)
—or
ENG 105 Advanced First Year Composition (3)
Elective chosen with an advisor 3)
—or
ENG 107 English for Foreign Students (3)
ENG 108 English for Foreign Students (3)

Total 6

General Studies/School Requirements

Humanities and Fine Arts/Social and Behavioral Sciences
ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* 3)
HU, SB, and awareness area courses 13

Total 16

Literacy and Critical Inquiry
CHE 352 Transport Laboratories *L*. 3
ECE 300 Intermediate Engineering Design *L* 3

Total 6

Natural Sciences/Basic Sciences
CHM 113 General Chemistry *SQ* 4
CHM 116 General Chemistry *SQ* 4
CHM 331 General Organic Chemistry. 3
CHM 335 General Organic Chemistry Laboratory 1
PHY 121 University Physics I: Mechanics *SQ*[2] 3
PHY 122 University Physics Laboratory I *SQ*[2]. . . . 1

Total 16

Numeracy/Mathematics
ECE 100 Introduct on to Engineering Design *CS* 4
ECE 384 Numerical Analysis for Engineers I 2
MAT 270 Calculus with Analytic Geometry I *MA*. 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 274 Elementary Differential Equations *MA*. . . . 3

Total 21
General Studies/school requirements total... 59

Engineering Core

CHE 342 Applied Chemical Thermodynamics 4
CHE 461 Process Control *CS* 4
ECE 394 ST Conservation Principles. 4
ECE 394 ST: Engineering Systems 4
ECE 394 ST. Properties that Matter 4

Total 20

Major

CHE 311 Introduction to Chemical Processing 3
CHE 331 Transport Phenomena I Fluids 3
CHE 332 Transport Phenomena II· Energy Transfer 3
CHE 333 Transport Phenomena III: Mass Transfer. 3
CHE 432 Principles of Chemical Engineering Design 3
CHE 442 Chemical Reactor Design 3
CHE 451 Chemical Engineering Laboratory. 2
CHE 462 Process Design 3
CHM 332 General Organic Chemistry 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
ECE 385 Numerical Analysis for Engineers II 2
Technical electives. 12

Total 43

[1] Engineering students may not use aerospace studies (AES) or military science (MIS) courses to fulfill HU or SB equirements

[2] B oth PHY 121 and 22 must be taken to secure SQ credit

Consult with your department academic advisor to ensure that all requirements are met.

The technical elective courses must be selected from upper division courses w th an advisor's approval and must include two three semester hour chemistry courses, a three semester-hour natural science or materials course; and a three semester hour chemical engineering course

To fulfi l accreditation requirements and to prepare adequately for the advanced chemistry courses, Chemical Engi neering majors are required to take the CHM 113 and 116 introductory chemistry sequence (CHM 117 and 118 are acceptable substitutes). Other freshman chemistry courses are *not acceptable,* and transfer students who have taken another chemistry course may be required to enroll in CHM 113 and 116.

The faculty in the Department of Chemical and Materials Engineering also offer graduate programs leading to the M.S.E., M S , and Ph.D. degrees These programs provide a blend of classroom instruction and research. Many various 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 Study

Students who wish to specialize may develop an area of interest through the use of technical electives and selective substitutions for required courses. Substitutions must be approved by the advisor and the Department Standards Committee and must be consistent with ABET accreditation criteria. No substitution of CHE 462 is allowed. The follow ing are possible elective areas w ith suggested courses A student may choose electives within the general department guidelines and does not have to select one of the areas listed.

Biochemical. Students wishing to prepare for a career in biotechnology, fermentation, food process ng, pharmaceuti cals, and other areas within biochemical engineering should select from the following:

Chemistry Electives

BCH 361 Princip es of Biochemistry 3
BCH 461 General Biochemistry 3
BCH 462 General Biochemistry. 3

Technical Electives

CHE 475 Biochemical Engineering 3
CHE 476 Bioreaction Engineering 3
CHE 477 Bioseparation Processes 3
CHE 494 ST· Biotechnology Techniques 3

NOTE: For the Genera Stud es requ rement, courses and codes such as L, SQ C, and H) see "Genera Studies," page 87 For graduat on requ rements, see Un vers ty Graduation Requ rements," page 83 For an explanat on of add t onal omn bus courses offered but not sted n this catalog see 'C ass f cat on of Courses,' page 60.

Biomedical. Students who are interested in biomedical engineering but wish to maintain a strong, broad chemical engineering base should select from the following:

Chemistry Electives

BCH 361 Principles of Biochemistry . . . 3
BCH 461 General Biochemistry . . . 3
BCH 462 General Biochemistry . . . 3

Technical Electives

BME 318 Biomaterials . . . 3
BME 435 Physiology for Engineers . . . 4

Environmental. ASU does not offer a B.S.E. degree in Environmental Engineering, but students with this interest are encouraged to pursue a B.S.E. degree in Chemical Engineering with this area of study. Students interested in the management of hazardous wastes and air and water pollution should select from the following:

Chemistry Electives

CHM 302 Environmental Chemistry . . . 3
BCH 361 Principles of Biochemistry . . . 3
BCH 461 General Biochemistry . . . 3
CHM 481 Geochemistry . . . 3
CHM 494 ST Chemistry of Global Climate Change . . 3

Technical Electives

CEE 561 Physical Chemical Treatment of Water and Waste . . . 3
CEE 563 Environmental Chemistry Laboratory . . . 3
CHE 474 Chemical Engineering Design for the Environment . . 3
CHE 478 Industrial Water Quality Engineering . . . 3
CHE 479 Air Quality Control . . . 3

Materials. Students interested in the development and production of new materials such as alloys, ceramics, composites, polymers, semiconductors, and superconductors should select from the following:

Chemistry Electives

CHM 345 Physical Chemistry I . . . 3
CHM 346 Physical Chemistry II . . . 3
CHM 453 Inorganic Chemistry . . . 3
CHM 471 Solid State Chemistry . . . 3

Technical Electives

BME 318 Biomaterials . . . 3
CHE 458 Semiconductor Material Processing . . . 3
ECE 352 Properties of Electronic Materials . . . 4
MSE 353 Introduction to Materials Processing and Synthesis 3
MSE 354 Experiments in Materials Synthesis and Processing I . . 2
MSE 431 Corrosion and Corrosion Control . . . 3
MSE 453 Experiments in Materials Synthesis and Processing II . . . 2
MSE 454 Advanced Materials Processing and Synthesis 3
MSE 470 Polymers and Composites . . . 3

Premedical. Students planning to attend medical school should select courses from those listed under the biomedical area. In addition, BIO 181, 182, and CHM 336 must be taken to satisfy medical-school requirements but are not counted toward the Chemical Engineering bachelor's degree.

Process Engineering. The engineering core and required chemical engineering courses serve as a suitable background for students intending to enter the traditional petrochemical and chemical process industries. Students can build on this background by selecting courses with the approval of their advisor. Examples of these courses are as follows:

CHE 474 Chemical Engineering Design for the Environment 3
CHE 478 Industrial Water Quality Engineering . . . 3
CHE 479 Air Quality Control . . . 3
CHE 494 ST. Advanced Process Control 3
CHE 528 Process Optimization Techniques . . . 3
CHE 556 Separation Processes . . . 3
CHE 563 Chemical Engineering Design . . . 3
MAE 436 Combustion . . . 1–4

Semiconductor Processing. Students who are interested in the development and manufacturing of semiconductor and other electronic devices should select from the following:

Chemistry Electives

CHM 345 Physical Chemistry I . . . 3
CHM 346 Physical Chemistry II . . . 3
CHM 453 Inorganic Chemistry . . . 3
CHM 471 Solid State Chemistry . . . 3

Technical Electives

CHE 458 Semiconductor Material Processing . . . 3
CHE 494 Special Topics . . . 1–4
ECE 352 Properties of Electronic Materials . . . 4
EEE 435 Microelectronics . . . 3
EEE 436 Fundamentals of Solid State Devices . . . 3
EEE 439 Semiconductor Facilities and Cleanroom Practices . . . 3
MSE 353 Introduction to Materials Processing and Synthesis . 3
MSE 354 Experiments in Materials Synthesis and Processing I 2
MSE 453 Experiments in Materials Synthesis and Processing II . . . 2
MSE 454 Advanced Materials Processing and Synthesis . . . 3
MSE 472 Integrated Circuit Materials Science . . . 3

Chemical Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CHM 113 General Chemistry *SQ* . . . 4
ECE 100 Introduction to Engineering Design *CS* . . . 4
ENG 101 First Year Composition . . . 3
MAT 270 Calculus with Analytic Geometry I *MA* . . . 4

Total . . . 15

Second Semester

CHM 116 General Chemistry *SQ* . . . 4
ENG 102 First Year Composition . . . 3
MAT 271 Calculus with Analytic Geometry II 4
PHY 121 University Physics I: Mechanics *SQ** . . . 3
PHY 122 University Physics Laboratory I *SQ** . . . 1

Total . . . 15

Second Year

First Semester

CHE 311 Introduction to Chemical Processing . . . 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* . . . 3
ECE 394 ST Conservation Principles . . . 4
ECN 111 Macroeconomic Principles *SB* . . . 3
or ECN 112 Microeconomic Principles *SB* 3
MAT 274 Elementary Differential Equations *MA* . . . 3

Total . . . 16

Second Semester

CHE 331 Transport Phenomena I Fluids 3
ECE 384 Numerical Analysis for Engineers I . . . 2
ECE 394 ST. Properties that Matter . . . 4

MAT 272 Calculus with Analytic Geometry III *MA* 4
HU or SB elective 4

Total 17

Third Year

First Semester
CHE 332 Transport Phenomena II Energy Transfer 3
CHE 342 Applied Chemical Thermodynamics 4
CHM 331 General Organic Chemistry 3
CHM 335 General Organic Chemistry Laboratory ...
ECE 300 Intermediate Engineering Design *L* 3
HU or SB elective 3

Total 17

Second Semester
CHE 333 Transport Phenomena III· Mass Transfer 3
CHE 352 Transport Laboratories *L* 3
CHE 432 Principles of Chemical Engineering Design 3
CHM 332 General Organic Chemistry 3
ECE 385 Numerical Analysis for Engineers II 2
ECE 394 ST Engineering Systems 4

Total 8

Fourth Year

First Semester
CHE 442 Chemical Reactor Design 3
CHE 451 Chemical Engineering Laboratory 2
CHE 461 Process Control *CS* 4
HU, SB, or awareness area course 3
Technical elective 3

Total 15

Second Semester
CHE 462 Process Design 3
HU, SB, or awareness area course 3
Technical elective 9

Total 15
Total degree requirements 128

* Both PHY 121 and 122 must be taken to secure SQ credit.

MATERIALS SCIENCE AND ENGINEERING—B.S.E.

Innovations that create new and improved materials help drive the cutting edge of new technologies in many industries, including automotive, aerospace, materials production, semiconductors, electronics, and health professions. The space shuttle, lightweight cars, and today's fastest computers have all been developed using the latest materials technologies. Materials engineers play a critical role in innovations in such applications. In advancing today's technologies, they fulfill a wide range of job responsibilities. They may

1. select the best material for a given application or develop innovative materials and processing techniques for new applications;
2. analyze materials failures in order to redesign more robust engineering components; and
3. manage or participate with teams of engineers working on larger scale engineering projects.

In summary, materials engineers play an important role in advancing leading edge technologies in a wide range of industries.

The mission of the materials science and engineering program is to educate students in the application of basic principles of science toward the design and utilization of materials in engineering components for the betterment of humanity. The overall goal of the program is to produce high quality graduates with a broad based education in materials engineering who can effectively compete for the best positions in graduate school and or industry.

The program's mission is achieved by having its graduates fulfill the following objectives. Graduates should

1. have an ability and technical competence to apply knowledge and laboratory skills in math, science, computers, statistics, and basic engineering to the principles of families of materials that include metals, ceramics, polymers, composites, and semiconductors;
2. have an integrated understanding of structure, properties, processing, and performance of materials from classroom and laboratory as developed from exposure to families of materials in bulk and thin film geometries;
3. possess an ability to apply and integrate knowledge of materials, in conjunction with economic, ethical, and societal considerations, to solve problems n materials selection, design, and manufacturing;
4. have an ability to communicate effectively as individuals and as team members with engineers from materials and other engineering disciplines; and
5. identify themselves as members of the materials engineering profession, demonstrate professional collegiality, and be aware of opportunities for life long learning and for interactions in local professional communities.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the B S E degree in Materials Science and Engineering A minimum of 50 upper division semester hours is required.

Graduation Requirements. In addition to fulfilling school and major requirements, majors must satisfy all university graduation requirements. See "University Graduation Requirements," page 83.

Course Requirements. The undergraduate curriculum requires that students take a series of interdisciplinary courses of fundamental importance to an understanding of all engineering materials. Following these are additional courses that may be taken as technical electives to develop an area of study. The courses for the undergraduate degree can be classified into the following categories (in semester hours):

First-Year Composition
Choose among the course combinations below 6
ENG 101 First Year Composition (3
ENG 102 First Year Composition 3)

NOTE: For the General Studies requirement, courses and codes (such as L SQ C and H) see General Studies page 87 For graduation requirements, see University Graduation Requirements" page 83. For an explanation of additional omnibus courses offered but not listed in this catalog see "Classification of Courses" page 60

or

ENG 105 Advanced First Year Composition (3)
Elective chosen with an advisor (3)

or

ENG 107 English for Foreign Students (3)
ENG 108 English for Foreign Students (3

Total .. 6

General Studies/School Requirements

Humanities and Fine Arts Social and Behavioral Sciences
ECN 111 Macroeconomic Principles *SB* . . 3
or ECN 112 Microeconomic Principles *SB* 3)
HU, SB, and awareness area courses . 13

Total 16

Literacy and Critical Inquiry
ECE 300 Intermediate Engineering Design *L* . . 3
ECE 400 Engineering Communications *L* . . 3

Total . 6

Natural Sciences Basic Sciences
CHM 113 General Chemistry *SQ* . . 4
CHM 116 General Chemistry *SQ* . . 4
PHY 121 University Physics I· Mechanics *SQ*[1] . . 3
PHY 122 University Physics Laboratory *SQ*[1] . . 1
PHY 131 University Physics II Electricity and Magnetism *SQ*[2] . . 3
PHY 132 University Physics Laboratory II *SQ*[2] . . 1

Total . 16

Numeracy Mathematics
ECE 100 Introduction to Engineering Design *CS* . . 4
MAT 242 Elementary Linear Algebra . . 2
or ECE 384 Numerical Analysis for Engineers I 2)
or ECE 386 Partial Differential Equations for Engineers (2)
MAT 270 Calculus with Analytic Geometry I *MA* 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 274 Elementary Differential Equations *MA* . . 3

Total . . 21
General Studies school requirements total . 59

Engineering Core
ECE 210 Engineering Mechanics I Statics . . 3
ECE 301 Electrical Networks I . . 4
ECE 313 Introduction to Deformable Solids . . 3
ECE 350 Structure and Properties of Materials . . 3
MSE 430 Thermodynamics of Materials 3

Total . . 16

Major
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* . . 3
MSE 353 Introduction to Materials Processing and Synthesis . . 3
MSE 354 Experiments in Materials Synthesis and Processing I . 2
MSE 355 Introduction to Materials Science and Engineering . . . 3
MSE 420 Physical Metallurgy . . 3
MSE 421 Physical Metallurgy Laboratory . . 1
MSE 440 Mechanical Properties of Solids . . 3
MSE 450 X ray and Electron Diffraction . . 3
MSE 470 Polymers and Composites . . 3
MSE 471 Introduction to Ceramics . . 3
MSE 482 Materials Engineering Design . . 3
MSE 490 Capstone Design Project . . 3
Select two of the following four courses[3] . 6
CHM 325 Analytical Chemistry (3)
CHM 331 General Organic Chemistry (3)
CHM 341 Elementary Physical Chemistry (3)
PHY 361 Introductory Modern Physics (3)
Technical electives[4] . . 8

Total . . 47

[1] Both PHY 121 and 122 must be taken to secure SQ credit

[2] Both PHY 131 and 132 must be taken to secure SQ credit

[3] To take CHM 341 Elementary Physical Chemistry, CHM 331 Organic Chemistry must be taken as the prerequisite

[4] Three of the eight hours must be a non MSE upper-division engineering elective course

Materials Science and Engineering Areas of Study

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.

Biomaterials. Students interested in the materials used in the body and other living systems to improve or replace body components should choose from the following technical electives:

BME 318 Biomaterials . . 3
BME 411 Biomedical Engineering I . . 3
BME 412 Biomedical Engineering II. . . 3
BME 413 Biomedical Instrumentation *L* . . 3
BME 416 Biomechanics . . 3

Ceramic Materials. Students who want to develop an understanding of the chemistry and processing that control the structure and properties of ceramics and their application should select from these technical electives:

CHM 331 General Organic Chemistry . . 3
CHM 332 General Organic Chemistry . . 3
CHM 471 Solid State Chemistry . . 3
EEE 435 Microelectronics . . 3
EEE 436 Fundamentals of Solid State Devices . . 3
EEE 439 Semiconductor Facilities and Cleanroom Practices. . . 3
MSE 453 Experiments in Materials Synthesis and Processing II . . 2
MSE 454 Advanced Materials Processing and Synthesis . . 3
MSE 472 Integrated Circuit Materials Science . . 3

Energy Systems. Students interested in the materials used in energy conversion systems such as solar energy or nuclear energy should choose from the following technical electives:

MAE 441 Principles of Design. . 3
MAE 442 Mechanical Systems Design . . 3
MSE 431 Corrosion and Corrosion Control . . 3
MSE 441 Analysis of Material Failures . . 3

Integrated Circuit Materials. Students interested in the materials used in the semiconductor industry and in how they are processed to achieve the desired properties should choose from the following technical electives:

CHE 458 Semiconductor Material Processing . . 3
EEE 435 Microelectronics . . 3
EEE 436 Fundamentals of Solid State Devices . . 3
EEE 439 Semiconductor Facilities and Cleanroom Practices. . . 3
MSE 453 Experiments in Materials Synthesis and Processing II . . 2
MSE 454 Advanced Materials Processing and Synthesis . . 3
MSE 471 Introduction to Ceramics . . 3

Manufacturing and Materials Processing. Students interested in the manufacturing and processing of materials for a broad base of applications should choose from the following technical electives.

CHE 458 Semiconductor Material Processing 3
MAE 422 Mechanics of Materials 4
MAE 441 Principles of Design 3
MAE 442 Mechanical Systems Design 3
MSE 431 Corrosion and Corrosion Control 3
MSE 441 Analysis of Material Failures 3
MSE 453 Experiments in Materials Synthesis and Processing II 2
MSE 454 Advanced Materials Processing and Synthesis 3
MSE 472 Integrated Circuit Materials Science 3

Mechanical Metallurgy. Students interested in understanding the design, processing, and manufacturing of metals for structural applications, such as autos, airplanes, and buildings, should choose from the following technical electives:

MAE 415 Vibration Analysis 4
MAE 422 Mechanics of Materials 4
MAE 441 Principles of Design 3
MAE 442 Mechanical Systems Design 3
MSE 431 Corrosion and Corrosion Control 3
MSE 441 Analysis of Materials Failures 3

Metallic Materials Systems. Students interested in building an understanding of the basis for the design and processing of metals and alloys should choose from the following technical electives:

MAE 351 Manufacturing Processes 3
MSE 431 Corrosion and Corrosion Control 3
MSE 441 Analysis of Material Failures 3
MSE 472 Integrated Circuit Materials Science 3

Polymers and Composites. Students who desire to build an understanding of the chemical and processing basis for the properties of polymers and their applications, including composite systems, should select from the following technical electives:

CHM 331 General Organic Chemistry 3
CHM 332 General Organic Chemistry 3
CHM 471 Solid-State Chemistry 3
MSE 441 Analysis of Material Failures 3
MSE 472 Integrated Circuit Materials Science 3

Materials Science and Engineering Program of Study Typical Four-Year Sequence

First Year

First Semester

CHM 113 General Chemistry *SQ* 4
ECE 100 Introduction to Engineering Design *CS* 4
ENG 101 First Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4

Total 15

Second Semester

CHM 116 General Chemistry *SQ* 4
ENG 102 First Year Composition 3
MAT 271 Calculus with Analytic Geometry II *MA* 4
PHY 121 University Physics I: Mechanics *SQ*[1] 3
PHY 122 University Physics Laboratory I *SQ* 1

Total 15

Second Year

First Semester

ECE 210 Engineering Mechanics I Statics 3
ECN 111 Macroeconomic Principles *SB* 3
MAT 242 Elementary Linear Algebra 2
or ECE 384 Numerical Analysis for Engineers I (2)
or ECE 386 Partial Differential Equations for Engineers (2)
MAT 272 Calculus with Analytic Geometry III *MA* 4
PHY 131 University Physics II: Electricity and Magnetism *SQ*[2] 3
PHY 132 University Physics Laboratory II *SQ*[2] 1

Total 16

Second Semester

ECE 301 Electrical Networks I 4
ECE 313 Introduction to Deformable Solids 3
ECE 350 Structure and Properties of Materials . . . 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
MAT 274 Elementary Differential Equations *MA* 3

Total 16

Third Year

First Semester

ECE 300 Intermediate Engineering Design *L* 3
MSE 353 Introduction to Materials Processing and Synthesis 3
MSE 355 Introduction to Materials Science and Engineering 3
Advanced science course[3] 3
HU, SB, and awareness area course(s)[4] 4

Total 16

Second Semester

MSE 354 Experiments in Materials Synthesis and Processing I . . . 2
MSE 420 Physical Metallurgy 3
MSE 421 Physical Metallurgy Laboratory 1
MSE 430 Thermodynamics of Materials 3
MSE 450 X-ray and Electron Diffraction 3
HU, SB, and awareness area courses[4] 6

Total 18

Fourth Year

First Semester

MSE 440 Mechanical Properties of Solids 3
MSE 470 Polymers and Composites 3
MSE 471 Introduction to Ceramics 3
MSE 482 Materials Engineering Design 3
Technical elective 4

Total 16

Second Semester

ECE 400 Engineering Communications *L* 3
MSE 490 Capstone Design Project 3
Advanced science course[3] 3
HU, SB, or awareness area course[4] 3

NOTE: For the General Studies requirement courses, and codes (such as L, SQ, C and H) see "General Studies" page 87. For graduation requirements see "University Graduation Requirements" page 83. For an explanation of additional omnibus courses offered but not listed in this catalog see "Classification of Courses" page 60.

Technical electives 4

Total 16
Degree requirements total 128

[1] Both PHY 121 and 122 must be taken to secure SQ credit

[2] Both PHY 131 and 132 must be taken to secure SQ credit

[3] To take CHM 341 Elementary Physical Chemistry, CHM 331 Organic Chemistry must be taken as the prerequisite.

[4] Engineering students may not use aerospace studies (AES) or military science (MIS) courses to fulfill HU and SB requirements

CHEMICAL ENGINEERING (CHE)

CHE 311 Introduction to Chemical Processing. (3) F, S
Application of chemical engineering analysis and problem solving to chemical processes material and energy balance methods and skills Prerequisites CHM 116, MAT 271.

CHE 331 Transport Phenomena I: Fluids. (3) F S
Transport phenomena, with emphasis on fluid systems Prerequisites CHE 311, ECE 394 ST Conservation Principles MAT 274.

CHE 332 Transport Phenomena II: Energy Transfer. (3) F, S
Continuation of transport principles, with emphasis on energy transport in stationary and fluid systems Prerequisite CHE 331.

CHE 333 Transport Phenomena III: Mass Transfer. (3) F S
The application of transport phenomena to mass transfer. The design of mass transfer equipment, including staged processes Prerequisite CHE 332.

CHE 342 Applied Chemical Thermodynamics. (4) F, S
Application of conservation and accounting principles with non ideal property estimation techniques to model phase and chemical equilibrium processes Lecture recitation. Prerequisites CHE 311; ECE 394 ST: Conservation Principles, ECE 394 ST Properties that Matter. Prior or corequisite MAT 272

CHE 352 Transport Laboratories. (3) S
The demonstration of transport phenomena principles with experiments in fluid flow heat, and mass transfer. Prerequisites: CHE 332; ECE 300 Pre- or corequisite CHE 333. *General Studies: L*

CHE 432 Principles of Chemical Engineering Design. (3) F
Multicomponent distillation, engineering economics, equipment sizing and costs plant operation economics and simulation and optimization techniques Prerequisites: CHE 332 342

CHE 442 Chemical Reactor Design. (3) F S
Application of kinetics to chemical reactor design Prerequisite CHE 342 Pre- or corequisite: CHE 333

CHE 451 Chemical Engineering Laboratory. (2) F
Operation, control, and design of experimental and industrial process equipment Independent research projects 6 hours lab Prerequisites: CHE 333, 352, ECE 384

CHE 458 Semiconductor Material Processing. (3) N
Introduction to the processing and characterization of electronic materials for semiconductor applications. Prerequisites: CHE 333 342.

CHE 461 Process Control. (4) F
Process dynamics instrumentation and feedback applied to automatic process control. Lecture, lab. Prerequisite: ECE 394 ST Engineering Systems. *General Studies. CS.*

CHE 462 Process Design. (3) S
Application of economic principles to optimize equipment selection and design development and design of process systems. Prerequisites CHE 432, 442

CHE 474 Chemical Engineering Design for the Environment. (3) F
Conflict of processing materials and preserving the natural resources Students will understand/value the environment and attempt to control our impact. Prerequisites CHE 333 342

CHE 475 Biochemical Engineering. 3) N
Application of chemical engineering methods mass transfer, thermodynamics, and transport phenomena to industrial biotechnology Prerequisite instructor approval

CHE 476 Bioreaction Engineering. (3) N
Principles of analysis and design of reactors for processing with cells and other biological catalytic materials, applications of reaction engineering in biotechnology Prerequisite instructor approval

CHE 477 Bioseparation Processes. (3) N
Principles of separation of biological systems; the application scale up, and design of separation processes in biotechnology Prerequisite instructor approval

CHE 478 Industrial Water Quality Engineering. (3) F
Chemical treatment processing quality criteria and control, system design, and water pollutants. Prerequisites: CHE 331 senior standing

CHE 479 Air Quality Control. (3) F
Air pollutant control, effects and origins Chemical and physical processes, including combustion, control equipment design dispersion, and sampling Prerequisites CHE 331, senior standing

CHE 490 Chemical Engineering Projects. (1 5 F, S SS
Individual projects in chemical engineering operations and design. Prerequisite instructor approval

CHE 494 Special Topics. (1–4) F, S
(a Advanced Process Control. (3)
(b) Biotechnology Techniques. (3)

CHE 496 Professional Seminar. (1 3) F, S
Professional and ethical aspects with a discussion of responsibilities. Lecture field trips. Prerequisite: instructor approval

CHE 501 Introduction to Transport Phenomena. (3) F S
Transport phenomena with emphasis on fluid systems Prerequisite transition student with instructor approval

CHE 502 Introduction to Energy Transport. (3 F S
Continuation of transport principles with emphasis on energy transport in stationary and fluid systems Prerequisite transition student with instructor approval

CHE 503 Introduction to Mass Transport. (3) F, S
The application of transport phenomena to mass transfer The design of mass transfer equipment including staged processes Prerequisite transition student with instructor approval.

CHE 504 Introduction to Chemical Thermodynamics. (3) F, S
Energy relations and equilibrium conversions based on chemical potentials and phase equilibria Prerequisite. transition student with instructor approval

CHE 505 Introduction to Chemical Reactor Design. (3) F, S
Application of kinetics to chemical reactor design. Prerequisite transition student with instructor approval.

CHE 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.

CHE 528 Process Optimization Techniques. (3) S
Method for optimizing engineering processes. Experimental design and analysis; linear and nonlinear regression methods, classical search and dynamic programming algorithms

CHE 533 Transport Processes I. (3) F
Unified treatment of momentum, heat and mass transfer from molecular theory and continuum points of view. Continuum equations of microscopic and macroscopic systems and multicomponent and multiphase systems. Cross-listed as BME 533 Credit is allowed for only BME 533 or CHE 533

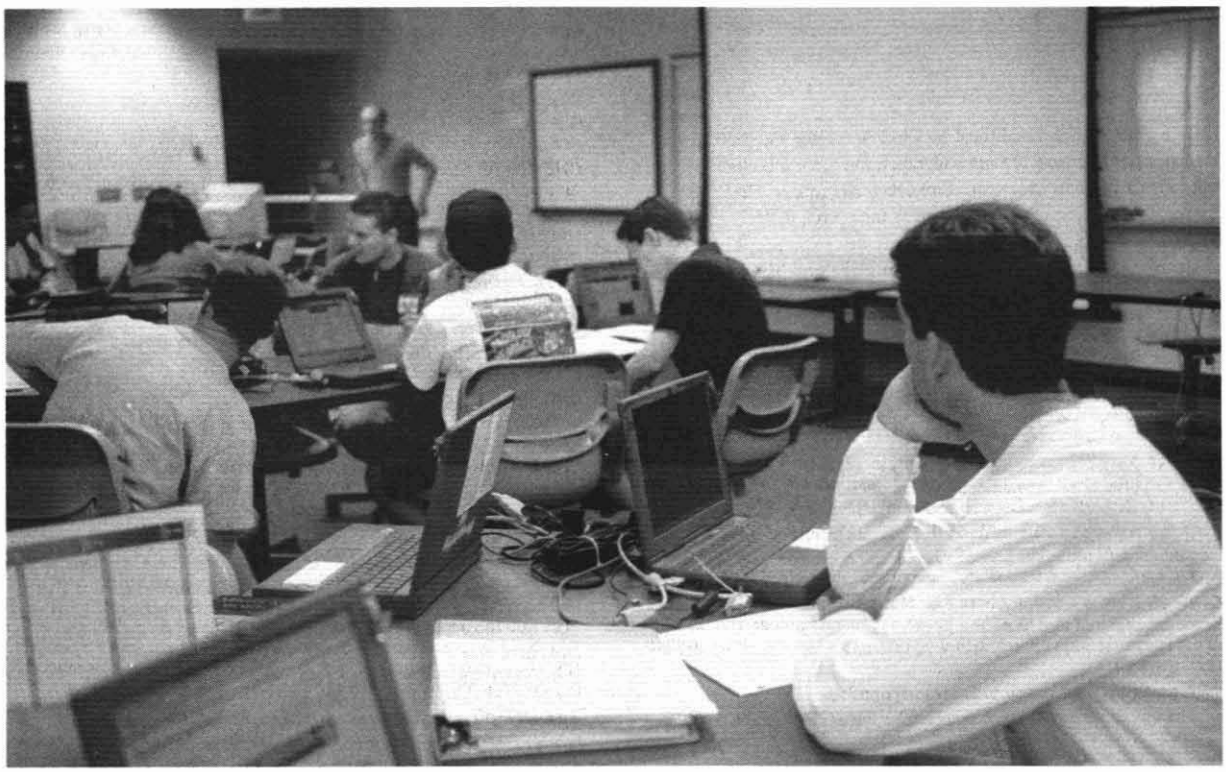
CHE 534 Transport Processes II. 3) S
Continuation of CHE/BME 533 emphasizing mass transfer. Cross-listed as BME 534 Credit is allowed for only BME 534 or CHE 534 Prerequisite BME/CHE 533

CHE 536 Convective Mass Transfer. 3) N
Turbulent flow for multicomponent systems, including chemical reactions with applications in separations and air pollution Prerequisite: CHE 533 or MAE 571

CHE 543 Thermodynamics of Chemical Systems. (3) F
Classical and statistical thermodynamics of nonideal physicochemical systems and processes, prediction of optimum operating conditions Cross listed as BME 543 Credit is allowed for only BME 543 or CHE 543

CHE 544 Chemical Reactor Engineering. (3) S
Reaction rates, thermodynamics and transport principles applied to the design and operation of chemical reactors Cross listed as BME 544 Credit is allowed for only BME 544 or CHE 544. Prerequisite: BME/CHE 543

CHE 548 Topics in Catalysis. (3) N
Engineering catalysis, emphasizing adsorption, kinetics characterization diffusional considerations, and reactor design Other topics include mechanisms, surface analyses and electronic structure



Faculty and programs geared toward producing professionals keep engineering students up-to-date with cutting-edge technology.

Tim Trumble photo

CHE 552 Industrial Water Quality Engineering. (3) N
Water pollutants, quality criteria and control, chemical treatment processing, and system design. Case studies. Prerequisite: CHE 331 or equivalent.

CHE 553 Air Quality Control. (3) N
Air pollutant origins, effects, and control. Physical and chemical processes, including dispersion, combustion, sampling, control equipment design, and special topics. Prerequisite: CHE 331 or equivalent.

CHE 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.

CHE 556 Separation Processes. (3) N
Topics in binary/multicomponent separation, rate governed and equilibration processes, mass transfer criteria, energy requirements, separating agents and devices, and staged operations.

CHE 558 Electronic Materials. (3) N
Processing and characterization of electronic materials for semiconductor type uses. Thermodynamics and transport phenomena, phase equilibria and structure, mass transfer, and diffusion and thermal properties.

CHE 561 Advanced Process Control. (3) S
Dynamic process representation, linear optimal control, optimal state reconstruction, and parameter and state estimation techniques for continuous and discrete time systems.

CHE 563 Chemical Engineering Design. (3) N
Computational methods; the design of chemical plants and processes.

MATERIALS SCIENCE AND ENGINEERING (MSE)

MSE 353 Introduction to Materials Processing and Synthesis. (3) F
Principles of materials structure and properties with emphasis on applications in bulk and thin film materials processing and synthesis. Prerequisites: CHM 116 and PHY 131 *or* equivalents.

MSE 354 Experiments in Materials Synthesis and Processing I. (2) S
Small groups of students complete three experiments selected from a list. Each is supervised by a selected faculty member. Lab. Prerequisite: MSE 353 or equivalent.

MSE 355 Introduction to Materials Science and Engineering. (3) F
Elements of the structure of metals and alloys, measurement of mechanical properties, and optical metallography. Lecture, lab, field trips. Prerequisite: CHM 114 or 116.

MSE 420 Physical Metallurgy. (3) F
Crystal structure and defects. Phase diagrams, metallography, solidification and casting, deformation, and annealing. Prerequisite: ECE 350.

MSE 421 Physical Metallurgy Laboratory. (1) S
Focuses on analysis of microstructure of metals and alloys and includes correlation with mechanical properties to some extent. Lab. Pre- or corequisite: MSE 420.

MSE 430 Thermodynamics of Materials. (3) S
Principles of statistical mechanics, statistical thermodynamics of single crystals, solutions, phase equilibrium, free energy of reactions, free electron theory, and thermodynamics of defects. Prerequisite: ECE 350.

MSE 431 Corrosion and Corrosion Control. (3) S
Introduction to corrosion mechanisms and methods of preventing corrosion. Topics include the following: electrochemistry, polarization, corrosion rates, oxidation, coatings, and cathodic protection. Prerequisite: ECE 350.

NOTE: For the General Studies requirement, courses, and codes (such as L, SQ, C, and H), see "General Studies," page 87. For graduation requirements, see "University Graduation Requirements," page 83. For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses," page 60.

MSE 440 Mechanical Properties of Solids. (3) S
Effects of env ronmenta and m crostructura var ab es of mechan ca properties, ncluding plast c deformat on, fatigue, creep, br tt e frac ture and nterna fr ct on. Prerequ s te ECE 350.

MSE 441 Analysis of Material Failures. 3) S
dentif'cat on of types of fai ures Ana yt ca techn ques Fractography SEM nondestruct ve nspection and meta ography Mechanical and e ectron c components Prerequ s te· ECE 350

MSE 450 X-ray and Electron Diffraction. (3) F
Fundamentals of X ray d ffraction transm'ss on e ectron m croscopy, and scann ng e ectron m croscopy Techniques for studying surfaces nternal m crostructures, and f uorescence. Lecture demonstrat ons Prerequ s te ECE 350

MSE 453 Experiments in Materials Synthesis and Processing II. (2) F
A continuation of MSE 354 w th emphas s on characterizat on Sma l groups comp ete three exper ments supervised by selected faculty members Lab Prerequ s tes MSE 353 and 354 *or* equ valents

MSE 454 Advanced Materials Processing and Synthesis. 3) S
Case stud es from publ shed l terature of current techn ques n materi als process ng and synthes s Student partic pat on n classroom presentations. Lecture, rec tation Prerequ s tes MSE 353 and 354 *or* equivalents

MSE 470 Polymers and Composites. (3) F
Re at onship between chem stry structure and properties of eng neer ng polymers. Des gn, properties, and behav or of fiber composite systems Cross 'sted as MAE 455 Cred t s a owed for on y MAE 455 or MSE 470 Prerequ s te ECE 350

MSE 471 Introduction to Ceramics. (3) F
Pnnc ples of structure and property re ations n ceram c materia s Process ng techn ques App cations in mechan ca , e ectron c, and superconduct'ng systems Prerequ s te. ECE 350

MSE 472 Integrated Circuit Materials Science. (3) N
Principles of mater a s sc ence app ied to sem conductor process ng and fabr cat on n meta s ceram cs, po ymers, and sem conductors Prerequ s te ECE 350

MSE 482 Materials Engineering Design. 3) F, S
Pr nciples of the des gn process. Feas b l ty and optim zat on Manufacturing processes materia s se ection fa lure analys s, and economics. Prerequ s tes ECE 313 350.

MSE 490 Capstone Design Project. (1–3 F, S
For sma groups n fundamenta or app ed aspects of eng neer ng mater a s emphas s on experimenta prob ems and design Prerequ - sites MSE 430, 440, 450

MSE 496 Professional Seminar. 1 3) F S
Profess onal and eth cal aspects w'th a d scuss on of respons b l ties Lectures, f e d trips. Prerequisite nstructor approval.

MSE 510 X-ray and Electron Diffraction. (3) F
Fundamentals of X ray d ffract on transm ss on e ectron m croscopy and scann ng e ectron m croscopy Techniques for study ng surfaces, nternal m'crostructures and f uorescence Lecture, demonstrations. Prerequ s te. trans tion student w th nstructor approval

MSE 511 Corrosion and Corrosion Control. (3) S
Introduct on to corros on mechan sms and methods of prevent ng corrosion Top cs nc ude the fol owing e ectrochem stry polar zation cor rosion rates ox dation coatings, and cathod c protection Prerequisite trans tion student w th nstructor approval

MSE 512 Analysis of Material Failures. 3) S
Ident fication of types of fai ures Analyt ca techn ques. Fractography SEM, nondestruct ve nspection and meta ography Mechanical and electron c components Prerequ s te· trans t on student with nstructor approva

MSE 513 Polymers and Composites. 3) F
Re at onship between chem stry, structure and propert es of engi neering po ymers. Design propert es, and behav or of f ber compos'te systems

MSE 514 Physical Metallurgy. (3) S
Crysta structure and defects Phase d'agrams metal ography, so dif cat'on and cast ng, and deformat on and annea ng Prerequ s te trans t on student w th nstructor approva

MSE 515 Thermodynamics of Materials. (3) N
Pnnc p es of stat st cal mechan cs, stat st ca thermodynam cs of sin- gle crystals, solut ons phase equi br um free energy of reactions, free e ectron theory and thermodynam cs of defects Prerequisite: transition student with instructor approval.

MSE 516 Mechanical Properties of Solids. (3) S
Effects of environmenta and microstructiona var ab es of mechan ca properties including plastic deformation fat gue, creep britt e frac ture and nternal friction Prerequisite trans tion student w th nstructor approval

MSE 517 Introduction to Ceramics. (3) F
Pr nciples of structure, property relations n ceram c materials Pro cess ng techniques. Appl cat'ons n mechanical, e ectron c, and super conduct ng systems Prerequ s te transit on student w th nstructor approval.

MSE 518 Integrated Circuits Materials Science. (3 N
Pr nc p es of materials science appl ed to sem conductor processing and fabr cation n metals ceramics, polymers and sem conductors. Prerequisite: transition student with instructor approval

MSE 519 Physical Metallurgy Laboratory. (1) S
Ana ysis of m crostructure of meta s and a oys and includes some correlation with mechanica propert es Lab Pre or corequ s te MSE 514.

MSE 520 Theory of Crystalline Solids. (3) F
An sotropic propert es of crysta s; tensor treatment of elastic mag netic electric and thermal properties and crystal ography of Martens - t c transformat ons

MSE 521 Defects In Crystalline Solids. (3) S
ntroduct on to the geometry, interact on, and equ ibrium between dislocations and point defects Re ations between defects and propert es wi be discussed. Prerequ s te ECE 350 or nstructor approva

MSE 530 Materials Thermodynamics and Kinetics. (3) S
Thermodynam cs of al oy systems d ffusion n so ds, kinetics of pre c pitat on and phase transformat ons n so ds Prerequisites: ECE 340, 350

MSE 540 Fracture, Fatigue, and Creep. (3) F
Relat onsh'p between microstructure and fracture fat gue and creep propert es of materials Env ronmenta effects and recent develop ments Current theories and experimenta results Prerequis te: MSE 440 or equiva ent

MSE 550 Advanced Materials Characterization. (3) N
Ana ytical nstrumentat'on for characterizat on of materia s SEM SIMS, Auger, ana ytical TEM, and other advanced research tech niques.

MSE 556 Electron Microscopy Laboratory. (3) F
Lab support for MSE 558. Cross listed as SEM 556. Credit s a lowed for on y MSE 556 or SEM 556. Pre- or corequisite MSE/SEM 558

MSE 557 Electron Microscopy Laboratory. (3) S
Lab support for MSE 559. Cross l sted as SEM 557 Credit s a lowed for on y MSE 557 or SEM 557. Pre- or corequisite: MSE/SEM 559

MSE 558 Electron Microscopy I. (3) F
M croanalys's of the structure and composit on of mater als us ng mages d ffract on and X-ray, and energy oss spectroscopy. Knowl edge of e ementary crystallography rec proca latt'ce, stereograph c project ons and complex variables is requ red. Cross sted as SEM 558 Cred t s a lowed for on y MSE 558 or SEM 558 Prerequ s te nstructor approval.

MSE 559 Electron Microscopy II. (3) S
M croanalys's of the structure and composit on of materia s us ng mages d ffract on, X-ray and energy loss spectroscopy Knowledge of e ementary crysta ography, reciproca att ce stereographic projec tions and complex var ables is requ red Cross isted as SEM 559. Cred t s allowed for on y MSE 559 or SEM 559 Prerequ s te: instruc- tor approval

MSE 560 Strengthening Mechanisms. (3 S
Deformat on of crysta ine mater a s Properties of d s ocations. Theo r es of stra n harden ng, so d so ution prec p tat on, and transforma- tion strengthening Prerequ s te ECE 350 or equivalent.

MSE 561 Phase Transformation in Solids. (3) N
Heterogeneous and homogeneous prec p tat on reactions, shear dis- p ac ve reactions, and order d sorder transformation

MSE 562 Ion Implantation. (3) S
nc udes defect product on and annea ing General zed treatment, nc ud ng on implantat on, neutron rradiat on damage and the inter act on of other incident beams. Prerequisite· MSE 450

MSE 570 Polymer Structure and Properties. (3) F
Re at'onsh ps between structure and propert es of synthetic po ymers inc ud ng g ass trans t on, molecu ar re axat ons crystal 'ne state v s- coelast c ty morphologica character zat on, and processing.

MSE 571 Ceramics. (3) A
Inc udes ceram c process ng, casting mold ng, f r ng, s nter ng crystal defects, and mechanical, electron c, and phys ca properties. Prereq uisites: MSE 521, 561.

MSE 573 Magnetic Materials. (3 A
Emphas s on ferromagnet c and ferr magnetic phenomena. Domains, magnet c an sotrophy, and magnetostr ct on Study of commercial magnet c materia s Prerequisite. MSE 520 or equ va ent

MSE 598 Special Topics. (3 A
(a) Growth and Process ng of Sem conductor Dev ces

Department of Civil and Environmental Engineering

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PROFESSORS
S. HOUSTON, W. HOUSTON, MAMLOUK, MAYS, RAJAN, S NGHAL, WITCZAK

ASSOCIATE PROFESSORS
ABBASZADEGAN, DUFFY, FAF TIS, FOX HINKS, JOHNSON MOBASHER

ASSISTANT PROFESSORS
MUCCINO, OWUSU-ANTW WESTERHOFF, ZHU

The civil engineering profession includes analysis, plan ning, design, construction, and maintenance of many types of facilities for government, commerce, industry, and the public domain. These facilities include high rise office tow ers, factories, schools, airports, tunnels and subway sys tems, dams, canals, and water purification and environmen tal protection facilities such as solid waste and wastewater treatment systems Civil engineers are concerned with the impact of their projects on the public and the environment, and they attempt to coordinate the needs of society with technical and economic feasibility

Career Opportunities in the Field. University graduates with the B.S E. degree in Civil Engineering readily find employment Civil engineers work in many different types of companies, from large corporations to small, private con sulting firms, or in governmental agencies. A civil engineer ing background is an excellent foundation for jobs in man agement and public service. Civil engineering is one of the best engineering professions from the viewpoint of interna-tional travel opportunities or for eventually establishing one's own consulting business

Uniqueness of the Program at ASU. The faculty in the Department of Civil and Environmental Engineering at ASU offer a challenging program of study designed to pro vide the student with the resources and background to pur sue a career in a wide range of specialty areas Some of these areas are structural, geotechnical, environmental and water resources, transportation and materials engineering. The Civil Engineering program is fully accredited by ABET With the program, students will be prepared for the Funda mentals of Engineering (FE) examination and professional registration.

The Department of Civil and Environmental Engineering offers challenging programs of study designed to provide students with the scientific and technical resources to pursue a broad and multifaceted range of careers.

Civil Engineering Areas of Study

Areas of study in the civil engineering curriculum are described below.

Environmental Engineering. This area of study includes the quality of air, water, and land resources; transport, use, and disposal of hazardous wastes; water and wastewater treatment, and water reuse

Geotechnical/Geoenvironmental Engineering. This area of study includes the analysis and design of foundation sys tems, seepage control, earthdams and water resource struc tures, earthwork operations, fluid flow through porous media, response of foundations and embankments to earth quakes, and solutions to environmental problems.

Structures/Materials Engineering. This area of study con siders the planning, analysis and design of steel and con-crete bridges, buildings, dams; special offshore and space structures; Portland cement concrete; composite materials, and structural retrofit of existing bridges.

Transportation/Materials Engineering. This area of study includes (1) transportation planning, design, and operation and (2) pavements and materials. Transportation planning, design, and operation covers urban transport planning, geo-metric design of facilities, traffic operations, evaluation of highway capacity and safety, and intelligent vehicle high way systems. Pavements and materials focus on pavement analysis and design; pavement maintenance and rehabilita-tion; pavement evaluation and management; characteriza tion of highway materials and durability of highway struc tures.

Water Resources Engineering. This area of study is con cerned with surface and groundwater flow, planning and management of water supply, and water distribution system modeling.

The undergraduate program provides an excellent back ground for entry to graduate study in engineering.

UNDERGRADUATE OPPORTUNITIES IN CIVIL AND ENVIRONMENTAL ENGINEERING

Students majoring in Civil Engineering have three choices.

1. the major without a concentration;
2. the major with a concentration in construction engi neering; and
3. the major with a concentration in environmental engineering.

NOTE: For the Genera Studies requ rement, courses and codes (such as L SQ C and H) see "Genera Stud es" page 87 For graduation requirements see Un vers ty Graduation Requ rements" page 83 For an exp anat on of add t ona omn bus courses offered but not l sted 'n th s catalog see "Class f cat on of Courses" page 60.

Civil Engineering. The B S E degree in Civil Engineering offers students a wide background on various areas of study within civil and environmental engineering The degree provides basic principles of environmental, geotechnical/geoenvironmental, structural/materials, transportation/materials, and water resources engineering Students have the option to select among a certain number of design and technical elective courses in their junior and senior years.

Civil Engineering with Construction Engineering Concentration. The B S.E. degree in Civil Engineering with a construction engineering concentration offers students basic principles of civil engineering with the option to concentrate on construction engineering The degree provides education based on the traditional engineering principles, construction materials and practice, quality control, and civil engineering project management.

Civil Engineering with Environmental Engineering Concentration. The B S E degree in Civil Engineering with an environmental engineering concentration offers students basic principles of civil engineering with the option to concentrate on environmental engineering The degree provides a multidisciplinary education based on the traditional engineering principles, chemistry, biology, and hydrogeology

CIVIL ENGINEERING—B.S.E.

The B.S.E. degree in Civil Engineering requires a minimum of 128 semester hours of course work A minimum of 50 upper division semester hours is required The minimum requirements are for a student who has successfully completed at least a year each) of high school chemistry, physics, computer programming; and precalculus, algebra, and trigonometry.

The B.S.E. degree program consists of the following categories·

Civil Engineering

First Year Composition	6
General Studies school requirements	54
Engineering core	19 20
Major	48–49
Total	128

Civil Engineering with Construction Engineering Concentration

First Year Con position	6
General Studies school requirements	54
Engineering core	20
Major	48
Total	128

Civil Engineering with Environmental Engineering Concentration

First Year Composition	6
General Studies school requirements	54
Engineering core	19
Major	49
Total	128

Graduation Requirements

In addition to fulfilling school and major requirements, majors must satisfy all university graduation requirements. See ' University Graduation Requirements," page 83.

Course Requirements. See "Degree Requirements," page 207, and "Course Requirements," page 207, for General Studies, school, and engineering core requirements

DEGREE REQUIREMENTS WITHOUT CONCENTRATION

Civil Engineering Core

Twenty seven hours are required Each sequence of the MAT courses and the ECE courses (excluding ECE 300, 351, and 380 must be completed with an average grade of "C" or higher before any 400 level CEE courses are taken Also, each sequence of the CEE courses, and the senior design and technical elective courses must be completed with an average grade of "C" or higher All are part of the CEE graduation requirement.

CEE	296	Civil Engineering Systems 3
CEE	315	Computer Methods for Civil Engineers 1
CEE	321	Structural Analysis and Design 4
CEE	34	Fluid Mechanics for Civil Engineers 4
CEE	35	Geotechnical Engineering 4
CEE	361	Introduction to Environmental Engineering 4
CEE	372	Transportation Engineering 4
ECE	380	Probability and Statistics for Engineering Problem Solving *CS* 3

Total 27

Civil Engineering Design Electives

Six semester hours from the following list are required.

CEE	423	Structural Design 3
CEE	441	Water Resources Engineering 3
CEE	452	Foundations 3
CEE	466	Sanitary Systems Design 3
CEE	475	Highway Geometric Design 3

Civil Engineering Technical Electives

Fifteen to 16 semester hours are required The design elective courses that have not been selected to satisfy the design electives requirement (see above) may be used as technical electives

A maximum of seven hours may be selected from outside civil engineering, with an advisor's approval. One of the following construction courses may be taken as a technical elective CON 341, 383, 495, and 496 Students must select technical electives from at least three different CEE areas of study

Environmental Engineering. This area includes water treatment, industrial and domestic waste treatment and disposal, public health engineering, and industrial hygiene.

CEE	362	Unit Operations in Environmental Engineering 3
CEE	466	Sanitary Systems Design 3
CHM	231	Elementary Organic Chemistry *SQ* 3
MIC	220	Biology of Microorganisms 3
		or MIC 205 Microbiology *SG* (3)
		and MIC 206 Microbiology Laboratory *SG* (1

Geotechnical/Geoenvironmental Engineering. This area includes assessment of engineering properties and design utilizing soils and rocks as engineering materials

CEE	452	Foundations 3

Structures/Materials Engineering. This area includes analysis and design of structures for buildings, bridges, space frames, and structural mechanics.

CEE 322 Steel Structures 3
CEE 323 Concrete Structures 3
CEE 423 Structural Design 3
CEE 432 Matrix and Computer Applications in Structural Engineering 3

Transportation/Materials Engineering. This area includes analysis and design of transportation facilities, transportation planning and economics, and transportation in the urban environment.

CEE 412 Pavement Analysis and Design 3
CEE 471 Intelligent Transportation Systems 3
CEE 475 Highway Geometric Design 3

Water Resources Engineering. This area includes planning and design of facilities for collection, storage and distribution of water, water systems management, and estimating availability of water resources.

CEE 440 Engineering Hydrology 3
CEE 441 Water Resources Engineering 3

Civil Engineering Program of Study
A Four-Year Sequence

First Year

First Semester

CHM 114 General Chemistry for Engineers *SQ* 4
ECE 100 Introduction to Engineering Design *CS* 4
ENG 101 First Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4

Total 15

Second Semester

CEE 296 Civil Engineering Systems 3
ENG 102 First-Year Composition 3
MAT 271 Calculus with Analytic Geometry II *MA* 4
PHY 121 University Physics I: Mechanics *SQ*[1] 3
PHY 122 University Physics Laboratory I *SQ* 1

Total 14

Second Year

First Semester

ECE 210 Engineering Mechanics I. Statics 3
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 274 Elementary Differential Equations *MA* 3
PHY 131 University Physics II: Electricity and Magnetism *SQ*[2] 3
PHY 132 University Physics Laboratory II *SQ*[2] 1
HU/SB or awareness area course[3] 3

Total 17

Second Semester

CEE 315 Computer Methods for Civil Engineers 1
ECE 312 Engineering Mechanics II Dynamics 3
ECE 313 Introduction to Deformable Solids 3
ECE 340 Thermodynamics 3
or ECE 301 Electrical Networks I (4)
ECE 384 Numerical Analysis for Engineers I 2
ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* (3)
Basic science elective 3

Total 18 19

Third Year

First Semester

CEE 321 Structural Analysis and Design 4
CEE 341 Fluid Mechanics for Civil Engineers 4
ECE 300 Intermediate Engineering Design *L* 3
ECE 351 Civil Engineering Materials 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3

Total 17

Second Semester

CEE 351 Geotechnical Engineering 4
CEE 361 Introduction to Environmental Engineering 4
CEE 372 Transportation Engineering 4
HU/SB or awareness area course[3] 3

Total 15

Fourth Year

First Semester

Design elective 3
HU SB and awareness area course(s)[3] 4
Technical electives 9

Total 16

Second Semester

CEE 486 Integrated Civil Engineering Design *L* 3
Design elective 3
HU/SB or awareness area course[3] 3
Technical electives 6–7

Total 15 16
Graduation requirement total 128

[1] Both PHY 121 and 122 must be taken to secure SQ credit.

[2] Both PHY 131 and 132 must be taken to secure SQ credit.

[3] Engineering students may not use aerospace studies (AES) or military science (MIS courses to fulfill HU or SB requirements.

A maximum of two graduate courses may be taken for undergraduate credit by students whose cumulative GPA is 3.00 or higher and with the approval of the instructor, advisor, department chair, and the dean of the college.

DEGREE REQUIREMENTS WITH ENVIRONMENTAL ENGINEERING CONCENTRATION

Environmental Engineering Core

See "Course Requirements," page 207, for General Studies, school, and engineering core requirements.

Thirty semester hours are required. Each sequence of the MAT courses and the ECE courses (excluding ECE 300, 351, and 380) must be completed with an average grade of "C" or higher before any CEE 400 level courses are taken. Also, each sequence of the environmental engineering core courses, and the senior design and technical courses must be completed with an average grade of "C" or higher. This is a CEE graduation requirement.

CEE 296 Civil Engineering Systems 3
CEE 315 Computer Methods for Civil Engineers 1

NOTE: For the General Studies requirement courses and codes (such as L SQ C and H), see "General Studies," page 87 For graduation requirements, see "University Graduation Requirements," page 83. For an explanation of additional omnibus courses offered but not listed in this catalog see "Classification of Courses," page 60

CEE 321 Structural Analysis and Design . 4
CEE 341 Fluid Mechanics for Civil Engineers . . 4
CEE 351 Geotechnical Engineering . . 4
CEE 361 Introduction to Environmental Engineering . . 4
CEE 372 Transportation Engineering . 4
CHM 341 Elementary Physical Chemistry 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3

Total . . . 30

Environmental Design Courses

CEE 441 Water Resources Engineering 3
CEE 466 Sanitary Systems Design. 3

Total 6

Environmental Technical Courses

BIO 320 Fundamentals of Ecology 3
or BCH 361 Principles of Biochemistry 3
or CHM 302 Environmental Chemistry 3
or PUP 442 Environmental Planning (3
or PUP 475 Environmental Impact Assessment (3
CEE 362 Unit Operations in Environmental Engineering. 3
CEE 440 Engineering Hydrology 3
MIC 205 Microbiology *SG* 3
MIC 206 Microbiology Laboratory *SG* 1

Total 13

Environmental Engineering Concentration
Program of Study
A Four-Year Sequence

First Year

First Semester

CHM 114 General Chemistry for Engineers *SQ* 4
ECE 100 Introduction to Engineering Design *CS* 4
ENG 101 First Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4

Total . . 15

Second Semester

CEE 296 Civil Engineering Systems 3
ENG 102 First Year Composition 3
MAT 271 Calculus with Analytic Geometry II *MA* 4
PHY 121 University Physics I Mechanics *SQ* 3
PHY 122 University Physics Laboratory I *SQ* . . 1

Total 14

Second Year

First Semester

ECE 210 Engineering Mechanics I. Statics. 3
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 274 Elementary Differential Equations *MA* 3
PHY 131 University Physics II. Electricity and Magnetism *SQ*. 3
PHY 132 University Physics Laboratory II *SQ* . 1
HU SB or awareness area course[3]. 3

Total 17

Second Semester

CEE 315 Computer Methods for Civil Engineers. 1
CHM 231 Elementary Organic Chemistry *SQ*. 3
ECE 312 Engineering Mechanics II: Dynamics . . . 3
ECE 313 Introduction to Deformable Solids . . 3
ECE 340 Thermodynamics 3
ECE 384 Numerical Analysis for Engineers I 2
ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principle *SB* 3

Total 18

Third Year

First Semester

CEE 321 Structural Analysis and Design 4
CEE 341 Fluid Mechanics for Civil Engineers 4
ECE 300 Intermediate Engineering Design *L* 3
ECE 351 Civil Engineering Materials 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3

Total 17

Second Semester

CEE 351 Geotechnical Engineering 4
CEE 361 Introduction to Environmental Engineering 4
CEE 372 Transportation Engineering 4
CHM 341 Elementary Physical Chemistry 3
HU SB or awareness area course[3]. 3

Total 18

Fourth Year

First Semester

CEE 362 Unit Operations in Environmental Engineering 3
CEE 440 Engineering Hydrology 3
CEE 466 Sanitary Systems Design 3
MIC 205 Microbiology *SG* 3
MIC 206 Microbiology Laboratory *SG* 1
HU SB and awareness area course[3] 4

Total. 17

Second Semester

BIO 320 Fundamentals of Ecology 3
or BCH 361 Principles of Biochemistry 3)
or CHM 302 Environmental Chemistry 3)
or PUP 442 Environmental Planning (3
or PUP 475 Environmental Impact Assessment 3)
CEE 441 Water Resources Engineering 3
CEE 486 Integrated Civil Engineering Design *L*. 3
HU SB or awareness area course 3

Total 12
Graduation requirement total 128

Both PHY 121 and 122 must be taken to secure SQ credit

Both PHY 131 and 132 must be taken to secure SQ credit

Engineering students may not use aerospace studies (AES) or military science (MIS) courses to fulfill HU or SB requirements

A maximum of two graduate courses may be taken for undergraduate credit by students whose cumulative GPA is 3.00 or higher and with the approval of the instructor, advisor, department chair, and the dean of the college

DEGREE REQUIREMENTS WITH CONSTRUCTION ENGINEERING CONCENTRATION

Construction Engineering Core

See "Degree Requirements," page 197, for General Studies, school, and engineering core requirements.

Twenty-seven semester hours are required. Each sequence of the MAT courses and the ECE courses (excluding ECE 300, 351, and 380) must be completed with an average grade of "C" or higher before any CEE 400 level courses are taken. Also, each sequence of the construction engineering core courses and the senior design and technical courses must be completed with an average grade of "C" or higher. This is a CEE graduation requirement

CEE 296 Civil Engineering Systems 3
CEE 315 Computer Methods for Civil Engineers 1

CEE 321 Structural Analysis and Design 4
CEE 341 Fluid Mechanics for Civil Engineers . . . 4
CEE 351 Geotechnical Engineering . . . 4
CEE 361 Introduction to Environmental Engineering . . . 4
CEE 372 Transportation Engineering . . . 4
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* . . . 3

Total . . . 27

Construction Engineering Design Courses

CEE 322 Steel Structures . . . 3
CEE 452 Foundations . . . 3

Total . . . 6

Construction Engineering Technical Courses

CEE 323 Concrete Structures . . . 3
CEE 481 Civil Engineering Project Management . . . 3
CEE 483 Highway Materials, Construction, and Quality . . . 3
CON 341 Surveying . . . 3
CON 496 Construction Contract Administration *L* . . . 3

Total . . . 15

Construction Engineering Concentration
Program of Study
A Four-Year Sequence

First Year

First Semester

CHM 114 General Chemistry for Engineers *SQ* . . . 4
or CHM 116 General Chemistry *SQ* (4)
ECE 100 Introduction to Engineering Design *CS* . . . 4
ENG 101 First Year Composition . . . 3
MAT 270 Calculus with Analytic Geometry I *MA* . . . 4

Total . . . 15

Second Semester

CEE 296 Civil Engineering Systems . . . 3
ENG 102 First Year Composition . . . 3
MAT 271 Calculus with Analytic Geometry II *MA* . . . 4
PHY 121 University Physics I Mechanics *SQ* . . . 3
PHY 122 University Physics Laboratory I *SQ*[1] . . . 1

Total . . . 14

Second Year

First Semester

ECE 210 Engineering Mechanics I: Statics . . . 3
MAT 272 Calculus with Analytic Geometry III *MA* . . . 4
MAT 274 Elementary Differential Equations *MA* . . . 3
PHY 131 University Physics II: Electricity and Magnetism *SQ*[2] . . . 3
PHY 132 University Physics Laboratory II *SQ*[2] . . . 1
HU SB or awareness area course[3] . . . 3

Total . . . 17

Second Semester

CEE 315 Computer Methods for Civil Engineers . . . 1
ECE 301 Electrical Networks I . . . 4
ECE 312 Engineering Mechanics II. Dynamics . . . 3
ECE 313 Introduction to Deformable Solids . . . 3
ECE 384 Numerical Analysis for Engineers I . . . 2
ECN 111 Macroeconomic Principles *SB* . . . 3
or ECN 112 Microeconomic Principles *SB* (3)
Basic science elective . . . 3

Total . . . 19

Third Year

First Semester

CEE 321 Structural Analysis and Design . . . 4
CEE 341 Fluid Mechanics for Civil Engineers . . . 4
ECE 300 Intermediate Engineering Design *L* . . . 3
ECE 351 Civil Engineering Materials . . . 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* . . . 3

Total . . . 17

Second Semester

CEE 351 Geotechnical Engineering . . . 4
CEE 361 Introduction to Environmental Engineering . . . 4
CEE 372 Transportation Engineering . . . 4
HU SB or awareness area course[3] . . . 3

Total . . . 15

Fourth Year

First Semester

CEE 322 Steel Structures . . . 3
CEE 452 Foundations . . . 3
CEE 481 Civil Engineering Project Management . . . 3
CON 341 Surveying . . . 3
HU/SB and awareness area course(s) . . . 4

Total . . . 16

Second Semester

CEE 323 Concrete Structures . . . 3
CEE 483 Highway Materials, Construction, and Quality . . . 3
CEE 486 Integrated Civil Engineering Design *L* . . . 3
CON 496 Construction Contract Administration *L* . . . 3
HU/SB or awareness area course . . . 3

Total . . . 15
Graduation requirement total . . . 128

[1] Both PHY 121 and 122 must be taken to secure SQ credit

[2] Both PHY 131 and 132 must be taken to secure SQ credit

[3] Engineering students may not use aerospace studies (AES) or military science (MIS courses to fulfill HU or SB requirements. Students should consider the following list of electives to enhance communication and management skills: COM 100, 110, and 320 and PUP 100 and 200.

A maximum of two graduate courses may be taken for undergraduate credit by students whose cumulative GPA is 3 00 or higher and with the approval of the instructor, advisor, department chair, and the dean of the college.

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 concentration B of the School of Architecture.

CIVIL AND ENVIRONMENTAL ENGINEERING (CEE)

CEE 296 Civil Engineering Systems. (3) F S
Introduction to civil engineering. Problem solving, economics, description of civil engineering systems, design concepts, ethics, and professional responsibilities. Lecture, field trips. Pre- or corequisite: ECE 100.

NOTE: For the General Studies requirement, courses, and codes (such as L, SQ, C and H), see "General Studies" page 87. For graduation requirements see "University Graduation Requirements" page 83 For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses," page 60

CEE 310 Testing of Materials for Construction. 3) F S
Structura and behav ora characterist cs eng neer ng propert es measurements and appl cat on of construct on mater a s Lecture, ab Not open to eng neer ng students Prerequ site: CON 323.

CEE 315 Computer Methods for Civil Engineers. 1 F S
Deve pment f computer programs in a h gh eve language to so ve c v eng neer ng problems. Lecture, ab. Pre or corequisite: ECE 384.

CEE 321 Structural Analysis and Design. 4 F, S
Statica ly determ nate and ndeterm nate structures (trusses beams and frames by class ca and matr x meth ds ntroduct on to structura des gn Lecture rec tation Prerequ s tes ECE 312, 313. Pre or c requ s tes ECE 380 384

CEE 322 Steel Structures. 3) F
Behav or of structura components and systems. Des gn of stee mem bers and connect ons Load and res stance factor des gn methods. Lecture rec tat on Prerequis te CEE 321

CEE 323 Concrete Structures. 3 S
Behav or of concrete structures and the des gn f re nforced and pre stressed concrete members, nclud ng foot ngs Part a des gn of con crete bu d ng system Lecture recitat on Prerequ s te CEE 321.

CEE 340 Hydraulics and Hydrology. 3 F, S
App cat on of hydrau ic eng neer ng pr nc p es to flow f 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 stu dents Lecture ab. Prerequ s te CON 221

CEE 341 Fluid Mechanics for Civil Engineers. (4) F S
Fundamenta pr nc p es and methods of flu d mechan cs form ng the ana yt ca basis for water resources eng neer ng Condu t and open channel f ow. 3 hours ecture 1 hour ab Prerequis tes ECE 312 313 Pre or corequ s tes· ECE 380 384

CEE 351 Geotechnical Engineering. 4 F S
Index propert es and eng neer ng character stics of so s Compaction permeab ty and seepage, compress b ity and sett ement, and shear strength. Lecture, tab Prerequ s tes ECE 312, 313 Pre or corequ s tes ECE 380 384

CEE 361 Introduction to Environmental Engineering. (4) F S
Concepts of a r and water po ut on; env ronmenta regu at on risk assessment chem stry, water qual ty mode ng, water and wastewater treatment systems des gns Lecture ab. Prerequ s tes ECE 312, 313 Pre- or corequisites ECE 380 384

CEE 362 Unit Operations in Environmental Engineering. 3 S
Des gn and operat on of un't processes for water and wastewater treatment Prerequ s te CEE 361.

CEE 372 Transportation Engineering. 4) F S
H ghway ra , water and a r transportat on Operat onal character st cs and traff c contro dev ces of each transport mode mpact on urban form Prerequ s tes: ECE 312 313 Pre or corequ s tes ECE 380, 384.

CEE 412 Pavement Analysis and Design. 3 F
Des gn of f exib e and r g d pavements for h ghways and airports Sur face base, and subgrade courses Cost ana ys s and pavement se ec t on Prerequ'sites CEE 351, ECE 351

CEE 423 Structural Design. 3) F
Ana ysis and des gn of re nforced concrete stee masonry and t mber structures Lecture ab Prerequ s te CEE 323. Pre or corequ s te CEE 322

CEE 432 Matrix and Computer Applications 'n Structural Engineering. (3 S
Matr x and computer app cat ons to structural engineer ng and struc tura mechan cs St ffness and f ex bi ty methods, f n te e ements and d fferences. Prerequ s te. CEE 321.

CEE 440 Engineering Hydrology. (3) F
Descr pt ve hydro ogy hydrolog c cyc e mode s and systems Ra n runoff mode s Hydro og c des gn Concepts propert es and bas c equat'ons of groundwater f ow Prerequ site CEE 341

CEE 441 Water Resources Engineering. 3 S
App cation of the prin p es of hydrau cs and hydro ogy to the engi neering of water resources projects; des gn and operat on of water resources systems water qua ity. Prerequ s te. CEE 341.

CEE 450 Soil Mechanics in Construct on. (3 F S
So mechan cs as app ed to the construct on f e d nc ud ng founda tions, h ghways reta n ng wa s, and s ope stab ty. Relat onsh p between soi characterist cs and geo og c format ons. Not open to engineer ng students Lecture ab. Prerequ s te: CON 323

CEE 452 Foundations. 3) F
App cat ons of so l mechan cs to foundat on systems bear ng capac ty latera earth pressure and s ope stab ity. Prerequ site. CEE 351.

CEE 466 Sanitary Systems Design. 3 F
Capacity, plann ng and des'gn of water supp y domest c and storm dra nage and so d waste systems Prerequ s te. CEE 361

CEE 471 Intelligent Transportation Systems. 3 N
App cat on of advanced techno ogy to the veh c e and the roadway to so ve traff c congest on, safety, and a r qua ty prob ems Prerequisite CEE 372 or nstructor appr va

CEE 475 Highway Geometric Design. 3) S
Des gn of the visib e elements of the roadway Fundamenta des gn contro s with app cat on to rural roads at grade intersect ons free ways and nterchanges Lecture rec tat on. Prerequis te CEE 372

CEE 481 Civil Engineering Project Management. (3 A
C v l eng neer ng project management and adm n strat on, p ann ng and schedu ng, c st est mat ng and b dd ng strateg es f nanc a man agement qua ty contro and safety and computer appl cat ons Lec ture fie d tr p Prerequ s tes CEE 321, 351, 372.

CEE 483 Highway Materials, Construction, and Quality. (3) A
Properties of h ghway mater a s nc ud ng aggregates, aspha t con crete, and port and cement concrete construct on pract ce, material de very p acement and compact on qua ty contro Lecture, f e d tr p Prerequ s tes CEE 321, 351 372, ECE 351 380

CEE 486 Integrated Civil Engineering Design. (3) F S
Students are requ red to comp ete a civi eng neer ng des gn n a s m- u ated pract c ng eng neer ng env ronment Lecture, team earn ng L m ted to undergraduates n the r f na semester Prerequ s tes CEE 321 341 351, 361, 372. *General Stud es L*

CEE 512 Pavement Performance and Management. (3) S
Pavement management systems nc ud ng data col ect on, eva uat on, opt mizat on econom c ana ys s and computer appl cat ons for h gh way and airport des gn Prerequ s te nstructor approva

CEE 514 Bituminous Materials and Mixture. (3) F
Types of b tum nous materia s used n pavement m xtures Chem cal compos tion phys ca propert es, des rable aggregate characterist cs opt mum asphalt contents superpave asphalt binder m xture des gn Lecture ab Prerequ s te ECE 351

CEE 515 Properties of Concrete. 3 S
Materia s science of concrete Cement chem stry mechan sms of hydrat on, interre at onships among m cro and macro propert es of cement-based mater a s Mechan ca propert es fa ure theories, frac ture mechan cs of concrete mater a s. Cement-based compos te mater a s and the durab ty aspects Lecture lab Prerequ s te ECE 350 or 351

CEE 521 Stress Analysis. 3 F
Advanced top cs n the ana ytica determ nat on of stress and stra n. Prerequ s te CEE 321

CEE 524 Advanced Steel Structures. (3) F
Strength propert es of stee and the r effects on structura behav r E ast c des'gn of stee structures P ast c ana ys s and des gn of beams frames and bents. Plast c def ect ons P ast c des gn requ re ments Mu tistory bu dings Prerequ s te CEE 322

CEE 526 Finite Element Methods in Civil Eng neering. (3) F
F n te e ement formu at on for so utions of structural, geotechnica , and hydrau ic prob ems. Prerequ site CEE 432

CEE 527 Advanced Concrete Structures. 3 N
Ult mate strength des gn. Comb ned shear and tors on. Serv ceab l ty Plast c ana ys s Spec a systems Prerequ s te CEE 323

CEE 530 Prestressed Concrete. 3) N
Mater als and methods of prestress ng Ana ysis and des gn for f ex ure shear and tors on Prestress osses due to fr ct on creep, shr nk age and anchorage set Stat cal y ndeterm nate structures. Des gn of f at slabs, bridges and compos te beams Prerequ s te CEE 323

CEE 533 Structural Optimization. (3) N
L near and non near programm ng Prob em formulat on. Constra ned and unconstra ned opt m zat on Sensit v ty ana ys s Approx mate techn ques FEM based opt mal des gn of mechan ca and aerospace structures Cross sted as MAE 521. Cred t s a owed for only CEE 533 or MAE 521 Prerequ s te. nstructor approva

CEE 536 Structural Dynamics. (3 N
Structures and structura members subjected to dynam c oad ngs response spectra theory app cations to br dges and p wer p ants nvest gat'ons of the responses of mu t degree of freedom structures and matr x and numerical methods of ana ys s. Lecture, rec tat on Prerequ s tes CEE 321 nstructor approva

CEE 537 Topics in Structural Engineering. 1 3) N
Advanced top cs nc ud ng non inear structura ana ys s exper menta stress analys's, advanced finite elements, plast c ty and v scoelest c ty compos tes and damage mechanics. Prerequ s te 'nstructor approval

CEE 540 Groundwater Hydrology. 3 F
Phys cal properties of aqu fers, we l pump ng, subsurface f ow mode ng unsaturated f ow, numer cal methods land subsidence and groundwater pol ution Prerequ s te. CEE 440 or instructor approval.

CEE 541 Surface Water Hydrology. (3) S
Hydro og c cyc e and mechan sms nc ud ng prec p'tat on evapora tion and transpiration hydrograph analys s f ood rout ng· stat stical methods n hydro ogy and hydrolog c design Prerequisite CEE 440 or nstructor approva

CEE 543 Water Resources Systems. (3) F
Theory and appl cat on of quant tat ve p ann ng methodo og es for the des gn and operat on of water resources systems c ass projects us ng a computer, case stud es Pre or corequ s te instructor approval.

CEE 546 Free Surface Hydraulics. (3) S
Derivat on of 1-dimensiona equat ons used n open channe f ow ana ys s computat ons for un form and nonuniform flows unsteady f ow and f ood rout ng Mathemat cal and physica mode s Prerequ s te CEE 341.

CEE 547 Principles of River Engineering. (3) N
Uses of r vers study of watershed, and channe processes Sed ment sources, y e d and contro hydro og c ana ys s Case studies Prereq uis'te· CEE 341 or nstructor approva

CEE 548 Sedimentation Engineering. (3) N
Introduction to the transportation of granu ar sed mentary mater a s by mov ng f u ds Degradat on, aggregat on, and oca scour n a tuv al channels Mathematica and phys ca models Prerequ s te CEE 547 or instructor approval.

CEE 550 Soil Behavior. (3) N
Phys cochem cal aspects of so behav or, stabi zat on of so s, and eng neering propert es of soi s. Prerequisite: CEE 351.

CEE 551 Advanced Geotechnical Testing. 3) N
Odometer tr ax a (static and cyc c) back pressure saturated and unsaturated samp es pore pressure measurements, closed oop computer contro led testing in-s tu test ng and samp ng. Lecture lab. Prerequ s te CEE 351

CEE 552 Geological Engineering. (3 N
Geo og'ca nvest gat ons for eng neering purposes case h stor es geo og c structure, weather ng, remote sens ng, geophys cs, and a r photo interpretation for eng neer'ng site locations. Lecture, f e d tr ps Prerequ s te CEE 351

CEE 553 Advanced Soil Mechanics. (3) N
App ication of theories of e ast c ty and p ast c ty to so s theor es of consol dat on, fai ure theories, and response to static and dynam c load ng Prerequ s te. CEE 351

CEE 554 Shear Strength and Slope Stability. 3) N
Shear strength of saturated and unsaturated so s strength deforma t on relat onships, t me dependent strength parameters effects of samp ng and advanced s ope stab ty Prerequisite CEE 351

CEE 555 Advanced Foundations. 3) N
Deep foundations, braced excavat ons anchored bu kheads rein forced earth and underp nn ng Prereq s te CEE 351.

CEE 557 Hazardous Waste: Site Assessment and Mitigation Measures. (3 N
Techn ques for hazardous waste s te assessment and m t gat on Case h stor es presented by instructor and guest speakers Prerequ s tes graduate stand'ng nstructor approva .

CEE 559 Earthquake Engineering. (3) N
Characterist cs of earthquake mot ons se ect on of design earth quakes s te response analyses se sm c s ope stab ty and quefac tion Prerequ s te CEE 351

CEE 560 Soi and Groundwater Remediation. 3) F
Techniques for remed at on of contaminated soi s and groundwaters are presented w th bas c engineer ng pr nc p es Prerequ s te· instruc t r approva.

CEE 561 Physical-Chemical Treatment of Water and Waste. (3) F
Theory and design of phys ca and chem cal processes for the treat ment of water and waste waters. Prerequ site CEE 361.

CEE 562 Environmental Biochemistry and Waste Treatment. (3) S
Theory and des gn of b o g ca waste treatment systems. Po lut on and env ronmenta ass m at on of wastes Prerequ site CEE 362

CEE 563 Environmental Chemistry Laboratory. (3) F
Ana ys s of water domest c and ndustr a wastes aboratory proce- dures for po ut on eva uat on and the contro of water and waste treat- ment processes Lecture, lab Prerequisite CEE 361

CEE 565 Modeling and Assessment of Aquatic Systems. (3) N
Deve opment of pred ctive models of water qua ty, methods to assess env ronmenta impacts app cat ons to water qua ty management Prerequis te· CEE 361 r nstructor approva

CEE 566 Industrial Hazardous Waste Treatment. (3) N
Emphas s on treatment of oca industr al/hazardous waste problems nc ud ng so vent recovery and meta s Lecture project. Prerequisites CEE 561, 563

CEE 573 Traffic Engineering. (3 N
Dr ver, veh c e and roadway character stics aws and ordinances traff c contro devices, traff c eng neer ng stud es, and Transportat on System Management measures Prerequ s te CEE 372

CEE 574 Highway Capacity. 3) N
H ghway capac ty for a functiona classes of highways Traffic signa - zation nc ud ng traff c stud es warrants, cyc e ength t m ng phas ng and coord nat on Prerequisite· CEE 372.

CEE 575 Traffic Flow Theory and Safety Analysis. 3) N
Traff c f ow theory d str but ons queuing de ay mode s, and car fo ow ng. H ghway safety· acc dent records systems accident analys s, dent fy ng prob em locat ons, and acc dent countermeasures Prereq u s te CEE 573 or 574

CEE 577 Urban Transportation Planning. (3 N
App cat on of and use parameters traff c generat on theory traff'c d s tr but on and ass gnment mode s trans t ana ysis and econom c fac tors to the solut on of the urban transportat on problem. Prerequ s te CEE 372

CEE 580 Practicum. (1 12) N

CEE 590 Reading and Conference. 1 12) N

CEE 592 Research. (1 12) N

CEE 599 Thesis. 1 12 N

CEE 792 Research. 1 15) N

CEE 799 Dissertation. (1 15 N

Students enrolled 'n CEE 580 590 592 599, 792, and 799 are requ'red to attend graduate student seminars at the t mes shown in the Schedu e of Classes *Each semester every graduate student enrolled for more than e ght semester hours s to enro l for at east one semester hour of CEE 592 599 792 or 799*

NOTE: For the Genera Stud es requ rement, courses and codes such as L SQ C and H , see "General Stud es," page 87 For graduation requ rements see "Un vers ty Graduat on Requirements page 83 For an exp anat on of add t onal omn bus courses offered but not i sted n th s cata og see "C ass f'cation of Courses, page 60

Department of Computer Science and Engineering

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PROFESSORS
ASHCROFT, COLLOFELLO, FARIN, GOLSHAN , LEWIS, NIELSON, TSAI, J. URBAN, YAU

ASSOCIATE PROFESSORS
BARAL, BHATTCHARYA, DASGUPTA, DIETRICH FALTZ, GHOSH, HUEY, KAMBHAMPATI, LINDQUIST, LIU, M LLER, O'GRADY, PANCHANATHAN, PHEANIS, SEN, S. URBAN

ASSISTANT PROFESSORS
BAZZI, CANDAN, CHALASAN , G. GANNOD, RICHA, WAGNER

LECTURERS
DeLIBERO B. GANNOD, R. HOUSTON, NAVAB , THURMAN, WH TEHOUSE

Computers have a significant impact on our daily lives, and this impact is likely to be even greater in the future as computer professionals continue to develop more powerful, smaller, faster, and less expensive computing systems. Computer science and computer engineering deal with the study, design, development, construction, and application of modern computing machinery. Other important topics include computing techniques and appropriate languages for general information processing, for scientific computa tion, for the recognition, storage, retrieval, and processing of data of all kinds, and for the automatic control and simu lation of processes.

The curricula offered by the Department of Computer Science and Engineering prepare the student to be a partici pant in this rapidly changing area of technology by presenting in depth treatments of the fundamentals of computer science and computer engineering. The department offers two undergraduate degrees· a B.S. degree in Computer Science and a B.S.E. degree in Computer Systems Engineering.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is required for the B.S. degree in Computer Science and the B.S.E. degree in Computer Systems Engineering. A minimum of 50 upper-division semester hours is required. In addition to the requirement for a cumulative GPA of 2 00 or higher, all computer science and computer systems engineering students must obtain a minimum grade of "C" in all CSE courses used for degree credit.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, majors must satisfy all university graduation requirements. See "University Graduation Requirements," page 83

DEGREES

Computer Science—B.S.

The faculty in the Department of Computer Science and Engineering offer a B.S. degree that prepares the student for a career in computer science. A student pursuing a B.S degree must complete the First Year Composition requirement, the General Studies requirement, department degree requirements, the computer science core courses, a senior level breadth requirement in the major, technical electives, and unrestricted electives. For more information, contact the department office, refer to the department Web site, or e mail questions to cse ugrad.desk@asu.edu

The following list specifies departmental requirements for the B.S. degree in Computer Science.

First-Year Composition

Choose among the course combinations below 6
- ENG 101 First Year Composition (3)
- ENG 102 First Year Composition (3)

or

- ENG 105 Advanced First Year Composition (3
- Elective chosen with an advisor (3)

or

- ENG 107 English for Foreign Students 3
- ENG 108 English for Foreign Students (3)

Total 6

General Studies/Department Requirements

Humanities and Fine Arts Social and Behavic ral Sciences
HU SB electives 18

Literacy and Critical Inquiry
L elective..... 3
ECE 400 Engineering Comn unications *L* 3
or approved CSE *L* course 3)

Total 6

Natural Sciences Basic Scien es
PHY 121 University Physics I Mechanics *SQ* 3
PHY 122 University Physics Laboratory I *SQ* 1
PHY 131 University Physics II: Electricity and Magnetism *SQ*- 3
PHY 132 University Phys cs Laboratory II *SQ*[2] 1
Science elective[3]..... .4

Total 12

Numeracy Mathematics
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
MAT 243 Discrete Mathematical Structures 3
MAT 270 Calculus with Analytic Geometry I *MA*. 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA*.. 4
MAT 342 Linear Algebra 3

Total 21
General Studies department requirement total. 57

Computer Science Core

CSE 120 Digital Design Fundamentals 3
CSE 200 Concepts of Computer Science. 3
CSE 210 Object Oriented Design and Data Structures *CS* 3
CSE 225 Assembly Language Programming and Microprocessors (Motorola) 4
or CSE 226 Assembly Language Programming and Microprocessors (Inte) (4
CSE 240 Introduction to Programming Languages 3
CSE 310 Data Structures and Algorithms 3
CSE 330 Computer Organization and Architecture 3

CSE 340 Principles of Programming Languages 3
CSE 355 Introduction to Theoretical Computer Science 3
CSE 360 Introduction to Software Engineering 3
CSE 430 Operating Systems 3

Total computer science core 34

400 level CSE computer science breadth requirement . . . 18
Technical electives[4] 6
Unrestricted electives 7

Total 31
Degree requirements total 128

Both PHY 121 and 122 must be taken to secure SQ credit

Both PHY 131 and 132 must be taken to secure SQ credit

This elective may be satisfied by any physics courses requiring PHY 131 as a prerequisite or any laboratory science for majors in the discipline and satisfying the SQ General Studies requirement (except PHS 110 See an advisor for approved listing.

[4] Each student must complete six hours of courses chosen from the computer science technical elective list and approved by the student's advisor

Computer Science
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CSE 200 Concepts of Computer Science *CS* 3
ENG 101 First Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
HU SB or awareness area course 3
Unrestricted elective 3

Total 16

Second Semester

CSE 120 Digital Design Fundamentals 3
CSE 210 Object Oriented Design and Data Structures *CS* 3
ENG 102 First Year Composition 3
MAT 271 Calculus with Analytic Geometry II *MA* 4
Unrestricted elective 4

Total 17

Second Year

First Semester

CSE 240 Introduction to Programming Languages 3
MAT 243 Discrete Mathematical Structures 3
MAT 272 Calculus with Analytic Geometry III *MA* 4
PHY 121 University Physics I: Mechanics *SQ* 3
PHY 122 University Physics Laboratory I *SQ* 1
HU SB or awareness area course 3

Total 17

Second Semester

CSE 225 Assembly Language Programming and Microprocessors Motorola 4
or CSE 226 Assembly Language Programing and Microprocessors Intel 4
CSE 310 Data Structures and Algorithms 3
PHY 131 University Physics II. Electricity and Magnetism *SQ*[3] 3
PHY 132 University Physics Laboratory II *SQ*[3] 1
HU SB or awareness area course 3
L elective 3

Total 17

Third Year

First Semester

CSE 330 Computer Organization and Architecture 3
CSE 340 Principles of Programming Languages 3
MAT 342 Linear Algebra 3
HU SB or awareness area course 3
Laboratory science for engineering majors *SQ*[4] 4

Total 16

Second Semester

CSE 355 Introduction to Theoretical Computer Science . 3
CSE 360 Introduction to Software Engineering . . 3
CSE 430 Operating Systems 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
HU SB or awareness area course 3

Total 15

Fourth Year

First Semester

ECE 400 Engineering Communications *L* 3
or approved CSE L course (3
Technical elective 3
400 level CSE computer science breadth electives . . . 9

Total 15

Second Semester

400 level CSE computer science breadth electives 9
HU SB or awareness area course 3
Technical elective 3

Total 15

Engineering students may not use aerospace studies (AES) or military science MIS) courses to fulfill HU and SB requirements

Both PHY 121 and 122 must be taken to secure SQ credit

[3] Both PHY 131 and 132 must be taken to secure SQ credit.

[4] This elective may be satisfied by any physics courses requiring PHY 131 as a prerequisite or any laboratory science for majors in the discipline and satisfying the SQ General Studies requirement except PHS 110). See an advisor for approved listing

Computer Systems Engineering—B.S.E.

The Department of Computer Science and Engineering offers a B.S E degree that prepares the student for a career in computer systems engineering. This degree program provides training in both engineering and computer science. The following list specifies departmental requirements for the B S E. degree in Computer Systems Engineering.

First-Year Composition

Choose among the course combinations below 6
ENG 101 First Year Composition (3
ENG 102 First Year Composition (3
—or
ENG 105 Advanced First-Year Composition (3)
Elective chosen with an advisor 3

NOTE: For the General Studies requirement, courses and codes (such as L, SQ, C and H) see "General Studies" page 87. For graduation requirements see University Graduation Requirements" page 83 For an explanation of additional omnibus courses offered but not listed in this catalog see "Classification of Courses," page 60

or

ENG 107 English for Foreign Students (3
ENG 108 English for Foreign Students (3)

Total 6

General Studies/Department Requirements

Humanities and Fine Arts/Social and Behavioral Sciences
ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* (3
HU and SB electives 13

Total 16

Literacy and Critical Inquiry
CSE 423 Microcomputer System Hardware *L* 3
or CSE 438 Systems Programming *L* (3)
ECE 300 Intermediate Engineering Design *L* 3

Total 6

Natural Sciences/Basic Sciences
CHM 114 General Chemistry for Engineers *SQ* 4
or CHM 116 General Chemistry *SQ* (4)
PHY 121 University Physics I Mechanics *SQ* 3
PHY 122 University Physics Laboratory I *SQ* 1
PHY 131 University Physics II: Electricity and Magnetism *SQ*[2] 3
PHY 132 University Physics Laboratory II *SQ*[2] 1
PHY 361 Introductory Modern Physics 3

Total 15

Numeracy/Mathematics
MAT 243 Discrete Mathematica Structures 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 274 Elementary Differential Equations *MA* 3
MAT 342 Linear Algebra 3

Total 21
General Studies/department requirement total 64

Engineering Core
CSE 200 Concepts of Computer Science *CS* 3
CSE 225 Assembly Language Programming and Microprocessors Motorola) 4
ECE 100 Introduction to Engineering Design *CS* 4
ECE 210 Engineering Mechanics I Statics 3
ECE 301 Electrical Networks I 4
ECE 334 Electronic Devices and Instrumentation 4

Total 22

Computer Science Core
CSE 120 Digital Design Fundamentals 3
CSE 210 Object Oriented Design and Data Structures *CS* 3
CSE 240 Introduction to Programming Languages 3
CSE 310 Data Structures and Algorithms 3
CSE 330 Computer Organization and Architecture 3
CSE 340 Principles of Programming Languages 3
CSE 355 Introduction to Theoretical Computer Science 3
CSE 360 Introduction to Software Engineering 3
CSE 421 Microprocessor System Design I 4
CSE 422 Microprocessor System Design II 4
CSE 430 Operating Systems 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
Technical elective(s)[1] 4

Total 42

Degree requirement total 128

Both PHY 121 and 122 must be taken to secure SQ credit

[2] Both PHY 131 and 132 must be taken to secure SQ credit.

[3] Each student must complete four hours of courses chosen from the computer science technical elective list and approved by the student's advisor.

Computer Systems Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester
CSE 200 Concepts of Computer Science *CS* 3
ECE 100 Introduction to Engineering Design *CS* 4
or CSE 120 Digital Design Fundamentals 3)
ECN 111 Macroeconomic Principles *SB* 3
ENG 101 First Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4

Total 17

Second Semester
CHM 114 General Chemistry for Engineers *SQ* 4
CSE 120 Digital Design Fundamentals 3
or ECE 100 Introduction to Engineering Design *CS* (4)
CSE 210 Object-Oriented Design and Data Structures *CS* 3
ENG 102 First Year Composition 3
MAT 271 Calculus with Analytic Geometry II *MA* 4

Total 17

Second Year

First Semester
CSE 225 Assembly Language Programming and Microprocessors (Motorola) 4
MAT 243 Discrete Mathematical Structures 3
MAT 272 Calculus with Analytic Geometry III *MA* 4
PHY 121 University Physics I: Mechanics *SQ* 3
PHY 122 University Physics Laboratory I *SQ*[1] 1

Total 15

Second Semester
CSE 240 Introduction to Programming Languages 3
CSE 330 Computer Organization and Architecture 3
ECE 210 Engineering Mechanics I: Statics 3
MAT 274 Elementary Differential Equations *MA* 3
PHY 131 University Physics II: Electricity and Magnetism *SQ*[2] 3
PHY 132 University Physics Laboratory II *SQ*[2] 1

Total 16

Third Year

First Semester
CSE 310 Data Structures and Algorithms 3
CSE 421 Microprocessor System Design I 4
ECE 300 Intermediate Engineering Design *L* 3
MAT 342 Linear Algebra 3
HU/SB or awareness area course[3] 3

Total 16

Second Semester
CSE 340 Principles of Programming Languages 3
CSE 360 Introduction to Software Engineering 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
PHY 361 Introductory Modern Physics 3

HU/SB and awareness area course(s)[3]	4
Total	16

Fourth Year

First Semester

CSE 355 Introduction to Theoretical Computer Science	3
CSE 422 Microprocessor System Design II	4
CSE 430 Operating Systems	3
ECE 301 Electrical Networks I	4
HU/SB or awareness area course[3]	3
Total	17

Second Semester

CSE 423 Microcomputer System Hardware *L*	3
ECE 334 Electronic Devices and Instrumentation	4
HU/SB or awareness area course[3]	3
Technical electives	4
Total	14

[1] Both PHY 121 and 122 must be taken to secure SQ credit.

[2] Both PHY 131 and 132 must be taken to secure SQ credit.

[3] Engineering students may not use aerospace studies (AES) or military science (MIS) courses to fulfill HU and SB requirements.

COMPUTER SCIENCE AND ENGINEERING (CSE)

CSE 100 Principles of Programming with C++. (3) F, S, SS
Principles of problem solving using C++, algorithm design, structured programming, fundamental algorithms and techniques, and computer systems concepts. Social and ethical responsibility. Lecture, lab. Prerequisite: MAT 170. *General Studies: CS.*

CSE 110 Principles of Programming with Java. (3) F, S, SS
Concepts of problem solving using Java, algorithm design, structured programming, fundamental algorithms and techniques, and computer systems concepts. Social and ethical responsibility. Lecture, lab. Prerequisite: MAT 170.

CSE 120 Digital Design Fundamentals. (3) F, S, SS
Number systems, conversion methods, binary and complement arithmetic, Boolean algebra, circuit minimization, ROMs, PLAs, flipflops, synchronous sequential circuits. Lecture, lab. Cross-listed as EEE 120. Credit is allowed for only CSE 120 or EEE 120. Prerequisite: computer literacy.

CSE 180 Computer Literacy. (3) F, S, SS
Introduction to personal computer operations and their place in society. Problem-solving approaches using databases, spreadsheets, and word processing. May be taken for credit on either Windows or Macintosh, but not both. Lecture, demonstration. Prerequisite: nonmajor. *General Studies: CS.*

CSE 181 Applied Problem Solving with Visual BASIC. (3) F, S, SS
Introduction of systematic definition of problems, solution formulation, and method validation. Computer solution using Visual BASIC required for projects. Lecture, lab. Prerequisites: MAT 117; nonmajor. *General Studies: CS.*

CSE 183 Applied Problem Solving with FORTRAN. (3) F
A human-oriented, systems approach to problem definition, formulation, and solution using FORTRAN. Computer solution required for projects. Prerequisites: MAT 170; nonmajor. *General Studies: CS.*

CSE 185 Internet and the World Wide Web. (3) F, S
Fundamental Internet concepts, World Wide Web browsing, publishing, searching, advanced Internet productivity tools.

CSE 200 Concepts of Computer Science. (3) F, S, SS
Overview of algorithms, languages, computing systems, theory. Problem solving by programming with a high-level language (Java or other). Lecture, lab. Prerequisite: CSE 100 or 110 *or* one year of high school programming with Java or C++ or PASCAL. *General Studies: CS.*

CSE 210 Object-Oriented Design and Data Structures. (3) F, S, SS
Object-oriented design, static and dynamic data structures (strings, stacks, queues, binary trees), recursion, and searching and sorting. Professional responsibility. Prerequisite: CSE 200. *General Studies: CS.*

CSE 225 Assembly Language Programming and Microprocessors (Motorola). (4) F, S, SS
Assembly language programming, including input/output programming and exception/interrupt handling. Register-level computer organization, I/O interfaces, assemblers, and linkers. Motorola-based assignments. Lecture, lab. Cross-listed as EEE 225. Credit is allowed for only CSE 225 or EEE 225. Prerequisites: CSE 100 (or 200); CSE/EEE 120.

CSE 226 Assembly Language Programming and Microprocessors (Intel). (4) F, S
CPU/Memory/peripheral device interfaces and programming. System buses, interrupts, serial and parallel I/O, DMA, coprocessors. Intel-based assignments. Lecture, lab. Cross-listed as EEE 226. Credit is allowed for only CSE 226 or EEE 226. Prerequisites: CSE 100 (or 200); CSE/EEE 120.

CSE 240 Introduction to Programming Languages. (3) F, S, SS
Introduction to the procedural (C++), applicative (LISP), and declarative (Prolog) languages. Lecture, lab. Prerequisite: CSE 210.

CSE 310 Data Structures and Algorithms. (3) F, S, SS
Advanced data structures and algorithms, including stacks, queues, trees (B, B+, AVL), and graphs. Searching for graphs, hashing, external sorting. Lecture, lab. Prerequisites: CSE 210; MAT 243.

CSE 330 Computer Organization and Architecture. (3) F, S, SS
Instruction set architecture, processor performance and design; datapath, control (hardwired, microprogrammed), pipelining, input/output. Memory organization with cache, virtual memory. Prerequisite: CSE/EEE 225 or 226.

CSE 340 Principles of Programming Languages. (3) F, S, SS
Introduction to language design and implementation. Parallel, machine-dependent and declarative features; type theory; specification, recognition, translation, run-time management. Prerequisites: CSE 240, 310; CSE/EEE 225 (or 226).

CSE 355 Introduction to Theoretical Computer Science. (3) F, S
Introduction to formal language theory and automata, Turing machines, decidability/undecidability, recursive function theory, and introduction to complexity theory. Prerequisite: CSE 310.

CSE 360 Introduction to Software Engineering. (3) F, S, SS
Software life cycle models; project management, team development environments and methodologies; software architectures; quality assurance and standards; legal, ethical issues. Prerequisites: CSE 210, 240.

CSE 408 Multimedia Information Systems. (3) F
Design, use, and applications of multimedia systems. An introduction to acquisition, compression, storage, retrieval, and presentation of data from different media such as images, text, voice, and alphanumeric. Prerequisite: CSE 310.

CSE 412 Database Management. (3) F, S
Introduction to DBMS concepts. Data models and languages. Relational database theory. Database security/integrity and concurrency. Prerequisite: CSE 310.

CSE 420 Computer Architecture I. (3) S
Computer architecture. Performance versus cost trade-offs. Instruction set design. Basic processor implementation and pipelining. Prerequisite: CSE 330.

CSE 421 Microprocessor System Design I. (4) F, S
Assembly-language programming and logical hardware design of systems using 8-bit microprocessors and microcontrollers. Fundamental concepts of digital system design. Reliability and social, legal implications. Lecture, lab. Prerequisite: CSE/EEE 225.

CSE 422 Microprocessor System Design II. (4) F, S
Design of microcomputer systems using contemporary logic and microcomputer system components. Requires assembly language programming. Prerequisite: CSE 421.

NOTE: For the General Studies requirement, courses, and codes (such as L, SQ, C, and H), see "General Studies," page 87. For graduation requirements, see "University Graduation Requirements," page 83. For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses," page 60.

CSE 423 Microcomputer System Hardware. (3) S
Information and techn ques presented n CSE 422 are used to deve op the hardware design of a mu t processor mu t programm ng m croprocessor based system Prerequisite CSE 422 *General Studies L*

CSE 428 Computer-Aided Processes. 3 A
Hardware and software cons derations for computer zed manufacturing systems Specif c concentrat on on automatic nspect on numer ca control, robot cs and ntegrated manufactur ng systems Prerequisite: CSE 330

CSE 430 Operating Systems. (3 F, S
Operat ng system structure and serv ces processor schedu ng concurrent processes synchron zat on techn ques, memory management virtua memory, nput/output, storage management and f le systems Prerequ s tes: CSE 330 340

CSE 434 Computer Networks. (3) F, S
Cryptography fundamenta s data compress on; error handl ng; f ow control; mult hop rout'ng· network protoco algorithms network re ab l ty tim ng, security physica ayer basics. Prerequisite: CSE 330.

CSE 438 Systems Programming. (3 A
Design and mplementation of systems programs, ncluding text edi tors, f e ut it es mon tors assemblers re ocat'ng l nk ng oaders I O hand ers, and schedulers Prerequ s te CSE 421 or nstructor approva *General Studies: L.*

CSE 440 Compiler Construction I. (3) F
Introduct on to programming anguage mp ementation Implementa t on strateg es such as comp ation nterpretat on, and translat on. Major compi at on phases such as ex cal analys s semant c ana ys's opt m zat on, and code generat on Prerequisites: CSE 340 355.

CSE 445 Distributed Computing with Java and CORBA. (3) F S
Techno ogies for deve op ng software components Cl ent server com put ng with sockets and d str buted objects Dynam c nterface d scov ery and nvocat on. Lecture, projects Prerequ s te: CSE 310 or nstructor approva .

CSE 446 Client-Server User Interfaces. 3) S
C ient-server mode and ts use in creat ng and manag ng w ndow nterfaces Too k ts and ibraries includ'ng X11 M crosoft Foundat on C asses, and Java Abstract W ndow Too k t Lecture, projects Prereq u s te CSE 310 or instructor approva

CSE 450 Design and Analysis of Algorithms. (3) F S
Design and analysis of computer a gor thms us ng ana yt ca and emp rical methods complex ty measures design methodolog es, and survey of mportant algor thms. Prerequisite· CSE 310

CSE 457 Theory of Formal Languages. 3) A
Theory of grammar, methods of syntact c ana ys s and spec f cat on, types of artific al anguages, re ationsh p between formal anguages and automata Prerequ s te CSE 355.

CSE 459 Logic for Computing Scientists. (3) F
Proposit onal og c, syntax and semant cs proof theory versus model theory soundness cons stency and comp eteness, f rst order og c, og cal theories, automated theorem proving ground resolut on pattern match ng unif cation and reso ut on D jkstras logic proof ob ga tions and program prov'ng. Prerequ s te CSE 355.

CSE 460 Software Analysis and Design. (3) F S
Requ rements ana ysis and des gn; arch tecture and patterns; repre sentations of software, forma methods component-based development Lecture projects. Prerequisite: CSE 360

CSE 461 Software Engineering Project I. (3) F, S
F rst of two-course software team deve opment sequence P anning management design and mp ementation us ng object oriented tech no ogy CASE tools CMM-leve -5 guidel nes. Lecture ab, oral and wr tten commun cat ons Prerequ s te CSE 360

CSE 462 Software Engineering Project II. 3) F, S
Second of two course software team development sequence Soft ware evolut on, ma'ntenance, reengineer ng, reverse eng neering component based development and outsourcing Lecture ab ora and wr tten commun cations Prerequisite CSE 461

CSE 470 Computer Graphics. (3) F S
Disp ay dev ces data structures, transformat ons nteract ve graph cs, 3 d mens onal graph cs and hidden l ne problem Prerequis tes· CSE 310· MAT 342

CSE 471 Introduction to Artificial Intelligence. (3) F, S
State space search heur'st c search games know edge representa tion techn ques expert systems, and automated reason ng. Prerequ s tes: CSE 240 310.

CSE 473 Nonprocedural Programming Languages. (3 A
Funct ona and og c programm ng us ng anguages ke Luc d and Prolog Typ ca app cat ons would be a Screen Ed tor and an Expert System Prerequisite: CSE 355

CSE 476 Introduction to Natural Language Processing. (3) A
Principles of computat ona nguist cs forma syntax and semant cs as app ied to the des gn of software with natura (human) language I O Prerequ s te CSE 310 or nstructor approva

CSE 477 Introduction to Computer-Aided Geometric Design. (3) S
Introduction to parametr c curves and surfaces Bez er and B spl ne nterpo at on and approximat on techn ques Prerequ s tes: CSE 210 470 MAT 342

CSE 507 Virtual Reality Systems. (3) S
Computer generated 3D env ronments simulat on of rea ty, spat'a presence of v rtua objects, technolog es of immers on track ng systems Lecture ab Prerequ s te CSE 408 or 470 or 508 or nstructor approva

CSE 508 Digital Image Processing. (3) A
Dig ta Image fundamenta s mage transforms, image enhancement and restorat on techniques, image encod ng and segmentat on meth ods Prerequ s te EEE 303 or nstructor approva

CSE 510 Advanced Database Management. (3) F S
Advanced data model ng, deductive databases, object oriented databases, distr buted and mu t database systems emerging database technolog es. Prerequ s te CSE 412

CSE 512 Distributed Databases. (3) A
Fragmentation des gn. Query optim zat on Distr buted jo ns Concurrency contro D str buted dead ock detect on Prerequ's te. CSE 510

CSE 513 Deductive Databases. 3 A
Logic as a data mode Query optim zat on emphas zing the top down and bottom up eva uat on of dec arat ve ru es. Prerequisite CSE 510

CSE 514 Object-Oriented Database Systems. (3) A
Object or ented data mode ing database and anguage integrat on, object a gebras extensib ty, transactions, object managers vers on ng/conf guration act ve data nonstandard app cations. Research sem nar Prerequ s te CSE 510.

CSE 517 Hardware Design Languages. 3) A
Introduction to hardware des gn anguages Model ng concepts for spec f cat on, simulat on, and synthes s Prerequ s te CSE 423 or EEE 425 or instructor approval

CSE 518 Synthesis with Hardware Design Languages. (3) N
Model ng VLSI des gn n hardware des gn languages for synthesis Transformat on of anguage based designs to phys cal ayout App ica tion of synthes s tools Prerequ s te: CSE 517

CSE 520 Computer Architecture II. (3) F
Computer arch tecture descr ption languages computer ar thmet c memory-h erarchy des gn para el, vector, and mu t processors, and nput/output Prerequ s tes: CSE 420 430

CSE 521 Microprocessor Applications. (4) A
M croprocessor techno ogy and its app cation to the des gn of pract ca d g ta systems. Hardware, assembly anguage programming and interfac ng of m croprocessor-based systems Lecture, ab. Prerequi s te: CSE 421

CSE 523 Microcomputer Systems Software. (3) A
Deve op ng system software for a mu tiprocessor, mu t programm ng, m croprocessor-based system us ng nformation and techn ques pre sented n CSE 421 422 Prerequ s te: CSE 422

CSE 526 Parallel Processing. (3) N
Rea and apparent concurrency Hardware organ zat on of mu tipro cessors mult ple computer systems scient f c attached processors and other paral e systems Prerequ s'te: CSE 330 or 423

CSE 530 Operating System Internals. 3) A
mp ementat on of process management and synchron zat on, system ca and interrupt hand ng, memory management device drivers and fi e systems n UNIX Prerequ s tes CSE 430 knowledge of C lan guage

CSE 531 Distributed and Multiprocessor Operating Systems. (3) A
D stributed systems arch tecture remote f le access message-based systems object-based systems c ent/server parad gms d str buted a gor thms, rep cat on and cons stency, and mu t processor operat ng systems Prerequ s te CSE 530 or nstructor approva

CSE 532 Advanced Operating System Internals. (3) N
Memory, processor process and commun cation management and concurrency contro n the W ndows NT mult processor and d stributed operating system kernels and servers. Prerequ s'tes CSE 530, 531 (or 536)

CSE 534 Advanced Computer Networks. (3) F S
Advanced network protoco s and infrastructure, app 'cations of h gh-performance networks to distributed systems, high performance comput'ng and mult med a doma'ns, spec a features of networks Prereq u s te: CSE 434

CSE 536 Theory of Operating Systems. (3) S
Protection Commun cation and synchronization n d stributed systems, d stributed file systems, deadlock theory virtua memory theory and uniprocessor and mult processor thread management. Prerequisite· CSE 430.

CSE 537 ATM Network Design. (3) S
Principles of ATM networks sw tch arch tecture traff c management call and connect'on contro , routing nternetworking w th ATM net works s gnal ng, and OAM Prerequisite: CSE 434

CSE 540 Compiler Construction II. (3) S
Formal parsing strateg es optim zat on techn ques code generat on, extens b l ty and transportab ity cons derations, and recent deve op-ments. Prerequ s te. CSE 440

CSE 545 Programming Language Design. (3) N
Language constructs, extensibi ty and abstractions and runtime support Language design process Prerequisite CSE 440

CSE 550 Combinatorial Algorithms and Intractability. (3) N
Comb natoria algorithms nondetermin stic algorithms classes P and NP NP hard and NP-comp ete problems and ntractab l ty Design techniques for fast comb natoria algorithms Prerequ s te CSE 450

CSE 555 Theory of Computation. (3) F, S
R gorous treatment of regular languages, context-free anguages Tur ing mach nes and dec dab ity reducibi ty, and other advanced top cs in computabi ity theory. Prerequ s te CSE 355 or nstructor approva

CSE 556 Expert Systems. (3) N
Know edge acqu s t on and representation ru e-based systems, frame-based systems va dation of knowledge bases nexact reason ing and expert database systems Prerequ s te CSE 471

CSE 562 Software Process Automation. (3) A
Represent ng the software process, creating a measured and struc tured work'ng environment· using, constructing, and adapting compo nent-based too s. Prerequ s te: CSE 360.

CSE 563 Software Requirements and Specification. (3) A
Examinat on of the defin tional stage of software development analy sis of specificat on representat ons formal methods and techniques emphasizing important appl cat on issues Prerequ s te CSE 460

CSE 564 Software Design. (3) A
Examination of software des gn issues and techniques Inc udes a survey of des gn representat ons and a comparison of des gn methods Prerequis te CSE 460

CSE 565 Software Verification, Validation, and Testing. (3) A
Test plann ng, requ rements-based and code-based testing techn ques, tools, re iabi ty mode s and statist ca test ng Prerequisite: CSE 460

CSE 566 Software Project, Process, and Quality Management. (3) A
Project management, risk management configurat'on management, quality management and s mu ated project management experi ences Prerequisite. CSE 360.

CSE 570 Advanced Computer Graphics I. (3) A
H dden surface algorithms lighting mode s, and shading techniques User interface des gn An mation techniques Fractals and stochast c models. Raster algor'thms Prerequ'site· CSE 470.

CSE 571 Artificial Intelligence. (3) S
Def n tions of inte igence, computer problem so v ng, game playing pattern recognition theorem proving and semant c nformation processing evolut onary systems; heurist'c programm ng. Prerequisite: CSE 471

CSE 573 Advanced Computer Graphics II. (3 S
Mode ng of natura phenomena terra n c ouds, f re water and trees Part c e systems deformat on of sol ds, ant aliasing and vo ume v sua a ization Lecture, lab. Prerequisite: CSE 470

CSE 574 Planning and Learning Methods in AI. (3) A
Reason ng about time and act on plan synthes s and execut on, mprov ng p ann ng performance, app 'cations to manufacturing inte li-gent agents. Prerequ s te CSE 471 or equivalent.

CSE 575 Decision-Making Strategies in AI. (3) S
Automatic know edge acqu s t on, automatic analys s/synthes s of strateg es distr buted plann ng/prob em so ving, causal model ng, pre d ctive human-mach ne env ronments Prerequ s te CSE 471 or 571 or equiva ent

CSE 576 Topics in Natural Language Processing. (3) S
Comparative pars ng strategies scop ng and reference prob ems, nonfirst-order og ca semantic representat ons and d scourse struc ture Prerequ s te CSE 476 or nstructor approva

CSE 577 Advanced Computer-Aided Geometric Design I. (3) F
General nterpolat on; review of curve interpolat on and approx mation; spl ne curves, v sua smoothness of curves parameterizat on of curves ntroduct on to surface nterpo ation and approximat on. Pre requ s tes CSE 470 and 477 *or* nstructor approva

CSE 578 Advanced Computer-Aided Geometric Design II. (3) S
Coons patches and Bez er patches triangular patches arbitrar y located data methods geometry process ng of surfaces; higher dimens ona surfaces Prerequ s tes CSE 470 and 477 *or* nstructor approva

CSE 579 NURBs: Nonuniform Rational B-Splines. (3) A
Project ve geometry NURBs based mode ing basic theory of conics and rational Bezier curves, rat ona B sp ines, surfaces rationa sur faces, stereograph c maps, quadrics, IGES data specification Prereq u s tes CSE 470 477

CSE 593 Applied Project. (1 12) N

Department of Electrical Engineering

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REGENTS' PROFESSORS
BALANIS, FERRY

PROFESSORS
BACKUS, CROUCH, EL-GHAZALY, GOODN CK GORUR HEYDT, H GGINS, HOPPENSTEADT, HUI, KARADY KOZICK PALAIS PAN, ROEDEL, SCHRODER, SPANIAS, THORNTON

ASSOCIATE PROFESSORS
ABERLE, ALLEE, B RD, CHAKRABARTI, COCHRAN, EL SHARAWY GREENEICH, GRONDIN, HOLBERT, LAI, MORRELL, RODRIGUEZ, SHEN, SI SKROMME, TSAKAL S, TYLAVSKY ZHANG

ASSISTANT PROFESSORS
CAPONE, DUMAN, KARAM, PAPANDREOU SUPPAPPOLA, VAS LESKA KAFEDZISKA, YAZDI

The professional activities of electrical engineers directly affect the everyday lives of most of the world's population.

NOTE: For the General Stud es requirement courses, and codes (such as L SQ, C, and H), see "General Studies," page 87 For graduation requ rements see "Univers ty Graduat on Requ rements" page 83 For an explanation of add tional omn bus courses offered but not l sted n th s cata og, see "Class fication of Courses," page 60.

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 develop ment problems.

Electrical engineers design minuscule semiconductor integrated circuits that contain many thousands of elemen tary devices. They design systems for automatically control ling 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 oppor tunities for electrical engineers to improve the design of familiar products since these devices are now incorporated in automobiles, consumer and office products, entertain ment systems, and a vast variety of test and measurement instruments and machine tools

Students who earn a B.S.E. degree in Electrical Engineer ing will be involved in a variety of electrical and electronic problems in the course of their careers. To ensure the neces sary breadth of knowledge, the Electrical Engineering cur riculum includes basic (core engineering courses and courses in networks and electronic circuits, electromagnetic fields and waves, microprocessors, communication and con trol systems, solid state electronics, electrical power sys tems, and other specialty courses.

ELECTRICAL ENGINEERING—B.S.E.

The goal of the Electrical Engineering undergraduate pro gram is to prepare the graduates for entry level positions as electrical engineers for the broad range of opportunities available in industrial, commercial, and governmental orga nizations, and to prepare the graduates for continued learn ing experiences either in a formal graduate program or in continuing education applications

The curriculum in Electrical Engineering builds upon the base provided by the engineering core Beyond the engi neering core, the curriculum includes a number of required electrical engineering and technical elective courses. Approved technical elective courses serve to provide stu dents with an opportunity either to broaden their back ground in electrical engineering or to study, in greater depth, technical subjects in which they have special inter ests. Successful completion of the curriculum leaves the stu dent prepared to embark on a career in electrical engineer ing or to pursue advanced education in graduate school.

The engineering design experience is structured around three backbone courses employing engineering teams: ECE 100 Introduction to Engineering Design (freshman year), ECE 300 Intermediate Engineering Design (junior year), and EEE 490 Senior Design Laboratory. The integrated experience is strengthened with required courses, EEE 120 Digital Design Fundamentals, EEE 225 226 Assembly Lan guage Programming and Microprocessors, EEE 303 Signals and Systems, and EEE 360 Energy Conversion and Trans port. Students focus on design pertaining to specific electri cal engineering areas in their senior technical electives before the culminating, capstone design experience in EEE 490.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the B.S.E. degree in Electrical Engineering. A minimum of 50 upper division semester hours is required.

GRADUATION REQUIREMENTS

A student must earn a grade of "C" or higher in the math ematics and physics courses listed in the program of study. The student must also have an overall GPA of at least 2.00 for the following group of courses: CSE 100; ECE 300, 301, 334, 352; all courses with an EEE prefix; and all other courses used as technical electives

In addition to fulfilling school and major requirements, students must satisfy all university graduation requirements. See "University Graduation Requirements," page 83

COURSE REQUIREMENTS

The specific course requirements for the B.S.E. degree in Electrical Engineering follow.

First-Year Composition

Choose among the course combinations below 6
- ENG 101 First Year Composition (3)
- ENG 102 First Year Composition 3)

or

- ENG 105 Advanced First Year Composition 3)
- Elective chosen w th an advisor 3

or

- ENG 107 English for Foreign Students (3
- ENG 108 English for Foreign Students (3

Total 6

General Studies/School Requirements

Humanities and Fine Arts Social and Behavioral Sciences

ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* (3
HU courses 6–10
SB courses 3 7

Minimum total 16

Literacy and Critical Inquiry

ECE 300 Intermediate Engineering Design *L* 3
EEE 490 Senior Design Laboratory *L* 3

Total 6

Natural Sciences Basic Sciences

CHM 114 General Chemistry for Engineers *SQ* . . 4
or CHM 116 General Chemistry *SQ* (4
PHY 121 University Physics I Mechanics *SQ*[2] 3
PHY 122 University Physics Laboratory I *SQ*[2] 1
PHY 131 University Physics II: Electricity and Magnetism *SQ* 3
PHY 132 University Physics Laboratory II *SQ*[3] 1
PHY 241 University Physics III 3

Total 15

Numerical and Mathematical

ECE 100 Introduction to Engineering Design *CS* 4
MAT 270 Calculus w th Analyt c Ge ometry I *MA* 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 274 Elementary Differential Equations *MA* 3
MAT 342 Linear Algebra 3
MAT 362 Advanced Mathematics for Engineers and Scientists I 3

Total 25

General Studies/school requirements total..... 62

Engineering Core

ECE 301 Electrical Networks I 4
ECE 314 Engineering Mechanics. 4
ECE 334 Electronic Devices and Instrumentation 4
ECE 352 Properties of Electronic Materials. 4
EEE 225 Assembly Language Programming and Microprocessors (Motorola) 4
or EEE 226 Assembly Language Programming and Microprocessors (Intel) (4)

Total 20

A minimum grade of "C" is required

[2] Both PHY 121 and 122 must be taken to secure SQ credit.

[3] Both PHY 131 and 132 must be taken to secure SQ credit.

Electrical Engineering Major

The following courses are required to fulfill the Electrical Engineering major:

CSE 100 Principles of Programming with C++ *CS* 3
EEE 120 Digital Design Fundamentals. 3
EEE 302 Electrical Networks II 3
EEE 303 Signals and Systems 3
EEE 340 Electromagnetic Engineering I 4
EEE 350 Random Signal Analysis 3
EEE 360 Energy Conversion and Transport 4

Total 23

The program in Electrical Engineering requires a total of 17 hours of technical electives. With department approval, a maximum of two technical electives may be taken outside electrical engineering. Qualified students may choose from approved courses in business, engineering, mathematics, and the sciences at or above the 300 level, including graduate courses. Students must have a GPA of not less than 3.00 and approval of the dean to enroll in EEE graduate level courses. To ensure breadth of knowledge, students *must* select courses from at least three of the following six areas. In addition, to ensure depth, two courses must be taken in one area.

Communications and Signal Processing

EEE 407 Digital Signal Processing..... 4
EEE 455 Communication Systems 4
EEE 459 Communication Networks 3

Control

EEE 480 Feedback Systems 4
EEE 482 Introduction to State Space Methods 3

Electromagnetics

EEE 440 Electromagnetic Engineering II 4
EEE 443 Antennas 3
EEE 445 Microwaves 4
EEE 448 Fiber Optics 4

Electronic Circuits

EEE 405 Filter Design 3
EEE 425 Digital Systems and Circuits 4
EEE 433 Analog Integrated Circuits. 3

Power Systems

EEE 460 Nuclear Concepts for the 21st Century 3
EEE 463 Electrical Power Plant 3
EEE 470 Electric Power Devices 3
EEE 471 Power System Analysis 3
EEE 473 Electrical Machinery 3

Solid-State Electronics

EEE 434 Quantum Mechanics for Engineers.. 3
EEE 435 Microelectronics..... 3
EEE 436 Fundamentals of Solid State Devices. 3
EEE 437 Optoelectronics 3
EEE 439 Semiconductor Facilities and Cleanroom Practices. . 3

With department approval Computer Science and Engineering courses at or above the 300 level may be substituted for one of the above areas.

Electrical Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CHM 114 General Chemistry for Engineers *SQ*. 4
or CHM 116 General Chemistry *SQ* (4)
ECE 100 Introduction to Engineering Design[1] *CS* 4
or EEE 120 Digital Design Fundamentals 3)
ENG 101 First Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4

Total... ... . 14 or 15

Second Semester

EEE 120 Digital Design Fundamentals 3
or ECE 100 Introduction to Engineering Design *CS* (4)
ENG 102 First Year Composition 3
MAT 271 Calculus with Analytic Geometry II *MA*. 4
PHY 121 University Physics I. Mechanics *SQ* 3
PHY 122 University Physics Laboratory I *SQ*[2]... 1

Total.. . ...15 or 14

Second Year

First Semester

CSE 100 Principles of Programming with C++ *CS*.. 3
ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* (3)
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 274 Elementary Differential Equations *MA* 3
PHY 131 University Physics II: Electricity and Magnetism *SQ*[3] 3
PHY 132 University Physics Laboratory II *SQ*[3] 1

Total 17

Second Semester

ECE 301 Electrical Networks I. 4
EEE 225 Assembly Language Programming and Microprocessors Motorola) 4
or EEE 226 Assembly Language Programming and Microprocessors (Intel) (4
MAT 362 Advanced Mathematics for Engineers and Scientists I 3
PHY 241 University Physics III 3
HU/SB or awareness area course[4] 3

Total. 17

Third Year

First Semester

ECE 300 Intermediate Engineering Design *L* 3
EEE 302 Electrical Networks II 3

NOTE: For the General Studies requirement, courses and codes (such as L, SQ, C, and H), see "General Studies," page 87. For graduation requirements see "University Graduation Requirements" page 83. For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses," page 60.

EEE 340 Electromagnetic Engineering I . . . 4
MAT 342 Linear Algebra 3
HU SB and awareness area course(s)[4] 4

Total 17

Second Semester

ECE 334 Electronic Devices and Instrumentation . . 4
ECE 352 Properties of Electronic Materials . 4
EEE 303 Signals and Systems. 3
EEE 360 Energy Conversion and Transport 4

Total 15

Fourth Year

First Semester

ECE 314 Engineering Mechanics 4
EEE 350 Random Signal Analysis 3
HU/SB or awareness area course[4] 3
Technical electives 7

Total 17

Second Semester

EEE 490 Senior Design Laboratory I 3
HU SB or awareness area course[4] 3
Technical electives 10

Total 16

Both ECE 100 and EEE 120 are required

[2] Both PHY 121 and 122 must be taken to secure SQ credit

[3] Both PHY 131 and 132 must be taken to secure SQ credit

[4] Engineering students may not use aerospace studies (AES) or military science (MIS) courses to satisfy HU or SB requirements.

ELECTRICAL ENGINEERING (EEE)

EEE 120 Digital Design Fundamentals. 3 F S SS
Number systems conversion methods, binary and complement arithmetic Boolean algebra, circuit minimization, ROMs, PLAs, flip-flops, synchronous sequential circuits Lecture lab Cross listed as CSE 120. Credit is allowed for only CSE 120 or EEE 120 Prerequisite computer literacy

EEE 225 Assembly Language Programming and Microprocessors (Motorola). (4) F S SS
Assembly language programming, including input/output programming and exception interrupt handling Register level computer organization Interfaces assemblers and linkers. Motorola based assignments. Lecture, lab Cross-listed as CSE 225 Credit is allowed for only CSE 225 or EEE 225 Prerequisites CSE 100 or 200 · CSE/EEE 120

EEE 226 Assembly Language Programming and Microprocessors (Intel). (4) F S
CPU memory peripheral device interfaces and programming. System buses, interrupts serial and parallel I/O DMA coprocessors interfaces based assignments Lecture lab Cross-listed as CSE 226 Credit is allowed for only CSE 226 or EEE 226 Prerequisites CSE 100 (or 200), CSE/EEE 120

EEE 294 Special Topics. (1–4 N

EEE 302 Electrical Networks II. 3 F S SS
Analysis of linear and nonlinear networks Analytical and numerical methods Prerequisite· ECE 301 Prior or corequisite MAT 362

EEE 303 Signals and Systems. (3 F S SS
Introduction to continuous and discrete time signal and system analysis linear systems Fourier and z transforms Prerequisite EEE 302 Prior or corequisite MAT 342

EEE 340 Electromagnetic Engineering I. 4 F S SS
Static and time varying vector fields boundary value problems, dielectric and magnetic materials Maxwell's equations boundary conditions Prerequisites MAT 362, PHY 131 132

EEE 350 Random Signal Analysis. 3) F S
Probabilistic and statistical analysis as applied to electrical signals and systems Prior or corequisite· EEE 303 or MAE 317.

EEE 360 Energy Conversion and Transport. (4 F S
Three phase circuits Energy supply systems Magnetic circuit analysis synchronous generators, transformers, induction and DC machines Transmission Line Modeling and Design Lecture, lab Prerequisite EEE 302

EEE 405 Filter Design. (3) F
Principles of active and passive analog filter design frequency domain approximations sensitivity and synthesis of filters Prerequisite EEE 303

EEE 407 Digital Signal Processing. 4 F
Time and frequency domain analysis difference equations z transform FIR and IIR Digital Filter Design Discrete Fourier Transform, FFT, and random sequences Lecture, lab Prerequisites EEE 303 MAT 342

EEE 425 Digital Systems and Circuits. (4 F, S
Digital logic gate analysis and design Propagation delay times fan out, power dissipation noise margins Design of MOS and bipolar logic families, including NMOS CMOS standard and advanced TTL ECL, and BiCMOS Inverter, combinational and sequential logic circuit design MOS memories VLSI circuits Computer simulations using PSPICE Lecture lab Prerequisite ECE 334

EEE 433 Analog Integrated Circuits. 3 S
Analysis design and applications of modern analog circuits using integrated bipolar and field effect transistor technologies. Prerequisite ECE 334

EEE 434 Quantum Mechanics for Engineers. 3) F
Angular momentum, wave packets, Schroedinger wave equation probability principles one dimensional, principles of wave mechanics scattering tunneling, central forces, angular momentum hydrogen atom perturbation theory variational techniques Prerequisites ECE 352 EEE 340

EEE 435 Microelectronics. 3) S
Practice of solid state device fabrication techniques including thin film and integrated circuit fabrication principles Lecture lab. Prior or coreq uisite EEE 436

EEE 436 Fundamentals of Solid-State Devices. 3 F S
Semiconductor fundamentals, pn junctions, metal semiconductor contacts, metal oxide-semiconductor capacitors and field effect transistors bipolar junction transistors Prerequisite: ECE 352

EEE 437 Optoelectronics. 3) N
Basic operating principles of various types of optoelectronic devices which play important roles in commerce and communication electronics; lighting emitting diodes injection lasers and photodetectors Prerequisite: EEE 436

EEE 439 Semiconductor Facilities and Cleanroom Practices. 3) F
Microcontamination, controlled environments cleanroom layout and systems, modeling codes and regulations, ultrapure water production materials personnel and operations hazard management advanced concepts Prerequisite EEE 435 or instructor approval

EEE 440 Electromagnetic Engineering II. (4 F S
Second half of an introductory course in electromagnetic theory and its application in electrical engineering Analytical and numerical solution of boundary value problems Advanced transmission lines, waveguides antennas; radiation and scattering Lecture lab Prerequisite EEE 340 or equivalent.

EEE 443 Antennas. (3) S
Fundamental parameters, engineering principles and radiation integrals near wire antennas loops and arrays numerical computations measurements Prerequisite EEE 340 or equivalent

EEE 445 Microwaves. (4) F
Waveguide circuit theory for waveguiding systems microwave devices systems and energy sources strip lines and microstrips impedance matching transformers measurements Lecture lab Prerequisite EEE 340 or equivalent

EEE 448 Fiber Optics. (4 F
Principles of fiber optic communications Lecture lab Prerequisites EEE 303 340

EEE 455 Communication Systems 4) F S
Signal analysis techniques applied to the operation of electrical communication systems An introduction to and overview of modern digital and analog communications Lecture lab Prerequisite EEE 350

EEE 459 Communication Networks. (3 S
Fundamentals of communication networks Study of Seven Layer OSI Model Focus on functionality and performance of protocols used in communication networks Prerequisite EEE 350

EEE 460 Nuclear Concepts for the 21st Century. (3) N
Rad ation interactions, damage, dose and nstrumentation Cosm c rays, satel te effects; soft errors transmutation doping F ss on reac tors nuclear power. TMI, Chernobyl Rad oact ve waste Prerequ site. PHY 241 or 361

EEE 463 Electrical Power Plant. (3) F
Nuclear, foss and solar energy sources Ana ysis and des gn of steam supply systems, electrical generat ng systems and auxi ary systems. Power plant effic ency and operat on Prerequisites: ECE 301, 340 (or PHY 241).

EEE 470 Electric Power Devices. (3) F
Ana ysis of devices used for short circuit protection, including circuit breakers relays, and current and vo tage transducers Protect on aga nst sw tch ng and l ghtn ng over vo tages. Insu ation coordination. Prerequ s te· EEE 360

EEE 471 Power System Analysis. (3) S
Rev ew of transm ss on ine parameter calcu ation. Zero sequence mpedance, symmetrical components for fault ana ys s, short circu t calculation, review of power flow ana ys s, power system stab lity and power system control concepts Prerequisite: EEE 360

EEE 473 Electrical Machinery. (3) F
Operating princip es construct ona detai s, and design aspects of conventional DC and AC mach nes, transformers and mach nes used in computer disc drives, printers, wr st watches, and automob es Prerequ s te EEE 360

EEE 480 Feedback Systems. (4) F, S
Analysis and des gn of inear feedback systems. Frequency response and root ocus techniques series compensat on, and state var able feedback. Lecture ab Prerequ s te: EEE 303

EEE 482 Introduction to State Space Methods. (3) F
Discrete and continuous systems n state space form control ab ity stabi ty, and po e p acement. Observab lity and observers Pre- or corequ site: EEE 480

EEE 490 Senior Design Laboratory. (3) F S
Project-oriented aboratory. Each student must complete one or more design projects during the semester Lecture, lab Prerequisites: ECE 300, 334; EEE 303, senior status *General Studies· L*

EEE 506 Digital Spectral Analysis. (3) S
Princ p es and appl cations of d g tal spectral ana ysis least squares, random sequences parametric, and nonparametric methods for spec- tra est mation. Prerequisites EEE 407 554.

EEE 507 Multidimensional Signal Processing. (3) F
Process ng and representat on of mult dimensiona signa s. Des gn of systems for processing mult dimens ona data. ntroduct on to mage and array process ng issues. Prerequ s te. EEE 407 or nstructor approval.

EEE 508 Digital Image Processing and Compression. (3) S
Fundamentals of dig tal 'mage perception, representation, process ng, and compression Emphasis on mage cod ng techn ques Signa s include sti l p ctures and mot on v deo. Prerequ s tes. EEE 350 and 407 *or* equiva ents.

EEE 511 Artificial Neural Computation Systems. (3) F
Networks for computat on, earning funct on representat ons from data, learning algor thms and analys s, funct on approx mat on and nformat on representat on by networks, app cations in contro sys tems and signa ana ys s. Prerequisite: nstructor approva .

EEE 523 Advanced Analog Integrated Circuits. (3) F
Ana ysis and design of ana og 'ntegrated circu ts analog circu t blocks reference circu ts operational amp fier circu ts, feedback, and non inear c rcu ts Prerequ s te. EEE 433 or equ valent.

EEE 525 VLSI Design. (3) F, S
Analys s and des gn of Very Large Sca e Integrated (VLS) C rcuits Physics of sma l dev ces fabr cation, regular structures, and system tim ng. Open on y to graduate students

EEE 526 VLSI Architectures. (3 F
Special-purpose architectures for s gnal processing Des gn of array processor systems at the system level and processor level. H gh level synthesis Prerequ'site: CSE 330 or EEE 407 or instructor approval.

EEE 527 Analog to Digital Converters. (3) F
A deta ed introduct on to the des gn of Nyquist rate, CMOS analog to digital converters Prerequ site· EEE 523

EEE 530 Advanced Silicon Processing. (3) S
Th n f lms CVD, oxidation, diffus'on on implantat on for VLSI meta l - zation s ic des, advanced ithography dry etch ng, rapid thermal pro- cessing Pre- or corequisite. EEE 435

EEE 531 Semiconductor Device Theory I. (3) F
Transport and recombination theory, pn and Schottky barr er d odes, b po ar and junction field-effect transistors, and MOS capac tors and trans stors. Prerequ s te. EEE 436 or equ va ent

EEE 532 Semiconductor Device Theory II. (3) S
Advanced MOSFETs, charge-coup ed dev ces solar ce ls photode tectors ight emitting diodes, m crowave devices, and modulat on doped structures Prerequ s te: EEE 531.

EEE 533 Semiconductor Process/Device Simulation. (3) F
Process s mu ation concepts, oxidation, ion mp antation, d ffusion device simulat on concepts pn junct ons MOS devices, b po ar tran sistors. Prerequisite EEE 436 or equ'valent.

EEE 534 Semiconductor Transport. (3) S
Carr er transport n sem conductors Hal effect, high electric field Bo tzmann equat on, corre ation funct ons and carrier carrier interac- tions. Prerequ s tes: EEE 434, 436 (or 531)

EEE 536 Semiconductor Characterization. (3) S
Measurement techniques for semiconductor materials and devices. Electrical, optical, phys ca and chemical character zation methods. Prerequ s te· EEE 436 or equiva ent

EEE 537 Semiconductor Optoelectronics I. (3) F
E ectron c states n semiconductors quantum theory of rad at'on, absorpt on processes, rad ative processes nonradiat ve processes, photolum nescence and photonic devices Prerequis tes: EEE 434 436 (or 531)

EEE 538 Semiconductor Optoelectronics II. (3) S
Material and device physics of sem conductor asers, l ght emitting diodes and photodetectors Emerging material and device techno ogy in I I-V sem conductors Prerequ s te· EEE 537

EEE 539 Introduction to Solid-State Electronics. (3) F
Crystal lattices, reciprocal att ces quantum statist cs att ce dynam cs equi br'um, and nonequ librium processes 'n semiconductors. Prerequ s te: EEE 434.

EEE 541 Electromagnetic Fields and Guided Waves. (3) N
Po ar zat on and magnetization; dielectric, conducting, anisotropic, and sem conducting media; dua ity, un queness, and mage theory· plane wave functions, waveguides, resonators, and surface gu ded waves Prerequ site. EEE 440 or equ valent

EEE 543 Antenna Analysis and Design. (3) F
Impedances broadband antennas frequency ndependent antennas, m niaturizat on, aperture antennas, horns ref ectors, lens antennas and continuous sources des gn techn ques Prerequ s te. EEE 443 or equiva ent

EEE 544 High Resolution Radar. (3) N
Fundamentals, wideband coherent design, waveforms, and process- ing, stepped frequency synthet c aperture radar (SAR), inverse syn- thet c aperture radar (ISAR)· mag ng Prerequ s tes· EEE 303 and 340 *or* equ va ents.

EEE 545 Microwave Circuit Design. (3) S
Analys s and des gn of m crowave attenuators, in phase and quadra ture phase power d'v'ders mag c tee s, directiona coup ers phase sh fters, DC blocks, and equa izers. Prerequisite: EEE 445 or instruc tor approva

EEE 546 Advanced Fiber-Optics. (3) N
Theory of propagation n fibers, couplers and connectors d stribut on networks modu ation no se and detection, system des gn, and fiber sensors. Prerequisite· EEE 448 or nstructor approva

EEE 547 Microwave Solid-State Circuit Design I. (3) S
Appl cation of sem conductor characterist cs to pract cal des gn of microwave mixers, detectors im ters switches, attenuators multip i ers, phase sh fters, and amp 'f ers Prerequisite· EEE 545 or instructor approval

EEE 548 Coherent Optics. (3) N
D ffract on enses, opt cal processing ho ography, electro-optics, and asers Prerequisite: EEE 440 or equ valent.

NOTE: For the General Stud es requ rement courses, and codes (such as L, SQ, C, and H) see "Genera Stud es" page 87. For graduation requ rements, see "Univers ty Graduat on Requ rements" page 83 For an explanat on of addit ona omnibus courses offered but not listed n th s catalog see "C ass ficat on of Courses" page 60.

EEE 549 Lasers. (3 N
Theory and des gn of gas soi d, and sem conductor asers Prerequi site· EEE 448 or instructor approval

EEE 550 Transform Theory and Applications. 3 N
Introduction to abstract ntegrat on, function spaces and complex ana ys s n the context of ntegra transform theory App cat ons to s g- na analys s commun cat on theory, and system theory Prerequ s te EEE 303

EEE 551 Information and Coding Theory. 3 N
Fundamenta theorems of nformat on theory for sources and chan- nels convo utiona and burst codes Prerequ s tes EEE 553, 554

EEE 552 Digital Communications I. (3) S
Fundamentals of d g ta commun cat ons comp ex s gna theory mod- u at on opt mal coherent and ncoherent rece vers coded modu at on and the Viterbi a gorithm Prerequisites· EEE 455 554

EEE 553 Error-Correcting Codes. (3) S
App ication of modern a gebra to the des gn of random error detect ng and error-correct ng block codes Prerequ s te: EEE 455

EEE 554 Random Signal Theory I. (3) F
App ication of stat st ca techniques to the representat on and ana ys s of e ectrica s gnals and to communications systems ana ysis Prereq- u site EEE 350 or nstructor approva .

EEE 555 Random Signal Theory II. (3) N
Processing of s gnals n the presence of no se. Random s gna s cor relat on, frequency spectra est mat on, f ter ng no se, pred ct on and trans ents Prerequisite: EEE 554

EEE 556 Detection and Estimation Theory. (3) S
Comb nat on of the class ca techn ques of stat stica nference and the random process character zation of communicat on, radar, and other m dern data process ng systems Prerequisites EEE 455 554

EEE 558 Digital Communications II. (3) F
Cont nuat on of EEE 552 Advanced top cs n dig ta commun cations: synchron zat on; mu t path and fad ng equal zat on; m scel aneous top cs Prerequ s te EEE 552.

EEE 571 Power System Transients. 3) N
S mp e sw tch ng trans ents Trans ent analys s by deduct on Damp ng of transients. Capacitor and reactor switch ng Transient recovery vo t age Trave ng waves on transm ssion nes L ghtn ng. Protect on of equ pment aga nst trans ent overvo tages Introduction to computer ana ys s of transients Prerequ s te EEE 471

EEE 572 Advanced Power Electronics. 3) N
Ana ys s of device operat on nc ud ng thyr stors gate turn off thyr s tors, and trans stors Des gn of rect f er and nverter c rcu ts Appl ca t ons such as var able speed drives HVDC motor control, and un nterruptab e power supp es Prerequ site EEE 470

EEE 573 Electric Power Quality. (3) S
Sinuso dal waveshape ma ntenance study of momentary events, power system harmon cs nstrumentat on fi ters power cond t oners and other power qual ty enhancement methods Prerequ s te EEE 360 or equ va ent

EEE 574 Computer Solution of Power Systems. 3 N
A gor thms for d g ta computat on for power f ow fault and stab ty analys s Sparse matr x and vector programming methods, numer ca ntegration techn ques, stochast c methods, so ution of the east squares prob em. Prerequ s te: EEE 471.

EEE 577 Power Engineering Operat'ons and Planning. (3) F
Econom c d spatch un t comm tment dynam c programm'ng power system p ann ng and operat on, control, generat on mode ing AGC and power product on Prerequ site EEE 471 or graduate stand ng

EEE 579 Power Transmission and Distribution. (3) S
High vo tage transm'ss on ne e ectr c design conductors corona RI and TV no se nsu ators clearances DC character st c feeders vo t age drop and capacitors. Prerequ s te EEE 470.

EEE 581 Filtering of Stochastic Processes. 3 N
Model ng, estimat on and f ter ng of stochast c processes, with emphas s on the Ka man fi ter and ts app cations n s gna process ng and control Prerequ sites EEE 482 550 554.

EEE 582 Linear System Theory. (3) S
Contro ab ity observab ity and rea zat'on theory for mu t var able cont nuous t me systems Stab zat on and asymptot c state est ma t on. D sturbance decoup ing non nteract ng contro Prerequ s te EEE 482

EEE 584 Internship. (1–12) N

EEE 585 Digital Control Systems. (3) F
Analys s and design of d gita and samp ed data contro systems, nclud ng samp ng theory z-transforms, the state trans tion method, stabi ty des gn and synthes s Prerequisites EEE 482, 550

EEE 586 Nonlinear Control Systems. (3) N
Stab ty theory, includ ng phase-plane descrip ng funct on, Liapunov s method and frequency doma n cr ter a for cont nuous and d screte, non inear and time-vary ng systems. Prerequ s te EEE 482

EEE 587 Optimal Control. 3) F
Opt ma contro of systems Calcu us of variations, dynam c program m ng inear quadratic regu ator numer'ca methods, and Pontryag'n's pr nc p e. Cross isted as MAE 507 Cred t s a owed for on y EEE 587 or MAE 507 Prerequis te EEE 482 or MAE 506

EEE 588 Design of Multivariable Control Systems. (3) S
Practica too s for des gn ng robust M MO control ers State feedback and est mation mode based compensators M MO des gn methodol og es CAD, real wor d appl cat ons Prerequ s te: EEE 480 or equiva ent

EEE 606 Adaptive Signal Processing. (3) F
Pr nc p es/appl cat ons of adapt ve signa process ng, adapt ve near combiner, W ener east squares so ut on, grad ent search, perfor- mance surfaces LMS/RLS a gorithms, b ock t me frequency doma n LMS. Prerequ sites EEE 506, 554.

EEE 607 Speech Coding for Multimedia Communications. (3 S
Speech and audio cod ng a gorithms for appl cat ons n wire ess com munica ons and mult med a comput ng. Prerequ s te· EEE 407 Pre- or corequ s te EEE 506

EEE 631 Heterojunctions and Superlattices. (3) F
Princ ples of heterojunct ons and quantum wel structures, band ine ups, optical, and e ectr ca propert es Introduction to heterojunction devices Prerequisites: EEE 436 531

EEE 632 Heterojunction Devices. (3) N
App ication of heterostructures quantum we s and superlattice to modu at on-doped FETs heterostructure b po ar trans stors asers detectors and modu ators Prerequ s tes EEE 434 and 631 (or 537).

EEE 641 Advanced Electromagnetic Field Theory. 3) N
Cy ndr ca wave funct ons wavegu des and resonators, spher ca wave functions and resonators; scatter ng from p anar cy 'ndr cal, and spher ca surfaces Green's funct ons Prerequ s te EEE 541 or equ v a ent

EEE 643 Advanced Topics in Electromagnetic Radiation. 3 S
H gh-frequency asymptot c techn ques geometr'ca and phys ca the or es of d ffract on (GTD and PTD) moment method (MM) radar cross sect on (RCS) pred ct on, Fourier transforms n rad ation and synthe s s methods Prerequ s te EEE 543

EEE 647 Microwave Solid-State Circuit Design II. 3) F
Pract ca des gn of m crowave free-running and vo tage-contro led osc l ators us ng Gunn and mpatt d odes and trans stors· analys s of noise character st cs of the osci ator. Prerequ sites· EEE 545 547

EEE 686 Adaptive Control. (3 N
Ma n top cs covered adapt ve dent f cat on, convergence parametr c models performance and robustness properties of adapt ve contro - ers, persistence of excitation and stabi ty. Prerequisites· EEE 582 and 586 *or* nstructor approva

EEE 731 Advanced MOS Devices. 3 S
Thresho d voltage subthresho d current, sca 'ng smal geometry effects, hot e ectrons, and a ternative structures Prerequ s te· EEE 531

EEE 770 Advanced Topics in Power Systems. (3) N
Power system prob ems of current interest approached at an advanced techn cal evel, for mature students Prerequisites: EEE 577 and 579 *or* equ valents 'nstructor approva

Department of Industrial Engineering

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PROFESSORS
DOOLEY, HENDERSON, HOGG, HUBELE KEATS MONTGOMERY, WOLFE

ASSOCIATE PROFESSORS
ANDERSON-ROWLAND, COCHRAN, MACKULAK, MOOR, ROBERTS, ROLL ER, RUNGER SHUNK, VILLALOBOS, YE

ASSISTANT PROFESSORS
CARLYLE, FOWLER, MOU, SENTURK

The industrial engineer (IE) provides leadership for American organizations in reestablishing competitiveness in the global marketplace through system integration and pro ductivity improvement. No challenge can be greater than improving productivity, which is the application of knowledge and skills to provide improved goods and services to enhance the quality of life, both on and off the job. This improvement must be achieved without waste of physical and human resources while maintaining the environmental balance. Industrial engineers are the "productivity people" who provide the necessary leadership and skills to integrate technology. This gives IEs a wide range of interests and responsibilities.

As in other engineering fields, industrial engineering is concerned with solving problems through the application of scientific and practical knowledge. What sets industrial engineering apart from other engineering disciplines is its broader scope An IE relates to the total picture of produc tivity. An IE looks at the "big picture" of what makes society perform best the right combination of human resources, natural resources, synthetic structures, and equip ment. An IE bridges the gap between management and oper ations, dealing with and motivating people as well as deter mining what tools should be used and how they should be used.

An IE deals with people as well as things. In fact, indus trial engineering is often called the "people oriented profes sion." It is a primary function of the IE to integrate people and technology oriented systems. Therefore. IEs are active in the fields of ergonomics and human factors

To be competitive in this global economy. it is essential to emphasize and continually improve the quality of goods and services. Industrial engineering is the only engineering dis cipline offering course work in designing and implementing quality assurance systems.

The IE's skills are applicable to every kind of organiza tion IEs learn how to approach, think about, and solve pro ductivity and integration problems regardless of their set tings IEs work in manufacturing facilities, banks, hospitals, government, transportation, construction, and social ser vices. Within this wide variety of organizations, IEs get involved in projects such as designing and implementing quality control systems, independent work groups, the work flow in a medical laboratory, real time production control systems, computer based management information systems, and manufacturing operating systems, to name a few A unique feature of most industrial engineering assignments is that they involve interdisciplinary teams. For example, the IE might be the leader of a team consisting of electrical and mechanical engineers, accountants, computer scientists, and planners. This IE program gives the student the skills neces sary to direct these teams These skills include team build ing, brainstorming, group dynamics, and interpersonal rela tionships

IEs have a sound background in technology integration, management theory and application, engineering economics and cost analysis. They are well equipped to deal with prob lems never seen before, making them prime candidates for promotion through the management career path, especially in high tech organizations. In fact, more than half of all practicing IEs are in management positions. This area of expertise has placed the IE in the leadership role in the establishment of a new field of activity called "management of technology."

Industrial engineers are well trained in the development and use of analytical tools, and their most distinctive skill is in the area of model building. IEs must quickly learn and understand the problems of their clients. In this context, good people skills and good analytic skills are essential. This industrial engineering program offers both.

INDUSTRIAL ENGINEERING—B.S.E.

The curriculum in Industrial Engineering builds upon mathematics, computer programming, and the engineering core. Beyond this foundation, the curriculum includes a number of required IE core courses, IE electives, and study area electives, enabling students to focus on a specific career objective.

By successfully completing this curriculum, the student is prepared to embark on a career in industrial engineering or to pursue advanced education in graduate school.

The career-focused study areas are as follows:

1. Industrial and management systems: For a broad traditional IE career in the design and analysis of man ufacturing and service systems.
2. Information and telecommunication systems: For a career in the application of integrated computer and telecommunication systems to manufacturing and service systems analysis and design.
3. Global industrial engineering leadership· For a career in global manufacturing and service organiza tions
4. High-tech manufacturing For a career in the design and analysis of integrated manufacturing systems
5. Preprofessional and service systems: For a career in law, medicine or public service or careers in the design and analysis of health care, agribusiness,

NOTE: For the Genera Stud es requ rement courses, and codes (such as L SQ C and H), see General Studies, page 87 For graduat on requ rements see "Un vers ty Graduat on Requ rements" page 83 For an exp anation of add tional omn bus courses offered but not sted n th s cata og see "C ass f cat on of Courses" page 60

banking financial, and government/public-administration systems.

Degree Requirements

A minimum of 128 semester hours is necessary for the B.S.E degree in Industrial Engineering, including a minimum of 50 upper division semester hours.

Graduation Requirements

To graduate, a student must satisfy all university, college, and department requirements See "University Graduation Requirements," page 83, and "College Degree Requirements," page 198.

Course Requirements

Students take 60 semester hours of university English proficiency and general studies course work, 20 hours of engineering core, 30 hours of industrial engineering courses, six hours of industrial engineering electives, and 12 hours of career focused study area electives Each study area has an associated list of recommended general studies, IE electives, and study area courses. The course work for the undergraduate degree can be classified into the following categories:

First-Year Composition

Choose among the course combinations below 6

ENG 101 First Year Composition 3)
ENG 102 First Year Composition 3)
or
ENG 105 Advanced First Year Composition (3)
Elective chosen with an advisor (3
or
ENG 107 English for Foreign Students (3)
ENG 108 English for Foreign Students (3)

Total .6

General Studies/School Requirements

Humanities and Fine Arts Social and Behavioral Sciences

ECN 112 Microeconomic Principles *SB* .3
HU courses .6–10
SB courses .3 7

Minimum total 16

Literacy and Critical Inquiry

ECE 300 Intermediate Engineering Design *L* .3
Approved IE Course .3

Total .6

Natural Sciences Basic Sciences

CHM 114 General Chemistry for Engineers *SQ* 4
or CHM 116 General Chemistry *SQ* (4)
PHY 121 University Physics I Mechanics *SQ* .3
PHY 122 University Physics Laboratory I *SQ* .1
PHY 131 University Physics II: Electricity and Magnetism *SQ*[2] .3
PHY 132 University Physics Laboratory II *SQ*[2] .1
Basic science elective 3

Total .15

Numeracy Mathematics

MAT 242 Elementary Linear Algebra 2
MAT 270 Calculus with Analytic Geometry I *MA* .4
MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA* .4
MAT 274 Elementary Differential Equations *MA* .3

Total 17
General Studies school requirements total. 64

Engineering Core

ECE 100 Introduction to Engineering Design *CS* .4
ECE 210 Engineering Mechanics I: Statics. .3
ECE 301 Electrical Networks I .4
ECE 312 Engineering Mechanics II· Dynamics. .3
ECE 350 Structure and Properties of Materials .3
IEE 463 Computer Aided Manufacturing and Control *CS*. .3

Total 20

Both PHY 121 and 122 must be taken to secure SQ credit
' Both PHY 131 and 132 must be taken to secure SQ credit

Industrial Engineering Major

The following courses are required.

ASE 485 Engineering Statistics *CS* 3
CSE 100 Principles of Programming with C++ *CS* 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
IEE 300 Economic Analysis for Engineers 3
IEE 368 Facilities Analysis and Design. 3
IEE 374 Quality Control *CS* 3
IEE 461 Production Control 3
IEE 475 Simulating Stochastic Systems *CS* .3
IEE 476 Operations Research Techniques Applications *CS* 4
IEE 494 ST. Industrial Engineering Applications Seminar 2

Total .30

Industrial Engineering Electives Area

Students select six semester hours of industrial engineering electives For course information, see the list of recommended courses in the department advising office.

Career-Focused Study Area Electives

Students select a minimum of 12 semester hours from the following recommended electives in one of the five career-focused study areas

Global Industrial Engineering Leadership

ECN 306 Survey of International Economics *SB G* .3
IBS 300 Principles of International Business *G* 3
IBS 400 Cultural Factors in International Business *C, G* 3
Any approved international business elective 3

High-Tech Manufacturing

ECE 352 Properties of Electronic Materials 4
EEE 435 Microelectronics 3
EEE 436 Fundamentals of Solid State Devices 3
MSE 335 Introduction to Materials Science and Engineering 3
MSE 441 Analysis of Materials Failure. 3
MSE 470 Polymers and Composites. .3

Industrial and Management Systems

IEE 305 Information Systems Engineering *CS* .3
IEE 360 Manufacturing Processes 3
IEE 361 Manufacturing Processes Lab 1
IEE 431 Engineering Administration 3
Any approved engineering or business elective 3

Information and Telecommunication Systems

CSE 200 Concepts of Computer Science *CS* 3
CSE 210 Object Oriented Design and Data Structure .3
CSE 240 Introduction to Programming Languages 3
IEE 305 Information Systems Engineering *CS* .3

Preprofessional and Service Systems

Agribusiness Systems

AGB 340 Food Processing .3
AGB 341 Food Analysis .3
AGB 351 Management Science *CS* 3
AGB 364 Agribusiness Technologies I 3

AGB 414 Agribusiness Analysis *L* 3
AGB 440 Food Safety 3
AGB 442 Food and Industrial Microbiology 3

Banking and Financial Systems
FIN 300 Fundamentals of Finance 3
FIN 331 Financial Markets and Institutions 3
FIN 361 Managerial Financing 3
FIN 431 Management of Financial Institutions 3

Government and Public Administration Systems
POS 310 American National Government *SB* 3
POS 316 State and Local Government *SB* 3
POS 320 Public Administration *SB* 3
POS 333 Interest Groups *SB* 3

Health Care Systems
HSA 473 Comparative Health Systems 3
HSA 498 PS. Health Care Finance . . . 3
HSA 498 PS Health Economics 3
HSA 498 PS Health Service Administration and Policy 3
HSA 498 PS Policy Issues in Health Care 3

Prelaw Systems
AGB 456 World Agricultural Resources *G* 3
AJS 360 Substantive Criminal Law (ASU West 3
COM 422 Advanced Argumentation 3
GLB 300 Gateway to Global Business (ASU West . . 3
LES 306 Business Law 3
POL 470 Law and Political Order ASU West). 3

Premedicine Systems
BIO 181 General Biology *SQ* 4
BIO 182 General Biology *SG* 4
BIO 351 Developmental Anatomy 3
CHM 331 General Organic Chemistry 3
CHM 332 General Organic Chemistry 3
CHM 335 General Organic Chemistry Lab 1
CHM 336 General Organic Chemistry Lab 1

Industrial Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester
CHM 114 General Chemistry for Engineers *SQ* 4
or CHM 116 General Chemistry *SQ*
ECE 100 Introduction to Engineering Design *CS* 4
or HU/SB elective 4)[2]
ENG 101 First Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4

Total 15

Second Semester
ECN 112 Microeconomic Principles *SB* 3
ENG 102 First Year Composition. 3
MAT 271 Calculus with Analytic Geometry II *MA* 4
PHY 121 University Physics I: Mechanics *SQ*[3] 3
PHY 122 University Physics Laboratory I *SQ* 1
HU/SB elective[2] 3
or ECE 100 Introduction to Engineering Design *CS* 4)

Total 17

Second Year

First Semester
CSE 100 Principles of Programming with C++ *CS* 3
IEE 300 Economic Analysis for Engineers 3
MAT 242 Elementary Linear Algebra 2
MAT 272 Calculus with Analytic Geometry III *M4* 4
PHY 131 University Physics II: Electricity and Magnetism *SQ*[4] 3
PHY 132 University Physics Laboratory II *SQ*[4] 1

Total 16

Second Semester
ECE 210 Engineering Mechanics I Statics 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
IEE 463 Computer Aided Manufacturing and Control *CS* . . . 3
IEE 494 ST. Industrial Engineering Applications Seminar 2
MAT 274 Elementary Differential Equations *MA* 3
Basic science elective[5] 3

Total 17

Third Year

First Semester
ASE 485 Engineering Statistics *CS* 3
IEE 368 Facilities Analysis and Design 3
IEE 374 Quality Control *CS* 3
HU/SB elective 4
Industrial Engineering elective 3

Total 16

Second Semester
ECE 300 Intermediate Engineering Design *L* 3
ECE 312 Engineering Mechanics II Dynamics 3
ECE 350 Structure and Properties of Materials. 3
IEE 476 Operations Research Techniques Applications *CS* 4
Study area elective 3

Total 16

Fourth Year

First Semester
ECE 301 Electrical Networks I 4
IEE 461 Production Control 3
IEE 475 Simulation Stochastic Systems *CS* 3
HU SB elective 3
Industrial Engineering elective. 3

Total 16

Second Semester
HU SB elective[2] 3
Senior Capstone *L* 3
Study area electives 9

Total 15

Students who have taken no high school chemistry should take CHM 113 and 116.

[2] Engineering students may not use aerospace studies (AES) or military science (MIS) courses to satisfy HU or SB requirements

[3] Both PHY 121 and 122 must be taken to secure SQ credit.

[4] Both PHY 131 and 132 must be taken to secure SQ credit

[5] Must be an earth science or life science course, if physics or chemistry, the course must be of a more advanced level than CHM 114 or 116 or PHY 131

NOTE: For the General Studies requirement, courses and codes such as L, SQ, C, and H), see "General Studies" page 87. For graduation requirements, see University Graduation Requirements" page 83 For an explanation of additional omnibus courses offered but not listed in this catalog see "Classification of Courses' page 60

INDUSTRIAL ENGINEERING (IEE)

IEE 300 Economic Analysis for Engineers. (3) F S
Economic evaluat on of a ternat ves for engineer ng dec s'ons, empha s z ng the t me value of money Prerequisites· ECE 100 MAT 270

IEE 305 Information Systems Engineering. (3) F
Emphas s on systems analys s, design and mp ementation of infor-mat'on systems us ng fourth generation anguages and alternat ve data base structures. Prerequisite: CSE 100 *General Stud es. CS*

IEE 360 Manufacturing Processes. (3) F S
Product on technique and equipment. Cast ng and mold ng form ng mach n ng, jo n ng and assembly, computer integrated manufactur ng, rapid prototyp ng, and electronics manufacturing Cross-l sted as MAE 351 Cred t 's al owed for only IEE 360 or MAE 351 Prerequis te ECE 350

IEE 361 Manufacturing Processes Lab. (1) F, S
Ser es of abs designed to lustrate concepts presented n IEE 360 on product on technique and equ pment Corequisite· IEE 360 (or MAE 351

IEE 368 Facilities Analysis and Design. (3) F
Plann ng analys s and des gn of methods of the tang b e phys cal assets of the f rm Emphas s on fac l ties location mater als hand ng, automat on, computer ntegrat on, and ut l zat on of f nanc a resources App cat ons n diverse f elds Lecture, lab Prerequ site IEE 300.

IEE 369 Work Analysis and Design. (3) S
P anning ana ys s and des gn of methods of accomp sh ng work Emphas s on human factors work p ann ng methods analys s and des gn, and work measurement App ıcat ons ın d verse f e ds Lec ture lab

IEE 374 Quality Control. (3) F
Contro chart ng and other stat st ca process contro techn ques Organization and manager al aspects of qua ty assurance p us acceptance samp ng plans Prerequisite ECE 380 *General Studies CS*

IEE 431 Engineering Administration. (3) F
Introduc ng quant tat ve and qual tat ve approaches to management funct ons eng neer ng adm n strat on, organ zat ona ana ys s deci s on making and communication Prerequ s te sen or stand ng.

IEE 437 Human Factors Engineering. (3) F
Study of the human psycho og ca and phys'olog ca factors that under e the des gn of equipment and the nteraction between peop e and mach nes.

IEE 461 Production Control. (3) F
Techn ques for the p ann ng control, and eva uat on of product on sys-tems Project management forecast ng inventory contro , schedu ng enterprise requirements p ann ng Prerequisites ASE 485 CSE 100, IEE 476

IEE 463 Computer-Aided Manufacturing and Control. (3) S
Computer control n manufactur ng, C M, NC og c contro ers group technology, process p ann ng and robot cs Prerequ s te C program m ng capab ty *General Studies CS*

IEE 475 Simulating Stochastic Systems. (3) F S
Ana ysis of stochast'c systems us'ng basic queu ng networks and d s-crete event s mu at on Bas c network mode ng shared resources rout ng assembly og c Not open to students w th cred t n EE 545 Prerequ s tes ASE 485 CSE 100 IEE 476 *General Studies CS*

IEE 476 Operations Research Techniques Applications. (4) F S
Industrial systems app cat ons w th operat ons research techniques Resource a ocat on, product mix product on sh pp ng, task ass gn ment market share mach ne repa'r, customer serv ce Not open to students with cred t n EE 546. Prerequisites· ASE 485, CSE 100 *General Studies CS.*

IEE 490 Project in Design and Development. (3) F S
Ind vidua or team capstone project n creative design and synthesis Prerequ s te senior stand ng

IEE 494 Special Topics. (2) N
(a) Industr al Engineering App ıcations Seminar

IEE 505 Applications Engineering. (3) F
Develop work ng knowledge of app ıcation systems deve opment too s needed for computer ntegrated enterpr'se nc udes techniques for appl cat on generat on n fourth and f fth generation software env ron ments Top cs nc ude c ent server network systems dec s on support systems and transact on systems n d str buted env ronment

IEE 511 Analysis of Decision Processes. (3) S
Methods of mak ng decisions n comp ex env ronments and stat stical decis on theory· effects of r sk, uncerta nty, and strategy on eng neer ng and manageria dec s ons Prerequ'site· ECE 380

IEE 520 Ergonomics Design. 3) S
Human phys o og ca and psycholog ca factors n the des gn of work env ronments and n the emp oyment of peop e n man-mach ne sys tems Open shop lab ass gnments ın addit on to c ass work Prerequ - site· IEE 437 or 547

IEE 530 Enterprise Modeling. (3 S
Focus on social, economic, and techn ca mode s of the enterpr se with emphasis on the management of techno og ca resources Included are organ zat'on econometric f nanc a and arge scale mathemat cal mode s

IEE 531 Topics in Engineering Admin stration. (3 S 2002
Cons derat on g ven to phi osoph cal, psycho og cal, po t'ca and social mpl cat ons of adm n strat ve dec s ons Prerequ site IEE 532 or nstructor approval

IEE 532 Management of Technology. 3) F
Topics inc ude design ng a techn ca strategy techno og ca forecast ng nterfac ng market'ng eng neer ng and manufactur ng des gn ng and manag ng nnovat on systems creat v ty appl cat on of bas c management pr nc p es to techno ogy management Prerequisite· EE 431 or 541 or nstructor approva

IEE 533 Scheduling and Network Analysis Models. (3) S
Appl cat on of scheduling and sequenc ng algor thms determ n st c and stochast c network ana ysis and f ow a gorithms Prerequ s tes. ECE 380, EE 476 or 546)

IEE 541 Engineering Administration. 3 F
Introduc ng quantitative and qua tat ve approaches to management funct ons eng neering adm nistrat on organizationa ana ys s deci-s on mak'ng and commun cat on EE 431 students ne 'gib e.

IEE 543 Computer-Aided Manufacturing and Control. (3) S
Computer contro ın manufactur ng CIM NC, log c control ers, group techno ogy process p anning and robot cs EE 463 students nel g b e Prerequ s te C programming capab ty.

IEE 545 Simulating Stochastic Systems. (3) F S
Ana ys s of stochast c systems us ng bas c queu ng networks and dis crete event simu at on Basic network model ng, shared resources, rout ng, assemb y og c Not open to students w th cred t n IEE 475 Prerequ s'tes ASE 485 CSE 100 (or equiva ent EE 476 or 546)

IEE 546 Operations Research Techniques Applications. 4) F S
Students mode and ana yze ndustr a systems app cat ons with oper-at ons research techn'ques Resource a ocat on, product m x, produc-t on sh pp ng task ass gnment market share machine repair customer service. Not open to students with cred t n EE 476 Prereq-u s tes ASE 485 CSE 100

IEE 547 Human Factors Engineering. 3 F
Study of peop e at work design ng for human performance effect ve-ness and product v ty Cons derat ons of human phys o og ca and psy-cholog ca factors. Open only to students w thout prev ous credit for EE 437.

IEE 552 Strategic Technological Planning. 3 S
Study of concept of strategy strategy formu at on process and strate-g c plann ng methodo og es w th emphasis on eng neering design and manufactur'ng strategy comp emented w th case stud es An ana yt-cal execut ve p anning dec s on support system s presented and used throughout course Pre or corequ site IEE 545 or 566 or 567 or 574 or 575

IEE 560 Object-Oriented Information Systems. 3 S
App ıcation of object or ented techno ogy concepts to manufacturing and enterpr se systems Top cs nclude Java, object management sys tems and app cat on des gn. Prerequisites CSE 100· EE 305 or 505 *or* equ valents.

IEE 561 Production Systems. 3) F S
Understand ng how factor es operate how performance s measured and how operat ona changes mpact performance metr cs Opera t onal phi osoph es ncreasing product on eff c ency through quant ta tive methods Prerequ s tes ASE 485 or equ va ent) IEE 475, 476

IEE 562 Computer Aided Manufacturing (CAM) Tools. (3) F
Current top cs n automation d str buted contro contro code genera tion contr ogic va dation CAM integrat on, CAD CAM data struc-tures, plann ng for control systems Top cs vary by semester Prerequ s te EE 463 or 543 or equ va ent

IEE 563 Systems Analys's for Distributed Systems. (3) S
Analys s and des gn of d str buted groupware app ıcat ons f r manufactur ng and enterpr se systems Prerequ s te ECE 380

IEE 564 Plann ng for Computer-Integrated Manufacturing. (3) F
Theory and use of DEF methodo ogy n p ann ng for flex b e manufac tur ng, rob t cs and rea time tro S mu at on concepts app ed to computer ıntegrated manufacturıng plann ng Prerequ s te EE 463 or 543

IEE 565 Computer Integrated Manufacturing Research. (3) S
Determ'nat on and eva uation of research areas ın computer inte grated manufactur ng nc uding rea t me software, manufactur ng nformat on systems f ex b e and ntegrated manufactur ng systems robot cs and computer graph cs. Prerequ s te IEE 564.

IEE 566 Simulation in Manufacturing. 3 S
Use of simu at on n computer ıntegrated manufacturıng w th an emphas s on model ng mater a hand ng systems. Programmıng, declarat ve and nte gence based s mu at on environments Prereq u s te EE 545

IEE 567 Simulation System Analysis. 3 F
S mu at on m del ng of pr cesses nvo v ng d screte and cont nuous system components Top cs nclude random number generators out put ana ys s var ance reduct on, and stat stica ssues related to simu- ation Prerequ s te IEE 545

IEE 569 Advanced Statistical Methods. 3) F 2000
App cat on of stat st ca nference procedures based on ranks to engineer ng prob ems Eff c ent a ternat ves to c ass cal statist ca nference constrained by norma ty assumptions. Prerequisite: ASE 485 or 500

IEE 570 Advanced Quality Control. 3 S
Economic based acceptance samp ng, mu t attr bute acceptance sampl ng, narrow m t gaug ng n spector error and attr butes accep tance samp ng, pr nc p es of qua ty management and se ected top cs from current terature Prerequ s te ASE 485 or 500 or equiva ent

IEE 571 Quality Management. 3 F
Total qua ty concepts qua ty strateg es qua 'ty and competitive post t on qual ty costs vendor re at ons the qua ty manua , and qua ty n the serv ces. Prerequ s te EE 431 or 541.

IEE 572 Design of Engineering Exper'ments. 3) F, S
Analys s of var ance and exper menta des gn Top cs nclude genera des gn methodology ncomp ete b ocks confound ng fract onal repl cat on and response surface methodo ogy Prerequ s te ASE 485 or 500

IEE 573 Reliability Engineering. 3 S
Nature of rel ab ty, t me to fa ure densit'es, ser es para el/standby systems, comp ex system re ab ty, Bayes an re ab ty and sequen t a re ab ty tests Prerequ s te ECE 380

IEE 574 Applied Determ'nist'c Operations Research Models. (3) F, S
Advanced techn ques n operat ons research are deve oped for the solut on of comp ex ndustr a systems prob ems Goa programm ng ınteger programm ng heur st c meth ds dynamic and non inear pro gramm ng Prerequ s tes IEE 476 or 546 ; MAT 242

IEE 575 Applied Stochastic Operations Research Models. (3) S
Students formulate and so ve ındustr a systems prob ems w th sto chast c components us ng ana yt ca techn ques Convo ut on cont nu ous-t me Markov cha ns queues w th batch ng prıor t es, ba k'ng open/c osed queu ng networks Prerequ sites· ASE 485 EE 476 or 546 .

IEE 577 Decision and Expert Systems Methodologies. 3) F
Applicat on of art f c al nte gence methodo ogıes n dec s on support systems Top cs nc ude neura networks, fuzzy logic systems, and expert systems Prerequ s te CSE 100 or equ va ent

IEE 578 Regression Analysis. 3) F
A course n regress on m de bu d ng or ented toward eng'neers phys ca sc ent sts Top s n ude near regressıon d agnost cs biased and robust f tt ng non near regress on Prerequ s te ASE 485 or 500.

IEE 579 Time Series Analysis and Forecasting. (3) F 2001
Forecast ng t'me ser es by the Box Jenkins and exponent a smooth- ıng techn ques ex stıng d g ta computer programs are uti zed to aug ment the theory Prerequisites ASE 485 or 500)· IEE 461

IEE 582 Response Surfaces and Process Optimization. (3) S
An ntroduct on to response surface method and ts app cations Top ics ınclude steepest ascent, canon ca ana ys s, des gns, and optımal ity cr ter a Prerequ s te. EE 572

IEE 591 Seminar. (1 12) N
a) Effects of Econom cs/New Products Market
b) Manufactur ng Strategy
(c) New Product Strategy
(d) Strateg c Product Deve opment

IEE 672 Advanced Topics in Experimental Design. (3) S 2002
Eng neering applicat ons of factoria and fract onal factorıal designs with random zat on restrict ons, ana ysis techniques n parameter comparison m ss ng data, unbalanced des gns Prerequisite EE 572 or nstructor approva

IEE 677 Regression and Linear Models. (3) S 2001
Genera ınear models applicat ons theory, ınc ud ng least squares max mum kel hood est mation, properties of est mators, l ke ihood rat o tests and computat onal procedures Prerequis te IEE 578 or ınstructor approval.

IEE 679 Time Series Analysis and Control. (3) F 2000
dentification, est'mat on, diagnost c check ng techn ques for ARIMA mode s, transfer functions, mu t p e t me ser es models for feedback and feedforward contro schemes Prerequ s te IEE 579 or nstructor approva

IEE 681 Reliability, Availability, and Serviceability. (3) F 2000
Organiz ng hardware and software, integr ty and fau t tolerant design ma ntenance design and strategy, Markov models fault-free ana ysis and m tary standards. Prerequ s te ECE 380

Department of Mechanical and Aerospace Engineering

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PROFESSORS
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ASSOCIATE PROFESSORS
CHEN, KOURIS, KUO, LEE, MIGNOLET, PHELAN, RANKIN SQUIRES, WELLS

ASSISTANT PROFESSORS
CHAPSKY, FUSSELL McNEILL, PERALTA, SUGAR

The Department of Mechanical and Aerospace Engineer ıng is the administrative home for two undergraduate majors: Aerospace Engineering and Mechanical Engineer ıng.

Both majors build on the broad exposure to the engineer ing, chemical, and physical sciences and the mathematics embodied ın the General Studies and engineering core courses required of all engineering students.

The Aerospace Engineering major provides students an education ın technological areas critical to the design and development of aerospace vehicles and systems. Aerospace

NOTE· For the Genera Stud es requ rement courses, and codes such as L SQ C, and H), see "General Studies," page 87 For graduation requ rements see Un vers ty Graduat on Requirements," page 83. For an exp anation of add tional omn bus courses offered but not l sted n this cata og, see C ass'f cati n of Courses,' page 60

Engineering graduates are typically employed at government laboratories (e.g., NASA) and in a wide range of aerospace and mechanical industries. The Mechanical Engineering major is perhaps one of the most broadly applicable programs in engineering, providing education for a wide variety of employment opportunities.

The two majors, discussed in more detail below, can serve as entry points to immediate professional employment or to graduate study. The emphasis in all fields is on the development of fundamental knowledge that will have long lasting utility in our rapidly changing technical society.

DEGREE REQUIREMENTS

All degree programs in the department require that students attain a minimum GPA of 2.00 in the engineering core and in the major and take a minimum of 50 upper division semester hours in order to be eligible for graduation. Also the department may require additional or remedial course work for those students who have demonstrated a trend toward academic difficulties.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, majors must satisfy all university graduation requirements. See "University Graduation Requirements," page 83.

COURSE REQUIREMENTS

General Studies

See "Course Requirements," page 207, for General Studies, school, and engineering core course requirements.

Engineering Core

Students in the Department of Mechanical and Aerospace Engineering are required to take the following from among the choices listed on page 208 as part of the engineering core requirements.

ECE	100 Introduction to Engineering Design *CS*	4
ECE	210 Engineering Mechanics I: Statics	3
ECE	300 Intermediate Engineering Design *L*	3
ECE	301 Electrical Networks I	4
ECE	312 Engineering Mechanics II: Dynamics	3
ECE	313 Introduction to Deformable Solids	3
ECE	340 Thermodynamics	3
ECE	350 Structure and Properties of Materials	3
Total		26

AEROSPACE ENGINEERING—B.S.E.

The goal of the Aerospace Engineering program is to provide students with an education in technological areas critical to the design and development of aerospace vehicles and systems. The program emphasizes aeronautical engineering with topics in required courses covering aerodynamics, aerospace materials, aerospace structures, propulsion, flight mechanics, aircraft performance, and stability and control. Astronautic topics such as orbital mechanics, attitude dynamics, spacecraft control, and rocket propulsion are also covered in required courses.

Design is integrated throughout the curriculum beginning with ECE 100 Introduction to Engineering Design and followed later by ECE 300 Intermediate Engineering Design, both of which focus on basic design theory as well as professional practice. These required courses are followed by topic specific design content in aerospace engineering courses in the junior and senior years. The senior capstone design course integrates design and analysis topics from the earlier courses and completes the required design sequence. This sequence includes a minimum of 20 semester hours of required design. In addition, many of the aerospace technical electives have design content.

Laboratory experience is provided in the areas of aerodynamics, aerospace structures, and vibrations. Laboratory facilities include four major wind tunnels, an integrated mechanical testing laboratory, a controls laboratory, and a vibrations laboratory.

Aerospace Engineering Major

Aerospace Engineering students are required to take the following two courses in addition to those required for the major.

MAT	242 Elementary Linear Algebra	2
PHY	361 Introductory Modern Physics	3

The Aerospace Engineering major consists of the following courses:

ECE	384 Numerical Analysis for Engineers I	2
ECE	386 Partial Differential Equations for Engineers	2
ECE	350 Random Signal Analysis	3
MAE	307 Dynamic Systems and Control	3
MAE	306 Aerodynamics I	3
MAE	413 Aircraft Performance, Stability, and Control	3
MAE	415 Vibration Analysis	4
MAE	425 Aerospace Structures	4
MAE	444 Fundamentals of Aerospace Design	3
MAE	460 Gas Dynamics	3
MAE	467 Space Vehicle Dynamics and Control	3
MAE	463 Propulsion	3
MAE	464 Aerospace Laboratory	3
MAE	468 Aerospace Systems Design *L*	3
Area of emphasis technical electives		6
Total		48

Aerospace Engineering Areas of Study

To further the design experience, all Aerospace Engineering students must choose at least one technical elective from the following list of courses.

MAE	426 Design of Aerospace Structures	3
MAE	401 Aerodynamics II	3
MAE	465 Rocket Propulsion	3
MAE	466 Rotary Wing Aerodynamics and Performance	3
MAE	467 Aircraft Performance	3
MAE	462 Projects in Astronautics and Aeronautics	3

The remaining technical elective(s) may be selected from among any of the courses listed in the following course tables or from courses listed under the Mechanical Engineering areas of study. The courses are grouped so that the student may select an elective package of closely related courses. A student may, with prior approval of the advisor and department, select a general area and a corresponding set of courses not listed that would support a career objective not covered by the categories shown below. *Note:* MAE 371 may *not* be substituted for MAE 361, and MAE 422 may *not* be substituted for MAE 425.

Aerodynamics. Select from these courses:

MAE	327 Fluid Mechanics	3
MAE	435 Turbomachinery	3

MAE 461 Aerodynamics II 3
MAE 463 Propulsion 3
MAE 466 Rotary Wing Aerodynamics and Performance 3
MAE 471 Computational Fluid Dynamics 3
MAE 490 Projects in Design and Development *L* 3
MAT 421 Applied Computational Methods *CS* 3

Aerospace Materials. Select from these courses:

MAE 455 Polymers and Composites 3
MSE 355 Introduction to Materials Science and Engineering 3
MSE 420 Physical Metallurgy 3
MSE 440 Mechanical Properties of Solids 3
MSE 441 Analysis of Material Failures 3
MSE 450 X ray and Electron Diffraction 3
MSE 471 Introduction to Ceramics 3

Aerospace Structures. Select from these courses

MAE 404 Finite Elements in Engineering 3
MAE 426 Design of Aerospace Structures 3
MAE 455 Polymers and Composites 3
MAE 490 Projects in Design and Development *L* 3

Computer Methods. Select from these courses:

ASE 485 Engineering Statistics *CS* 3
CSE 310 Data Structures and Algorithms 3
CSE 422 Microprocessor System Design II 4
CSE 428 Computer Aided Processes 3
IEE 463 Computer Aided Manufacturing and Control *CS* 3
IEE 475 Simulating Stochastic Systems *CS* 3
MAE 404 Finite Elements in Engineering 3
MAE 406 CAD/CAM Applications in MAE 4
MAE 471 Computational Fluid Dynamics 3
MAE 541 CAD Tools for Engineers 3
MAT 421 Applied Computational Methods *CS* 3
MAT 423 Numerical Analysis I *CS* 3
MAT 425 Numerical Analysis II *CS* 3

Design. Select from these courses:

MAE 341 Mechanism Analysis and Design 3
MAE 404 Finite Elements in Engineering 3
MAE 406 CAD CAM Applications in MAE 4
MAE 426 Design of Aerospace Structures 3
MAE 435 Turbomachinery 3
MAE 442 Mechanical Systems Design 3
MAE 446 Thermal Systems Design 3
MAE 455 Polymers and Composites 3
MAE 466 Rotary Wing Aerodynamics and Performance 3
MAE 467 Aircraft Performance 3
MAE 490 Projects in Design and Development *L* 3
MSE 440 Mechanical Properties of Solids 3
MSE 441 Analysis of Material Failures 3

Mechanical. Any courses listed under the Mechanical Engineering concentrations except MAE 371 and 422 may be selected.

Propulsion. Select from these courses:

MAE 382 Thermodynamics 3
MAE 388 Heat Transfer 3
MAE 434 Internal Combustion Engines 3
MAE 435 Turbomachinery 3
MAE 436 Combustion 3
MAE 461 Aerodynamics II 3
MAE 465 Rocket Propulsion 3
MAE 466 Rotary Wing Aerodynamics and Performance 3
MAE 471 Computational Fluid Dynamics 3
MAE 490 Projects in Design and Development *L* 3

System Dynamics and Control. Select from these courses:

CSE 428 Computer-Aided Processes 3
EEE 480 Feedback Systems 4
EEE 482 Introduction to State Space Methods 3
MAE 417 Control System Design 3
MAE 447 Robotics and Its Influence on Design 3
MAE 469 Projects in Astronautics or Aeronautics 3
MAE 490 Projects in Design and Development *L* 3

TYPICAL FOUR-YEAR SEQUENCE

The first two years are usually devoted to the General Studies and engineering core requirements. Thus, the degree programs in the department share essentially the same course schedule for that period of time. A typical schedule is given below.

Aerospace Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester
CHM 114 General Chemistry for Engineers *SQ* 4
or CHM 116 General Chemistry *SQ* (4)
ECE 100 Introduction to Engineering Design *CS* 4
or HU SB elective[1]
ENG 101 First Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4

Total 15

Second Semester
ENG 102 First Year Composition 3
MAT 242 Elementary Linear Algebra 2
MAT 271 Calculus with Analytic Geometry II *MA* 4
PHY 121 University Physics I: Mechanics *SQ*[2] 3
PHY 122 University Physics Laboratory I *SQ* 1
HU SB and awareness area course 3
or ECE 100 Introduction to Engineering Design *CS* (4)

Total 16

Second Year

First Semester
ECE 210 Engineering Mechanics I. Statics 3
ECE 350 Structure and Properties of Materials 3
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 274 Elementary Differential Equations *MA* 3
PHY 131 University Physics II Electricity and Magnetism *SQ*[3] 3
PHY 132 University Physics Laboratory II *SQ*[3] 1

Total 17

Second Semester
ECE 301 Electrical Networks I 4
ECE 312 Engineering Mechanics II: Dynamics 3
ECE 313 Introduction to Deformable Solids 3
ECE 340 Thermodynamics 3
ECE 384 Numerical Analysis for Engineers I 2
ECE 386 Partial Differential Equations for Engineers 2

Total 17

NOTE: For the General Studies requirement, courses and codes (such as L, SQ, C, and H) see "General Studies" page 87. For graduation requirements see "University Graduation Requirements" page 83. For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses," page 60.

Third Year

First Semester

ECE 3 Intermediate Engineering Design L	3
MAE 317 Dynamic Systems and Control	3
MAE 361 Aerodynamics I	3
MAE 425 Aerospace Structures	4
HU, SB or awareness area course	3
Total	16

Second Semester

EEE 350 Random Signal Analysis	3
MAE 413 Aircraft Performance, Stability, and Control	3
MAE 444 Fundamentals of Aerospace Design	3
MAE 460 Gas Dynamics	3
HU, SB, or awareness area course	3
Total	15

Fourth Year

First Semester

MAE 415 Vibration Analysis	4
MAE 462 Spacevehicle Dynamics and Control	3
MAE 463 Propulsion	3
PHY 361 Introductory Modern Physics	3
Required design technical elective	3
Total	16

Second Semester

MAE 464 Aerospace Laboratory	3
MAE 468 Aerospace Systems Design L	3
technical elective	3
HU SB and awareness area courses	7
Total	16

Engineering students may not use aerospace studies AES or military science MIS courses to satisfy HU or SB requirements

Both PHY 121 and 122 must be taken to secure SQ credit

Both PHY 131 and 132 must be taken to secure SQ credit

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 that 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 power plants, the transport of energy via devices like heat exchangers, pipelines, gears, and linkages, 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 hardware 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 for 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 production, control, management, and sales of the devices and systems needed by society 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 the principles governing the use of energy, the principles of design, instruments and control devices; and the application of these studies to the creative solution of practical, modern problems.

Design is integrated throughout the curriculum, beginning with ECE 100 Introduction to Engineering Design and followed later by ECE 300 Intermediate Engineering Design, both of which focus on basic design theory as well as professional practice. These required courses are followed by topic specific design content in mechanical engineering courses in the junior and senior years. The senior capstone design course combines the design topics from the earlier courses and completes the required design sequence In addition, many of the mechanical technical electives have design content

Laboratory experience is provided in the areas of thermofluid systems, mechanics of materials, and controls. Laboratory facilities include a thermal systems laboratory, an integrated mechanical testing laboratory, a controls laboratory, and a manufacturing laboratory.

Mechanical Engineering Major

Mechanical Engineering students are required to select the following supplemental courses

ECE 384 Numerical Analysis for Engineers I	2
ECE 386 Partial Differential Equations for Engineers	2
EEE 350 Random Signal Analysis	3
MAT 242 Elementary Linear Algebra	2
PHY 361 Introductory Modern Physics	3

The Mechanical Engineering major requires the following departmental courses

MAE 317 Dynamic Systems and Control	3
MAE 318 Dynamic Systems and Control Laboratory	1
MAE 371 Fluid Mechanics	3
MAE 388 Heat Transfer	3
MAE 422 Mechanics of Material	4
MAE 441 Principles of Design	3
MAE 443 Engineering Design	3
MAE 493 Project in Design and Development L	3
MAE 491 Experimental Mechanical Engineering	3
Area of emphasis technical elective	15
Total	4

Mechanical Engineering Areas of Study

Technical electives may be selected from among any of the following courses or from courses listed under the Aerospace Engineering areas of study The courses are grouped to assist a student in identifying areas of specialization. Students preferring a broader technical background may choose courses from different areas. Generally, no more than two technical elective courses from outside the department are allowed. Credit for courses not on the list requires prior approval of the advisor and department Mechanical Engineering students may not use MAE 361 or 425 to fulfill degree requirements

Aerospace. Any courses listed under the Aerospace Engineering areas of study except MAE 361 and 425 may be selected.

Biomechanical. Select from these courses

BME 411 Biomedical Engineering I	3
BME 412 Biomedical Engineering II	3

BME 416 Biomechanics 3
BME 419 Biocontrol Systems 3
EEE 302 Electrical Networks II 3
EEE 434 Quantum Mechanics for Engineers 3

Computer Methods. Select from these courses:

ASE 485 Engineering Statistics *CS* 3
CSE 310 Data Structures and Algorithms 3
CSE 422 Microprocessor System Design II 4
CSE 428 Computer Aided Processes 3
IEE 463 Computer Aided Manufacturing and Control *CS* . 3
IEE 475 Simulating Stochastic Systems *CS* 3
MAE 404 Finite Elements in Engineering 3
MAE 406 CAD CAM Applications in MAE. 4
MAE 471 Computational Fluid Dynamics 3
MAE 541 CAD Tools for Engineers 3
MAT 421 Applied Computational Methods *CS* 3
MAT 423 Numerical Analysis I *CS* 3
MAT 425 Numerical Analysis II *CS* 3

Control and Dynamic Systems. Select from these courses:

CSE 428 Computer Aided Processes 3
EEE 360 Energy Conversion and Transport. 4
IEE 463 Computer Aided Manufacturing and Control *CS* 3
MAE 413 Aircraft Performance, Stability, and Control . . 3
MAE 417 Control System Design 3
MAE 462 Space Vehicle Dynamics and Control 3
MAE 467 Aircraft Performance 3

Design. Select from these courses:

MAE 341 Mechanism Analysis and Design 3
MAE 351 Manufacturing Processes 3
MAE 404 Finite Elements in Engineering. 3
MAE 406 CAD CAM Applications in MAE. 4
MAE 413 Aircraft Performance, Stability, and Control 3
MAE 417 Control System Design 3
MAE 434 Internal Con bustion Engines 3
MAE 435 Turbomachinery 3
MAE 442 Mechanical Systems Design 3
MAE 446 Thermal Systems Design 3
MAE 447 Robotics and Its Influence on Design 3
MAE 462 Space Vehicle Dynamics and Control 3
MAE 467 Aircraft Performance 3

Energy Systems. Select from these courses:

EEE 360 Energy Conversion and Transport. 4
MAE 372 Fluid Mechanics 3
MAE 382 Thermodynamics 3
MAE 434 Internal Combustion Engines 3
MAE 435 Turbomachinery. 3
MAE 436 Combustion. 3
MAE 446 Thermal Systems Design 3

Engineering Mechanics. Select from these courses:

MAE 341 Mechanism Analysis and Design 3
MAE 402 Introduction to Continuum Mechanics 3
MAE 404 Finite Elements in Engineering 3
MAE 413 Aircraft Performance, Stability, and Control 3
MAE 415 Vibration Analysis 4
MAE 426 Design of Aerospace Structures 3
MAE 442 Mechanical Systems Design 3
MAE 460 Gas Dynamics. 3
MAE 461 Aerodynamics II. 3
MAE 471 Computationa Fluid Dynamics 3
MAT 421 Applied Computational Methods *CS* 3
MAT 423 Numerical Analysis I *CS* 3
MSE 440 Mechanical Properties of Solids 3

Manufacturing. Select from these courses:

CSE 428 Computer Aided Processes 3
IEE 300 Economic Analysis for Engineers 3
IEE 374 Quality Control *CS* 3
IEE 461 Production Control. 3
IEE 463 Computer Aided Manufacturing and Control *CS* . . .3
MAE 341 Mechanism Analysis and Design. 3
MAE 351 Manufacturing Processes 3
MAE 404 Finite Elements in Engineering 3
MAE 442 Mechanical Systems Design 3
MAE 447 Robotics and Its Influence on Design 3
MAE 455 Polymers and Composites 3
MSE 355 Introduction to Materials Science and Engineering. . . .3
MSE 420 Physical Metallurgy 3
MSE 431 Corrosion and Corrosion Control 3
MSE 440 Mechanical Properties of Solids 3

Stress Analysis, Failure Prevention, and Materials. Select from these courses:

MAE 341 Mechanism Analysis and Design 3
MAE 404 Finite Elements in Engineering. 3
MAE 426 Design of Aerospace Structures 3
MAE 447 Robotics and Its Influence on Design 3
MAE 455 Polymers and Composites 3
MSE 355 Introduction to Materials Science and Engineering 3
MSE 420 Physical Metallurgy 3
MSE 431 Corrosion and Corrosion Control. 3
MSE 440 Mechanical Properties of Solids 3
MSE 450 X ray and Electron Diffraction 3

Thermosciences. Select from these courses:

MAE 372 Fluid Mechanics 3
MAE 382 Thermodynamics 3
MAE 433 Air Conditioning and Refrigeration 3
MAE 434 Internal Combustion Engines. 3
MAE 435 Turbomachinery 3
MAE 436 Combustion 3
MAE 446 Thermal Systems Design 3
MAE 460 Gas Dynamics 3
MAE 463 Propulsion 3
MAE 471 Computational Fluid Dynamics. 3

Mechanical Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CHM 114 General Chemistry for Engineers *SQ*. . . . 4
or CHM 116 General Chemistry *SQ* 4
ECE 100 Introduction to Engineering Design *CS* . .4
or HU or SB elective[1]
ENG 101 First-Year Composition. 3
MAT 270 Calculus with Analytic Geometry I *MA* 4

Total 15

Second Semester

ENG 102 First Year Composition 3
MAT 242 Elementary Linear Algebra. 2
MAT 271 Calculus with Analytic Geometry II *MA* . . 4
PHY 121 University Physics I Mechanics *SQ*[2] 3

NOTE: For the General Studies requirement courses and codes (such as L, SQ, C, and H), see "General Studies" page 87 For graduation requirements, see University Graduation Requirements" page 83 For an explanation of additional omnibus courses offered but not listed in this catalog see "Classification of Courses," page 60

PHY 122 University Physics Laboratory I *SQ*[2] 1
HU, SB, and awareness area course 3
or ECE 100 Introduction to Engineering Design *CS* (4

Total 16

Second Year

First Semester

ECE 210 Engineering Mechanics I Statics 3
ECE 350 Structure and Properties of Materials 3
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 274 Elementary Differential Equations *MA* 3
PHY 131 University Physics II Electricity and Magnetism *SQ*[3] 3
PHY 132 University Physics Laboratory II *SQ*[3] 1

Total 17

Second Semester

ECE 301 Electrical Networks I 4
ECE 312 Engineering Mechanics II: Dynamics 3
ECE 313 Introduction to Deformable Solids 3
ECE 340 Thermodynamics 3
ECE 386 Partial Differential Equations for Engineers 2

Total 15

Third Year

First Semester

ECE 30(Intermediate Engineering Design *L* 3
MAE 317 Dynamic Systems and Control 3
MAE 318 Dynamic Systems and Control Laboratory 1
MAE 371 Fluid Mechanics 3
MAE 422 Mechanics of Materials 4
HU, SB, or awareness area course 3

Total 17

Second Semester

ECE 384 Numerical Analysis for Engineers I 2
EEE 350 Random Signal Analysis 3
MAE 388 Heat Transfer 3
MAE 441 Principles of Design 3
HU, SB, or awareness area course 3
Technical elective 3

Total 17

Fourth Year

First Semester

MAE 491 Experimental Mechanical Engineering 3
PHY 361 Introductory Modern Physics 3
HU, SB, and awareness area course s 4
Technical electives 6

Total 16

Second Semester

MAE 443 Engineering Design 3
MAE 490 Projects in Design and Development *L* 3
HU, SB, and awareness area course 3
Technical electives 6

Total 15

Engineering students may not use aerospace studies (AES or military science (MIS) courses to satisfy HU or SB requirements

Both PHY 121 and 122 must be taken to secure SQ credit

Both PHY 131 and 132 must be taken to secure SQ credit

MECHANICAL AND AEROSPACE ENGINEERING (MAE)

MAE 317 Dynamic Systems and Control. (3) F S
Model ng and representat ons of dynam c phys ca systems nc ud ng transfer functions b ock d agrams and state equations. Trans ent response Princ p es of feedback contro and l near system ana ysis nc ud ng root ocus and frequency response. Prerequ s te ECE 312. Pre or corequ s te ECE 386. Corequ s te for Mechan ca Eng neering majors only MAE 318

MAE 318 Dynamic Systems and Control Lab. (1 F, S
Ser es of abs des gned to i ustrate concepts presented 'n MAE 317 Lab Corequisite for Mechan cal Engineer ng majors only MAE 317

MAE 341 Mechanism Analysis and Design. 3 A
Posit ons veloc t es and acce erat ons of mach ne parts; cams, gears, flexib e connectors and ro ling contact ntroduction to synthes s Pre requ s te ECE 312

MAE 351 Manufacturing Processes. (3) F S
Product on techn que and equ pment. Casting and molding form ng mach n ng, joining and assemb y computer- ntegrated manufactur ng rap d prototyp ng, and e ectron cs manufacturing Cross l sted as IEE 360 Credit s a owed for on y EE 360 or MAE 351 Prerequ s te ECE 350

MAE 361 Aerodynamics I. (3) A
F u d stat cs conservat on princ ples, stream function ve oc ty poten tial, vort'c ty, inv scid flow, Kutta Joukowsk thin a rfo l theory, and pane methods. Prerequisites. ECE 312, 340.

MAE 371 Fluid Mechanics. 3) F S
ntroductory concepts of fluid mot ons; f u d stat cs contro vo ume forms of bas c pr nc'ples v scous nterna f ows. Prerequ s tes: ECE 312, 340

MAE 372 Fluid Mechanics. (3 A
App ication of bas c pr nciples of fluid mechan cs to prob ems n vis- cous and compress ble flow. Prerequisites ECE 384, 386; MAE 361 (or 371)

MAE 382 Thermodynamics. (3 A
Appl ed thermodynam cs· gas mixtures psychrometrics, property rela t onsh ps power and refrigerat on cycles, and reactive systems. Pre- requ s te ECE 340.

MAE 388 Heat Transfer. (3) F S
Steady and unsteady heat conduct on, inc ud ng numer ca so utions· thermal boundary ayer concepts and app cations to free and forced convection Therma rad at on concepts Prerequ s te MAE 361 or 371

MAE 402 Introduction to Continuum Mechanics. 3) A
Appl cat on of the pr nc p es of cont nuum mechanics to such f e ds as flow n porous media, b omechan cs e ectromagnet c cont nua and magneto-flu d mechan cs Prerequ s tes: ECE 313· MAE 361 (or 371); MAT 242 (or 342).

MAE 404 Finite Elements in Engineering. (3) A
ntroduct on to deas and methodo ogy of f n te e ement analysis App ications to sol d mechan cs heat transfer f u d mechan cs and v brat ons Prerequisites ECE 313, MAT 242 (or 342)

MAE 406 CAD CAM Applications in MAE. (4) A
Solut on of eng neering prob ems w th the a d of state of the art soft ware too s in so d mode ing eng neering ana ys s, and manufactur ng, select on of modeling parameters· re ab ity tests on software 3 hours ecture 3 hours ab Prerequ s tes MAE 441, nstructor approva

MAE 413 Aircraft Performance, Stability, and Control. (3) S
Aircraft performance cru se, c imbing and turn ng f ghts, energy maneuverabi ty, 6 DOF equat ons for a rcraft aerodynam c stab ty derivatives fl ght stab ity contro Prerequ s'tes: MAE 317 361

MAE 415 Vibration Analysis. 4) F S
Free and forced response of s ngle and mu t p e degree of freedom systems, cont nuous systems· app ications n mechan ca and aero space systems numerica methods Lecture, lab Prerequ s tes· ECE 312 MAE 422 (or 425)· MAT 242 or 342)

MAE 417 Control System Design. 3) A
Tools and methods of control system des gn and compensat on, inc ud ng s mu ation response opt mization frequency doma n tech n ques state var able feedback, and sens t v ty ana ysis Introduct on to nonl near and d screte time systems Prerequ s te MAE 317

MAE 422 Mechanics of Materials. (4) F S
Fai ure theories energy methods, f n te element methods p ates tor sion of noncircular members, unsymmetrical bend ng shear center, and beam co umn Lecture lab Prerequ sites· ECE 313, MAT 242 (or 342). Pre or corequ site ECE 386

MAE 425 Aerospace Structures. (4) A
Stab ity energy methods finite e ement methods torsion unsymmet rical bend ng and tors on of mu tice ed structures, des gn of aero space structures Lecture, lab. Prerequisites: ECE 313, MAT 242 or 342).

MAE 426 Design of Aerospace Structures. (3) A
F 'ght vehic e oads des gn of sem monocoque structures, loca buck ing and cr pp ng fat gue aerospace materia s, composites o nts and finite e ement appl cat ons Prerequ s tes: MAE 361 425

MAE 433 Air Conditioning and Refrigeration. (3) A
A r cond tioning processes; environmenta contro heating and cool ng oads; psychrometry; refr geration cyc es Prerequisite. MAE 388 or MET 432 or nstructor approva

MAE 434 Internal Combustion Engines. (3) A
Performance character stics, combust on, carburetion and fuel-injec tion and the cool ng and contro of nterna combustion eng nes Com puter model ng. Lab Prerequ s te MAE 388

MAE 435 Turbomachinery. (3) A
Des gn and performance of turbomach nes nc ud ng steam gas and hydrau ic turb nes, centr fuga pumps, compressors, fans and blow ers. Pre- or corequ s te· MAE 361 or 371

MAE 436 Combustion. 3) A
Thermochem ca and react on rate processes, combust on of gaseous and condensed phase fue s. App ications to propu s on and heat ng systems Po utant format on. Prerequ s te MAE 388

MAE 441 Principles of Design. (3) F S
Conceptual and embodiment des gn of mechan cal e ements form synthesis mater'al se ect on, fa ure modes manufacturabi ty to er ances, common mechan sms and mach ne e ements. Lecture ab (project). Prerequisites: ECE 300 350 Pre or corequ s te MAE 422 or 425

MAE 442 Mechanical Systems Design. (3) A
App ication of des gn pnncip es and techniques to the synthesis mod e ng and opt mization of mechan ca e ectromechan cal, and hydrau l c systems Prerequ s tes MAE 422 (or 425), 441

MAE 443 Engineering Design. (3) F S
Group projects to design eng'neer ng components and systems. Prob lem def n t on ideation, mode ing and analys s decision making and documentat on activit es emphasized 6 hours ab Prerequ s te MAE 441

MAE 444 Fundamentals of Aerospace Design. (3) S
Des gn theory and des gn too s app ed to aerospace eng neering Eng neer ng drawings so d mode ng, RFP s Federa Av ation Regu lat ons and m l tary spec fica ons aircraft s z ng rap d prototyp ng Lab projects. Prerequ sites: ECE 300 MAE 361 425 Pre- or corequ s te MAE 413

MAE 446 Thermal Systems Design. (3) A
App ication of eng'neering princip es and techniques to the mode ng and ana ys s of therma systems and components. Opt m zation tech niques are presented and their use demonstrated Prerequ's te: ECE 300 MAE 388.

MAE 447 Robotics and Its Influence on Design. (3) A
Robot appl cat ons conf gurat ons, s'ngu ar positions, and work space; modes of contro v sion, programm ng exercises des'gn of parts for assembly Prerequ site MAE 317

MAE 455 Polymers and Composites. (3) F
Relat onsh p between chemistry, structure and propert es of eng neer ng polymers Des gn propert es and behav or of f ber composite systems Cross- isted as MSE 470 Cred t is al owed for only MAE 455 or MSE 470 Prerequ s te ECE 350.

MAE 460 Gas Dynamics. 3) A
Compressib e flow at subson c and superson c speeds duct flow nor ma and obl que shocks perturbation theory and wind tunne des gn Prerequ sites ECE 386 MAE 361 (or 371)

MAE 461 Aerodynamics II. (3) A
Transon c/hypersonic f ows w ng theory, Navier Stokes lam nar turbu ent shear f ows pressure drop in tubes separat on drag v scous/ nvisc d interact on and w ng design Prerequisite: MAE 460.

MAE 462 Space Vehicle Dynamics and Control. (3) F
Att tude dynam cs and contro aunch vehicles orb tal mechan cs, orb tal transfer rendezvous space m ss on design space structures spacecraft contro systems des gn Prerequisite MAE 317

MAE 463 Propulsion. (3) A
Fundamenta s of gas turbine eng nes and des gn of components Pr nci es and des gn of rocket propulsion and alternat ve dev ces Lecture des gn projects Prerequ site ECE 386 Pre- or corequisite MAE 361 (or 371)

MAE 464 Aerospace Laboratory. (3) F, S
Aerodynamic flow parameters, f ow over airfo s and bod es of revo u tion f ow visua ization on; computer a ded data acquisit on and process ng boundary ayer theory. 1 hour ecture, 4 hours lab Prerequ s tes ECE 386, MAE 361, 460.

MAE 465 Rocket Propulsion. (3) A
Rocket f ght performance; nozzle design combustion of iquid and sol d prope lants, component des'gn· advanced propu s on systems nterp anetary m ssions; test ng Prerequ site: MAE 361 or 371.

MAE 466 Rotary Wing Aerodynamics and Performance. 3) A
Introduct on to he copter and prope ler ana ys's techniques Momen tum b ade-e ement and vortex methods Hover and forward f ght Ground effect autorotation and compress b l ty effects. Prerequ s'tes ECE 386 and MAE 361 *or* nstructor approval

MAE 467 Aircraft Performance. (3) A
Integrat on of aerodynam c and propu s ve forces into a rcraft perfor mance des gn Est mation of drag parameters for des gn Eng ne, air fo select on Conceptua design methodology Lecture des gn projects Prerequ s te MAE 361 or 371 Pre- or corequisite: MAE 441

MAE 468 Aerospace Systems Design. 3) F, S
Group projects re ated to aerospace veh'cle des gn, work ng from mis s on definit on and cont nu ng through prel minary des gn. Prerequi s tes MAE 361 413 463 *General Studies L*

MAE 469 Projects in Astronautics or Aeronautics. (3) F S
Various mult d'sc p inary team projects ava lab e each semester Projects nc ude design of h gh-speed rotocraft autonomous veh'c es, iquid-fue ed rockets m croaer a vehicles, satel tes Prerequ s te nstructor approval

MAE 471 Computational Fluid Dynamics. (3) A
Numer ca so utions for se ected problems n f u d mechanics Prereq u sites ECE 384 MAE 361 (or 371)

MAE 490 Projects in Design and Development. (3 F, S
Capstone projects n fundamenta or appl ed aspects of eng neer ng. Prerequis tes MAE 441, 491 *General Stud es L.*

MAE 491 Experimental Mechanical Engineering. (3) F S
Experimenta and ana ytica stud es of phenomena and performance of fluid flow heat transfer, thermodynam cs refrigeration, and mechanical power systems 6 hours lab Prerequ s tes EEE 350, MAE 388

MAE 498 Pro-Seminar. (1 3) N
Spec a top cs for advanced students. App ication of the engineer ng disc pl nes to des gn and ana ys s of modern technical dev ces and systems Prerequisite. nstructor approva

MAE 504 Laser Diagnostics. (3) S
Fundamenta s of optics and the 'nteract on of 'ght w th matter Laser sources aser spectroscopy, ve ocimetry part cle sizing and surface character zation.

MAE 505 Perturbation Methods. (3) N
Non 'near osci at ons stra ned coord nates, renorma zat on, mu t p e sca es boundary layers, matched asymptot c expans ons turn ng po nt prob ems, and WKBJ method Cross isted as MAT 505 Cred t s al owed for on y MAE 505 or MAT 505

MAE 506 Advanced System Modeling, Dynamics, and Control. (3) S
Lumped-parameter mode ing of phys ca systems w th examp es State variab e representat ons and dynamic response ntroduction to modern contro Prerequ s te ASE 582 or MAT 442.

MAE 507 Optimal Control. (3) F
Opt'mal control of systems. Calcu us of variations, dynam c program m ng, l near quadrat c regulator numer ca methods, and Pontryagin's principle Cross- isted as EEE 587 Credit is a owed for only EEE 587 or MAE 507. Prerequ site EEE 482 or MAE 506

NOTE: For the Genera Stud es requ rement, courses and codes (such as L SQ C and H), see General Stud es,' page 87 For graduat on requ rements, see "Un versity Graduation Requirements," page 83. For an exp anation of add tiona omn bus courses offered but not l sted n th s cata og, see "C assif cation of Courses," page 60

MAE 509 Robust Multivariable Control. (3) S
Characterization of uncertainty in feedback systems, robustness analysis, synthesis techniques, multivariable Nyquist criteria, computer-aided analysis and design. Prerequisites: MAE 417, 506.

MAE 510 Dynamics and Vibrations. (3) F
Lagrange's and Hamilton's equations, rigid body dynamics, gyroscopic motion, and small oscillation theory.

MAE 511 Acoustics. (3) F
Principles underlying the generation, transmission, and reception of acoustic waves. Applications to noise control, architectural acoustics, random vibrations, and acoustic fatigue.

MAE 512 Random Vibrations. (3) S
Review of probability theory, random processes, stationarity, power spectrum, white noise process, random response of single and multiple DOF systems, and Markov processes simulation. Prerequisite: MAE 510 or instructor approval.

MAE 515 Structural Dynamics. (3) S
Free vibration and forced response of discrete and continuous systems, exact and approximate methods of solution, finite element modeling, and computational techniques. Prerequisite: MAE 510 or instructor approval.

MAE 518 Dynamics of Rotor-Bearing Systems. (3) S
Natural whirl frequency, critical speed, and response analysis of rigid and flexible rotor systems. Bearing influence and representation. Stability analysis. Methods of balancing.

MAE 520 Solid Mechanics. (3) F
Introduction to tensors: kinematics, kinetics, and constitutive assumptions leading to elastic, plastic, and viscoelastic behavior. Applications.

MAE 521 Structural Optimization. (3) N
Linear and nonlinear programming. Problem formulation. Constrained and unconstrained optimization. Sensitivity analysis. Approximate techniques. FEM-based optimal design of mechanical and aerospace structures. Cross-listed as CEE 533. Credit is allowed for only CEE 533 or MAE 521. Prerequisite: instructor approval.

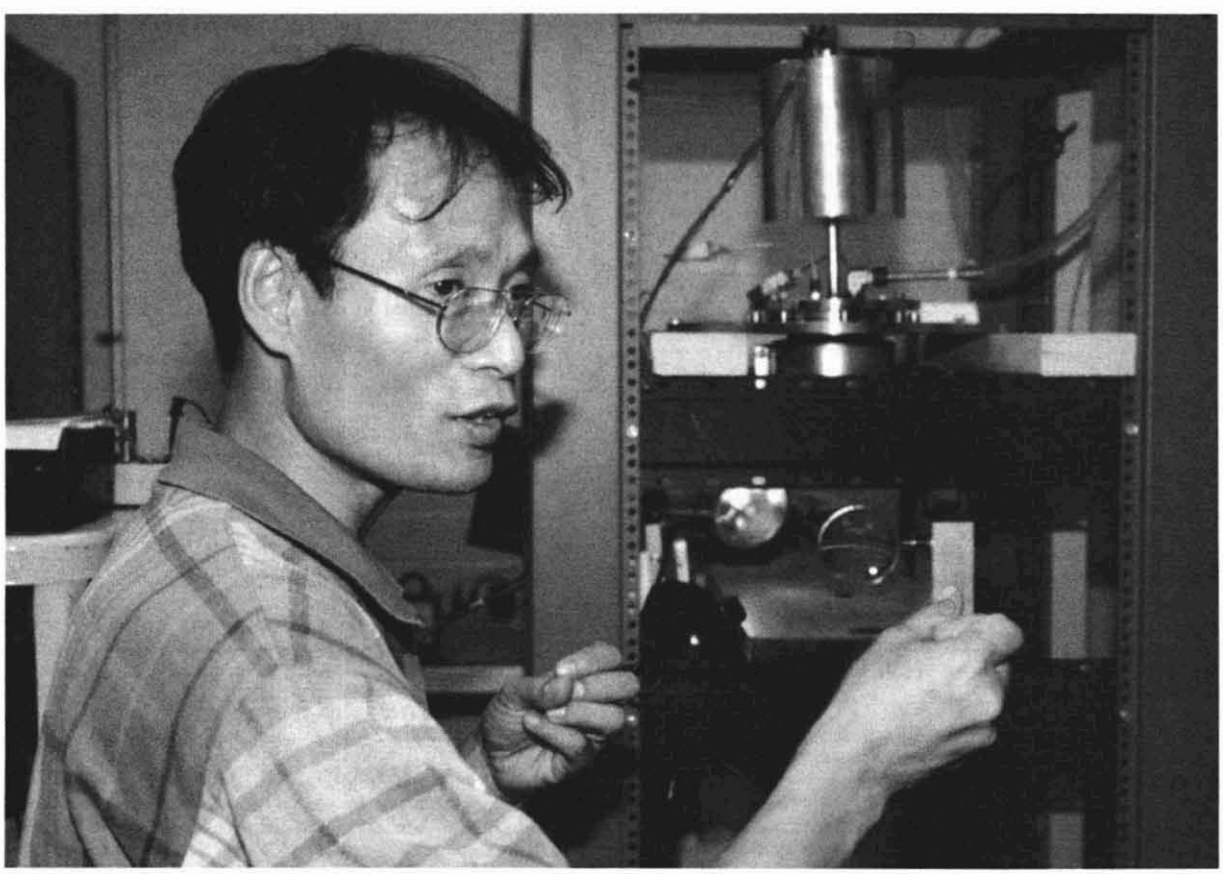
MAE 523 Theory of Plates and Shells. (3) F
Linear and nonlinear theories of plates. Membrane and bending theories of shells. Shells of revolution. Prerequisite: MAE 520.

MAE 524 Theory of Elasticity. (3) S
Formulation and solution of 2- and 3-dimensional boundary value problems. Prerequisite: MAE 520.

MAE 527 Finite Element Methods in Engineering Science. (3) F
Discretization, interpolation, elemental matrices, assembly, and computer implementation. Application to solid and fluid mechanics, heat transfer, and time dependent problems. Prerequisite: ASE 582.

MAE 536 Combustion. (3) N
Thermodynamics; chemical kinetics of combustion. Explosion and ignition theories. Reactive gas dynamics. Structure, propagation, and stability of flames. Experimental methods. Prerequisite: MAE 436 or instructor approval.

MAE 540 Advances in Engineering Design Theory. (3) F
Survey of research in engineering design process, artifact and design, knowledge, formal and informal logic, heuristic and numerical searches, theory of structure and complexity. Prerequisite: graduate standing.



The College of Engineering and Applied Sciences is known for the quality and variety of its programs. Tim Trumble photo

MAE 541 CAD Tools for Engineers. (3) F
E ements of computer techn ques requ red to deve op CAD software Data structures, nc ud ng sts trees, and graphs Computer graph cs inc ud ng 2 and 3-d mens ona a gor thms and user nterface techniques

MAE 542 Geometric Modeling in CAD CAM. (3) S
Geometr c and so id model ng, curve and surface design CAD database arch tectures, and integrat on of sol d mode ing nto eng neering processes. Prerequisite: MAE 541 or nstructor approva

MAE 544 Mechanical Design and Failure Prevention. (3) F
Modes of mechan ca fa'lure; app icat on of princ ples of e ast'city and plastic ty in mu tiaxial state of stress to des gn synthes s; fai ure theo r es fatigue, creep; mpact Prerequ s te. MAE 443

MAE 546 CAD CAM Applications in MAE. (4) F
Solut on of engineering problems w th the aid of state-of the art soft ware too s n so id mode ng, engineer ng ana ys s, and manufactur ng; se ection of mode ing parameters; re 'ab l ty tests on software Open only to students without previous credit for MAE 406 3 hours ecture, 3 hours ab. Prerequ s te nstructor approval.

MAE 547 Mechanical Design and Control of Robots. (3) N
Homogeneous transformations, 3 d mens onal k nemat cs, geometry of mot on, forward and inverse kinemat cs workspace and mot on tra jectories dynam cs, control, and stat c forces

MAE 548 Mechanism Synthesis and Analysis. (3) S
Algebraic and graphical methods for exact and approx mate synthesis of cam gear, and linkage mechanisms; des gn optimizat on, methods of p anar motion analysis character st cs of p ane motion, spat a kinemat cs.

MAE 557 Mechanics of Composite Materials. (3) S
Analysis of compos te mater als and app ications M cromechan ca and macromechan cal behav or. Class ca lam nat on theory devel oped with investigat on of bend ng-extens on coupl ng.

MAE 560 Propulsion Systems. (3) N
Design of air breathing gas turb'ne eng nes for aircraft propu s on; m ss on analysis· cycle analys s engine sizing; component des gn

MAE 561 Computational Fluid Dynamics. (3) S
F n te-difference and finite volume techn ques for solving the sub sonic transonic and superson c f ow equations The method of characterist cs Numerical grid-generat on techn ques Prerequ s te MAE 571 or instructor approval

MAE 563 Unsteady Aerodynamics. (3) S
Unsteady incompress b e and compress ble flow W ngs and bod es n osci atory and transient mot ons. Kernel funct'on approach and pane methods Aeroe ast c app icat ons Prerequ s te· MAE 460 or 461

MAE 564 Advanced Aerodynamics. (3) F
Perturbat on method. Linear'zed subsonic and superson c f ows. Thin w'ng/slender body theor es L ft ng surface theory. Pane method computation. Prerequ site: MAE 460 or 461.

MAE 566 Rotary-Wing Aerodynamics. (3 F
ntroduct on to hel copter and prope ler ana ys s techn'ques. Momen tum, b ade-e ement and vortex methods Hover and forward f ight. Ground effect, autorotat on, and compress b l ty effects Prerequ s te MAE 361

MAE 571 Fluid Mechanics. (3) F
Bas c k nematic dynamic and thermodynam c equat ons of the f u d cont nuum and their app ication to bas c f u d mode s

MAE 572 Inviscid Fluid Flow. (3) S
Mechan cs of f u ds for flows n wh ch the effects of viscos ty may be ignored Potent a flow theory waves and inv sc d compressib e f ows Prerequ s te MAE 571

MAE 573 Viscous Fluid Flow. (3) F
Mechan cs of fluids for f ows n wh ch the effects of v scos ty are signif icant. Exact and approx mate solut ons of the Navier-Stokes system, lam nar flow at ow and h gh Reyno ds number Prerequ s te MAE 571

MAE 575 Turbulent Shear Flows. (3) F
Homogeneous, sotrop c, and wa l turbu ence. Experimenta resu ts Introduction to turbulent-flow calcu ations. Prerequ s te. MAE 571

MAE 577 Turbulent Flow Modeling. (3) S
Reyno ds equat ons and the r c osure Mode ing of s mp e and com p ex turbulent flows calculations of internal and externa f ows and app cation to eng neer ng prob ems. Prerequisite: MAE 571.

MAE 581 Thermodynamics. (3) F
Bas c concepts and aws of class ca equ l brium thermodynam cs, app cat ons to engineer ng systems Introduction to statist cal thermo dynam cs

MAE 582 Statistical Thermodynamics. (3) A
K netic and quantum theory Statist ca mechan cs, ensemb e theory. Structure and thermodynam cs of non nteracting and nteract ng parti c es Bo tzmann integro-d fferentia equation Prerequ s te graduate stand ng.

MAE 585 Conduction Heat Transfer. (3) F
Bas c equations and concepts of conduct on heat transfer Mathemat ca formu ation and so ut on (ana ytical and numerical) of steady and unsteady one and mu t d mens onal heat conduction and phase change prob ems. Prerequ s tes: ECE 386; MAE 388

MAE 586 Convection Heat Transfer. (3 S
Bas c concepts and governing equations Ana ys s of am nar and turbulent heat transfer for nternal and externa f ows Natura and m xed convection Prerequis'te. MAE 388

MAE 587 Radiation Heat Transfer. (3) F
Advanced concepts and solut on methodolog es for radiat on heat transfer, nc ud ng exchange of therma rad ation between surfaces, rad at on n absorb'ng em tt ng and scattering media and radiat on comb ned with conduct on and convection Prerequ site· MAE 388

MAE 588 Two-Phase Flows and Boiling Heat Transfer. (3) S
Poo and flow boi ing heat transfer, condensat on heat transfer var ous mode s of vapor 'qu'd m xture flows, gas so d mixture f ows and exper menta measurement techn ques.

MAE 589 Heat Transfer. (3) F
Bas c concepts· phys cal and mathematical models for heat transfer. App icat ons to conductive convective rad ative, and combined mode heat transfer Prerequ s te MAE 388

MAE 594 Graduate Research Conference. (1) F, S
Top cs n contemporary research. Requ red every semester of a departmental graduate students reg stered for 9 or more semester hours. Not for degree credit

MAE 598 Special Topics. (1 3) F S
Spec al top cs courses, nc uding the fo lowing, which are regular y offered, are open to qua 'f ed students:
(a) Advanced Spacecraft Control
b) Aeroelastic ty
c) Aerospace Veh c e Guidance and Control
(d Boundary Layer Stab ity
(e) Hydrodynam c Stab l ty
(f) Plast c ty
(g) Polymers and Composites

Programs in Engineering Special Studies

Daniel F. Jankowski
Director

The major of Engineering Special Studies accommodates 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. The major is a School of Engineering program. Unlike the departmental major areas, however, there is not a separate faculty. The

NOTE: For the Genera Studies requirement, courses and codes (such as L, SQ, C, and H , see "Genera Studies" page 87. For graduat on requ rements, see "Un vers'ty Graduat on Requ rements ' page 83 For an explanat on of add t ona omn bus courses offered but not sted n this cata og see C ass f cat on of Courses" page 60

faculty teaching and advising in these programs are from the various departments within 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 is brought to bear on problems of a large scope. The necessary breadth that these students seek often is not obtainable in traditional engineering fields. Rather, specially designed programs of course work that merge the required principles and approaches drawn from all fields of engineering and other pertinent disciplines are desired.

The B S E. degree in Engineering Special Studies is designed primarily for students intending to pursue engineering careers at a professional level in industry or graduate studies.

ENGINEERING SPECIAL STUDIES—B.S.E.

Premedical Engineering. In the past decade, the interrelation between engineering and medicine has become vigorous and exciting. Our rapidly expanding technology dictates that engineering will continue to become increasingly involved in all branches of medicine. As this develops, so will the need for physicians trained in the engineering sciences medical men and women with a knowledge of computer technology, transport phenomena, biomechanics, bioelectric phenomena, operations research, and cybernetics. This concentration is of special interest to students desiring entry into a medical college and whose medical interests lie in research, aerospace and undersea medicine, artificial organs, prostheses, biomedical engineering, or biophysics Since both engineering and medicine have as their goal the well being of humans, this program is compatible with any field of medical endeavor.

Academic Requirements. The following courses are required in the premedical engineering concentration and have been selected to meet all university and school requirements

Note. To fulfill medical school admission requirements, BIO 182 General Biology is also required in addition to the degree requirements and is best taken in summer session before the Medical College Admission Test (MCAT).

First-Year Composition

Choose among the course combinations below 6
- ENG 101 First Year Composition (3)
- ENG 102 First Year Composition 3)

or

- ENG 105 Advanced First Year Composition 3)
- Elective chosen with an advisor (3

or

- ENG 107 English for Foreign Students (3
- ENG 108 English for Foreign Students (3

Total 6

General Studies/School Requirements

Humanities and Fine Arts Social and Behavioral Sciences

ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* 3)
HU, SB, and awareness area courses[2] 13

Total . . 16

Literacy and Critical Inquiry

BME 413 Biomedical Instrumentation *L* 3
BME 423 Biomedical Instrumentation Laboratory *L* ..1
ECE 300 Intermediate Engineering Design *L* 3

Total 7

Natural Sciences

PHY 121 University Physics I: Mechanics *SQ*[3]. 3
PHY 122 University Physics Laboratory I *SQ* 1
PHY 131 University Physics II Electricity and Magnetism *SQ*[4] 3
PHY 132 University Physics Laboratory II *SQ*[4] .....

Total 8

Numerary Mathematics

ECE 100 Introduction to Engineering Design *CS* 4
ECE 384 Numerical Analysis for Engineers I 2
or ECE 386 Partial Differential Equations for Engineers 2)
or MAT 242 Elementary Linear Algebra 2)
MAT 270 Calculus with Analytic Geometry I *MA* .4
MAT 271 Calculus with Analytic Geometry II *MA* .4
MAT 272 Calculus with Analytic Geometry III *MA* . 4
MAT 274 Elementary Differential Equations *MA* 3

Total 21
General Studies school requirements total 52

Engineering Core

ECE 210 Engineering Mechanics I Statics 3
ECE 301 Electrical Networks I 4
ECE 334 Electronic Devices and Instrumentation 4
ECE 340 Thermodynamics..... 3
ECE 350 Structure and Properties of Materials 3

Total 17

Engineering Special Studies Program Major
Premedical Engineering Concentration

BIO 181 General Biology *SQ* 4
BME 201 Introduction to Bioengineering *L* 3
BME 318 Biomaterials..... 3
BME 331 Biomedical Engineering Transport I Fluids ..3
BME 334 Bioengineering Heat and Mass Transfer 3
BME 4 6 Biomechanics..... 3
BME 417 Biomedical Engineering Capstone Design I 3
BME 435 Physiology for Engineers. 4
BME 470 Microcomputer Applications in Bioengineering .4
BME 490 Biomedical Engineering Capstone Design II 3
CHM 113 General Chemistry *SQ* 4
CHM 116 General Chemistry *SQ* 4
CHM 331 General Organic Chemistry ... 3
CHM 332 General Organic Chemistry 3
CHM 335 General Organic Chemistry Laboratory. .....
CHM 336 General Organic Chemistry Laboratory..... 1
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
Technical elective 1

Total 53

ECN 111 or ECN 112 must be included to fulfill the HU and SB requirements

- Engineering students may not use aerospace studies (AES or military science (MIS) courses to fulfil HU and SB requirements.

[3] Both PHY 121 and 122 must be taken to secure SQ credit

[4] Both PHY 131 and 132 must be taken to secure SQ credit

Premedical Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CHM 113	General Chemistry *SQ*	4
ECE 100	Introduction to Engineering Design *CS*	4
ENG 101	First Year Composition	3
MAT 270	Calculus with Analytic Geometry I *MA*	4
Total		15

Second Semester

CHM 116	General Chemistry *SQ*	4
ENG 102	First Year Composition	3
MAT 271	Calculus with Analytic Geometry II *MA*	4
PHY 121	University Physics I: Mechanics *SQ*	3
PHY 122	University Physics Laboratory I *SQ*	1
Total		15

Second Year

First Semester

BIO 181	General Biology *SQ*	4
BME 201	Introduction to Bioengineering *L*	3
ECE 210	Engineering Mechanics I: Statics	3
MAT 272	Calculus with Analytic Geometry III *MA*	4
PHY 131	University Physics II: Electricity and Magnetism *SQ*[2]	3
PHY 132	University Physics Laboratory II *SQ*[2]	1
Total		18

Second Semester

CHM 331	General Organic Chemistry	3
CHM 335	General Organic Chemistry Laboratory	1
ECE 301	Electrical Networks I	4
ECE 350	Structure and Properties of Materials	3
ECN 111	Macroeconomic Principles *SB*	3
	or ECN 112 Microeconomic Principles *SB* (3	
MAT 274	Elementary Differential Equations *MA*	3
Total		17

Third Year

First Semester

BME 331	Biomedical Engineering Transport I Fluids	3
BME 435	Physiology for Engineers	4
CHM 332	General Organic Chemistry	3
ECE 300	Intermediate Engineering Design *L*	3
ECE 340	Thermodynamics	3
Total		16

Second Semester

BME 318	Biomaterials	3
BME 334	Bioengineering Heat and Mass Transfer	3
CHM 336	General Organic Chemistry Laboratory	1
ECE 334	Electronic Devices and Instrumentation	4
MAT 242	Elementary Linear Algebra *MA*	2
	or ECE 384 Numerical Analysis for Engineers I 2)	
	or ECE 386 Partial Differential Equations for Engineers (2)	
HU, SB, and awareness area course(s)[1]		4
Total		17

Fourth Year

First Semester

BME 413	Biomedical Instrumentation *L*	3
BME 416	Biomechanics	3
BME 417	Biomedical Engineering Capstone Design I	3
BME 423	Biomedical Instrumentation Laboratory *L*	1
HU, SB, and awareness area courses		6
Total		16

Second Semester

BME 470	Microcomputer Applications in Bioengineering	4
BME 490	Biomedical Engineering Capstone Design II	3
ECE 380	Probability and Statistics for Engineering Problem Solving *CS*	3
HU, SB, and awareness area course[3]		3
Technical elective		1
Total		14
Degree requirements total		128

[1] Both PHY 121 and 122 must be taken to secure SQ credit

[2] Both PHY 131 and 132 must be taken to secure SQ credit.

[3] Engineering students may not use aerospace studies (AES or military science (MIS) courses to satisfy HU or SB requirements

NOTE: For the General Studies requirement, courses and codes (such as L, SQ, C and H) see "General Studies," page 87. For graduation requirements see "University Graduation Requirements" page 83 For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses" page 60

College of Extended Education

Bette F. DeGraw, D.P.A., Dean

www.asu.edu/xed

The ASU Downtown Center is located in the heart of the Phoenix business, cultural, and sports districts.

College of Extended Education file photo

ASU Extended Campus 257

Degree Programs 257

Winter Session (Main) 259

Certificate Programs 259

College Units by Program Area 260

PURPOSE

The College of Extended Education was created in 1990 to extend the resources of ASU throughout Maricopa County, the state, and the region The College of Extended Education is a university wide college that oversees the ASU Extended Campus and forms partnerships with other ASU colleges to meet the instructional and informational needs of a diverse community

For the most current information, visit the college's Web site at www asu edu xed.

ASU EXTENDED CAMPUS

The ASU Extended Campus goes beyond the boundaries of the university's three physical campuses to provide access to academic credit and degree programs for working adults through flexible schedules, a vast network of off campus sites, classes scheduled days, evenings, and weekends; plus innovative delivery technologies including television, the Internet, and independent learning The Extended Campus also offers a variety of professional continuing education and community outreach programs

DEGREE PROGRAMS

ASU offers degree programs through the ASU Extended Campus. Convenient times and locations as well as today's innovative technologies make it easier for working adults and other nontraditional students to earn a degree. The College of Extended Education facilitates the delivery of these programs. All courses and degrees are offered through the respective university academic departments These courses are published each fall and spring semester in the *Extended Campus Catalog* and in the *Schedule of Classes* All degree programs offered through the college are shown in the "Baccalaureate Degrees and Majors Offered Through the College of Extended Education" table, page 258, and the "Graduate Degrees and Majors Offered Through the College of Extended Education" table, page 259.

Off-Campus Degree Programs (Main)

Bachelor of Interdisciplinary Studies. This interdisciplinary degree completion program enables students to take an active role in creating their educational plan and defining their career goals. The program is offered for selected corporate and municipal employees It emphasizes self assessment and appraisal of opportunities to support academic and career goals

For more information, call 480 965 9797 or write

COLLEGE OF EXTENDED EDUCATION
ACADEMIC AND PROFESSIONAL PROGRAMS
ARIZONA STATE UNIVERSITY
PO BOX 874001
TEMPE AZ 85287 4001

College of Architecture and Environmental Design. The faculty in the School of Planning and Landscape Architecture in the College of Architecture and Environmental Design offer the Bachelor of Science in Design degree with a major in Housing and Urban Development primarily at the ASU Downtown Center, although some courses may be available at other locations and via cable television See the fall and spring issues of the *Extended Campus Catalogs* for complete scheduling information For information about this program, call 480 965 7167 or write

SCHOOL OF PLANNING AND LANDSCAPE
ARCHITECTURE
ARIZONA STATE UNIVERSITY
PO BOX 872005
TEMPE AZ 85287 2005

College of Business. The technology M.B.A. is an evening program designed specifically for technology professionals. The degree program is offered at the ASU Research Park. Cases, applications, and examples emphasize technology, global competition, and rapid organizational change The evening M.B.A is offered at the ASU Downtown Center. It is designed to meet the needs of working professionals and combines theoretical concepts with practical applications Call the College of Business at 480 965 3332 for detailed information about these degree programs.

College of Education. Three education degrees the Bachelor of Arts in Education degree in Elementary Education; the Master of Education degree in Curriculum and Instruction, with concentrations in either multicultural education or secondary education; and the DELTA doctorate, which leads to the Doctor of Education degree in Educational Administration and Supervision are available through the Off Campus Degree Program These degree programs are targeted to specific audiences. To learn more about these education degrees, call 480 965 1644 (regarding the bachelor's or master's degrees) or 480 965 6357 regarding the doctorate .

College of Public Programs. The College of Public Programs offers a Master of Public Administration (M.P.A.) degree. This interdisciplinary program is designed to provide professional training for careers in public administration and management Opportunities for completing course work leading to an M.P.A. are offered during evening hours at ASU Main and the ASU Downtown Center. For more information, call 480 965 3926 or write

SCHOOL OF PUBLIC AFFAIRS
ARIZONA STATE UNIVERSITY
PO BOX 87063
TEMPE AZ 85287 0603

The School of Social Work, in cooperation with the College of Extended Education, offers a Bachelor of Social Work degree in Tucson This program is grant funded for a five year period and offers a part time curriculum designed to increase the number of trained child welfare social workers in the rural areas of Arizona. For more information, call 520 884 5507, extension 19

Off-Campus Degree Programs (West)

Bachelor of Applied Science and Bachelor of Arts in Integrative Studies. Because of overlapping degree requirements and the flexibility built into each program, ASU West, working through the College of Extended Education, offers the same set of courses to meet the degree completion needs of students who bring differing educational experiences to the classroom. Thus, students who have completed an Associate of Applied Science (A A S) degree could enroll in the B A S degree program Those students entering the program with Associate of Arts

Baccalaureate Degrees and Majors Offered Through the College of Extended Education

Major	Concentration	Degree	Administered By
Applied Science	Aviation maintenance management technology, aviation management technology, computer systems administration, consumer products technology, digital media management, digital publishing, emergency management, fire service management, food retailing, instrumentation, microcomputer systems, municipal operations management, operations management, production technology, resource team specialist, semiconductor technology, software technology applications, technical graphics	B.A.S.	Bachelor of Applied Science Advisory Committee (ASU East)
Applied Science	All minors available at ASU West, individualized concentration	B.A.S.	Division of Collaborative Programs (ASU West)
Communication		B.A., B.S.	Hugh Downs School of Human Communication
Elementary Education	Bilingual education/English as a second language	B.A.E.	Division of Curriculum and Instruction
English	Linguistics, literature	B.A.	Department of English
History	—	B.A.	Department of History
Housing and Urban Development		B.S.D.	School of Planning and Landscape Architecture
Integrative Studies	All minors available at ASU West, individualized concentration	B.A.	College of Arts and Sciences (ASU West)
Interdisciplinary Studies		B.I.S.	Division of Undergraduate Academic Services
Political Science		B.A.	Department of Political Science
Psychology		B.A., B.S.	Department of Psychology
Social Work		B.S.W.	School of Social Work
Sociology		B.A.	Department of Sociology

degrees or some other combination of courses that totals 60 credit hours and encompasses the equivalent of the ASU General Studies requirements could receive the B.A. degree in Integrative Studies upon program completion. Both sets of students follow the same program of study.

Both degree programs emphasize focused study in the liberal arts, critical thinking, communication, and leadership skills and individual and team problem solving experience. Both include courses designed to refresh students' academic skills and to develop the resources to succeed in their educational pursuits.

For more information, call 480/965-9797 or write

COLLEGE OF EXTENDED EDUCATION
ACADEMIC AND PROFESSIONAL PROGRAMS
ARIZONA STATE UNIVERSITY
PO BOX 874001
TEMPE AZ 85287-4001

Master of Business Administration. The Scottsdale M.B.A. degree from the ASU West School of Management meets in the Scottsdale Airpark in north Scottsdale. Classes emphasize the development of critical learning skills, with practical application in analyzing local industries. Students, faculty and industry experts work together on projects for local companies. The integrated curriculum provides a comprehensive understanding of interrelated business issues. For more information, call 602/543-6201.

Off-Campus Degree Program (East)

Bachelor of Applied Science. Students holding an Associate of Applied Science (A.A.S.) degree from a regionally accredited community college can earn the Bachelor of Applied Science (B.A.S.) degree by completing 60 semester hours of upper division course work through ASU East.

The Bachelor of Applied Science degree is practical and flexible. ASU East faculty and advisors work with students to match a 60 semester hour program of study to their individual interests and career goals, or students may select one of the concentrations shown in the "Baccalaureate Degrees and Majors Offered Through the College of Extended Education" table, on this page.

For more information, call 480-727-1874.

Technology-Delivered Degree Programs (Main)

Master of Science in Engineering. The faculty in the Department of Electrical Engineering offer the Master of Science in Engineering via interactive television. This degree program meets the needs of the part-time student who is working full time in industry. Ten graduate courses are required; six should constitute a major, two courses a

Graduate Degrees and Majors Offered Through the College of Extended Education

Major	Concentration	Degree	Administered By
Business Administration		M B A.	College of Business
Business Administration		M.B.A.	School of Management (ASU West)
Curriculum and Instruction	Mult cultural education or secondary education	M.Ed	College of Education
Educational Administration and Supervision	—	Ed.D.	College of Education
Electrical Engineering		M.S.E.	College of Engineering and Applied Sciences
Engineering	—	M.E.	Tri-University Coordinating Board (ASU, NAU, UA)*
Public Administration	Public information management, public management, public policy analysis and evaluation, urban management and planning	M.P.A.	School of Public Affairs

* This collaborative program is offered by the three state universities.

minor, and two courses should be taken outside the Depart ment of Electrical Engineering. After completing the required hours of course work, students in this program must pass a comprehensive examination covering topics in the major. Using the department's three year schedule of courses, students are able to complete course requirements over the interactive television system. For more information call 480 965 3590.

Bachelor of Arts Degree in History. The faculty of the Department of History in the College of Liberal Arts and Sciences offer the B.A. degree in History via technology (Students are required to take two of the courses on campus in the evening.) For more information, call 480 965 8364.

Tri-University Master of Engineering. The Tri Univer sity Master of Engineering (M.E.) degree program is intended to meet the educational needs of Arizona's practic ing engineers. With industry input, Arizona's three state uni versities Arizona State University, Northern Arizona State University, and University of Arizona expect to enhance the skills, knowledge, and understanding that are critical to today's practicing engineers. The courses are offered through a variety of distance-delivery methods in flexible formats at any of the three universities

The M.E. degree offers the practicing engineer the oppor tunity to design, in conjunction with an advisory committee, a program of study that can reflect the increasingly interdis ciplinary nature of engineering practice. The M E. degree requires the completion of 30 hours of course work; stu dents must complete a minimum of three hours in applied engineering mathematics as well as three hours of engineer ing management/business. Up to six semester hours from a practice oriented project may be applied. A final examina tion is also required

For application information, visit the program's Web site at triuniv engr.arizona.edu, send e mail to m eng @asu edu, or call 480 965-1726.

On-Campus Evening Degree Programs (Main)

College of Liberal Arts and Sciences. The College of Lib eral Arts and Sciences offers six evening degree programs: the B.A. degree in English, History, Political Science, and Sociology, and B.A. and B S. degrees in Psychology. For more information about these programs, call 480 965 3986 and request "degree programs."

College of Public Programs. The faculty in the Hugh Downs School of Human Communication in the College of Public Programs offers B.A. and B.S. degrees in Communi cation through the College of Extended Education's Evening Degree Program. For more information, call 480 965 5095.

The School of Public Affairs offers a Master of Public Administration (M P.A.) degree. This interdisciplinary pro gram is designed to provide professional training for careers in public administration and management Opportunities for completing course work leading to the M.P A are offered during evening hours at ASU Main and the ASU Downtown Center. For more information, call 480 965 3926.

WINTER SESSION (MAIN)

The College of Extended Education schedules the winter session courses in collaboration with academic departments. The condensed, three-week session is offered between the fall and spring semesters. For more information about win ter session, call 480 965 9797.

CERTIFICATE PROGRAMS

Certificate programs provide opportunities for those seek ing to advance their careers, to begin a new career, to reenter the workplace, or to simply develop new knowledge. A practical choice for career development, certificate pro grams are recognized by employers as evidence of profes sional skill or accomplishment

English as a Second Language Certificate

The American English and Culture Program offers a cer tificate in the study of English as a second language (ESL), comprising 21 hours a week for eight weeks of language and culture training.

Gerontology Certificate Program

The Certificate in Gerontology, offered by the Graduate College, is available to graduate students enrolled in mas ter's or doctoral degrees in disciplines such as communica

tion, exercise science, nursing, psychology, social work, and sociology. Unclassified graduate students may pursue the certificate This program consists of 24 credit hours evenly divided between required and elective course work.

The Gerontology Program has an affiliated faculty of more than 60 members based in 22 different departments throughout the university. Students can work on independent study or participate with faculty in their aging related research.

Increased longevity means that by the year 2040 there could be more than 30 million Americans over the age of 85. The certificate is designed for individuals interested in learning more about the aging process. For more information, call 480 965 3225 (ASU Main) or 602 543 6600 (ASU West

Human Performance Improvement Certificate Program

The Human Performance Improvement Certificate Program is offered by the College of Extended Education and the American Society of Training and Development. This program is designed to provide a well rounded understanding of the human performance improvement field for those in a human resource capacity. Individuals can receive a Human Performance Improvement Certificate after completing the six courses of the program or may elect to enroll in one or more classes on a per class basis For more information, call 480 945 3046.

Nonprofit Management Certificate Program

The Nonprofit Management Institute is offered by the College of Extended Education and the United Way. This program is designed to enhance the management skills of those who serve nonprofit human services groups, hospitals, government agencies, churches, private schools, art organizations, environmental groups, and others in the nonprofit sector.

Individuals can receive a Certificate in Nonprofit Management along with 13 Continuing Education Units after completing 130 hours of the program. The individual class option permits participants to enroll in one or more classes on a per class basis Additional full and half day workshops are also provided to help those in the nonprofit sector achieve excellence in managing nonprofit organizations. For more information, call 480 965 3046.

COLLEGE UNITS BY PROGRAM AREA

Degree Programs and Credit Courses

The College of Extended Education facilitates the delivery of several degree programs and credit courses. All courses and degrees are offered through the respective university academic departments. These courses are published each fall and spring semester in the *Extended Campus Catalog* and in the *Schedule of Classes*.

Academic and Professional Programs. As a convenience to students, courses are conducted off campus in locations throughout the state, and on campus in the evening, and during the Winter Session

Academic credits earned off campus are recorded on a student's permanent record in the same manner as those earned on campus, and both are equivalent in all academic considerations All academic standards of the university, including policies related to admission and registration, apply to off campus courses It is the responsibility of the student to be aware of all applicable policies before registering. It is the responsibility of each dean to determine what courses to offer off campus and to make faculty assignments.

The tuition and fees for off campus credit courses are the same as for those offered on campus (See resident and non resident rates in the current *Schedule of Classes* Before the 21st calendar day of each semester, any combination of on campus and off campus resident credit courses resulting in a combined registration of seven or more semester hours requires that the student pay full time tuition Off campus credit courses and programs that commence on or after the 21st calendar day of the start of each semeste require full time and part time students to pay tuition separate from (but in addition to) those courses starting before the 21st calendar day of the semester.

ASU offers several degree programs through the ASU Extended Campus. Convenient times and locations as well as today's innovative technologies make it easier for working adults and other nontraditional students to earn a degree. For details, see "Degree Programs," page 257.

Professional continuing education activities focus on professional and personal development as well as lifelong learning. Programs are planned and developed to complement the missions of the college and the university These programs can be customized and transported to reach numerous target populations and levels of need.

Distance Learning Technology. Distance Learning Technology uses a variety of technologies Semester based courses are offered through Instructional Television Fixed Service, cable television, public television, satellite, microwave, videotape, and the Internet. In addition, independent learning courses are offered (print or Internet based) Distance Learning Technology makes it possible for many people to access and share educational resources locally, regionally, nationally, and internationally through a variety of electronic technologies and distribution systems. In addition to distance learning courses, other products and services are available, including teleconferencing and video production.

Many students are unable to attend class on campus due to schedule or commuting difficulties and prefer to participate in distance learning courses at convenient locations such as the work site or home. The distance learning course schedule consists of approximately 120 courses offered by various ASU colleges each semester, and these courses are available for credit at a variety of remote locations, including students' homes. Students participating in televised courses from the work site or home can interact with faculty and students in the classroom on campus while class is in session via teleconferencing technology. Videotapes of most courses are available through University Libraries Video Resources. Other student support services are available to assist off campus students.

Cable Public Television ASU offers credit courses that require students to view televised class sessions and complete work assignments at home Exams usually are held on campus. Courses are available throughout the Phoenix area via KAET Channel 8, Cox Communications, Insight Cable, Cable America, Digital Choice TV, or other cable providers.

Televised courses are also available in university residence halls.

Interactive Instructional Television Program (IITP). Students employed by companies participating in the IITP may take courses for credit at the work site. A daily courier service circulates course materials between faculty on campus and their students at remote sites. Exams typically are held at the work site. Each company has an on site coordinator to assist with registration, to provide information, and to proctor exams. A Master of Science in Engineering degree with a major in Electrical Engineering is available through the IITP. More information about the televised Master of Science in Engineering degree is available from the College of Engineering and Applied Sciences at 480 965 3506.

Interactive Television (Public Sites). Certain sites are open to the public. Students can participate in most televised courses at locations such as ASU Downtown Center, ASU East, ASU West, select community college campuses, Cactus Shadows High School, and the Gila River Indian Community. Each public site has an on site coordinator to assist with registration, to provide information, and to proctor exams.

Internet Courses. ASUonline is the university's gateway to an "online campus." Internet courses are offered by various departments through ASU Extended Campus, allowing students to participate from any location in the world. Through the Web, students can access lectures, participate in class assignments, interact with the instructor, collaborate with other students, and earn ASU credit at times and locations that are convenient. Students register for Internet courses through the normal university admissions registration process. Certain computer hardware software may be required for Internet courses. More information is available from Distance Learning Technology at 480 965 6738 or on the Web at asuonline.asu.edu.

Independent Learning. These courses allow students to pursue ASU credit and to fulfill degree requirements or to enhance occupational, professional, and intellectual skills. Independent Learning courses are appropriate for students seeking flexibility in progressing through university courses. Any individual with a high school diploma or GED may enroll; however, enrollment in Independent Learning is not the same as admission to ASU. For ASU degree seeking students, enrollment in these courses requires an advisor's and dean's approval. Generally, ASU students may take one course at a time; other students can participate in two. A maximum of 60 semester hours earned by independent learning and/or by comprehensive examination may be applied toward the baccalaureate degree at ASU. Independent Learning courses are not applicable toward graduate credit, and pass fail options are not available. Students have up to one year to complete courses. More information on registration, lesson formats, submission of assignments, correspondence with instructors, and other course details is available in a catalog from the Independent Learning office, at 480 965 6563.

Professional Continuing Education

Academic and Professional Programs provides professional continuing education programs valleywide. These ongoing programs are intended to improve professional competence and address current issues and trends, and are offered to adult learners in collaboration with ASU colleges, other educational providers, professional associations, and public and private organizations. In addition, the Elderhostel Program, a series of challenging, thought-provoking college level courses, is offered to people over 55. For more information, call 480 965 3046.

The Nonprofit Management Institute is offered by the College of Extended Education and the United Way. This program is designed to enhance the management skills of those who serve nonprofit human services groups, hospitals, government agencies, churches, private schools, art organizations, environmental groups, and others in the nonprofit sector. For more information, see "Nonprofit Management Certificate Program," page 260, or call 480 965 9200.

For an international educational travel experience, ASU and TraveLearn partner to provide programs to 15 exciting destinations, including Costa Rica, Egypt, Indonesia, and Kenya. For more information, call 480 965-3046.

For more information about Academic and Professional Programs, call 480 965 9797.

Global and Community Outreach

American English and Culture Program. The American English and Culture Program (AECP) features an intensive course of study designed for adult international students who want to become proficient in English as a second language for academic, professional, or personal reasons. Applicants must be at least 18 years of age and must have a high school diploma or its equivalent. All conditions of the U.S. Immigration and Naturalization laws pertaining to full time study in the United States must be met by all applicants. Students are required to take an English placement test before the beginning of classes. Certificates of achievement are awarded on completion of the course. Admission to the program does not constitute regular admission to ASU.

Beginning, intermediate, and advanced courses provide instruction in listening, reading, speaking, structure, and writing. Academic advising and orientation to Arizona and the United States are integral parts of the program.

Program wide social activities each cycle include a field trip, a picnic, a cultural activity, visits to museums, historical sites, or musical presentations. Campus housing and American Homestays are available.

Advanced-level students may be permitted to enroll concurrently in up to two ASU credit classes with the approval of the director. Several special classes are offered through the AECP. Classes in conversation, speech improvement, and the Test of English as a Foreign Language are offered during alternate terms.

The fall and spring semesters are divided into two eight week cycles. Students may enroll for one or more cycles. An eight week summer session of study is also offered. Inquiries concerning admission requirements, enrollment, and fee schedules should be sent to

AMERICAN ENGLISH AND CULTURE PROGRAM
DEPARTMENT 4
ARIZONA STATE UNIVERSITY
PO BOX 873504
TEMPE AZ 85287-3504

For more information, call 480 965 2376.

Extended Campus Programs. Extended Campus Pro grams was established in response to the rapidly expanding demand for educational services in Maricopa County and throughout Arizona Analyzing community needs for course offerings, workshops and seminars, the unit oversees the planning, organizing, and staffing necessary to satisfy these educational needs

A primary goal of this unit is to ensure that qualified stu dents have access to effective, appropriate university pro grams. Extended Campus Programs focuses on developing and maintaining education, business, government, profes sional, and community links in order to further the univer sity's and college's missions.

The major components of Extended Campus Programs are the classes and events at the ASU Downtown Center and emerging programs in the east Valley, Scottsdale, and Ahwatukee. For more information, call 480 965 3046.

ASU Downtown Center. The ASU Downtown Center is a university wide resource located in downtown Phoenix that serves as an educational, applied research, and community service facility.

Responding to the needs of business, industry, and state and local governments, the center offers traditional and interdisciplinary upper division undergraduate- and gradu ate-level courses. The center also offers professional and continuing education programs, lectures, and community forums, and serves as a meeting location for conferences, workshops and seminars.

ASU faculty, staff, and students can take advantage of the center's computer lab. A lab assistant is available during posted hours. They also can access the ASU library online catalog and ASU library information and resources. Library books may be ordered and returned through the center Text books for all courses held at the center are available at one of the ASU libraries usually at the beginning of each semes ter.

Accommodations for small or large meetings or confer ences are available at attractive rates and can include bever ages, food service, and professional equipment. Advice in logistics planning is available as are a wide range of related services. The center is available for use by outside organiza tions, subject to the limits of university policies and proce dures. Contact the center's facility scheduler for details.

For more information about the programs and services provided at the center, call 480 965-3046 or write

ASU DOWNTOWN CENTER
502 E MONROE ST
PHOENIX AZ 85004-2337

Several ASU programs and partnerships are located at the Downtown Center.

Academic and Professional Programs. Academic and Pro fessional Programs is part of ASU Extended Campus and the College of Extended Education. This brings the resources of ASU to many who may not be pursuing a tradi tional degree and are seeking professional and personal enrichment. See "Academic and Professional Programs," page 260, for a description

Joint Urban Design Program The Joint Urban Design Pro gram, located in the ASU Downtown Center, is a partner ship between the Colleges of Architecture and Environmen tal Design and Extended Education. The program directs institutional and public resources toward developing an understanding of issues that affect the urban quality of Phoenix For more information, call 480 965-3046.

Urban Data Center. The Urban Data Center, a partnership with the College of Public Programs, serves as a resource for analysis and implementation of public policy in metro politan Phoenix. The center works closely with ASU researchers and organizations such as the Joint Urban Design Program, the Morrison Institute for Public Policy, University Libraries, local governments, state agencies, and other independent organizations to build a comprehensive database on policy issues for urban planners and community leaders. For more information, call 480 965-3046

Advanced Public Executive Program. The Advanced Public Executive Program of the College of Public Programs is housed at the ASU Downtown Center. This program is designed to provide public managers and administrators with analytical approaches and skills through short courses and seminars to help mobilize ideas, people, and resources in support of public programs. For more information, call 480 965-4006

Office of Youth Preparation and Project PRIME. The Office of Youth Preparation and Project PRIME (Project to Improve Minority Education) are housed at the Downtown Center with evaluation support services located at the His panic Research Center. The programs are designed to increase the pool of college eligible minority students, who have historically been underrepresented in higher education, by providing instructional and support services to seventh- through 12th grade students and their families at targeted Arizona schools For more information, call 480 965 8510.

Arizona Drug and Gang Prevention Resource Center. The Arizona Drug and Gang Prevention Resource Center serves as a centralized source for individuals, schools, and commu nities throughout Arizona to support, enhance, and initiate prevention efforts.

For information about planning, mobilizing, training, and evaluating community prevention efforts, contact the center at 480 727 2772.

College of Fine Arts

J. Robert Wills, Ph.D., Dean

www.asu.edu/cfa

Students present many live performances during the year in dance, drama, and music. Tim Trumble photo

School of Art **268**

Department of Dance **280**

School of Music **284**

Department of Theatre **298**

PURPOSE

The College of Fine Arts provides both preprofessional and professional education in the arts disciplines and an opportunity for nonmajors 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 contemporary artist and scholar. The arts, as an integral part of the curriculum, offer the student a rewarding educational experience balanced and strengthened by studies in related fine arts areas, the humanities, social sciences, and the natural sciences.

In addition to professional curricula offered in each department and school, the college provides courses designed to meet the specific educational needs of students pursuing majors in other colleges throughout the university 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 community audiences many hours of cultural enjoyment through a myriad of concerts, art exhibitions, music and dance concerts, dramatic productions, operas, lectures, and seminars.

ORGANIZATION

The college houses the School of Art, the Department of Dance, the School of Music, and the Department of Theatre. An average of 2,800 students per semester enroll as majors in various degree programs offered through these units. The college also includes the ASU Art Museum and the Institute for Studies in the Arts.

ADMISSION

Students meeting the university requirements for admission may matriculate in the College of Fine Arts Separate admission 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. The university standards for evaluation of transfer credit are listed under "Transfer Credit," page 65. Transfer students are encouraged to contact their department or school or the College of Fine Arts Undergraduate Student Academic Services (GHALL 127) to ensure a smooth transition to the College of Fine Arts. Credits transferred from any accredited junior or community college may be accepted up to a maximum of 64 semester hours. A community college student planning to transfer at the end of his or her first or second year should plan to take community college courses that meet the requirements of the ASU curriculum selected. Students attending Arizona community colleges are permitted to follow the degree requirements specified in the ASU *General Catalog* in effect at the time they began their community college work, providing their college attendance has been continuous.

Courses transferred from community colleges are not accepted as upper division credit at ASU. Arizona students 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 45 hours of work taken at the university must be upper division credits. While attending a community college, it is suggested that students select courses similar to ASU General Studies lower division courses in the major field.

For optimal course selection, access the ASU Transfer Guides on the Web at www.asu.edu provost/articulation.

General Transfer Credit. Direct transfer of courses from other accredited institutions to the College of Fine Arts are 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. Every candidate for the bachelor's degree must earn a minimum of 30 semester hours in resident credit at ASU. Transfer students enrolled in the College of Fine Arts must complete a minimum of 15 semester hours of resident credit in the major as approved by the faculty

ADVISING

Advising is handled as a decentralized activity within the college. To offer personalized attention, each academic unit establishes its own graduation advising procedures. Students are encouraged to make appointments through the central office of their department or school.

Baccalaureate Degrees

The three baccalaureate degrees differ in curricula with respect to the amount of specialization permitted in the major field. The B A. degree provides a broad, scholarly, humanistic program, while the other two programs place greater emphasis upon the major field See the "College of Fine Arts Baccalaureate Degrees and Majors" table, page 265, for more information.

The university General Studies curriculum plays an integral role within the educational mission of the university and as such constitutes an important component of all undergraduate degrees in the College of Fine Arts. See "General Studies," page 87, for more information.

In cooperation with the College of Education a K 12 endorsement for teacher certification is available 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 education advisors, fulfill the requirements for the appropriate area of specialization under the Bachelor of Fine Arts or Bachelor of Music degrees. In addition, a student wishing to be admitted to the Professional Teacher Preparation Program (PTPP) in the College of Education (leading to teaching certification) must consult with an advisor from the Office of Student Affairs in the College of Education before making application for the PTPP. Students must have completed 56 hours with a minimum GPA of 2.50 and also have submitted scores from either the Pre Professional Skills Test (PPST or the ACT. Further details on admission requirements and procedures for the PTPP can be found under "Teacher Education," page 175.

Minors

The College of Fine Arts provides an opportunity for students majoring in other disciplines to sustain their interest in the arts through a structured program of required courses and electives leading to a minor. The minor is not intended as a substitute for professional work in the arts, but as a

College of Fine Arts Baccalaureate Degrees and Majors

Major	Concentration	Degree	Administered By
Art	Art history, studio art	B.A.	School of Art
Art	Art education, ceramics, drawing, fibers, intermedia, metals, painting, photography, printmaking, sculpture	B.F.A.	School of Art
Dance	Choreography, dance education, dance studies, performance	B.F.A.	Department of Dance
Music		B.A.	School of Music
Music Education*	Choral general, instrumental, string	B.M.	School of Music
Music Therapy*	—	B.M.	School of Music
Performance	Guitar, jazz, keyboard, music theatre, orchestral instrument, piano accompanying, voice	B.M.	School of Music
Theatre	—	B.A.	Department of Theatre
Theatre	Theatre education	B.F.A.	Department of Theatre
Theory and Composition	Composition, theory	B.M.	School of Music

* This major requires more than 120 semester hours to complete

complement to various liberal arts and preprofessional curricula.

Minors are offered in Art History, Dance, Music, and Theatre. The total number of semester hours required for a minor ranges from 18 to 22. Students should contact the relevant academic unit for specific requirements and guidelines regarding the minor.

Graduate Degrees

Master's programs range from 30 to 60 semester hours, depending upon the degree chosen. Doctoral programs vary in scope and curricula. See the "College of Fine Arts Graduate Degrees and Majors" table, page 266, for more information. See the *Graduate Catalog* for specific requirements.

UNIVERSITY GRADUATION REQUIREMENTS

In addition to fulfilling college and major requirements, students must meet all university graduation requirements For more information, see "University Graduation Requirements," page 83.

General Studies Requirement

All students enrolled in a baccalaureate degree program must satisfy a university requirement of a minimum of 35 semester hours of approved course work in General Studies, as described under "General Studies," page 87. Note that all three General Studies awareness areas are required. Consult your advisor for an approved list of courses. General Studies courses are listed in the "General Studies Courses" table, page 90, in the course descriptions, in the *Schedule of Classes*, and in the *Summer Sessions Bulletin*.

Courses in the major or in a related field area may not be used to satisfy both the major and core area portions of the General Studies requirement. Concurrent listings in the literacy areas, numeracy (computer applications) areas, and awareness areas are an exception. Students are encouraged to consult with an academic advisor to ensure that they comply with all necessary requirements.

COLLEGE DEGREE REQUIREMENTS

College of Fine Arts degree requirements supplement the General Studies requirement. Descriptions of additional required courses follow Students are encouraged to consult with an academic advisor to ensure that they comply with all necessary requirements.

Fine arts majors must take at least six semester hours of fine arts course work in areas outside of the major school or department. These courses may be in art, dance, music, or theatre. A student may concurrently fulfill this requirement and the humanities and fine arts portion of the General Studies requirement by selecting approved courses as indicated in the *Schedule of Classes*. This requirement may also be met by taking *any* College of Fine Arts course outside of the student's major.

All B.A. degrees require the equivalent of 16 semester hours in one foreign language except for the B.A. degrees in Theatre and Art with a concentration in studio art Foreign language study is strongly recommended but not required for these degree programs 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 are placed in language study at the level above completed work.

Candidates for the B.M. degree in Performance with a concentration in piano accompanying or voice and in Theory and Composition with a concentration in theory have specific foreign language requirements, which are stated with each of the degree requirements. There is no foreign language requirement for other concentrations of the B.F.A. or B.M. degrees.

MAJOR REQUIREMENTS

The minimum requirement for a baccalaureate degree is the completion of 120 semester hours with a minimum

NOTE: For the General Studies requirement courses and codes (such as L, SQ, C and H) see "General Studies" page 87. For graduation requirements, see University Graduation Requirements page 83 For an explanation of additional omnibus courses offered but not listed in this catalog see "Classification of Courses" page 60.

College of Fine Arts Graduate Degrees and Majors

Major	Concentration	Degree	Administered By
Art	Art education, art history	M.A.	School of Art
Art	Ceramics, drawing, fibers, intermedia, metals, painting, photographic studies, photography, printmaking, sculpture, wood	M.F.A.	School of Art
Composition		M.M.	School of Music
Creative Writing	—	M.F.A.[1]	Creative Writing Committee
Dance		M.F.A.	Department of Dance
History and Theory of Art[2]		Ph.D.	School of Art
Music	Ethnomusicology, music history and literature, music theory	M.A.	School of Music
Music Education	Choral music, general music, instrumental music, jazz studies	M.M.	School of Music
Music	Choral conducting; composition; music education; solo performance (instrumental, keyboard, voice)	D.M.A.	School of Music
Performance	Music theatre/opera musical direction; music theatre/opera performance; performance pedagogy; piano accompanying; solo performance (instrumental, keyboard, voice)	M.M.	School of Music
Theatre		M.A.	Department of Theatre
Theatre	Performance, scenography, theatre for youth	M.F.A.	Department of Theatre
Theatre	Theatre for youth	Ph.D.	Department of Theatre

[1] This program is administered by the Graduate College. See "Creative Writing M.F.A.," page 306. Playwriting is an option for students in this program offered by the faculty in the Department of Theatre. Fiction, nonfiction, poetry, and screenwriting are also options in this program offered by the faculty in the Department of English.

[2] This major is jointly offered with the University of Arizona.

cumulative GPA of 2.00. Of these 120 semester hours, at least 45 must be selected from upper division courses.

Several professional programs within the College of Fine Arts require additional semester hours for graduation and a higher cumulative GPA of their majors. To be acceptable as degree credit, all course work in the major discipline must show an earned grade of "C" (2.00) or higher.

In addition to the general information given below, consult the school and departmental sections that follow for specific degree requirements.

Bachelor of Arts (B.A.) Degree. The B.A. degree requires from 45 to 60 semester hours for the major. Depending on the major, 18 to 24 hours must be selected from upper division (300 or 400 level) courses. The semester hour requirements in the major are distributed between a field of specialization (30 to 53 hours) and one or more related fields (an additional 15 hours). The exact content of the major is selected by a student in consultation with an advisor under rules and regulations of the department or school concerned. An entrance audition is also required for admission to the B.A. degree in Music degree program.

Bachelor of Fine Arts (B.F.A.) Degree. The B.F.A. degree requires 52 to 79 semester hours for the major. At least 30 of these hours, depending on the major, must be selected from upper division (300 or 400 level) courses. The curriculum for the major is designed as preprofessional study in art, dance, or theatre education. Auditions and/or interviews are required for admission to the B.F.A. degree programs in Dance and Theatre. Consult these departments for specific information.

Bachelor of Music (B.M.) Degree. The B.M. degree requires 79 semester hours for the major. The required number of upper division (300 or 400-level) courses is dependent upon 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 jazz, music education, music performance, music theatre, music therapy, piano accompanying, and theory composition. An entering undergraduate music student, regardless of the area of specialization, must perform an entrance audition in his or her primary performing medium (voice or instrument).

ACADEMIC STANDARDS

The terms of disqualification, reinstatement, and appeals are consistent with those set forth by the university under "Retention and Academic Standards," page 79, except for degree programs in Theatre. For the B.F.A. degree in Theatre with a concentration in theatre education, a student must have a minimum GPA of 3.00 in the major to enroll in upper division courses and to remain in good standing. In addition, a student disqualified in any program is normally not eligible for reinstatement for two semesters.

SPECIAL PROGRAMS

Working closely with faculty, visiting scholars, and artists-in-residence, students in all fields of the College of Fine Arts participate in dynamic, innovative programs. Students receive a great deal of individual attention to their creative work and artistic development.

School of Art. The School of Art is one of the largest programs of its kind in the country and offers students a wide range of specialties in media, art history, and art education. The faculty are nationally recognized and provide excellent instruction in a curriculum with many different educational opportunities. Some of the unique offerings are in book making and paperhanging, digital art, film, neon, video animation, and foundry. In addition, internships are available in galleries and museums throughout the Phoenix area. The Children's Art Workshop is an on campus program taught by students in art education for school-age children in the metropolitan area. Northlight Gallery, a teaching gallery, hosts exhibitions organized and curated by students. Visiting artists and guest lecturers enrich the basic curriculum. Graduates of the School of Art have been accepted to top graduate schools and many are in leadership positions in art, education, and industry.

Department of Dance. Recognized as one of the top programs in the country, the Department of Dance emphasizes the choreography, performance, and theory of modern dance. Nationally prominent faculty and visiting artists create repertory for dance majors and for the Dance Arizona Repertory Theatre (DART), a student touring outreach company An ambitious performance program offers several concerts to the public each year with additional works created and performed by graduate and undergraduate students. Students work closely with renowned artists and companies who visit the campus annually and with researchers in the areas of dance science, dance in relation to technology, dance music composition, labanotation, sound, and video production. ASU students and faculty have consistently taken top honors at the regional and national festivals of the American College Dance Festival Association.

School of Music. Performers, teachers, conductors, composers, and scholars recognized both nationally and internationally make up the faculty of the School of Music. Students have the opportunity to participate in comprehensive degree programs that provide for wide and divergent opportunities in performance and course work. Student performing organizations are recognized as being some of the finest in the nation, and ASU students regularly compete successfully in national competitions The broad scope of degree options allows students excellent choices in gaining depth and breadth in the musical field.

Department of Theatre. The Department of Theatre has inaugurated a redesigned B A. degree. A strong feature of the new B.A. degree program is the broad liberal arts education, which cultivates in the student the ability to understand human behavior and values in societies of the past and present, an essential element in the creation of and response to theatre. Students interested in theatre education enroll in a B.F.A. degree program designed to allow work in both the Department of Theatre and the College of Education Special strengths of the department include internationally acclaimed programs in theatre education and theatre for youth; an outstanding playwriting area that infuses each specialization with new script work; multiethnic courses and programs in acting and directing; an acting program that allows work with nationally acclaimed directors and acting coaches; and a nationally recognized scenography area that provides for further specialization in costume, lighting, or scene design as well as theatre technology.

Production is at the core of ASU theatre and the quality of the faculty, student body, and facilities often attracts professionals to ASU The department recently premiered productions by three Pulitzer prize winning playwrights Four to six subscription series plays are produced in the 500 seat Galvin Playhouse and the smaller Lyceum Theatre An additional eight to 14 student directed shows are presented as part of the scholarship series

Theatre for youth artists, students, and scholars are attracted to ASU by the opportunities to work on national K 12 theatre curricula and research projects, theatre tours to area schools, and opportunities to teach on and off campus. The Child Drama Special Collection in Hayden Library, which includes rare books, plays, and personal and national association archives, is the most complete and extensive collection of its kind in the English speaking world and also contributes to the international recognition of the theatre for youth faculty.

Since theatre is a collaborative art form, students at the undergraduate level are required to learn and participate in all phases of theatre, specializing in an area of their choosing. In the theatre education and theatre for youth programs, both undergraduate and graduate students are challenged to excel in every aspect of theatrical training. Students are offered acting, directing, and other production opportunities for main stage, studio, and touring shows, as well as research and teaching possibilities on and off campus. Students in the B.A and M.F.A. scenography programs are actively involved in all aspects of design and technology for main stage and studio productions and have received regional and national awards for their work. The M.F A degree in Theatre with a concentration in performance challenges performing artists to reinvigorate the classics, develop new works, explore new theatrical forms, and discover changing relationships between art and technology.

A faculty playwright works closely with both undergraduate and graduate directing students to create and showcase original scripts from students and faculty. An interdisciplinary M.F.A. degree in Creative Writing encourages graduate students to work closely with writers of drama, fiction, and poetry and with directors and producers from the Departments of English and Theatre Faculty in the Departments of Theatre and English offer students a unique opportunity to tailor a course of study to fit individual needs, talents, and goals.

GENERAL INFORMATION

Undergraduate Credit for Graduate Courses. To enable interested students to benefit as much as possible from their undergraduate studies, the Graduate College and the College of Fine Arts extend to seniors with a GPA of at least 2.50 the privilege of taking 500 level graduate courses for undergraduate credit Students requesting to take 500 level graduate courses must have the approval of the instructor of the class and their academic advisor.

NOTE: For the General Studies requirement, courses, and codes (such as L SQ, C and H) see "General Studies" page 87 For graduation requirements, see University Graduation Requirements" page 83 For an explanation of additional omnibus courses offered but not listed in this catalog see "Classification of Courses" page 60.

Preprofessional Programs. Students preparing for admis sion to professional graduate schools should obtain infor mation regarding admission requirements by writing directly to the schools in which they are interested

College of Fine Arts. The academic units within the College of Fine Arts may use the CFA prefix for course offer ings that cross disciplinary boundaries

COLLEGE OF FINE ARTS (CFA)

CFA 194 Special Topics. (1–4) F S
(a) Academ c Ba ance for the Fine Arts Major
CFA 484 Internship. (1 12 F, S
CFA 494 Special Topics. (3 F S
(a) Inte lectua Property and the Fine Arts
CFA 498 Pro-Seminar. (1 7) F S
CFA 584 Internship. 1 12 F S
CFA 594 Special Topics. (3) F S
(a) Inte ectua Property and the F ne Arts
CFA 684 Internship. (1 12) F, S
CFA 784 Internship. (1 12) F S

School of Art

Julie F. Codell
Director
(ART 102) 480/965-3468
www.asu.edu/cfa/art

REGENTS' PROFESSOR
WE SER

PROFESSORS
ALQU ST, BATES, BRITTON, CODELL, ECKERT, ER CKSON, FAHLMAN, FRONSKE, GASOWSKI, GILLINGWATER, JAY KAIDA, LOVELESS, MAGENTA, MEISS NGER, PILE, PIMENTEL, R SSEEUW, SCHMIDT, SHARER STOKROCKI, SWEENEY, TAYLOR, WHITE, YOUNG

ASSOCIATE PROFESSORS
COCKE, COLLINS de MATTIES, DUNCAN, GULLY, HAJICEK JENK NS, KLETT, KRONENGOLD, MARC SM TH, MAXWELL, PITTSLEY, SCHLE F, SCHOEBEL, SCHUTTE, SEGURA, SERW NT UMBERGER, VERSTEGEN, WOLFTHAL

ASSISTANT PROFESSORS
BROWN KESTER, Mc VER, PESSLER

LECTURERS
HOK N SARD

A l students registering in a School of Art degree program enroll through the College of Fine Arts. Each degree pro gram and area of specialization has its own check sheet, which describes the particulars of course sequence and spe cial requirements Check sheets are available in the School of Art Undergraduate Advising office

ART—B.A.

The faculty in the School of Art offer two concentrations for students in the B.A. degree in Art program: art history and studio art. These concentrations are intended to give the student a broadly based general education in the field with some specialized work at the upper division level.

The major in Art consists of 45 to 48 semester hours, depending on the concentration, and includes the require ments listed on this page for each concentration. B.A pro grams are especially suited for individuals pursuing inter disciplinary studies or a minor in another discipline. All courses in the major must be completed with a "C" or higher.

In addition to fulfilling the major requirements, students must meet all university graduation requirements and col lege degree requirements See "University Graduation Requirements," page 83, and "College Degree Require ments," page 265.

Art History

Related Subject Field. Select three courses (nine semester hours) from those with the prefix APH, ARA, ARE or from the following:

ART	111	Drawing I 3
ART	112	Two Dimensional Design . . 3
ART	113	Color 3
ART	115	Three Dimensional Design 3
ART	201	Photography I . 3
ART	260	Ceramics for Nonmajors 3
ART	274	Wood I 3
ART	294	Special Topics 3

Also required is an approved upper division elective. Six semester hours of ART courses are recommended.

Specialization. The following courses make up the special ization

ARS	101	Art of the Western World I *HU, H* . . . 3
ARS	102	Art of the Western World II *HU H* 3
ARS	480	Research Methods *L* 3
ARS	498	PS Art History 3
Total		 12

Also required is at least one course from each of the fol lowing areas: ancient, baroque, medieval, modern, non Western, and renaissance art.

This concentration consists of a minimum of 45 semester hours as approved by the student's advisor It requires 33 semester hours of art history courses and 12 semester hours in related fields. At least 18 of the 45 semester hours must be upper-division credit Satisfactory completion of ARS 480 Research Methods is required before the senior year Demonstrated proficiency 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 the "Department of Languages and Literatures," page 388 (ASL is not acceptable for Art History majors.)

Art History Minor

The School of Art offers a minor in Art History consisting of 18 semester hours of course work, including 12 upper division electives A Minor Approval Form must be submit ted. A minimum grade of "C" is required of all classes in the

minor and for those pursuing a minor, a minimum overall GPA of 2.00 is required. Courses may not be double counted in a major and the minor, and a minimum of 12 hours of resident credit at ASU Main is required

ARS 100 or 300 may be used toward a minor. ARS 100 and ARS 300 may not be used toward an Art History minor if the student is an Art major or has credit in ARS 101 and 102.

Required Courses. Select two of the following four required courses:

ARS 101 Art of the Western World I *HU, H* 3
ARS 102 Art of the Western World II *HU, H* 3
ARS 201 Art of Asia *HU G H* 3
ARS 202 Art of Africa, Oceania, and the Americas *HU G H.* 3

Elective Courses. Students pursuing an art history minor select four three semester hour upper division courses. A seminar is strongly recommended for those considering graduate study. Students need to be aware of lower division prerequisites for all upper division courses.

Museum Studies

Contact the School of Art for details.

Studio Art

Core Curriculum. The following courses make up the core curriculum:

ARS 101 Art of the Western World I *HU H* 3
ARS 102 Art of the Western World II *HU, H* 3
ART 111 Drawing I 3
ART 112 Two Dimensional Design 3
ART 113 Color ... 3
ART 115 Three Dimensional Design 3

Total 18

Specialization. Eighteen semester hours of ART courses, including 12 upper division semester hours are required. Courses in area of specialization must have a focus

Art History. Nine semester hours of ARS courses are required, which must include three semester hours of non-Western art. At least six semester hours must be upper division ARS courses.

ART—B.F.A.

The major in Art consists of 75 semester hours, 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, intermedia, metals, painting, photography, printmaking, and sculpture.

B.F.A. Core Curriculum. All students in this degree program follow the same core curriculum in art for the first two semesters:

ARS 101 Art of the Western World I *HU H* 3
ARS 102 Art of the Western World II *HU, H* 3
ART 111 Drawing I 3
ART 112 Two-Dimensional Design 3
ART 113 Color 3
ART 115 Three Dimensional Design 3

Total 18

At least 30 upper division semester hours must be earned within the major, with a minimum of 12 semester hours within the concentration.

All course work counted in the major must be completed with a "C" or higher The specific requirements for each concentration are recommended by the faculty advisors of the area and are listed on School of Art check sheets.

Courses from other departments, when approved by the advisor and the School of Art, may be applied to the major if deemed appropriate to the student's program of study. Art courses that do not have the same title and description as ASU catalog courses must have the approval of the School of Art Standards Committee.

Graduation Requirements. In addition to fulfilling the major requirements, students must meet all university graduation requirements and college degree requirements. See "University Graduation Requirements," page 83, and "College Degree Requirements," page 265.

Art Education

Core Curriculum. See "B F A Core Curriculum," on this page, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ARE 440 Disciplines of Art Education 3
ARE 450 Studio Art Art History I 3
ARE 470 Art Criticism Aesthetics 3
ARE 482 Studio Art. Art History II 3
ARE 486 Art Education Strategies and Applications 3
ARE 494 Special Topics 3
ARE 496 Methods and Assessment of Learning in Art 3

Total 21

Area of Proficiency. Twenty one semester hours are required with a minimum of 15 semester hours in a specific area of studio or art history. Twelve of these semester hours must be upper division credits.

Art History. Six semester hours of ARS upper division electives are required with one 20th century ARS course.

Additional Requirements. The following courses are additional requirements:

ART 201 Photography I 3
ART 223 Painting I 3
ART 231 Sculpture I 3
or ART 261 Ceramic Survey (3)
or ART 272 Jewelry I (3
or ART 274 Wood I (3)
or ART 276 Fibers I (3

Total 9

The concentration in art education consists of 75 semester hours with 21 semester hours in art education and 21 semester hours in an art proficiency approved by an art education advisor. The art proficiency courses must include a

NOTE: For the General Studies requirement, courses and codes (such as L, SQ, C and H) see "General Studies" page 87 For graduation requirements see "University Graduation Requirements" page 83 For an explanation of additional omnibus courses offered but not listed in this catalog, see Classification of Courses" page 60

minimum of 15 semester hours in a specific area of studio art or art history Twelve of these semester hours must be upper division credits. The art proficiency can be in art history, ceramics, drawing, fibers, intermedia, metals, painting, photography, printmaking, or sculpture. Teaching experience is provided in the Children's Art Workshop, which is an on campus program based in studio and art history for children ages five to 15. Participation in the workshop is part of the requirements for ARE 486 Art Education. Strategies and Applications. ARE 486 meets the state certification requirements for the elementary methods class, and ARE 496 Methods and Assessment of Learning in Art meets the requirements for the secondary methods class in the subject area. Both of these courses have prerequisites

A student pursuing a B.F.A degree in Art with a concentration in art education may also choose to become certified for teaching art K 12. If certification is elected while pursuing the art education undergraduate degree, additional semester hours are required in the College of Education. Students must make special application to the professional education program in the College of Education three months before the beginning of the junior year. To be considered for admission to the professional program, students must have successfully completed the Pre Professional Skills Test (PPST) or the ACT during the sophomore year. In addition, as part of the certification process, students must meet the U.S. and Arizona constitution requirement. Certification may also be pursued after receiving an undergraduate degree in art through the postbaccalaureate program in the College of Education. Interested students should contact an advisor in the College of Education and in Art Education for admission requirements to the postbaccalaureate program Art education courses for this program are as follows:

ARE 450 Studio Art Art History I	3
ARE 482 Studio Art Art History II	3
ARE 486 Art Education Strategies and Applications	3
ARE 496 Methods and Assessment of Learning in Art	3
Total	12

The B.F.A degree in Art with a concentration in art education and the postbaccalaureate program for certification in art have special art education application procedures. This procedure is separate from, and in addition to, the admission requirements of ASU. Acceptance is based on a 2 50 GPA, completion of foundations courses (ART 111, 112, 113, and 115), completion of 12 semester hours of art history courses (ARS 101 and 102 and two upper division courses), and a "B" or higher in ARE 440 and 450. In addition, undergraduate and postbaccalaureate students seeking K 12 certification should check requirements and deadlines for admission to the College of Education professional program.

Student teaching in art education occurs only in the spring semester. To be accepted nto student teaching, a student must be recommended in writing by the art education faculty and must have completed all art education classes except for ARE 496, which should be taken concurrently with student teaching Students who are not recommended may complete the B F A degree in Art with a concentration in art education without certification or may reapply after meeting deficiencies in knowledge and skills related to the teaching of art.

Ceramics

Core Curriculum. See "B.F.A. Core Curriculum," page 269, for the courses that make up the core curriculum

Specialization. The following courses make up the specialization:

ART 231 Sculpture I	3
ART 261 Ceramic Survey	3
ART 360 Ceramic Throwing	3
ART 364 Ceramic Handbuilding I	3
ART 365 Ceramic Handbuilding II	3
ART 460 Ceramic Clay	3
ART 463 Ceramic Glaze	3
ART 466 Special Problems in Ceramics	6
Total	27

Art History. Six semester hours of upper-division ARS courses, including a 20th century and a non Western ARS course.

Additional Requirements. One of the following four courses is required:

ART 211 Drawing II	3
ART 214 Life Drawing I	3
ART 227 Watercolor I	3
ART 443 Intermedia	3

Two of the following three courses (six semester hours) are required:

ART 272 Jewelry I	3
ART 274 Wood I	3
ART 276 Fibers I	3

Art Electives. Fifteen semester hours of ARA, ARE, ARS, and ART courses are required.

Drawing

Core Curriculum. See "B.F.A. Core Curriculum," page 269, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART 211 Drawing II	3
ART 214 Life Drawing I	3
ART 223 Painting I	3
ART 227 Watercolor I	3
ART 311 Drawing III	3
ART 314 Life Drawing II	3
ART 315 Life Drawing III	3
ART 411 Advanced Drawing	3
Total	24

Also required are six semester hours of ART 411, 414, 494 ST: Drawing or 494 ST: Painting or a 494 Special Topics course on printmaking (three hours).

Art History. Nine semester hours, including six semester hours of upper division and three semester hours of non Western ARS courses.

Additional Requirements. Two of the following six courses (six semester hours) are required·

ART 201 Photography I	3
ART 231 Sculpture I	3
ART 261 Ceramic Survey	3

ART 272 Jewelry I 3
ART 274 Wood I 3
ART 276 Fibers I 3

Art Electives. Nine semester hours of ARA, ARE, ARS, or ART courses are required.

Fibers

Core Curriculum. See "B.F.A. Core Curriculum," page 269, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART 276 Fibers I 3
ART 376 Fibers: Loom Techniques 3
ART 377 Surface Design 3
ART 476 Fibers: Multiple Harness Weaving 6
ART 477 Printed Textiles 6

Total 21

Art History. Six semester hours of upper division ARS courses are required, including a 20th century elective.

Additional Requirements. Three of the following six courses (nine hours) are required.

ART 201 Photography I 3
ART 231 Sculpture I 3
ART 261 Ceramic Survey 3
ART 272 Jewelry I 3
ART 274 Wood I 3

Art Electives. Twenty one semester hours of ARA, ARE, ARS, and ART courses are required.

Intermedia

Core Curriculum. See "B.F.A. Core Curriculum," page 269, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART 439 Mixed Media 3
ART 440 New Media Concepts 3
ART 443 Intermedia 3

Total 9

Two of the following five courses (six semester hours) are required.

ART 231 Sculpture I 3
ART 261 Ceramic Survey 3
ART 272 Jewelry I 3
ART 274 Wood I 3
ART 276 Fibers I 3

Two of the following nine courses (six semester hours) are required:

ART 201 Photography I 3
ART 211 Drawing II 3
ART 214 Life Drawing I 3
ART 223 Painting I 3
ART 227 Watercolor I 3
ART 351 Intaglio I 3
ART 352 Lithography I 3
ART 354 Screen Printing I 3
ART 355 Photo Process for Printmaking I 3

Two of the following ten courses (six semester hours) are required

ART 439 Mixed Media 3
ART 440 New Media Concepts 3
ART 442 Folk/Outsider Art 3
ART 443 Intermedia 3
ART 444 Computer Art *CS** 3
ART 446 3 Dimensional Computer Imaging and Animation *CS* 3
ART 448 Computer Animation I* 3
ART 449 Computer Animation II* 3
ART 450 Computer Animation III* 3
ART 494 ST: Intermedia 3

* Special application is required.

Art History. Nine semester hours, including three hours of non-Western, and six hours of 20th century and/or contemporary art ARS courses. Six hours must be in the upper division.

Art Electives. Twenty one semester hours of ARA, ARE, ARS, and ART courses are required.

Admission to upper division computer graphics courses is by portfolio only. Application dates are September 15 to October 15 for spring enrollment and February 15 to March 15 for fall enrollment.

Metals

Core Curriculum. See "B.F.A. Core Curriculum," page 269, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART 272 Jewelry I 3
ART 372 Jewelry II 3
ART 373 Metalworking I 3
ART 472 Advanced Jewelry 6
ART 473 Advanced Metalworking 6
ART 494 ST: Metals 3

Total 24

Art History. Six semester hours of upper division ARS courses are required, including a 20th century elective.

Additional Requirements. Three of the following six courses (nine semester hours) are required:

ART 201 Photography I 3
ART 223 Painting I 3
ART 231 Sculpture I 3
ART 261 Ceramic Survey 3
ART 274 Wood I 3
ART 276 Fibers I 3

Art Electives. Eighteen semester hours of ARA, ARE, ARS, and ART courses are required.

NOTE: For the General Studies requirement, courses, and codes (such as L, SQ, C, and H) see "General Studies" page 87. For graduation requirements, see "University Graduation Requirements" page 83. For an explanation of additional omnibus courses offered but not listed in this catalog see "Classification of Courses" page 60.

Nelson Fine Arts Center — Tim Trumble photo

Painting

Core Curriculum. See "B.F.A. Core Curriculum," page 269, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART	211	Drawing II 3
ART	214	Life Drawing I 3
ART	223	Painting I 3
ART	227	Watercolor I 3
ART	311	Drawing III 3
ART	314	Life Drawing II 3
ART	323	Painting II 3
ART	324	Painting III 3
		or ART 327 Watercolor II (3)
ART	325	Figure Painting 3
ART	423	Advanced Painting 3
		or ART 427 Advanced Watermedia (3)
Total		 30

One of the following six courses (three semester hours) is required:

ART	324	Painting III 3
ART	327	Watercolor II 3
ART	411	Advanced Drawing 3
ART	423	Advanced Painting 3
ART	425	Advanced Figure Painting 3
ART	494	ST: Drawing 3
		or ART 494 ST: Painting (3)

Art History. Nine semester hours of ARS courses are required, including three hours of non-Western. Six hours must be upper-division ARS courses.

Additional Requirements. Two of the following six courses (six semester hours) are required:

ART	201	Photography I 3
ART	231	Sculpture I 3
ART	261	Ceramic Survey 3
ART	272	Jewelry I 3
ART	274	Wood I 3
ART	276	Fibers I 3

Art Electives. Nine semester hours of ARA, ARE, ARS, and ART courses are required.

Photography

Core Curriculum. See "B.F.A. Core Curriculum," page 269, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ARA	202	Understanding Photographs 3
ART	201	Photography I 3
ART	301	Photography II 3
ART	304	Advanced Photography 3
Total		 12

Three of the following ten courses (nine semester hours) are required:

ART	305	Color Photography I 3
ART	401	Nonsilver Photography 3
ART	403	Senior Photographic Projects 3
ART	404	Portraiture Photography 3
ART	405	Advanced Color Photography 3
ART	406	Photo Techniques 3
ART	407	View Camera 3
ART	408	Digital Photographic Images 3
ART	409	Photographic Exhibition 3
ART	494	ST: Photo 3

Art History. ARS 450 and 451 are required, as well as six semester hours of additional ARS courses, including a non-Western elective.

Additional Requirements. The following courses are additional requirements:

ART	211	Drawing II 3
ART	214	Life Drawing I 3
ART	223	Painting I 3
ART	227	Watercolor I 3
ART	443	Intermedia 3
Total		 15

One of the following five courses (three hours) is required:

ART	231	Sculpture I 3
ART	261	Ceramic Survey 3
ART	272	Jewelry I 3
ART	274	Wood I 3
ART	276	Fibers I 3

Art Electives. Eighteen semester hours of ARA, ARE, ARS, and ART courses are required.

Printmaking

Core Curriculum. See "B.F.A. Core Curriculum," page 269, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART 211 Drawing II . . . 3
or ART 214 Life Drawing I (3)
ART 351 Intaglio I . . 3
ART 352 Lithography I . . 3
ART 354 Screen Printing I . . 3

Total . . . 12

Three of the following nine courses (nine semester hours) are required:

ART 355 Photo Process for Printmaking I . . 3
ART 451 Advanced Intaglio . . 3
ART 452 Advanced Lithography . . 3
ART 454 Advanced Screen Printing . . 3
ART 455 Advanced Photo Processes for Printmaking . . 3
ART 456 Fine Printing and Bookmaking I . . 3
ART 457 Fine Printing and Bookmaking II . . 3
ART 458 Papermaking . . 3
ART 459 Monoprinting . . 3

Two of the following five courses (six semester hours) are required:

ART 214 Life Drawing I . . 3
ART 311 Drawing III . . 3
ART 314 Life Drawing II . . 3
ART 315 Life Drawing III . . 3
ART 411 Advanced Drawing . . 3

Art History. Six semester hours of upper-division ARS courses are required.

Additional Requirements. Two of the following eight courses (six semester hours) are required:

ART 201 Photography I . . 3
ART 223 Painting I . . 3
ART 227 Watercolor I . . 3
ART 231 Sculpture I . . 3
ART 261 Ceramic Survey . . 3
ART 272 Jewelry I . . 3
ART 274 Wood I . . 3
ART 276 Fibers I . . 3

Art Electives. Eighteen semester hours of ARA, ARE, ARS, and ART courses are required.

Sculpture

Core Curriculum. See "B.F.A. Core Curriculum," page 269, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART 223 Painting I . . 3
ART 231 Sculpture I . . 3
ART 274 Wood I . . 3
ART 331 Sculpture II . . 3
ART 332 Sculpture III . . 3
ART 431 Special Problems in Sculpture . . 3

Total . . 18

Four of the following nine courses (12 semester hours) are required (note that all are repeatable except ART 333):

ART 333 Foundry Casting Methods . . 3
ART 374 Wood II . . 3
ART 431 Special Problems in Sculpture . . 3
ART 432 Neon Sculpture . . 3
ART 436 Architectural Sculpture . . 3
ART 437 Film Animation . . 3
ART 438 Experimental Systems in Sculpture . . 3
ART 474 Advanced Wood . . 3
ART 494 Special Topics . . 3

Art History. Six semester hours of upper-division ARS courses are required.

Additional Requirements. Two of the following three courses are required:

ART 261 Ceramic Survey . . 3
ART 272 Jewelry I . . 3
ART 276 Fibers I . . 3

Art Electives. Fifteen semester hours of ARA, ARE, ARS, and ART courses are required.

GRADUATE PROGRAMS

The faculty in the School of Art offer programs leading to the M.A. degree in Art, with a concentration in art education or art history, the Master of Fine Arts degree with a concentration in ceramics, drawing, fibers, intermedia, metals, painting, photographic studies, photography, printmaking, sculpture, or wood, and a Ph.D degree in History and Theory of Art. In cooperation with the College of Education, the Doctor of Education degree is offered with a concentration in art education. See the *Graduate Catalog* for requirements for all graduate degrees.

STUDIO CORE CURRICULUM (ART)

ART 111 Drawing I. (3) F, S SS
Fundamental, technical and perceptual skills using common drawing media and their application to pictorial organization 6 hours a week.

ART 112 Two-Dimensional Design. (3) F S, SS
Fundamentals of pictorial design 6 hours a week.

ART 113 Color. (3) F, S SS
Principles of color theory as related to the visual arts. 6 hours a week Prerequisites: ART 111 112

ART 115 Three-Dimensional Design. (3) F S SS
Fundamentals of 3D form. 6 hours a week. Prerequisites ART 111, 112.

ART 294 Special Topics. (3) F, S

ART AUXILIARY (ARA)

ARA 202 Understanding Photographs. (3) A
Slide lecture course in understanding photography as a fine art form.

ARA 311 Art Appreciation and Human Development. (3) F
Foundations of art for children and young adults. Emphasis on learning, development, and understanding art in historical and cultural contexts. 3 hours lecture discussion Prerequisites: ENG 101, 102; junior standing. *General Studies. HU*

ARA 460 Gallery Exhibitions. (3) F, S
Practical experience in all phases of department gallery operations and preparation of gallery publications. May be repeated for credit. Prerequisite: instructor approval.

ARA 488 Understanding Art. (3) F S
Understanding art as an emergent cultural phenomenon with an emphasis on a critical examination of conceptual issues in art. Writing required. Prerequisites ARS 101 and 102 *or* instructor approval *General Studies: L/HU.*

ARA 494 Special Topics. (3) F, S
(a) Advanced Photo Aesthetics

NOTE: For the General Studies requirement courses, and codes (such as L, SQ, C, and H) see "General Studies" page 87. For graduation requirements, see "University Graduation Requirements" page 83 For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses" page 60.

ART EDUCATION (ARE)

ARE 301 Studio Art and Human Development. 3 A
The study of human deve opment n stud o art from early ch dhood to adult years

ARE 440 Disciplines of Art Education. (3) A
Exp orations in art educat on s d scipl nes h story, and peop e s art mak'ng development at d verse age eve s and abi t es Lecture d s cussion Prerequ s tes: ARS 101 and 102 and ART 113 and 115 *or* nstructor approva

ARE 450 Studio Art: Art History I. 3 F S
Art trad tions before the 20th century as a bas's for stud o and art h s tory nstruct on 2 hours ecture, 2 hours stud o. Meets art postbacca aureate cert f cat on requ rement Pre or corequ s te ARE 440

ARE 470 Art Criticism: Aesthetics. (3 F
Trad tions of aesthet cs and art cr t c sm· conceptua ssues n contem porary art education in the v sua arts. 2 hours lecture 2 hours stud o Prerequis te: ARE 440 or nstructor approval.

ARE 482 Studio Art: Art History II. 3 S
Art trad t ons of the 20th century as a bas s for stud o and art h story nstruct on. 2 hours ecture 2 hours stud o. Meets art p stbacca aure ate cert f'cation requ'rement. Pre or corequisite ARE 450 and 470 recommended.

ARE 486 Art Education: Strategies and Applications. 3 F
The mp ementat on and evaluation of art nstruct on f r K 12 popu a tion. Includes teaching of Saturday classes n the Ch dren s Art Work shop Meets art postbacca aureate certif cat on requirement Prerequ site ARE 482

ARE 494 Special Topics. (3) A

ARE 496 Methods and Assessment of Learning in Art. 3 A
Individua or group research on the assessment of art earn ng ncor poratng theory and pract ce Meets art postbacca aureate cert f cat on requirement Prerequ s tes ARE 470 and 486 *or* nstructor approval

ARE 510 Art Education Colloqu um. (3) N
Histor'ca foundations of art educat on and facu ty presentat ons regard ng teach ng and research re ated to the v sua arts.

ARE 520 Issues in Teaching Inquiry in Art. 3) A
ssues in teach ng and earn ng through nqu ry about artworks us ng pr nt and e ectron c reproduct ons and nformat on. Recommended to be taken before ARE 525

ARE 525 Research on Teaching Art History. (3) A
Rev ew of emp r ca and h stor ca research research methods earn ng theory, and assessment of learn ng n art h story P ot stud es on the effects of instruct on upon earn ng Recommended to be taken after ARE 520

ARE 530 Issues in Teaching Studio Art. (3 A
Crit ca exam nation of ssues concern ng teach ng mu t cu tura art to different populat ons of students H stor ca and ph osoph ca fo nda- t ons rev ewed Recommended to be taken before ARE 535 Lecture discuss on.

ARE 535 Research on Teaching Studio Art. 3) A
Rev ew of empirica and histor ca research methods earn ng theory, and assessment of earn ng n studio art nc ud ng deve opmenta stud es and their mitat ons P lot stud es on the effects of nstruct on upon learn ng Recommended to be taken after ARE 530

ARE 540 Teaching Art in Cultural Contexts. 3) A
Relat onsh p of mu t cu tura perspect ves to teach ng/learn ng art crit cism aesthet cs stud o art, and art h story.

ARE 610 Issues and Trends in Art Education. 3 N
Doctora - evel nvest gat on of h stor ca and contemp rary ssues re ated to teach ng and research n art educat on

ARE 611 Curriculum Development in Art Education. 3 N
Doctora evel nqu ry nto the ph osoph ca psycho og ca , and soc o- log'ca foundat ons of curr cu um development

ART HISTORY (ARS)

ARS 100 Introduction to Art. 3) F, S SS
Understand ng of art and its relat onsh p to everyday fe through pa nt ing scu pture architecture, and des gn No cred t for Art majors or stu- dents who have comp eted ARS 101 or 102 or 300. *Genera Stud es HU.*

ARS 101 Art of the Western World I. (3) F S SS
H story of Western art from the Paleo th c per od through the Middle Ages. *General Stud es HU, H*

ARS 102 Art of the Western Wor d II. 3 F S SS
H st ry of Western art fr m the Rena ssance to the present *Genera Stud es HU H*

ARS 201 Art of Asia. 3 A
H story of the art of the As an cu tu es, with emphas s n Ch na, Japan, a d nd a Meets n n Western art h story requ rement *Gen era Stud es. HU G H*

ARS 202 Art of Africa, Oceania, and the Americas. 3 A
H story of art of Afr ca Ocean a and the New Wor d Meets non West ern art h story requ rement *Genera Stud es HU G H*

ARS 300 Introduction to Art. 3 F
Course content same as AR 100 but requ res a h gher evel of accomp shment and comprehens n No cred t for students who have comp eted ARS 100 or used as art h story cred t by Art majors *Gen eral Stud es HU*

ARS 302 Art of Africa, Oceania, and the Americas. 3 A
H story of art of Afr ca Ocean a and the New Wor d Meets non-West ern art h story requ rements. N t open to students who have taken ARS 202 Prerequ s tes ARS 101 102 *Genera Stud es. HU G H*

ARS 310 The Renaissance in Tuscany. 3 SS
Course taught n F orence Ita y H story f arts n Tusca y w th focus on c ty of F rence fr m 14th through 16th centur es Le ture tours Comp et on of ARS 101 and 102 suggested

ARS 340 Art in America. 3 A
American art from co on a t mes through the Second W r d War Not ava lab e to stude ts who have had ARS 444 542 or 543 Prerequ s tes ARS 101 and 102 *or* nstructor approva *Genera Stud es HU H*

ARS 384 Art History Internships. 3 A
nst tut ona y based practicum w th n an art museum r profess ona v sua arts organ zat on nternsh p

ARS 400 History of Pr ntmaking. 3 A
H story of the pr nt as an art form and ts re at on to ther modes and forms of art st c express on Prerequ s tes ARS 101 and 1 2 *or* nstructor approva *Genera Stud es HU H*

ARS 402 Art of Ancient Egypt. 3 N
Aesthet c ph losoph ca , and cu tural bas s of Egypt an art from pre Dynast c per od through New K ngdom Emphas s on scu pture and arch tectura monuments Prerequ s tes ARS 101 and 102 *or* nstr c tor approva *Genera Studies HU H*

ARS 404 Greek Art. 3 A
H story of art arch tecture of Aegean c v zat ons Cyclad c M noan Mycenaean and of Greece to end of He en st c per od Prerequ sites: ARS 101 and 102 *or* nstructor approva *Gene a Stud es HU H*

ARS 406 Roman Art. 3 A
Art and arch tecture of Etrur a the Roman Repub c and the Roma Emp re Prerequ s tes: ARS 101 and 102 *or* nstructor approva *Gen eral Stud es HU H*

ARS 410 Early Christian and Byzantine Art. 3 A
Art and arch tect re of the ear y church and the Byzant ne Emp re from the 4th to the 15th century Prerequ s tes ARS 101 and 1 2 r nstructor approva . *Genera Stud es HU*

ARS 412 Early Medieval Art. 3 N
Pa nt ng, scu pture arch tecture and the m nor arts f om M grat on Carol ng an and Otton an peri ds ns dered w th n re g ous, soc a and econom c contexts Prerequ s tes ARS 101 and 1 2 *or* nstructor approva *General Studies HU H*

ARS 414 Romanesque Art. 3 A
Scu pture paint ng architecture, and m n r arts n western Europe ca. 1030–1200 cons dered w th n rel g o s econom c, and s c a con texts Prerequ s tes ARS 101 and 102 *or* nstructor app va . *General Studies HU H.*

ARS 416 Gothic Art. 3 A
Pa nting scu pture, and arch tecture n western Europe dur ng the Goth c per od. Prerequ s tes ARS 101 and 102 *or* nstructor approva *Genera Studies HU*

ARS 417 Late Gothic Art 'n Central Europe. 3 N
Scu pture pa nting and arch tecture of the ate Goth c sty e ca 1350–1525 considered w th n re ig ous, soc a econ m c and po it ca co texts Prerequ s tes ARS 101 and 102 *or* nstructor approva

ARS 418 Renaissance Art in Northern Europe. 3 A
Graph cs pa nt ng s u pture and arch tecture ca 1450–1550 Refor mat on themes and Rena ssan e sty e cons dered w th n re g ous po it ca soc a a d econom c contexts P erequ s tes ARS 101 and 102 *or* nstructor approva *General Stud es HU*

ARS 420 Early Renaissance Art in Italy. (3) N
Pa nting sculpture, and architecture in ta y from 1300 to 1500. Pre requ s tes ARS 101 and 102 *or* nstructor approva *General Studies· HU, H*

ARS 422 Italian High Renaissance Art and Mannerism. (3) A
History of ta 'an art dur ng the 16th century inc ud ng the ach eve ments and inf uence of Leonardo da V nc Raphae and M chel angelo. Prerequ s tes: ARS 101 and 102 *or* instructor approval *General Studies. HU.*

ARS 424 Italian Baroque Art. (3) A
ta ian paint ng, scu pture and arch tecture of the 17th century Pre requis tes: ARS 101 and 102 *or* nstructor approval. *General Studies· HU H*

ARS 426 Art of the 17th Century in Northern Europe. (3 A
Baroque paint ng, scu pture and arch tecture n F anders the Nether ands France, and England. Prerequ s tes ARS 101 and 102 *or* nstructor approva *General Studies· HU H*

ARS 428 Art of the 18th Century. 3) A
H story of paint ng scu pture, arch tecture, graph c arts and the deco rat ve arts from 1700 to the French Revolut on (1789) Prerequ s tes ARS 101 and 102 *or* nstructor approva *General Studies HU, H.*

ARS 430 Art of Spain and Its Colonies. (3) A
Arch tecture, pa nting and sculpture from 1500 to 1800 Colonial focus on central Mex co and the American Southwest. Prerequ s te ARS 102 or nstruct r approval. *General Studies HU H*

ARS 432 19th-Century French Art and Culture. (3) F
H'story of pa nt ng graph c arts scu pture and arch tecture 1800 to *1900 n France in ts pol tica , soc a and econom c context Prerequ -* s tes ARS 101 and 102 *or* nstructor approva *General Studies HU H*

ARS 434 From Courbet to Cézanne: History of European Art 1860–WWI. 3 S
Aesthet c po it cal and soc al forces affect ng the v sual arts n the ate 19th century Concentration on Cub sm Expression sm mpression- sm and Post mpress on sm Prerequ sites: ARS 101 and 102 *or* nstructor approva *General Stud es HU*

ARS 436 Art at the Turn-of-the-Century: 1885–1914. 3) F
H story of European avant-garde movements Concentrat on on post mpress on sm symbol sm express on sm, and cubism Prerequ s tes· ARS 101 and 102 *or* instructor approva . *General Studies· HU*

ARS 438 Art of the 20th Century I. (3) A
Developments and direct ons n art between 1900 and World War I Prerequisites: ARS 101 and 102 *or* nstructor approva *General Stud ies HU H*

ARS 439 Art of the 20th Century II. 3 A
Art s nce World War I w th cons deration of new concepts and exper *mentat on with med a and modes of presentat on Prerequ sites:* ARS 101 and 102 and 438 *or* instructor approval. *General Studies HU, H*

ARS 442 Critical Issues in American Painting I. 3) A
Exp ores themes and soc a ssues in Amer can art w th a crit ca study of Amer can pa nt'ng from the 18th century to 1850 Lecture, d scus sion Prerequ s tes. ARS 101 and 102 *or* nstructor approva *General Studies HU*

ARS 443 Critical Issues in American Painting II. (3) A
Explores themes and soc a ssues n American art with a critica study of American pa nting from 1850 to 1900. Lecture, d scussion Prereq uis tes: ARS 101 and 102 *or* instructor approva . *General Studies HU*

ARS 444 Modern American Art, 1900–1945. (3) A
American paint ng scu pture photography, and arch tecture 1900– 1945 Covers major monuments nc ud ng the E ght modern sm Pre- c s on sm, Regional sm, and the WPA Prerequ s tes ARS 101 and 102 *or* nstructor approva *General Stud es HU H*

ARS 450 19th-Century Photography. (3) A
H story of photography from the med um s preh story to 1914: person a it es, processes mages and deas Prerequ s tes ARS 101 and *102 or nstructor approva General Studies. HU.*

ARS 451 20th-Century Photography. (3) A
Persona t es, processes, mages and deas n photography from 1914 to present. Prerequ s tes ARS 101 and 102 *or* nstructor approva *General Studies· HU*

ARS 454 Research and Writing in Photography. (3) A
Princ ples and pract ce of research and writ ng in the h story and criti cism of photography Papers requ red Prerequ s tes: ARS 450 and 451 *or* nstructor approva ENG 101 and 102 *or* equ valents.

ARS 457 History of Art Criticism. (3) N
Theor es of cr t c sm of the v sual arts from late 18th century to present Prerequ s tes ARS 101 and 102 *or* nstructor approval *General Studies H*

ARS 458 Critical Theories in the Visual Arts. (3) N
Examines current crit ca theories through their app cation to al visua arts May nclude new h stor c sm Marx sm deconstruct on post- structural sm semiot cs Lacan an psychoana ysis fem n sm, post- modernism Lecture discussion, student presentations Prerequisites· ARS 101 and 102 *or* instructor approva *General Stud'es. HU*

ARS 459 Writing Art Criticism. (3) N
Trad tiona and contemporary approaches to the cr ticism of art Stu- dents w l wr te critica essays The atter ha f of the semester w l stress the cr t c sm of contemporary art 'n var ous med a Prerequ s te *ARS 458* or nstructor approva

ARS 462 Pre-Columbian Art I. (3) A
Architecture, scu pture, ceram cs paint ng, and other arts of Mesoamerica before European contact Meets non Western art h s- tory requ rement Prerequ s tes ARS 101 and 102 *or* nstructor approva *General Studies HU H*

ARS 463 Pre-Columbian Art II. 3) A
Arch tecture, scu pture ceram cs texti es and other art of South America before European contact w th focus on the Central Andes. Meets non-Western art h story requirement. Prerequisites ARS 101 and 102 *or* nstructor approva *General Stud es· HU, H.*

ARS 465 Native North American Art. (3) A
Nat ve American art forms of the United States and Canada from pre- h stor c t mes to the present. Prerequisites: ARS 101 and 102 *or* nstructor approva Meets non-Western art history requ rement *Gen- eral Studies. HU, H.*

ARS 466 Native American Art of the Southwest. (3) A
Amer can nd an art in the southwestern states from its or g ns to the present day Meets non Western art history requirement Prerequi sites *ARS 101 and 102 or* instructor approval *General Studies· HU, C H*

ARS 468 Art of the Arctic and Northwest Coast. (3) N
Art associated w th ceremony, shaman sm, and da y l fe n the Arct'c and on the Northwest Coast. Meets non Western art history requ're- ment Prerequisites ARS 101 and 102 *or* 'nstructor approval. *General Stud es. HU.*

ARS 469 Mexican Art. (3) A
Art of Mex co and re ated Central American cu tures from the prehis toric to the contemporary schools Meets non Western art h story requ rement Prerequisites: ARS 101 and 102 *or* instructor approval *General Stud es HU H*

ARS 472 Art of China. (3) A
Study of major forms in Ch nese art r tua bronze scu pture ceram c, ca ligraphy pa nt ng and architecture. Satisf es non Western art h s tory requ rement Prerequ s tes ARS 101 and 102 *or* nstructor approva *General Studies HU*

ARS 473 Art of Japan. (3) A
Japanese art from the Joman period to the present Sat sfies non Western art h story requ'rement. *Prerequisites· ARS 101 and 102 or* nstructor approval *General Studies. HU.*

ARS 475 Chinese Painting. (3) A
From Ku K a'-chin to Ch' Pai sh h Major art sts, styles, and move ments n Chinese pa nting Satisfies non Western art h story requ re- ment Prerequ s tes ARS 101 and 102 *or* instructor approva *General Studies· HU.*

ARS 480 Research Methods. (3) F S
Methodo ogy and resource mater a for art historica research Tech- niques of scholarly and crit ca writ ng and eva uation of b bl ographic sources Prerequ s tes· ARS 101 and 102 *or* nstructor approva *Gen eral Studies· L.*

NOTE: For the Genera Stud es requ rement, courses, and codes such as L SQ, C and H) see "Genera Stud es" page 87. For graduation requ rements see "Un'vers ty Graduat on Requirements, page 83. For an exp anat on of addit ona omnibus courses offered but not l sted n th s cata og, see "C ass fica t on of Courses," page 60.

ARS 485 Women in the Visual Arts. (3 S
Historical study of art by women various media; related social, political educational issues representation of women in art. Lecture discussion Prerequisite ARS 101 or 102 or instructor approval. *General Studies L*

ARS 494 Special Topics. 3 F S
(a) History of Photography

ARS 498 Pro-Seminar. (3–6) A
Undergraduate seminar in topics selected from the following Problems or critical sm in
(a) American Art
(b) American Indian Art
(c) Ancient Art
(d) Art History
(e) Baroque Art
(f) Chinese Art
(g Medieval Art
(h Modern Art
(i) Photographic History
(j) Pre-Columbian Art
(k Renaissance Art
Prerequisite. nstructor approval

ARS 501 Methodologies and Art History. 3 F
The history of the discipline and an exploration of various methodologies, critical theory and bibliographies used by art historians Seminar

ARS 502 Critical Studies in Egyptian Art. 3 N
Egyptian art from pre Dynastic to New Kingdom periods Focus on aesthetic, philosophical and cultural context Research paper and readings required

ARS 504 Critical Approaches to Greek Art. (3 A
Art and architecture of Aegean civilizations Cycladic, Minoan Mycenaean) and of Greece to end of Hellenistic period Research paper and readings required

ARS 506 Critical Studies in Roman Art. (3 A
Art and architecture of Etruria the Roman Republic and the Roman Empire Research paper and/or supplementary readings required

ARS 514 Critical Approaches to Romanesque Art. 3 N
Sculpture, painting architecture and the minor arts in western Europe ca 1030–1200 considered within religious economic and social contexts Research paper required

ARS 516 Critical Approaches to Gothic Art. 3) N
Architecture sculpture, painting, and the minor arts in western Europe ca 1150–1350 considered within religious social and economic contexts Research paper required

ARS 517 Critical Approaches to Late Gothic Art. 3 N
Art of the late Gothic style (ca 1350–1525) considered within religious social economic, and political contexts Research or reading project required.

ARS 522 Sixteenth-Century Italian Art. 3) A
Critical study of painting sculpture, and architecture in 16th-century Italy its religious and historical context

ARS 528 Eighteenth-Century Art in Europe. 3 A
Critical study of European art from the late Baroque to the early years of Neoclassicism

ARS 530 Art of Spain and New Spain. 3 A
Critical study of architecture, painting and sculpture from 1500 to 1800 Lecture, conference.

ARS 532 Art, Politics, and Patronage 1770–1850. 3 F
Critical analyses of political events in Europe issues of patronage, art as propaganda examined impact of war and revolution on visual arts

ARS 534 Studies in Modern European Art, 1850–1914. (3 A
Critical study of visual arts using primary source material from mid 19th century to WW with philosophical social economic contexts Lecture tutorial Prerequisite· nstructor approval

ARS 542 Critical Issues in American Painting I. 3 A
Explores themes and social issues in American art with a critical study of American painting from the 18th century to 1850 Lecture discussion Prerequisites ARS 101, 102

ARS 543 Critical Issues in American Painting II. (3 A
Explores themes and social issues in American art with a critical study of American painting from 1850 to 1900 Lecture, lab Prerequisite nstructor approval

ARS 544 American Modernism and Realism, 1900–1945. 3) A
Critical study of the social political and artistic changes in American art during the first half of the twentieth century Prerequisites ARS 101 and 102 *or* 340

ARS 562 Art of Ancient Mesoamerica. (3) F
Critical study of art and architecture of Mexico and Maya area before Spanish contact. Lecture, conference

ARS 565 Native Art of North America. 3) A
A critical examination of Native American art within culture prehistory to the present Prerequisites ARS 101 and 102 *or* nstructor approval

ARS 574 Studies in Japanese Art. 3 A
A critical examination of the nature and history of Japanese art, its rich heritage and its indebtedness to foreign sources Lecture discussion Prerequisites ARS 101 and 102 *or* nstructor approval

ARS 575 Approaches to Chinese Painting. (3) F
A critical history of Chinese painting from Eastern Chou to 1911. Emphasis on masters regional developments and conceptual underpinnings Lecture, discussion Prerequisites: ARS 101 and 102 *or* nstructor approval

ARS 591 Seminar. (3–6) A
Graduate seminar in topics selected from the following Problems or critical sm in.
(a) American Art
b American Indian Art
c Ancient Art
d Baroque Art
e) Chinese Art
(f Critical Theories in the Visual Arts
g) Medieval Art
(h Modern Art
Native American Art
(j Photographic History
k) Pre-Columbian Art
( ) Renaissance Art
Prerequisite nstructor approval.

ARS 599 Thesis. 1 12) N

CERAMICS (ART)

ART 260 Ceramics for Nonmajors. (3) F S, SS
Handbuilding methods, wheel throwing glaze and decorative processes, Raku and stoneware firings 6 hours a week.

ART 261 Ceramic Survey. 3 F S, SS
Handforming methods, throwing on the wheel decorative processes and glaze application 6 hours a week Prerequisites ART 113 and 115 *or* nstructor approval.

ART 360 Ceramic Throwing. (3) F S
Design analysis and production of functional pottery Emphasis on thrwing techniques surface enrichment, and glaze application. 6 hours a week May be repeated once for credit

ART 364 Ceramic Handbuilding I. 3 F
Search for form using handbuilding techniques K n f r ng and related problems Prerequisite ART 261 or instructor approval

ART 365 Ceramic Handbuilding II. (3) S
Continuation of ART 364 with additional focus on large-scale works, surface treatments and glaze decoration with related knifing applications Prerequisites ART 364 or instructor approval

ART 394 Special Topics. (1–4) N
a Ceramics
(b Turning

ART 460 Ceramic Clay. 3) S
Research into various clay body formulations, local natural materials slips glazes and engobes. Lecture, lab, studio Prerequisites: ART 360 and 364 *or* nstructor approval

ART 463 Ceramic Glaze. 3 F
Glaze calculation and formulation using various glaze colors and surfaces Lecture, lab studio Prerequisite ART 460 or nstructor approval

ART 466 Special Problems in Ceramics. (3 F, S SS
Emphasis on personal expression within structure of seminars critiques and studio work Professional methods of presentation documentation of work 6 hours a week May be repeated for credit. Prerequisite ART 364 or instructor approval

ART 494 Special Topics. (1–4) N
(a) Ceram cs Printmak ng
(b) Turning
(c) Vapor Glazes

ART 594 Conference and Workshop. 1 12 N
(a) Turning

ART 598 Special Topics. 1–4) N
(a Ceramic C ay
(b) Ceramic G aze
(c) Ceramics Printmak ng
(d) Experimenta Pr ntmak ng
(e) Spec a Problems n Ceramics

DRAWING (ART)

ART 211 Drawing II. (3 F, S SS
Cont nued deve opment of technica and perceptua sk s Emphasis on materials and p ctor a content 6 hours a week Prerequis tes ART 113 115

ART 214 Life Drawing I. (3) F S SS
Deve opment of sk and express'veness n draw ng the bas c form construct on, and gesture from the human f gure 6 hours a week Prerequisites ART 113, 115

ART 311 Drawing III. (3) F S
Emphas s on composition exp oration of draw ng med a 6 hours a week Prerequ s tes ART 211, 214; nstructor approva

ART 314 Life Drawing II. 3) F, S
Drawing from the model w th greater reference to structura graph c, and compositiona concerns 6 hours a week Prerequ s te ART 214 or instructor approval.

ART 315 Life Drawing III. (3) F, S
The human f gure as the subject for draw ng Emphas s on conceptual alternat ves and management of mater a s. 6 hours a week Prerequ site: ART 314 or nstructor approva

ART 411 Advanced Drawing. (3) F, S
Visua and ntel ectua concepts through problem solving and ndepen dent study Emphasis on the ndividua creat ve statement. 6 hours a week May be repeated for credit Prerequ s tes ART 311 nstructor approva

ART 414 Advanced Life Drawing. (3) F, S
Various med a and techn ques on an advanced evel The human figure as an express ve veh c e in various contexts. 6 hours a week May be repeated for cred t Prerequ s te ART 315 or instructor approval

ART 415 Art Anatomy. (4) N
Study of human anatom cal structures as app ied to the pract ce of f g ure oriented art 3 hours lecture 5 hours studio a week Prerequ s te ART 214.

ART 494 Special Topics. 3 F, S
(a) Draw ng

ART 598 Special Topics. 1--4) N
(a) Art Anatomy
(b) Life Draw ng

FIBERS (ART)

ART 276 Fibers I. (3) F S
Exp orat on of trad t onal and contemporary mater a s and bas c tech n'ques re ated to f bers Embro dery fe tmak ng dye'ng b ock pr nt ng, p a t ng, 3D structures. Prerequis tes: ART 113 and 115 *or* instructor approva

ART 294 Special Topics. 1–4 N
(a) F bers/Nonmajors

ART 376 Fibers: Loom Techniques. (3) A
nvestigat on of oom techn ques and computer pattern des gn. 6 hours a week. Prerequ s te: ART 113 or 115 or nstructor approva .

ART 377 Surface Design. (3) F, S
App cation of dyes and pigments on c oth exploring techn ques formal ssues, and content Cyanotype, monopr nt'ng pa nt ng on s lk, resists stenc ng Prerequ s te ART 276 or nstructor approva

ART 394 Special Topics. (1–4) N
(a) F bers Des gn for Nonmajors

ART 476 Fibers: Multiple Harness Weaving. (3 F, S
Advanced loom techniques and computer pattern des gn Emphas s on nd v dua des gn and oom app 'cat on Prerequ s te· ART 113 or 115 or 376 or nstructor approva

ART 477 Printed Textiles. 3 A
Techn ques for screen pr nting on fabr c exp or ng pattern as a compo s tiona e ement Var ous stenc l methods nc ud ng photograph'c processes Stud o May be repeated for cred t Prerequisite. ART 377 or nstructor approva

ART 478 Advanced Surface Design. (3) S 2001
Emphas s on persona express on w th advanced prob ems in st tch res st arash sh bori, transfers ndigo, vat and d sperse dyes, and p g ments Stud o Prerequ s tes ART 377 and 477 *or* instructor approva

ART 494 Special Topics. (1–4 N
(a Fibers and Surface
(b) Pr nt Text les

ART 598 Special Topics. 1–4) N
a) Advanced Screen Print ng
(b Fibers and Surface
(c) Pr nt Text es
(d Pr nted Text es

INTERMEDIA (ART)

ART 345 Visualization and Prototyping I. (3) S 2002
Stud o sem nar ntroduces concepts of computer visua zation model ng and rapid prototyp ng in an nterd sc p nary manner Lecture stu d o Prerequ s te CS course or nstructor approva

ART 439 Mixed Media. 3 F S
Explor ng visua effects by comb n ng trad t onal and nontradit ona methods techn ques and concepts. 6 hours a week May be repeated for cred t Stud o. Prerequ sites: ART 113 and 115 and 6 hours addi tiona stud o requ rements *or* nstructor approva

ART 440 New Media Concepts. (3) F S
Cont nued exper ments w th new med a and 'nterd scipl nary concerns n art. 6 hours a week May be repeated for cred t. Prerequis te: ART 443 Corequ s te ART 441

ART 441 Video Art. 1 F S
Uti z'ng v deo and audio equ pment essent a to the production of broadcast qua ity v deo art 2 hours a week May be repeated for cred t Corequ s te ART 440

ART 442 Folk/Outsider Art. (3) F
Explorat on of deas attitudes and art of contemporary "self taught," "v s onary, and "outs der" art sts Research and stud o pract ce. Lec ture stud o Prerequ s tes ART 113 and 115 *or* nstructor approva .

ART 443 Intermedia. (3) F S
Exper mental, conceptua and nterdisc p inary stud'o art with empha s s on new med a and techn og es 6 hours a week May be repeated once for cred t Prerequ s tes ART 113 and 115 *or* instructor approva

ART 444 Computer Art. (3 F S
A study of PC hardware and software for creat ng art Emphasis on computer graph cs h story, hardware software conf gurat ons DOS principles of 2 and 3-d mens ona graph'cs. 2 hours lecture 2 h urs stud o Prerequ s tes ART 111 112 or equ valent ; nstructor appr va *General Stud es CS*

ART 446 3D Computer Imaging and Animation. (3) F, S
Three dimens ona mode ng and an mat on Emphas s on concepts and f ne arts app cations. Stud o Prerequ s tes ART 113 115 nstructor approva . *General Stud es· CS*

ART 448 Computer Animation I. 3 F S
Pr nc p es and app icat ons of 3D anmat on for f ne arts Emphasis on an mat on techn ques for express ve effects Stud o Prerequ s te ART 446 or nstructor approva

ART 449 Computer Animation II. (3 F S
Advanced pr nc p es and appl cat ons of 3D an mat on for fine arts Studio. Prerequis te ART 448 or nstructor approva

ART 450 Computer Animation III. 3) F, S
Spec a effects n f ne arts 3D an mat on Studio. May be repeated for cred t Prerequ s tes· ART 449· nstructor approval

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NOTE: For the Genera Studies requ rement, courses and codes (such as L, SQ, C and H see "Genera Studies, page 87. For graduat'on requirements, see "Un versity Graduation Requ rements" page 83 For an exp anat on of add t ona omn bus courses offered but not l sted in this catalog see "Classif cat on of Courses" page 60

ART 494 Special Topics. 3) F, S
a) Intermed a
(b) Intermed a E ect ve

ART 530 Two-Dimensional and Three-Dimensional Computer Art. 3) A
Integrat on of 2D and 3D computer mag ng for art Emphas s on new direct ons for computer mag ng which accounts for med a character s- t cs Stud o

ART 540 Advanced Computer Art. (3) A
Study of motion for 3D mode s ight sources, and surface effects Course assumes students have a comprehension of comp ex mode ng, mapp ng, and ight ng. Stud o Prerequ s te ART 446 or nstructor approva

ART 598 Special Topics. (1–4) N
(a) D mens ona An mat o

METALS (ART)

ART 272 Jewelry I. (3) F, S
Emphasis on fabr cat on in ewelry making Basic techn ques of cutting and p erc ng, forg ng and solder ng, and form ng 6 hours a week Pre requ s te freshman or sophomore or junior stand ng

ART 372 Jewelry II. (3) F S
Fabricated approach to jewelry mak ng Techn ques n stone sett ng and surface embel shment 6 hours a week Prerequisites ART 113 and 115 and 272 *or* instructor approva

ART 373 Metalworking I. (3) A
Compression d e and stretch form ng as app ed to hol ow form con- struct on Hot and co d forg ng techn ques as app ed to sm thing 6 hours a week Prerequ s tes ART 113 and 115 and 272 *or* instructor approval.

ART 472 Advanced Jewelry. (3 F, S
Jewe ry mak ng w th emphas s on deve op ng persona statements and craftsmansh p 6 hours a week May be repeated for credit Pre requ s tes ART 372; instructor approva

ART 473 Advanced Metalworking. (3 A
Forg ng and form ng techn ques n ndividua ized d rections. 6 hours a week May be repeated for cred t Prerequis tes ART 373 nstructor approval.

ART 494 Special Topics. (3) F S
(a) Meta s

ART 598 Special Topics. (1–4) N
(a) Jewelry Meta work ng

PAINTING (ART)

ART 223 Painting I. (3) F, S SS
Fundamenta concepts and mater a s of trad t ona and experimental pa nting media Emphas s on preparat on of paint ng supports com pos tion and co or 6 hours a week Prerequ s tes ART 113, 115

ART 227 Watercolor I. (3) F S
Fundamenta concepts materials and techn ques of waterco or Emphasis on prob em so v ng bas c sk s, compos tion and color 6 hours a week Prerequ s tes. ART 113, 115.

ART 323 Painting II. (3) F S
Development of competency n sk ls and express on. Ass gned prob lems invo ve ght space co or form, and content. 6 hours a week Prerequ site. ART 223 or nstructor approva

ART 324 Painting III. (3 F, S
Cont nuat on of ART 323. 6 hours a week Prerequ s te. ART 323 or nstructor approva

ART 325 Figure Painting. 3 F, S
The human f gure c othed and nude as the subject for paint ng n se ected med a 6 hours a week Prerequ s tes· ART 314, 323.

ART 327 Watercolor II. (3) A
Exp orations of personal expression n waterco or Cont nued deve op- ment of watercolor sk ls us ng trad tiona and exper menta materia s and techn ques. 6 hours a week. Prerequisite: ART 227.

ART 423 Advanced Painting. (3) F S
Continuation of ART 324 6 hours a week May be repeated for cred t Prerequisite· ART 324.

ART 425 Advanced Figure Painting. (3 F, S
Continuation of ART 325 6 hours a week May be repeated for cred t Prerequisites· ART 315 324, 325

ART 427 Advanced Watermedia. (3) F S
Cont nuat on of ART 327. Advanced techn ques, concepts and meth ods w th waterc or and other water based med a on paper 6 hours a week May be repeated for cred t Prerequisite ART 327 or nstructor approval

ART 494 Special Topics. 3 F, S
(a) Pa nting

ART 598 Special Topics. 1–4) N
(a) F gure Pa nt ng
b) Watercolor

PHOTOGRAPHY (ART)

ART 201 Photography I. 3) F S
Deve opment of sk ls and techn ques of b ack and wh te photography Emphas s on camera work and darkroom procedures 2 hours ecture 3 hours lab

ART 301 Photography II. (3) F, S
Photography as an art med um w th add t onal exp oration nto per sonal photograph c aesthet cs 6 hours a week Prerequ s tes ART 113 and 115 and 201 *or* nstructor approval

ART 304 Advanced Photography. (3) F, S
Interpretation and manipulat on of ght as a too n the performance of express ve photography 6 hours a week Prerequ s te ART 301 or nstructor approval

ART 305 Color Photography I. (3) F, S
App cat on of co or transparenc es and prints to photographic art 6 hours a week Prerequisite: ART 304 or nstructor approval

ART 401 Nonsilver Photography. (3) F S
Recogn tion of the nherent character st cs of nons ver processes and the r use in commun cat ng ideas. 6 hours a week May be repeated for cred t. Prerequ site: ART 304 or instructor approval.

ART 403 Senior Photographic Projects. (3) F S
Technica and ph osoph ca ref nement of persona aesthet c with var - ous photograph c med a 6 hours a week May be repeated for cred t Prerequ s te ART 304 or nstructor approva .

ART 404 Portraiture Photography. 3) F, S
Photograph ng peop e Cr t ca d scuss ons and sl de ectures on ssues n portra ture 6 hours a week May be repeated for cred t Pre requ s te ART 304 or nstructor approva

ART 405 Advanced Color Photography. (3) F S
Intens ve use of subtractive co or process n photograph c pr nt ng 6 hours a week May be repeated for credit Prerequ s te ART 305 or nstructor approva

ART 406 Photo Techniques. (3 F, S
Camera and darkroom techn ques w th emphas s on creative contro of the black and white pr nt 6 hours a week Prerequ s te ART 301 or nstructor approva .

ART 407 View Camera. (3) F S
V ew camera and darkroom techn ques Studio ab Prerequ s te ART 301 or instructor approva

ART 408 Digital Photographic Images. (3) F S
Scann ng man pu at on ref nement, and compos ting of photograph c mages n the computer Lab, stud o. Prerequisite ART 201

ART 409 Photographic Exhibition. 3 A
Care of photograph c pr nts, pr nt presentat on, and exh b t on Pract cal exper ence n ga ery operat ons. 6 hours a week May be repeated for cred t Prerequ s te ART 304 or nstructor approva

ART 494 Special Topics. (3) F, S
(a) 19th-Century Photo Processes
(b) Photo

ART 498 Pro-Seminar. (1 7 N
(a) Landscape Photography Theory

ART 598 Special Topics. 1–4) N
(a) Advanced Co or Photography
(b) Nons lver Photography
(c) Portra ture Photography
(d) V ew Camera

PRINTMAKING (ART)

ART 253 Introduction to Printmaking. 3) A
Introduct on to bas c monotype ntag o re ief and re ated techniques Stud o Prerequ s te· ART 113

ART 351 Intagl'o I. 3 F S
Introducti n to contemporary and trad t ona deve opmenta tech n ques for b ack and wh te pr nts 6 hours a week Prerequ s tes: ART 113 and 115 *or* nstruct r approva

ART 352 Lithography I. 3 F S
Monochromat c and co or p anograph c pr ntmak ng util z ng stone and a um num plate processes 6 hours a week Prerequ s tes ART 113 and 115 *or* nstructor approva

ART 354 Screen Printing I. 3 F S
ntroduct on to paper d rect and photograph c stenc techniques. 6 hours a week Prerequ s tes ART 113 and 115 *or* nstructor approva

ART 355 Photo Process for Printmaking I. 3 F
ntroduct on to photograph c pr nc p es and sk ls for photomechan ca pr ntmaking processes nc ud ng photos kscreen ph to tho and photoetch ng. 6 h urs a week Prerequ s te ART 201 or equ va ent

ART 394 Special Topics. 1–4 N
a Re ef Pr ntmak ng

ART 451 Advanced Intaglio. 3 F S
Var ous contemporary and trad t onal methods of pr nt ng to ach eve co or pr nts 6 hours a week May be repeated for credit Prerequ s te ART 351 or nstructor approval

ART 452 Advanced Lithography. (3 F, S
Cont nuat on of ART 352 6 hours a week. May be repeated for cred t Prerequ site ART 352 or structor approval

ART 454 Advanced Screen Print ng. (3 A
C nt nuat on of ART 354 6 hours a week May be repeated for cred t Prerequis te ART 354 or structor approval

ART 455 Advanced Photo Processes for Pr'ntmaking 3 A
A cont nued study of phot mechanica techn ques and app cat ons to pr ntmaking or ph tograph c processes Prerequ s te ART 355 or instructor approva

ART 456 F ne Pr nting and Bookmak ng I. 3 A
Letterpres pr nt ng and typography as f ne art Study of h story alphabets, mechan cs of hand typesett ng presswork and var ous f rms of pr nted matter Prereq s te nstructor approva

ART 457 Fine Printing and Bookmaking II. 3 A
Cont nuat on of ART 456 Bookb nd ng, book des gn and pr nt ng, advanced typ graphy, theory and presswork May be repeated for cred t Prerequ s tes ART 456, nstructor approva

ART 458 Papermaking. (3) F S
H story, the ry, demonstrat ons sheet form ng c age treatments and 3 d mens ona approaches 6 hours a week May be repeated f r cred t Prereq s te nstructor approva

ART 459 Monoprinting. 3 F S
The n nmu t p e printed mage us ng a var ety of techn ca approaches. 6 h urs a week May be repeated for cred t Prerequi s tes ART 311 323 or any 300 evel pr ntmak ng c ass) nstructor approva

ART 494 Special Topics. 1–4) N
(a Exper menta Paper
b Experimenta Printmak ng
c Re ef Pr ntmak ng

ART 551 Intaglio Projects 3 F S
The mater a s and meth ds of ntag as a matr x for exp or ng var ous contemporary ssues Spec f ca y structured to accommodate the graduate- evel draw ng w th no pr ntmak ng ba kground Stud'o

ART 598 Special Topics. 1–4 N
a Advanced Phot Process for Printmak ng
b Exper menta Paper
(c) Fine Pr nt ng and Bookmak ng
(d) F ne Pr nt'ng and Bookmak ng
(e L thography
f) Monopr t ng
(g) Papermak ng
h) Photo Processes for Pr ntmak ng I
(Re ef Pr ntmak ng
(j Screen Pr nt ng

SCULPTURE (ART)

ART 231 Scu pture I. 3 F, S SS
Exp orat on of scu ptural forms through concepts related to basic mater a s Focus on stud o product on safety aesthetic cr t c sm, and h story of scu pture 6 hours a week Prerequ s tes ART 113 and 115 *or* nstructor approva

ART 274 Wood I. 3) F, S
Fundamenta woodwork ng techn ques to produce creat ve functiona 3-d mens ona objects. 6 hours a week

ART 331 Sculpture II. (3) F S
Cont uat'on of ART 231 with an emphasis on meta fabrication as an express ve scu ptural process Techn ques n we d ng, cutt ng and bend ng of meta s and the r aesthet cs 6 hours a week Prerequisite ART 231 or instructor approva

ART 332 Sculpture III. (3) F S
Exp orat ons n d verse med a w th a focus on mold mak ng processes Deve pment of the scu pture portfol o 6 hours a week Prerequ site: ART 331 or nstructor approva

ART 333 Foundry Casting Methods. (3) F S
The f ne art and techn ques of metal cast ng mold making foundry safety fin sh ng techn ques app cat on of pat nas and h story of cast ng. 6 hours a week May be repeated for cred t Prerequ s te ART 332 or instructor approva

ART 374 Wood II. (3) F S
nd v dua and d rected problems n wood related to the production of un que funct ona art objects. 6 hours a week Prerequ s tes: ART 113 and 115 and 274 *or* nstructor approva

ART 394 Special Topics. 1–4 N
a) Carv ng

ART 431 Special Problems in Sculpture. (3) F S
Deve opment of a personal approach to sculpture emphasis on form individua problems and re ated co or technology Profess onal prac t ces and presentat on 6 hours a week. May be repeated for credit. Prerequ s tes ART 332 nstructor approva

ART 432 Neon Sculpture. (3) F
Techniques for creat ng neon n an art context G ass tube bending and fabr cat on Construction of artworks ut l z ng ght generating gas ses 6 hours a week May be repeated for cred t Prerequ s te. instruc tor approva

ART 433 Foundry Research Methods. (3) F S
Research n foundry techn ques Stud o Pre or corequ s te ART 333 or nstructor approva

ART 436 Architectural Sculpture. (3 N
Scu ptura concepts as related to architecture and other man-made env ronments Sca e draw ng mode s, and rel ef scu pture 6 hours a week May be repeated for credit Prerequ s te ART 332 or nstructor approva

ART 437 Film Animation. 3) F
Product on of short 16mm f ms that feature articulated scu ptural ob ects mode s do s puppets, and graph cs through the use of s ng e frame f lm ng techn ques 6 hours a week May be repeated for cred t Prerequ s te nstructor approva

ART 438 Experimental Systems in Sculpture. (3) S
S mp e e ectr ca and mechanica systems that can be ut zed 'n the context of stud o art and nstal ations Active product on of studio art works required 6 hours a week May be repeated for cred t Prerequ s te nstructor approva

ART 474 Advanced Wood. 3 F, S
Extended exper ence and advanced techn ques n the use of wood to create funct ona works of art 6 hours a week May be repeated for credit. Prerequ s tes ART 374 nstructor approval

ART 494 Special Topics. 1–4) N
a Advanced Sculpture
b Carv ng
c Fi m Post Product on
(d Foundry Cast ng Methods

ART 594 Conference and Workshop. (1 12 N
(a Carv ng

NOTE: For the Genera Stud es requ rement courses, and codes (such as L, SQ C, and H see "Genera Stud es" page 87 For graduat on requ rements see "Un vers ty Graduat on Requ rements page 83 For an explanat on of addit ona omnibus courses offered but not isted n th s cata og see "C ass f cat on of Courses page 60.

ART 598 Special Topics. (1–4) N
a) Advanced Sculpture
(b) Arch tectura Scu pture
(c) Exper menta Systems n Sculpture
(d) F lm: Post Production
e) Foundry Casting Methods
(f) Neon Sculpture
(g Spec a Prob ems n Scu pture
(h) Wood

SPECIAL STUDIO ART (ART)

ART 582 Art Research. (1–12) F S, SS
Independent study research using classroom fac lities and suppl es Stud o

ART 621 Studio Problems. (3) F S SS
Advanced study in the fo low ng areas·
(a) Ceramics
(b) Drawing
c) F ber Art
(d) Jewelry Meta work ng
(e) Meta s
(f) Pa nt ng
(g) Photography
(h) Pr ntmak ng
(i) Scu pture
(j) Studio Art
(k) Wood
6 hours a week each sect on. May be repeated for cred t Prerequ s te nstructor approva

ART 680 Practicum: M.F.A. Exhibition. (1 15) F S, SS
Studio work n preparation for requ red M.F.A exh bit on Publ c exhibit to be approved by the student's supervisory comm ttee and accompa nied by a f nal ora examination. Photograph c documentat on and written statement of problem. Prerequis te approval of the student s supervisory comm ttee

ART 682 M.F.A. Exhibition Research. (1 12) F, S SS
M F A. exh b t on pract cum using classroom fac l ties and suppl es Can be used 'n place of ART 680. Prerequisite approval of the student s superv sory committee.

Department of Dance

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PROFESSORS
KAPLAN, KEUTER, LUDWIG MURPHEY

ASSOCIATE PROFESSORS
MATT, MOONEY

ASSISTANT PROFESSORS
JACKSON, PARK, VISSICARO

ASSOCIATE RESEARCH PROFESSIONAL
MITCHELL

SENIOR LECTURERS
FITZGERALD, TSUKAYAMA

For advising purposes, all students registering in a Dance degree program enroll through the College of Fine Arts. Each degree program and area of specialization has its own check sheet that describes the particulars of course sequence and special requirements. These check sheets are available in the Department of Dance office.

Placement Examinations. All students who enroll in dance major technique courses are required to take part in a placement audition to determine their levels of technical proficiency in modern dance and ballet. Official dates for auditions are set for the orientation periods that precede the fall and spring semesters of each academic year. Transfer students who have completed music theory for dance, dance production, or choreography courses at another institution are also required to take placement examinations in these areas before enrolling in intermediate or advanced levels of course work.

DANCE—B.F.A.

The faculty in the Department of Dance in the College of Fine Arts offer a Bachelor of Fine Arts degree at the undergraduate level with emphases in four areas of concentration: choreography, dance education, dance studies, and performance. All new Dance majors are admitted into the preprofessional program. Students audition or petition for admission into one of the Bachelor of Fine Arts dance concentrations during the sophomore year of study. Transfers may request admission into the B.F.A. degree after one semester in residence. Further details may be obtained from the Department of Dance.

Graduation Requirements. In addition to fulfilling the major requirements, students must meet all university graduation requirements and college degree requirements At least 45 semester hours must be upper-division courses. See "University Graduation Requirements," page 83, and "College Degree Requirements," page 265.

Core Curriculum. The Dance major consists of a minimum of 54 semester hours in the dance core. All courses in the major must be completed with a grade of "C" or higher. First-semester students in the preprofessional program should take the following courses.

DAN 134 Technique and Theory of Modern Dance	3
DAN 135 Technique and Theory of Ballet	2
ENG 101 First-Year Composition	3
Dance elective	1
General Studies courses	6
Total	15

The following courses make up the core curriculum.

Technique. Twenty-six semester hours in ballet and modern technique are required.

Performance. Two upper division courses are required.

Theory. The following dance theory courses are required:

DAH 100 Introduction to Dance *HU*	3
DAN 221 Rhythmic Theory for Dance I	2
DAN 222 Rhythmic Theory for Dance II	2
DAN 340 Dance Kinesiology	4
Total	11

Choreography. The following courses are required.

DAN 264 Improvisational Structures	3
DAN 265 Approaches to Choreography	3
Total	6

History. Choose two from the following three courses:

DAH 302 Cross Cultural Dance Perspectives *L/HU, G* . . 3
DAH 401 Dance History I *HU* 3
DAH 402 Dance History II *HU* 3

Production. Choose one of the following two courses:

DAN 210 Dance Production I 3
DAN 211 Dance Production II 3

Dance Concentration Curriculum. Each concentration in the dance curriculum dance education, dance studies, and performance is composed of 25 semester hours.

Choreography

Core Curriculum. See "Core Curriculum," page 280.

Specialization. The following courses are required for the choreography specialization

DAN 228 Dance Notation I 3
DAN 321 Music Literature for Dance 3
DAN 364 Choreography and Accompaniment. 3
DAN 365 Advanced Choreography 3
DAN 480 Senior Performance in Dance 2

Total 14

Production. The following two courses are required

DAN 210 Dance Production I 3
DAN 211 Dance Production II 3

Additional requirements are listed on the check sheet available from the Department of Dance.

Dance Education

Core Curriculum. See "Core Curriculum," page 280.

Specialization. The following courses are required for the dance education specialization:

DAN 321 Music Literature for Dance. 3
DAN 359 Dance Education Theory 3
DAN 364 Choreography and Accompaniment 3
DAN 365 Advanced Choreography. 3
DAN 480 Senior Performance in Dance 2

Total 14

Production. The following two courses are required:

DAN 210 Dance Production I 3
DAN 211 Dance Production II 3

Dance Methods. Choose two of the following three courses:

DAN 350 Methods of Teaching Modern Dance in Secondary Education 3
DAN 351 Methods of Teaching Ballet 3
DAN 311 Children's Dance 3

Additional requirements are listed on the check sheet available from the Department of Dance.

Dance Studies

Core Curriculum. See "Core Curriculum," page 280.

Specialization. The following courses are required for the dance studies specialization

DAH 495 Dance Research Sources 2
DAH 496 Senior Thesis Project 2

Total 4

Twenty additional hours approved by an advisor must be taken in no more than two related fields. Additional requirements are listed on the check sheet available from the Department of Dance

Performance

Core Curriculum. See "Core Curriculum," page 280.

Specialization. The following courses are required for the performance specialization

DAN 321 Music Literature for Dance 3
DAN 380 Performance Studies Practicum 3
DAN 480 Senior Performance in Dance 4
THP 101 Introduction to the Art of Acting 3

Total 13

Production. The following two courses are required:

DAN 210 Dance Production I 3
DAN 211 Dance Production II 3

Performance. Choose from the following three courses (six semester hours are required)

DAN 371 Dance Theatre Performance/Production 1 3
DAN 471 Dance Arizona Repertory Theatre 6
DAN 472 Concert Dance 2

Additional requirements are listed on the check sheet available from the Department of Dance.

A student pursuing the B F.A degree in Dance Education may also choose to become certified to teach dance (K 12) in Arizona public schools Students should apply to the College of Education in the middle of the sophomore year To be considered for admission to the teacher certification program, students must complete an admission portfolio specified by the College of Education, which may include completion of the Pre Professional Skills Test (PPST . Students should be advised that at least 20 additional semester hours are required to complete certification requirements For more information, consult the dance education advisor and College of Education Office of Student Affairs.

MINOR

The department offers a minor in Dance consisting of 18 semester hours of course work, including 12 upper division hours. A minimum grade of "C" is required in all courses. Dance minor requirements include:

Performance or choreography 3
Technique 6
Theory 6
Electives 3

Interested students should contact the Department of Dance for specific requirements and admission procedures

NOTE: For the General Studies requirement, courses and codes (such as L SQ, C and H) see 'General Studies page 87 For graduation requirements see "University Graduation Requirements," page 83 For an explanation of additional comments courses offered but not listed in this catalog, see "Classification of Courses," page 60

GRADUATE PROGRAM

A total of 60 semester hours of graduate credit is required· 30 hours of dance studio; 12 hours of dance theory; nine hours of electives; and nine hours of individual project (choreography, performance, or other approved proj ect). In addition to the studio concentrations in choreography and performance, specialized areas of emphasis are available within the 60 semester hour program. In consulta tion with the graduate director, specific interests, needs, and abilities determine a program of study that directs course work in alternative directions.

DANCE HISTORY (DAH)

DAH 100 Introduction to Dance. (3) F S
Orientation to the f e d of dance focus ng on h story, styles cultura , and theatnca aspects of the art form *General Stud es HU*

DAH 190 Introduction to the Dance Profession. (1) F
Orientation to the dance profess on ntroduc ng career options and university department resources Des gned for Dance majors.

DAH 300 Focus on Dance. (3) F S SS
Spec a zed study of cultura and theatr ca aspects of dance, such as soc a dance forms, specif c genres or historica per ods May be repeated for credit. Lecture, studio No credit for students who have comp eted DAH 100. *General Studies. HU.*

DAH 301 Philosophy and Criticism of Dance. (3) F S
Phi osoph cal 'ssues in dance and dance crit c sm with emphas s on written ana ysis and interpretat on Prerequ s te· 1 semester of F'rst Year Composit on *General Studies· L/HU.*

DAH 302 Cross-Cultural Dance Perspectives. (3) F, S
Comparat ve ana ysis of dance n diverse cu tura contexts Internet earn ng env ronment nc udes topic presentat ons d scuss'on responses and f na research project Prerequ s tes: complet on of F rst-Year Compos tion requirement jun or stand ng *General Studies L/HU, G*

DAH 401 Dance History I. (3) F
Cu tural and theatrical deve opment of dance from preh story through the 19th-century Romantic period, 'nc ud ng the early history of ba let *General Studies HU*

DAH 402 Dance History II. (3) S
Cultural and theatrical deve opment of dance from 19th century Romantic per od through Contemporary t mes Inc udes bal et mod ern, and mus cal theatre dance *General Studies. HU.*

DAH 495 Dance Research Sources. (2) F
The invest gat on of various resources and methods for conduct ng research in dance Seminar Prerequ site instructor approval

DAH 496 Senior Thesis Project. (2) S
A culm nating research project that ntegrates dance and a related fie d of 'nterest Prerequ s te DAH 495

DAH 501 Philosophy of Dance. (3 A
Analys s of tradit ona and contemporary theor es of dance w th regard to issues of express on, form and meaning.

DAH 502 Cultural Concepts of Dance. (3) A
Exam'nes the c ose connect on between cu ture dance, and movement through wr tings n cu tural theory dance ethno ogy, and phi oso phy

DANCE (DAN)

DAN 130 Dance. (2) F, S SS
Introduct on to styles and forms of dance ba et, modern, jazz, tap ba lroom, ethnic May be repeated for cred t.

DAN 134 Technique and Theory of Modern Dance. (3) F S
Elementary concepts of modern dance techn que. Development of movement qua ty and performance sk l s. 6 hours weekly May be repeated for credit. Placement aud tion requ red Prerequ s te Dance major

DAN 135 Technique and Theory of Ballet. (2 F, S
E ementary bal et techn que with emphas s on alignment, contro and development of the feet w th proper awareness of sty e and phrasing 4 hours weekly. May be repeated for cred t P acement audit on requ red

DAN 164 Improvisation. (1) F, S
mprovisation techn ques employ ng the bas c e ements of space t me, and energy Stud o

DAN 171 Dance Production Lab: Costume. (0) F S
Part c pation in concert dance product on n the area of costum ng Requ red of a Dance majors Lab

DAN 172 Dance Production Lab: Technical Theatre. (0) F S
Part c pation n concert dance product on n the area of technica theatre Requ red of a Dance majors. Lab

DAN 173 Dance Production Lab: Management. (0) F, S
Particpat on n concert dance product on n the area of production management. Requ red of a l Dance majors Lab

DAN 210 Dance Production I. (3) F
Theory and pract ce of ght ng scenery sound and stage manage ment for dance product on. Labs cover al areas of product on Lecture ab

DAN 211 Dance Production II. (3) S
Theory and pract ce of arts management and costume design for dance product on. Labs cover a areas of product on Lecture, lab.

DAN 221 Rhythmic Theory for Dance I. (2) F
E ements of music music structures and their re at onsh p to dance. Emphasis on rhythmic ana ys s and dance accompan ment

DAN 222 Rhythmic Theory for Dance II. (2) S
Cont nuat'on of DAN 221 w th an emphas s on sma group movement projects n relat on to mus ca t me and structure CD ROM work inc uded. Prerequ site: DAN 221 or prof c ency exam

DAN 228 Dance Notation I. (3) F S
Survey of systems of dance notat on ntroduct on to effort shape ana ys s of movement Emphas s on learn ng e ementary abanotat on Lecture studio Prerequ s tes DAN 221· MUS 100.

DAN 230 Dance. (2) F S SS
Intermed ate leve s Cont nuat on of DAN 130. May be repeated for credit

DAN 234 Technique and Theory of Modern Dance. 3 F S
Intermed ate concepts of modern dance technique. Development of movement qual ty and performance sk ls 6 hours week y May be repeated for cred t. P acement aud tion required

DAN 235 Technique and Theory of Ballet. (2 F, S
The advanced study of e ementary bal et techn que through the trad tiona exerc ses, with proper awareness of style and phras ng 4 hours week y May be repeated for credit Placement aud tion requ red

DAN 237 Beginning Pointe. (1) F S
The study of e ementary pointe techn que through the tradit ona exer c ses 2 hours week y. May be repeated for cred t Prerequ s tes bas c bal et tra ning nstructor approva .

DAN 264 Improvisational Structures. (3) F
ntroduct on to bas c improv sationa and choreograph c pr nc p es w th emphasis on current med a and technology group structures and movement invent on Lecture stud o.

DAN 265 Approaches to Choreography. 3) S
ntermed ate appl cat on of bas c choreograph c principles w th emphasis on mprov sat on, form content and eva uative ski s Lecture stud o Prerequ s te DAN 264.

DAN 311 Children's Dance. (3) S
Theory and practice of teach ng creat ve dance to ch dren Designed for Dance majors and re ated curricu a but open to a students.

DAN 321 Music Literature for Dance. (3) F S
Historical survey of mus c and compos t onal e ements re at ve to dance Emphas s on analys s of choreography from a mus ca standpo nt CD ROM ab Lecture ab Prerequ sites· DAN 221 and 222 *or* instructor approval Pre or coreqU site: MUS 340

DAN 328 Dance Notation II. (2) S
ntermed ate study of abanotation Emphas s on score read ng. Pre requisite DAN 228 or equ valent

DAN 330 Dance. (2) F S, SS
Advanced evels Cont nuation of DAN 230 May be repeated for credit

DAN 334 Technique and Theory of Modern Dance. 3) F, S
Advanced concepts of modern dance techn que Deve opment of movement qual ty and performance sk is 6 hours week y May be repeated for cred t P acement aud tion requ red

DAN 335 Technique and Theory of Ballet. (2) F S
ntermediate ba et techn que with emphas s on strength, dynam cs rhythm ca mpulses and transitions with awareness of proper sty e and phrasing. 4 hours weekly. May be repeated for credit. Placement aud tion required.

DAN 337 Intermediate Pointe. 1) F S
Study of ntermed ate and advanced pointe techn que through the traditional exercises. 2 hours weekly May be repeated for credit Prereq u site: DAN 237 or nstructor approval.

DAN 340 Dance Kinesiology. (4) S
K'nes o og cal princ p es app ed to dance technique ncluding ana y s's of muscular patterns 'n dance movement and the pathomechan cs of dance njury Prerequ s te: B O 201 or instructor approval.

DAN 342 Ideokinesis. (2) F
A study of posture us ng the visual zation of mage goa s to fac l tate improved al gnment and movement eff c ency. May be repeated for cred t. Lecture, studio.

DAN 350 Methods of Teaching Modern Dance in Secondary Education. (3) F
Analysis and acquisition of teach ng mater a s for the techn que mprovisation, and choreography of modern dance. Lecture, studio. Pre- or corequ s te: DAN 359.

DAN 351 Methods of Teaching Ballet. (3) S
Analysis and acquisition of teach'ng techniques and mater a s for bal et jazz, and mu t cu tural dance forms Lecture, stud o Pre or coreq u'site: DAN 359.

DAN 359 Dance Education Theory. (3) F
Application of princ ples of motivat on earning, and eva uation to the teach ng of dance

DAN 364 Choreography and Accompaniment. (3) F
Experience in the use of traditional and nontraditiona mus ca structures as a bas s for choreographic projects Lecture stud o Prerequ site: DAN 321.

DAN 365 Advanced Choreography. (3) S
Investigat on and pract ce of contemporary sty es of choreography. Studio. Prerequisites: DAN 264 and 265 *or* equ'va ents.

DAN 371 Dance Theatre Performance Production. (1 3) F, S
Performance or techn'ca theatre work n des gnated dance produc tions. 3 hours a week per semester hour May be repeated for credit Prerequisite. nstructor approva .

DAN 380 Performance Studies Practicum. (3) S
Focus on develop'ng rehearsa sk l s and achieving performance excel ence through the preparation of three completed works. Stud o, lab.

DAN 423 Dance, Computers, and Multimedia. (3) F S
Introduct on to desktop multimed a as it relates to dance creation, edu cat on, production, and research Lecture, lab. *General Studies. CS*

DAN 434 Technique and Theory of Modern Dance. (3) F, S
Preparation n the performance and comprehension of professiona - evel modern dance techn que 6 hours weekly May be repeated for cred t. P acement aud tion requ red

DAN 435 Technique and Theory of Ballet. (2) F S
The study of profess onal advanced bal et technique with emphas s on preparation for performance. 4 hours weekly. May be repeated for cred t. P acement aud tion required.

DAN 471 Dance Arizona Repertory Theatre. 3) F, S
Profess onal modern dance company exper ence and community outreach Opportun ty to work w th facu ty guest performers and choreographers. Lecture, studio. May be repeated for credit.

DAN 472 Concert Dance. (2) F, S
Extens ve preparat on of repertory or new works created by expen enced choreographers. S mulates dance company experience, culm - nating n performance Stud o Prerequ s tes audit on nstructor approva

DAN 480 Senior Performance in Dance. (2) F
Original choreography for group performance w'th analys's and cri- tique of prob ems encountered n production Must be repeated for a tota of 4 cred'ts Prerequ s'tes DAN 364 365

DAN 484 Dance Internship. (1–3) F S

DAN 494 Special Topics. (2) A
(a) Concert Dance

DAN 510 Dance Stagecraft and Production. (1 3) F, S
Theory of costum ng, ight ng, makeup scenery and sound as re ated to dance performance May be repeated once for credit. Lecture, stu dio. Prerequisite DAN 211 or equiva ent

DAN 521 Sound Lab I. (2) F
Audio m x ng for ana og/d g tal recording and editing Lecture, lab. Prerequ site· nstructor approva

DAN 522 Sound Lab II. (2) S
Continuation of DAN 521 Focus on digita record ng/ed ting of audio compos t ons for choreographic projects Lecture, lab Pre or corequ - s te DAN 423 or 521.

DAN 523 Dance, Computers, and Multimedia. (3) F, S
Introduct on to desktop mu timed a as t relates to dance creation, product on, educat on, and research Lecture ab.

DAN 534 Technique and Theory of Modern Dance. (3) F, S
Preparat on in the performance and comprehens on of professional- evel modern dance for first-year graduate students 6 hours week y. May be repeated for cred t P acement aud tion requ red.

DAN 535 Technique and Theory of Ballet. (2) F S
Graduate study of ba let technique May be repeated for credit Stud o. P acement audit on required

DAN 542 Ideokinesis. (2) F
A theoretical exam nation of ideok net c methods of fac'litat ng postural change and movement eff c ency

DAN 550 Graduate Dance Pedagogy: Modern. (3) S
Overview of the role of modern dance techn'que and theory in the un'- versity curricu um nc ud ng current pedagogical theory, d versity, gender May fol ow or precede internsh p in pract ca teach ng

DAN 551 Graduate Dance Pedagogy: Ballet. (3) F
Advanced analys s of teaching techniques for bal et Prerequ s te instructor approval.

DAN 561 Choreographer Composer Workshop. (1–3) N
Ana ys s of, exper mentat on w th and pract ce n work ng w th com posers of mus c for choreography Open to experienced choreogra phers and composers. Lecture studio Prerequisite: nstructor approval.

DAN 564 Solo and Group Choreography I. (3) F
Orig'na choreography created for solo and group performance Stu d o Prerequ's'tes DAN 364 and 365 *or* equ valent

DAN 565 Solo and Group Choreography II. (3) S
Cont nuat on of DAN 564 Stud o Prerequ s te DAN 564.

DAN 571 Dance Theatre. (1–3) F S
Performance n spec al y choreographed dance product ons May be repeated for credit Prerequ s te instructor approva

DAN 572 Concert Dance. (1 2) F, S
Extensive preparat'on of repertory or new works created by experi enced choreographers. S mulates dance company experience culm nat ng n performance Stud o Prerequ sites aud tion nstructor approval

DAN 580 Performance Studies Practicum. (1 3) S
Focus on developing rehearsa sk ls and ach ev ng performance exce lence through the preparation of three completed works Stud o ab.

DAN 591 Seminar. (1 3) F S
Seminar focus ng on enr chment topics, production aspects of thes s projects teach ng concerns spec a ectures f ms or critiques

DAN 634 Technique and Theory of Modern Dance. 3) F S
Preparat on n the performance and comprehension of professiona - leve modern dance for second year graduate students 6 hours week y. May be repeated for credit P acement audit on required

DAN 640 Advanced Problems in Analysis of Dance Technique. (3) S
Theories and pr nc p es of human anatomy, k nesiology and the psycho ogy of learn ng app ed to analysis of dance movement Prerequ s tes DAN 340 and 342 *or* nstructor approva

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NOTE: For the General Stud es requ'rement courses, and codes (such as L, SQ, C, and H), see "Genera Studies," page 87 For graduation requirements see "Univers ty Graduat on Requirements" page 83 For an explanation of add t onal omn bus courses offered but not l'sted in th s catalog, see "Class fication of Courses," page 60.

DAN 664 Choreography Workshop. (1 3) F
Choreograph c study n a seminar context with faculty and guest art sts Stud o May be repeated for cred t Prerequisites. DAN 564, 565.

DAN 671 Dance Arizona Repertory Theatre. (3) F, S
Profess onal modern dance company experience and commun ty out reach Opportunity to work w th choreographers facu ty and guest performers Lecture studio

DAN 693 M.F.A. Project. (1 9) F S, SS
Preparation for required M F.A. project approved by the student's superv sory committee Work is fol owed by a f na oral exam nation and documentation appropriate to the project. Prerequ site committee approval.

School of Music

(MUSIC E185) 480/965-3371
Fax 480/965-2659
www.asu.edu/cfa/music

REGENTS' PROFESSORS
H CKMAN PAGANO

PROFESSORS
ATSUM , BACON, BRITTON, COSAND CROWE, DeMARS, DOAN, FLEMING, HACKBARTH, HAMILTON, HARRIS, HILL, HOFFER, HUMPHREYS, KLIEWER BRITTON, KOONCE, LOCKWOOD, MAROHN C, METZ, OLDANI, PILAFIAN, REBER, ROGERS, RUSSELL SELLHEIM, SH NN SKOLDBERG, SP NOSA, SPR NG, STOCKER SUNKETT, SWAIM THOMPSON, UMBERSON, W LL AMSON, WYTKO

ASSOCIATE PROFESSORS
BARROLL-ASCHAFFENBURG, CARPENTER, DREYFOOS, HAEFER, HOLBROOK, KOPTA, MARSHALL MAY, PETERSON, RAVE, REYNOLDS, ROCKMAKER, SM TH, SOLÍS, STAUFFER, WILSON

ASSISTANT PROFESSORS
BRYAN, BUSH, LYMAN, McLIN, R O, SCHUR NG

SENIOR LECTURER
NORTON

LECTURER
SHELLANS

ACADEMIC PROFESSIONAL
CAMPBELL

The School of Music is a member of the National Association of Schools of Music, and the requirements for entrance and graduation set forth in this catalog are in accordance with the published regulations of the associa tion. The following statement of basic musicianship is endorsed by the School of Music:

> All musicians, whether performers, composers, scholars, or teachers, share common professional needs Every musician must to some extent be a performer a listener, a historian, a composer, a theorist, and a teacher. For this reason, certain subject matter areas and learning processes are common to all baccalaureate degrees in music
>
> Basic musicianship is developed n studies that prepare the student to function in a variety of musical roles that are supportive of his/her ma or concentration. All undergraduate curricula, therefore, provide the follow ing
>
> 1 A conceptual understanding of such musical properties as *sound, rhythm, melody harmony, texture,* and *form* and opportunities for developing a comprehensive grasp of their interrelationships as they form the cognitive affective basis for listening, composing and performing.
> 2 Repeated opportunities for enacting in a variety of ways the roles of listener (analysis), performer (interpretation), com poser (creation), scholar (research), and teacher
> 3. A repertory for study that embraces all cultures and histori cal periods

All students registering in a School of Music major program enroll through the College of Fine Arts.

Audition/Admission Requirements. *All students who enroll in an undergraduate music degree program are required to pass an entrance audition in their primary per forming medium (instrument or voice) before being admit ted to the School of Music* Audition forms and specific audition requirements for each instrument or voice may be obtained upon request by contacting the School of Music. Official dates for these auditions are set for each academic year.

Admission to the composition concentration is subject to the approval of the composition faculty based upon an eval uation of the student's compositions and/or interview

Diagnostic Examinations. Entering students, including *all* transfer students, must take a diagnostic examination in piano during orientation week of their first semester on campus, regardless of previous piano course work com pleted. All students are required to reach a minimum level of piano proficiency.

Continuation in the composition program is subject to review in the sophomore or junior year.

All Music Education majors, including transfer and post baccalaureate students, must perform an additional audition before being admitted to the teacher education program. Normally, this audition occurs during the sophomore year.

All students majoring in Music Therapy must pass MUE 211 Music in Recreation and a music therapy faculty review and screening interview before being passed into upper division study.

MUSIC—B.A.

The Bachelor of Arts degree requires a minimum of 120 hours for graduation.

The Music major consists of 50 semester hours and includes the requirements listed below for each area of con centration.

In addition to fulfilling the major requirements, students must meet all university graduation requirements and col lege degree requirements. See "University Graduation Requirements," page 83, and "College Degree Requirements," page 265.

Music Theory. The following music theory courses are required:

MTC 125	Basic Music Theory	3
MTC 221	Music Theory· 18th Century	3
MTC 222	Music Theory. 19th Century	3
MTC 223	Music Theory. 20th Century	3
MTC 320	Modal Counterpoint	2
	or MTC 321 Tonal Counterpoint (2)	
MTC 327	Form and Analysis I	3

MTC 422 Musical Acoustics . . . 3

Total 20

Music History. Three semester hours of MHL 341 Music History and three semester hours of MHL 342 Music His tory are required. Nine elective upper division hours in music history and or theory are required.

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction or 311 Studio Instruction are required. At least four of these hours must be at ASU.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

The remaining semester hours in music are selected by the student in consultation with an advisor. Areas of study may include ethnomusicology, music education, music history, music theory, and performance. At least 23 semester hours, 12 in the field of specialization, must be in the upper division Students must select sufficient elective courses to complete the 120 hours required for graduation.

BACHELOR OF MUSIC DEGREE

All Bachelor of Music (B.M.) degree programs require 120 semester hours for graduation excluding Music Education (125 semester hours) and Music Therapy (129 semester hours). The B.M. curriculum offers majors in Music Educa tion, Music Therapy, Performance, and Theory and Composition.

The curricula for the Music Education and Music Therapy degrees require more than 120 semester hours A stu dent wishing to complete these programs in four years is required to take more than 15 semester hours per semester or to attend summer sessions.

The music curriculum for the remaining B.M. degrees listed consists of 79 semester hours. The requirements for each major are listed below In addition, the Music Educa tion major provides certification to students interested in teaching in the public schools.

In addition to fulfilling the major requirements, students must meet all university graduation requirements and college degree requirements. See "University Graduation Requirements," page 83, and "College Degree Require ments," page 265.

MUSIC EDUCATION—B.M.

Choral-General Concentration

This degree program may include a teaching minor in instrumental music.

Music Theory. The following music theory courses are required·

MTC 125 Basic Music Theory . . . 3
MTC 221 Music Theory 18th Century . . . 3
MTC 222 Music Theory 19th Century . . . 3
MTC 223 Music Theory 20th Century . . . 3
MTC 327 Form and Analysis I . . . 3

Total . . . 15

Music History. The following music history courses are required:

MHL 341 Music History . . . 3
MHL 342 Music History. . . . 3

Total . . . 6

Conducting. The following conducting courses are required·

MUP 209 Beginning Choral Conducting . . . 1
MUP 339 Choral Conducting. . . . 2

Total . . . 3

Music Education. The following music education courses are required:

MUE 110 Introduction to Music Education . . . 1
MUE 313 Elementary Music Methods . . . 3
MUE 315 General Music in the Secondary Schools 2
MUE 480 Choral Methods . . . 3

Total . . . 9

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction and eight semester hours of MUP 311 Studio Instruction are required to obtain a proficiency level necessary to meet the graduation recital requirement. MUP 495 Solo Performance 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) is required. Students wish ing to extend their proficiency beyond this level may continue to study in MUP 321 Studio Instruction.

Ensemble. Eight different semesters of participation, including at least six semesters of MUP 352 Concert Choir and/or MUP 353 University Choir, four of which must be at ASU, are required.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Instrumental Concentration

It is strongly recommended that this degree program include courses in choral music or courses in jazz education.

Music Theory. The following music theory courses are required:

MTC 125 Basic Music Theory . . 3
MTC 221 Music Theory. 18th Century. 3
MTC 222 Music Theory 19th Century 3
MTC 223 Music Theory. 20th Century . . . 3
MTC 327 Form and Analysis I . . . 3

Total . . . 15

NOTE: For the Genera Stud es requ rement, courses and codes (such as L, SQ, C, and H) see "Genera Stud es" page 87 For graduation requ rements see Un versity Graduation Requ rements" page 83 For an explanat on of add't ona omn bus courses offered but not sted n this cata og, see C assif cation of Courses" page 60.

Music History. The following music history courses are required:

MHL 341 Music History	3
MHL 342 Music History	3
Total	6

Conducting. The following conducting courses are required:

MUP 210 Beginning Instrumental Conducting	1
MUP 340 Instrumental Conducting	2
Total	3

Music Education. The following music education courses are required

MUE 110 Introduction to Music Education	1
MUE 315 General Music in the Secondary Schools	2
MUE 317 Educational Methods for Violin and Viola	1
MUE 318 Educational Methods for Cello and String Bass	1
MUE 327 Educational Methods for Trumpet and Horn	1
MUE 328 Educational Methods for Trombone, Euphonium, and Tuba	1
MUE 336 Educational Methods for Percussion	1
MUE 337 Educational Methods for Flute, Clarinet, and Saxophone	1
MUE 338 Educational Methods for Double Reed Instruments	1
MUE 481 Instrumental Practicum/Methods	5
MUE 482 Instrumental Practicum/Methods	5
Total	20

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction and eight semester hours of MUP 311 Studio Instruction are required to obtain a proficiency level necessary to meet the graduation recital requirement. MUP 495 Solo Performance completes the requirement

Ensemble. Eight different semesters of participation in an ensemble are required, four of which must be at ASU. 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 Symphony Orchestra. Wind and percussion players must have a minimum of six semesters of MUP 361 Marching and Concert Bands.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

String Concentration

Music Theory. The following music theory courses are required

MTC 125 Basic Music Theory	3
MTC 221 Music Theory: 18th Century	3
MTC 222 Music Theory: 19th Century	3
MTC 223 Music Theory: 20th Century	3
MTC 327 Form and Analysis I	3
Total	15

Music History. Three semester hours of MHL 341 Music History and three semester hours of MHL 342 Music History are required

Conducting. The following conducting courses are required

MUP 210 Beginning Instrumental Conducting	1
MUP 340 Instrumental Conducting	2
Total	3

Music Education. The following music education courses are required:

MUE 110 Introduction to Music Education	1
MUE 315 General Music in the Secondary Schools	2
MUE 317 Educational Methods for Violin and Viola or MUE 318 Educational Methods for Cello and String Bass	1
MUE 335 Educational Methods for Guitar	1
MUE 336 Educational Methods for Percussion	1
MUE 482 Instrumental Practicum/Methods	5
MUE 485 String Practicum/Methods	2
Total	13

Also required are MUP 121 Studio Instruction for three semester hours in a stringed instrument other than the major instrument, MUP 121 for one semester hour in a third stringed instrument, and MUP 121 for one semester hour in a fourth stringed instrument.

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction and eight semester hours of MUP 311 Studio Instruction are required to obtain a proficiency level necessary to meet the graduation recital requirement. MUP 495 Solo Performance completes the requirement

Ensemble. Eight different semesters of participation in an ensemble are required, four of which must be at ASU. Six semesters of MUP 345 Symphony Orchestra or equivalent are required

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required

Recommended Elective. MUE 313 Elementary Music Methods.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232, unless waived by a diagnostic examination at the time of entrance, are required

MUSIC THERAPY—B.M.

Students are eligible to apply for the Certification Exam offered by the Certification Board for Music Therapists upon completion of the requirements for graduation.

Music Theory. The following music theory courses are required

MTC 125 Basic Music Theory	3
MTC 221 Music Theory 18th Century	3
MTC 222 Music Theory 19th Century	3
MTC 223 Music Theory 20th Century	3
MTC 327 Form and Analysis I	3
MTC 422 Musical Acoustics	3
Total	18

Music History. The following music history courses are required:

MHL 341	Music History	3
MHL 342	Music History	3
Total		6

Conducting. One of the following two courses is required:

MUP 209	Beginning Choral Conducting	1
MUP 210	Beginning Instrumental Conducting	1

Music Education. The following music education courses are required:

MUE 211	Music in Recreation	2
MUE 313	Elementary Music Methods	3
MUE 335	Educational Methods for Guitar	1
MUE 336	Educational Methods for Percussion	1
MUE 389	Repertoire for Music Therapy	3
Total		10

Music Therapy. The following music therapy courses are required:

MUE 161	Introduction to Music Therapy	2
MUE 261	Music Therapy as a Behavioral Science	2
MUE 361	Music Therapy Theory and Practice in Psychopathology	3
MUE 362	Music Therapy Techniques	3
MUE 381	Music Therapy Research *L*	3
MUE 384	Therapy Preclinical I	1
MUE 385	Therapy Preclinical II	1
MUE 386	Therapy Preclinical III	1
MUE 387	Therapy Preclinical IV	1
MUE 388	Therapy Preclinical V (elective)	1
MUE 441	Psychology of Music	3
MUE 475	Group Process and Music Therapy	1
MUE 476	Internship in Music Therapy	1
Total		23

Major Performing Medium. Six to eight semesters are required in the major performing medium, which must include at least two semester hours of MUP 311 Studio Instruction.

Voice. Two semesters of study in voice are required.

Ensembles. Six semesters of ensemble participation are required with at least four semesters in large groups.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Additional Requirements.

Four semesters of dance (DAN only)		4
BIO 201	Human Anatomy and Physiology I *SG*	4
PGS 101	Introduction to Psychology *SB*	3
PGS 466	Abnormal Psychology *SB*	3
PSY 230	Introduction to Statistics *CS* or STP 226 Elements of Statistics *CS* (3)	3
SOC 101	Introductory Sociology *SB*	3
Total		20

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

PERFORMANCE—B.M.

Guitar Concentration

Music Theory. The following music theory courses are required:

MTC 125	Basic Music Theory	3
MTC 221	Music Theory 18th Century	3
MTC 222	Music Theory 19th Century	3
MTC 223	Music Theory 20th Century	3
MTC 320	Modal Counterpoint or MTC 321 Tonal Counterpoint (2)	2
MTC 327	Form and Analysis I	3
Total		17

Music History. Three semester hours of MHL 341 Music History and three semester hours of MHL 342 Music History are required.

Repertoire and Pedagogy. Two semester hours of MUP 451 Repertoire and two semester hours of MUP 481 Performance Pedagogy and Materials are required.

Conducting. MUP 210 Beginning Instrumental Conducting is required

Major Performing Medium. Sixteen semester hours of MUP 127 Studio Instruction and 16 semester hours of MUP 327 Studio Instruction are required to attain a proficiency level necessary to meet the graduation recital requirements. A half recital (MUP 495 Solo Performance) and a full recital (MUP 496 Solo Performance) are also required.

Ensemble. Eight semester hours of ensemble are required within a minimum of six different semesters. Four of the eight semester hours must be MUP 379 Chamber Music Ensemble: Guitar.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

Additional Requirements. MHL 447 Music Since 1900 may be used to satisfy the General Studies L requirement.

Jazz Concentration

Music Theory. The following music theory courses are required:

MTC 125	Basic Music Theory	3
MTC 221	Music Theory: 18th Century	3
MTC 222	Music Theory: 19th Century	3
MTC 223	Music Theory: 20th Century	3
MTC 315	Modern Arranging	2
MTC 316	Modern Arranging	2
MTC 320	Modal Counterpoint or MTC 321 Tonal Counterpoint (2)	2
MTC 327	Form and Analysis I	3

NOTE: For the General Studies requirement, courses and codes (such as L, SQ, C, and H), see "General Studies," page 87. For graduation requirements, see "University Graduation Requirements," page 83. For an explanation of additional bus courses offered but not listed in this catalog, see "Classification of Courses," page 60.

MTC 440 Jazz Theory and Ear Training . . . 2
MTC 441 Jazz Con position 2

Total 25

Music History. The following music history courses are required.

MHL 341 Music History. 3
MHL 342 Music History. 3
MHL 352 The Evolution of Jazz *H* 3

Total 9

Conducting. MUP 210 Beginning Instrumental Conducting is required.

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction and eight semester hours of MUP 311 Studio Instruction are required to obtain a proficiency level necessary to meet the graduation recital requirements Two half recitals (MUP 495 Solo Performance) are required, with one in the jazz idiom

Improvisation. The following courses are required.

MUP 141 Jazz Fundamentals 1
MUP 142 Jazz Fundamentals 1
MUP 217 Improvisation Workshop 2
MUP 218 Improvisation Workshop 2
MUP 417 Advanced Improvisation 2
MUP 418 Advanced Improvisation 2

Total 10

Workshops. The following courses are required

MUP 319 Recording Studio Techniques 2
MUP 320 MIDI Workshop 2

Total 4

Ensemble. Eight semesters of ensemble are required, including six semesters of MUP 379 Chamber Music Ensembles and two semesters of MUP 386 Stage Band.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

Keyboard Concentration

Music Theory. The following music theory courses are required:

MTC 125 Basic Music Theory 3
MTC 221 Music Theory: 18th Century 3
MTC 222 Music Theory: 19th Century 3
MTC 223 Music Theory: 20th Century 3
MTC 320 Modal Counterpoint 2
or MTC 321 Tonal Counterpoint 2
MTC 327 Form and Analysis I 3
MTC 425 Studies in 20th Century Theory. 3
or MTC 428 Form and Analysis II (3)

Total 20

Music History. The following music history courses are required

MHL 341 Music History. 3
MHL 342 Music History. 3

Total 6

Repertoire and Pedagogy. The following courses are required:

MUP 451 Repertoire. 2
MUP 481 Performance Pedagogy and Materials 2
or MUP 482 Piano Pedagogy II (2)

Total 4

Conducting. One of the following two courses is required

MUP 209 Beginning Choral Conducting 1
MUP 210 Beginning Instrumental Conducting 1

Harpsichord. One semester hour of harpsichord is required.

Major Performing Medium. Sixteen semester hours of MUP 127 Studio Instruction and 16 semester hours of MUP 327 Studio Instruction are required to attain a proficiency level necessary to meet the graduation recital requirements. A half recital MUP 495 Solo Performance) and a full recital (MUP 496 Solo Performance) are required

Ensemble. Eight semester hours of ensemble within a minimum of six different semesters are required, including two semesters of accompanying and two semesters of chamber music.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Additional Requirements. MHL 447 Music Since 1900 may be used to satisfy the General Studies L requirement.

Music Theatre Concentration

Music Theory. The following music theory courses are required

MTC 125 Basic Music Theory 3
MTC 221 Music Theory 18th Century 3
MTC 222 Music Theory 19th Century 3
MTC 223 Music Theory 20th Century 3
MTC 327 Form and Analysis I 3

Total 15

Music History. The following music history courses are required.

MHL 341 Music History 3
MHL 342 Music History 3

Total 6

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction and eight semester hours of MUP 311 Studio Instruction are required to attain a proficiency level necessary to meet the graduation requirement of a public performance of two roles, both of which must be of major proportion.

Music Theatre. Five semesters of MUP 370 Music Theatre: Techniques, four semesters of MUP 371 Music Theatre

Workshops; eight semesters of MUP 373 Music Theatre: Performance, two semesters of MUP 374 Music Theatre Production, and one semester of MUP 451 Repertoire: Broadway Musicals are required.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Additional Requirements. Nine semester hours in theatre and 11 semester hours in dance are required. MHL 447 Music Since 1900 should be used to satisfy the General Studies L requirement

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

Opera Option. For those students whose goal is opera per formance, the following substitutions to the course of study may be made: MUP 451 Repertoire Opera instead of MUP 451 Repertoire: Broadway Musicals, and two semesters of MUP 371 Music Theatre Aria Preparation and three semes ters of MUP 250 Diction for Singers instead of five semester hours of dance. Permission of the director of the music theatre program is required.

Orchestral Instrument Concentration

Music Theory. The following music theory courses are required.

MTC 125	Basic Music Theory	3
MTC 221	Music Theory· 18th Century	3
MTC 222	Music Theory· 19th Century	3
MTC 223	Music Theory· 20th Century	3
MTC 320	Modal Counterpoint	2
	or MTC 321 Tonal Counterpoint (2	
MTC 327	Form and Analysis I	3
MTC 425	Studies in 20th Century Theory	3
Total		20

Music History. The following courses are required:

MHL 341	Music History	3
MHL 342	Music History	3
Total		6

Repertoire and Pedagogy. One of the following two courses is required:

MUP 451	Repertoire	2
MUP 481	Performance Pedagogy and Materials	2

Conducting. The following courses are required:

MUP 210	Beginning Instrumental Conducting	1
MUP 340	Instrumental Conducting	2
Total		3

Major Performing Medium. Sixteen semester hours of MUP 127 Studio Instruction and 16 semester hours of MUP 327 Studio Instruction are required to attain a proficiency level necessary to meet the graduation recital requirements. A half recital (MUP 495 Solo Performance) and a full recital (MUP 496 Solo Performance) are required

Ensemble. Eight semester hours of large ensembles within a minimum of six different semesters are required plus four semester hours of small ensembles within a minimum of four different semesters

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

Additional Requirements. MHL 447 Music Since 1900 may be used to satisfy the General Studies L requirement.

Piano Accompanying Concentration

Music Theory. The following music theory courses are required:

MTC 125	Basic Music Theory	3
MTC 221	Music Theory 18th Century	3
MTC 222	Music Theory 19th Century	3
MTC 223	Music Theory 20th Century	3
MTC 320	Modal Counterpoint	2
	or MTC 321 Tonal Counterpoint (2)	
MTC 327	Form and Analysis I	3
MTC 428	Form and Analysis II	3
Total		20

Music History. The following courses are required:

MHL 341	Music History	3
MHL 342	Music History	3
Total		6

Diction and Repertoire. The following courses are required·

MUP 250	Diction for Singers	1
MUP 451	Repertoire	2
MUP 453	Song Literature	2
MUP 454	Song Literature	2
Total		7

Conducting. One of the following two courses is required:

MUP 209	Beginning Choral Conducting	1
MUP 210	Beginning Instrumental Conducting	1

Major Performing Medium. The following courses are required:

MUP 127	Studio Instruction	16
MUP 311	Studio Instruction	8
MUP 327	Studio Instruction Piano Accompanying	8
Total		32

In addition, each student accompanies two half recitals (MUP 495 Solo Performance), one for a singer and one for an instrumentalist, during his or her junior year. (A half solo recital may be substituted for either of the above.) During the senior year, the student accompanies two full recitals (MUP 496 Solo Performance), one vocal and one instru mental.

NOTE: For the Genera Stud es requ rement, courses, and codes such as L, SQ C, and H) see "Genera Studies," page 87. For graduat on requ rements see "Un versity Graduat on Requirements," page 83 For an explanation of add t onal omn bus courses offered but not sted in this catalog, see C assif cation of Courses," page 60.

Ensemble. Two semesters of MUP 379 Chamber Music Ensembles, one semester of MUP 379 Chamber Music Ensembles (piano), one semester of MUP 487 Piano Accompanying, four semesters of MUP 388 Piano Accompanying, and two semesters of ensemble elective (minimum of six different semesters) are required.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Language. Eight semester hours of one foreign language (French, Italian, or German) are required.

Additional Requirements. MHL 447 Music Since 1900 should be used to satisfy the General Studies L requirement.

Voice Concentration

Music Theory. The following music theory courses are required:

MTC 125	Basic Music Theory	3
MTC 221	Music Theory: 18th Century	3
MTC 222	Music Theory: 19th Century	3
MTC 223	Music Theory: 20th Century	3
MTC 320	Modal Counterpoint	2
	or MTC 321 Tonal Counterpoint (2)	
MTC 327	Form and Analysis I	3
MTC 425	Studies in 20th-Century Theory	3
Total		20

Music History. The following music history courses are required:

MHL 341	Music History	3
MHL 342	Music History	3
Total		6

Repertoire and Pedagogy. Two semester hours of MUP 451 Repertoire and two semester hours of MUP 481 Performance Pedagogy and Materials are required.

Also required are two semester hours selected from MUP 453 Song Literature or 454 Song Literature or a repeated enrollment of MUP 451 Repertoire.

Diction. Three semester hours of MUP 250 Diction for Singers is required in Italian, German, and French.

Conducting. MUP 209 Beginning Choral Conducting is required.

Major Performing Medium. Sixteen semester hours of MUP 127 Studio Instruction and 16 semester hours of MUP 327 Studio Instruction are required to attain a proficiency level necessary to meet the graduation recital requirements. A half recital (MUP 495 Solo Performance) and a full recital (MUP 496 Solo Performance) are required.

Ensemble. Four different semesters of large vocal ensembles are required plus five semester hours of ensembles within five different semesters to be selected from large and/or small ensembles.

A performance of Mozart's *The Magic Flute*

Tim Trumble photo

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Language. Sixteen semester hours are required in more than one foreign language, chosen from French, German, and Italian. A student may select one year of one language and either one or two semesters of the other s), chosen in conference with the advisor

Additional Requirements. MHL 447 Music Since 1900 should be used to satisfy the General Studies L requirement.

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

THEORY AND COMPOSITION—B.M.

Composition Concentration

Music Theory. The following music theory courses are required·

MTC 125	Basic Music Theory	3
MTC 221	Music Theory 18th Century	3
MTC 222	Music Theory 19th Century	3
MTC 223	Music Theory. 20th Century	3
MTC 320	Modal Counterpoint	2
MTC 321	Tonal Counterpoint	2
MTC 327	Form and Analysis I	3
MTC 422	Musical Acoustics	3
MTC 425	Studies in 20th Century Theory	3
MTC 428	Form and Analysis II	3
MTC 429	Canon and Fugue	2
MTC 430	20th Century Counterpoint	2
MTC 432	Instrumentation	2
MTC 433	Orchestration	2
Total		36

Four semesters of MTC 323 Composition are also required, of which at least three must be taken at ASU

Music History. Three semester hours of MHL 341 Music History and three semester hours of MHL 342 Music His tory are required

Also required are three upper division elective semester hours in music history, not to include MHL 447 Music Since 1900.

Conducting. Choose between the two combinations of courses: MUP 209 Beginning Choral Conducting and MUP 339 Choral Conducting *or* MUP 210 Beginning Instrumental Conducting and MUP 340 Instrumental Conducting.

Applied Music. Twelve semester hours of study in applied music are required, eight of which must be in MUP 111 Stu dio Instruction.

Ensemble. Eight semesters of participation in an ensemble are required.

Final Project. MTC 495 Final Project is required.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Four semesters of class piano MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

Additional Requirements. MHL 447 Music Since 1900 should be used to satisfy the General Studies L requirement

Theory Concentration

Music Theory. The following music theory courses are required

MTC 125	Basic Music Theory	3
MTC 221	Music Theory 18th Century	3
MTC 222	Music Theory 19th Century	3
MTC 223	Music The ory 20th Century	3
MTC 320	Modal Counterpoint	2
MTC 321	Tonal Counterpoint	2
MTC 323	Composition	2 3
MTC 327	Form and Analysis I	3
MTC 422	Musical Acoustics	3
MTC 425	Studies in 20 th Century Theory	3
MTC 428	Form and Analysis II	3
MTC 496	Theory Project	3
Total		33 34

Also required are 10 semester hours of electives in MTC courses at the 300 level or above, to be chosen in consulta tion with advisor.

Music History. Three semester hours of MHL 341 Music History and three semester hours of MHL 342 Music His tory are required.

Also required are three upper division elective semester hours in music history, not to include MHL 447 Music Since 1900

Conducting. Choose between the two combinations of courses MUP 209 Beginning Choral Conducting and MUP 339 Choral Conducting *or* MUP 210 Beginning Instrumen tal Conducting and MUP 340 Instrumental Conducting

Applied Music. Twelve semester hours of study in applied music are required, eight of which must be in MUP 111 Studio Instruction.

Ensemble. Eight semesters of participation in an ensemble are required.

Final Project. MTC 496 Theory Project is required

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Language. The equivalent of 16 semester hours in one for eign language is required. The choice of language is subject to approval of advisor

Diagnostic Examination. Four semesters of class piano (MUP 131, 132, 231, 232), unless waived by a diagnostic examination at the time of entrance, are required.

Additional Requirements. MHL 447 Music Since 1900 should be used to satisfy the General Studies L requirement

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NOTE: For the Genera Stud es requ rement, courses and codes such as L SQ C, and H) see Genera Studies page 87 Fo graduat on requ rements, see "Un versity Graduat on Requirements, page 83. For an exp anation of add t onal omn b s courses offered but not sted n this cata og see "C assif cation of Courses, page 60.

MUSIC MINOR

The School of Music offers a minor in music consisting of 20 semester hours of course work. A minimum grade of "C" is required in all courses.

MHL 341 Music History	3
MHL 342 Music History	3
MTC 125 Basic Music Theory	3
MTC 221 Music Theory 18th Century	3
Electives	8
Total	20

Interested students should contact the School of Music for specific requirements and admission procedures.

GRADUATE PROGRAMS

The faculty in the School of Music offer graduate programs leading to the following degrees: Master of Arts, Master of Music, and Doctor of Musical Arts. Refer to the "College of Fine Arts Graduate Degrees and Majors" table, page 266, for a list of majors and concentrations. A document on graduate degree programs in music may be obtained by contacting the School of Music See the *Graduate Catalog* for information on all graduate degrees

MUSIC HISTORY/LITERATURE (MHL)

MHL 201 MacLiteracy for Musicians. 3) F, S, SS
Instruction in basic Macintosh computer literacy, including generic applications and music specific programs with hands-on experience. Lecture/lab *General Studies CS*

MHL 341 Music History. (3) F S
Western music from the Greeks to the present day Need not be taken in sequence with MHL 342 Prerequisite MTC 221.

MHL 342 Music History. (3) F S
See MHL 341 Prerequisite MTC 221

MHL 344 Music in World Cultures. (3) S
Examination of the relations among music, dance theatre religion, and social status in Asia Africa Oceania, Europe, and the United States *General Studies HU G*

MHL 352 The Evolution of Jazz. 3) N
Origin development, and styles of jazz music and its exponents Prerequisite MTC 223 *General Studies H*

MHL 363 Survey of Russian Music. (3) F 2001
Examines music and musicians in Russia the Soviet Union and the post Soviet CIS from the Middle Ages to the present. Lecture discussion Prerequisite MHL 342 or instructor approval *General Studies. HU*

MHL 438 Music in the Classic Era. (3) F 2000
Development of the classic style of the 18th century, major works of Haydn, Mozart and Beethoven Prerequisites: MHL 341 342; MTC 327 *General Studies H*

MHL 439 Music in the 19th Century. (3) S
European art music after Beethoven Prerequisites MHL 341, 342, MTC 327 *General Studies. L H.*

MHL 441 Music of the Baroque Era. (3) F 2001
Works of major composers and stylistic tendencies of the period. Prerequisites: MHL 341 342 MTC 327 *General Studies. L*

MHL 447 Music Since 1900. (3) F, SS
Survey of the works by major composers and stylistic trends Prerequisites MHL 341, 342; MTC 327 *General Studies L*

MHL 456 History of Opera. (3) S 2001
The development of opera from its creation c 1600 to present Emphasis placed on major stylistic developments and representative works Prerequisites MHL 341, 342: MTC 222

MHL 466 North American Indian Music. 3) S 2001
Various styles of Indian music in the United States Canada, and Mexico Open to Music majors and nonmajors. *General Studies: L/HU, C.*

MHL 532 Music Bibliography. (3) F
Major historical and analytical writings systematic and historical collections of music Reading knowledge of a foreign language recommended

MHL 535 Medieval Music. (3) S 2001
Music of Europe in the Middle Ages, Gregorian chant, religious and secular monophony and polyphony to 1400.

MHL 536 Music of the Renaissance. (3 S 2002
Music in Europe with emphasis on stylistic concepts and changes c 1400–1580.

MHL 544 World Music I. (3) F 2001
Music of traditional and folk cultures of Africa, Europe, and the Americas

MHL 545 World Music II. 3) F 2000
Traditional folk, and art music of the Pacific, Near East, and Asia

MHL 547 Topics in American Music. (3) N
Selected topics in the history of music. Composers working in the Americas with emphasis upon music since 1900

MHL 557 Topics in Symphonic Literature. (3) S 2002
An examination of the evolution of the symphony and symphonic poem from the early classic era through the 19th century, with emphasis on the analysis of selected works

MHL 564 History of Music Instruments. (3) F 2000
Survey of the history and development of music instruments in traditional, folk and art cultures

MHL 566 Area Studies in Ethnomusicology. (3) S
Study of the music of a particular culture country, or area (e g music of Mexico Latin America, China, Africa). May be repeated for credit.

MHL 568 Introduction to Ethnomusicology. (3) F 2001
Introduction to the theory and methodology of the discipline, including bibliography, fieldwork transcription analysis, and organology.

MHL 575 History of Choral Music. (3) F
Major choral works

MHL 591 Seminar. (1 12) N

MHL 592 Research. (1 12) N

MHL 599 Thesis. (1–12) N

MHL 644 Notation of Polyphonic Music. (3) S 2002
Music notation from the 15th through 17th centuries including problems of transcription into modern notation

MUSIC THEORY AND COMPOSITION (MTC)

MTC 125 Basic Music Theory. (3) F, S
Notation, scales keys, modes intervals chords basic part writing Development of related aural skills through sightsinging and dictation Prerequisite: Music major or instructor approval

MTC 221 Music Theory: 18th Century. (3) F, S
Styles, techniques and idioms of 18th century music, emphasis on analysis, composition (part writing) and related aural skills with applications for performance. Prerequisite: MTC 125

MTC 222 Music Theory: 19th Century. (3) F S
Styles techniques, and idioms of 19th century music, emphasis on analysis, composition (part writing), and related aural skills, with applications for performance. Prerequisite: MTC 221

MTC 223 Music Theory: 20th Century. (3) F, S
Styles techniques, and idioms of 20th century music emphasis on innovative treatments of musical elements: related aural skills Prerequisite: MTC 222

MTC 315 Modern Arranging. (2) F
Techniques in arranging for the contemporary jazz radio television and studio orchestra. Prerequisite MTC 223.

MTC 316 Modern Arranging. (2) S
Continuation of MTC 315. Prerequisite: MTC 315.

MTC 320 Modal Counterpoint. (2) F
Counterpoint based on 16th century vocal polyphonic style Prerequisite MTC 221.

MTC 321 Tonal Counterpoint. (2) S
Counterpoint based on 18th-century polyphonic style Prerequisite MTC 221.

MTC 323 Composition. (2 3) F, S
Writing music compositions, with emphasis on basic techniques and smaller structures. May be repeated for credit Prerequisite: instructor approval.

MTC 327 Form and Analysis I. (3) F S
Organ z ng e ements in the most important contrapunta and homophon c mus ca forms from the Rena ssance through the 19th century Prerequ s te: MTC 222

MTC 422 Mus cal Acoustics. 3 F
Propert es of sound and tone Harmonic ser es, instruments, the ear aud tor um acoust cs and the reproduction of sound A thorough know edge of musica notat on nterva s, scales, and harmony, or 2 years of mus c theory is assumed

MTC 425 Studies in 20th-Century Theory. (3) F
Cont nued deve opment of ana yt ca techn ques and aural ski l, with an exam nation of theoret ca systems appl cable to 20th-century mus c Prerequis te MTC 223

MTC 428 Form and Analysis II. 3) S
Organiz ng pr nc p es of the large forms of mus ca compos tion n the 19th and 20th centur es Prerequ site MTC 327

MTC 429 Canon and Fugue. (2) F 2001
Writ ng of canons and fugues n tona sty e Prerequisite: MTC 321

MTC 430 20th-Century Counterpoint. (2 S 2002
Counterpo nt studies ut izing 20th ce tury d oms Prerequisite MTC 223.

MTC 432 Instrumentation. (2) F 2000
Study of the character st cs and performance techn ques of individua orchestra nstruments Prerequis te MTC 223.

MTC 433 Orchestration. (2) S 2001
Theoretical and pract ca study of scor ng mus c for orchestra Prerequisite· MTC 432.

MTC 436 Electronic Studio Techniques I. (2) F
Pr nc p es of analog e ectron c mus c systems and the r appl cation in the compos t on of e ectron c mus c A thorough know edge of music notat on and ntervals s assumed

MTC 437 Electronic Studio Techniques II. (2) S
Pr nc ples of d g ta e ectron c music systems and their app ication ons in the compos t on of e ectron c mus c Prerequ s te MTC 436

MTC 440 Jazz Theory and Ear Training. (2) F
Advanced study of jazz harmon c systems Da y oral dr ls Prerequ site: MTC 223

MTC 441 Jazz Composition. (2) F
Creat ve wr ting n the sma er forms and n the d om of jazz. Prerequ site MTC 321

MTC 495 Final Project. 0) F S
A half rec tal of compos tions or approval of a arge scale compos t on or a research paper.

MTC 496 Theory Project. (3 F S
Superv sed nd v dua writing project deal ng with mus c theory

MTC 516 Baroque Music. (3 S 2002
Deta ed ana ys s of se ected examples of mus c from the Baroque per od

MTC 517 Classic Music. 3) S 2001
Deta led ana ys s of se ected examples of mus c from the Class c period

MTC 518 Romantic Music. 3) F 2000
Deta led analys s of se ected examp es of music from the Romantic period

MTC 519 Late 19th- Early 20th-Century Music. 3 F 2001
Deta led analys s of se ected examp es of mus c from the late 19th and ear y 20th centuries

MTC 520 Analytical Techniques. (3 S, SS
Ana yt ca techn ques systemat ca ly app ied to mus c Concentration on structura and compos tiona procedures

MTC 523 Advanced Composition. 2 3) F S
Advanced m s c compos t on, nc ud ng comp ex techniques and arger structure. May be repeated for cred t Prerequis te nstructor approva

MTC 525 Pedagogy of Theory. (3) F 2000
Practices and pr nc p es of teaching music theory. Emphasizes most desirable and pract ca offer ngs poss b e Comparat ve studies of exist ng pract ces

MTC 527 History of Music Theory. (3) N
Theory from Pythagoras to the 16th century Need not be taken in sequence with MTC 528

MTC 528 History of Music Theory. (3) N
Theory from the 17th century to the present Need not be taken n sequence with MTC 527

MTC 555 Computer Music Notation. (2) N
Instruct on in preparing score and parts of mus c composit ons using various mus c notat on software packages Cred t cannot be applied toward the graduate theory requ rement. Lecture, ab. Prerequ site: nstructor approva .

MTC 591 Seminar. (1–12) N

MTC 592 Research. (1 12) N

MTC 599 Thesis. (1–12) N

MTC 647 Directions in New Music. (3) N
Stud es n contemporary idioms and aesthetics drawn from recent works of visiting composers involves analyt cal d scourse, cnt ca writ ng, and app ed concepts n composit'on Lecture d scuss on, exer cise Prerequ s te instructor approval.

MTC 723 Advanced Composition. (3) F, S
Special problems n writ ng in complex forms and textures May be repeated for credit Stud o

MTC 755 Music Composition Technology. (3) N
Advanced study in dig tal sampl ng, synthes s, sequencing, computer generated sound, and computer/performer interfaces. May be repeated for credit Lecture, lab Prerequisites: MTC 436 and 437 *or* equiva ents.

MUSIC EDUCATION (MUE)

MUE 110 Introduction to Music Education. (1) S
Overv ew of music education Or entation to student character st cs, teacher ro es and foundations of ph osophy and history School observat ons requ red

MUE 161 Introduction to Music Therapy. (2) F
Overv ew of the profess on of music therapy and ts applicat ons n mental health rehab itat on and spec a education

MUE 211 Music in Recreation. (2) F
Materials methods, and organ zat ona structures appropr ate for rec reat ona mus c Prerequ s te ab l ty to read mus c, as determined by the nstructor

MUE 261 Music Therapy as a Behavioral Science. (2) F
Orientat on to prechnical experience w th an emphas's on observat on sk l s assessment, goal setting and profess'ona eth cs Requ red off-campus observat ons Prerequ s te: MUE 161

MUE 310 Music in Early Childhood Education. (3) S
Ident fying and understand ng mus cal needs of young ch ldren Meth ods and materials for program deve opment for c assroom teachers

MUE 311 Music for the Classroom Teacher. (3) F, S
Deve opment of the classroom music program in the e ementary schoo No previous mus c experience or course work required Prerequ s te non Mus c major or minor.

MUE 313 Elementary Music Methods. (3) F
Methods of nstruction, plann ng, and presentat on of appropr ate contents in mus c. For mus c educators and mus c therap sts. Prerequ s te Mus c major

MUE 315 General Music in the Secondary Schools. 2) F S
Curr cu um student characterist cs and teach ng strategies for gen era music Prerequ'site: Music major

MUE 317 Educational Methods for Violin and Viola. (1) F, S
Teach ng and p aying sk l s for music teachers 3 hours per week

MUE 318 Educational Methods for Cello and String Bass. (1) F, S
Teach ng and p aying sk l s for music teachers. 3 hours per week

MUE 327 Educational Methods for Trumpet and Horn. 1) F, S
Teach ng and p aying ski s for music teachers 3 hours per week.

MUE 328 Educational Methods for Trombone, Euphonium, and Tuba. (1 F, S
Teach ng and p aying skil s for mus c teachers 3 hours per week

MUE 335 Educational Methods for Guitar. (1) F, S
Teaching and playing ski ls for mus c teachers. 3 hours per week

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NOTE: For the Genera Stud es requirement, courses and codes (such as L SQ, C and H) see "General Stud es," page 87. For graduat on requirements, see Un versity Graduation Requ rements" page 83 For an exp anation of additiona omn bus courses offered but not sted n th s cata og see "C ass f cat on of Courses" page 60

MUE 336 Educat'onal Methods for Percussion. (1 F S
Teach ng and p ay ng sk s for music teachers 3 hours per week.

MUE 337 Educat'onal Methods for Flute, Clarinet, and Saxophone. (1 F S
Teach ng and p ay ng ski ls for mus c teachers 3 hours per week

MUE 338 Educational Methods for Double Reed Instruments. 1 F S
Teach ng and p ay ng sk s for music teachers 3 hours per week

MUE 361 Music Therapy Theory and Practice in Psychopathology. 3 F
Influence of mus c on behav or pr nc p es and pract ces of mus c ther apy and psych atr c c ients Prerequ s tes MUE 211, 261 Mus c Ther apy major

MUE 362 Music Therapy Techniques. 3 S
Organizat on adm n strat n, and use of mus c in rehab tat on w th var'ous c ent popu at ons Prerequis tes· MUE 361 Mus c Therapy major.

MUE 381 Music Therapy Research. (3) S
Stat stics and research des gn appropr ate for nvest gat ons n mu ic therapy *Genera Stud es L*

MUE 384 Therapy Preclinical I. (1) F S
Pa red students w provide mus c therapy for sma groups at a com mun ty agency for menta y retarded ger atr c r phys ca y d sab ed c ents for a min mum of 10 clock hours Prerequ s tes MUE 211 261

MUE 385 Therapy Preclinical II. (1 F, S
nd v dua placement in ASU Mus c Therapy C n c

MUE 386 Therapy Preclinical III. 1) F S
See MUE 385

MUE 387 Therapy Preclinical IV. (1 F S
ndiv dua cl n ca w rk n a c mmun ty mental hea th fac ty

MUE 388 Therapy Preclinical V. (1 F S
See MUE 387

MUE 389 Repertoire for Music Therapy 3 S
Mus c sk ls reperto re for mus c therapy nc ud ng un t o brass, str ngs woodwinds e ectronic nstruments computer mus c, and improv at on techn ques Lab Prerequ s tes MUE 211 Mus c Ther apy major.

MUE 441 Psychology of Music. (3 S
Psycho og cal and phys olog ca aspects f mus c emphas z ng mus ca behav or funct on percept on and earn ng Prerequ s tes· jun or stand ng Mus c Therapy major (or nstruct r app ova)

MUE 475 Group Process and Music Therapy. 1 F
Pr nc p es of group process, verba counse ng pr fess ona wr t ng as re ated to mus c therapy pract ce Prerequ s tes MUE 362, Mus c Therapy major

MUE 476 Internship in Music Therapy. 1 F, S
A fu t me 6 month off ampus res dency n an approved c n ca nstitut on

MUE 480 Choral Methods. 3 S
Methods f instruction organ zat on, and presentat f appropr ate content n chora mus c c asses. Prerequ s te Secondary Educat on major

MUE 481 Instrumental Practicum Methods. 5 F
Instrumental mus c as a means of developing music sk s, under stand ngs and att tudes n e ementary and secondary sch o stu dents Prerequis te Secondary Educat on ma or

MUE 482 Instrumental Practicum Methods. (5 S
See MUE 481 Prerequ s tes MUE 481 or 485 , Secondary Educa t on maj r

MUE 485 String Practicum Methods. (2) F
For students prepar ng to adm nister a string program and teach str ngs at the e ementary leve Lecture ab

MUE 548 Introduction to Research in Music Education. 3 F SS
Survey of research methods and terature n mus c educat on. Focus on nterpretat on and evaluat on

MUE 549 Foundations of Music Education. (3) A
A treatment of historica perspect ves ph osophy aesthet cs 'dent'f ed w th mus c education and learn ng theor es app ed to mus c tea h ng/ earning Bas c research and wr ting sk s appropr ate to graduate studies n mus c educat on

MUE 550 Studies in Music Curricula. (3 A
Scope and sequence of mus ca exper ences Deve opment of cr ter a for the eva uat on of mus c curr cu a

MUE 551 Advanced Studies in Elementary School Music. (3) A
For exper en ed teachers· organ zat on and content of the general mus c c asses n k ndergarten and the f rst 6 grades of e ementary s h o Emphas n tea h g mus c read ng and ear tra n ng to young ch dren

MUE 552 Advanced Studies in Secondary General Music. (3) A
Organ zat on and content of schoo music classes that are not performance or ented

MUE 553 Contemporary E ementary Music. (3 N
dent f cat on and deve opment of mater a s and techn ques for teach ng spe a un ts of mus c study to e ementary K–8) ch ldren

MUE 560 Jazz Pedagogy. 3) S 2001
Study of pedagogy repert re and techn que of instruct on in jazz sty es ensemb e techn ques and performance pract ce for schoo ensemb es Lecture ab d scuss'on observat on Prerequ s te M M. Mus c Educat on major

MUE 562 Jazz Ensemble Rehearsal Techniques. (1) F S
Conduct ng and rehearsa techn ques for school jazz ensembles Lab. Prerequ s te M M Mus c Educat on major

MUE 564 Instrumenta Music, Advanced Rehearsal Techniques. 3 A
An n depth ana ys s of nstrumenta techn ques n preparation for a th rough d scuss on f band tun ng prob ems and so utions. Discuss on of pr du t ve c nduct ng and rehearsa techniques for schoo mus tea hers

MUE 566 Instrumental Literature for Schools. 3) A
Comprehens ve study and ana ys s of a types of nstrumenta mus c.

MUE 568 Choral Music, Advanced Rehearsal Techniques. (3) A
Mus ca and vocal techn ques necessary for presentat on of chora t erature A a ys s and exper mentat on w th psycholog ca acoust ca , and other prob ems of rehearsa and performance

MUE 570 Chora Literature for Schools. 3 A
Comprehens ve study and a a ys s of chora mus c for the h gh school w th spec a emphas s on octavo terature

MUE 579 Psychology of Music. 3 A
The nature f mus ca ty and ts eva uat on A rev ew of recent research

MUE 585 Vocal Acoustics and Production. 3) A
An n depth approach t the psycho og ca phys o og ca workings of the voca mechan sm

MUE 733 Contemporary Issues and Research in Music Educat on 3 A
Emphas s upon recent research re at ng to mus c nstruction at a l ev e curre t and h st r ca ssues n chora , genera and instrumenta m s c

MUE 744 Higher Education Instruction 3 A
Ph osoph ca and psycho og ca princ ples of co ege un vers ty teach ng Patterns of mus c teacher educat on and a project on of course out nes

MUE 755 Phi osophy and Aesthetics in Music Education. (3) SS
Ph sophy and aesthet cs as they nf uence curr cu um content and teach ng p ocedures

MUSIC PERFORMANCE (MUP)

MUP 100 Concert Attendance. 0) F, S
Requ red of a us c maj rs for 6 semesters n each degree program w th a m n mum of 4 convocat ons attended each semester

MUP 111 Studio Instruction. 2 F S
For majors n Mus c degree program Bassoon cel o c arinet contrabass c rnet euphon um f ute gu tar, harp harps chord horn oboe, orga perc ss on, p a o saxophone trombone trumpet tuba, v ola v o n vo ce M n mum contact of 1 hour p us stud o c ass weekly May be repeated for cred t May not be taken for aud t. Prerequis tes. p acement exam nat on and aud t on

MUP 121 Studio Instruction. 1) F S, SS
For secondary or m nor instrument nstruct on and nonmajors n the un versity Basso n cel o c arinet, contrabass cornet euphon um f ute gu tar harp, harps chord horn, oboe organ, percuss'on, p ano

saxophone, trombone, trumpet tuba v o a vio n, vo ce M nimum contact of 1 2 hour per week May be repeated for cred t. May not be taken for audit Prerequ s tes p acement examination and aud tion.

MUP 127 Studio Instruction. (4) F S
For Performance majors in Bache or of and Master of Music degree programs on y Bassoon, cel o c annet contrabass cornet eupho- n'um flute, gu'tar harp, harpsichord, horn oboe organ percuss on, p ano, saxophone, trombone trumpet tuba, viola, vio in voice Min mum contact of 1 hour p us studio c ass week y May be repeated for credit. May not be taken for aud t Prerequisites· placement exam na t on and audit on.

MUP 130 Beginning Group Piano. (1) F S
Prov des a bas c ntroduct on to playing p ano through music read ng, chords rhythm c, and written act'vit es. Prerequ'site: non Mus c major.

MUP 131 Class Piano. (1) F, S
A four-semester sequence (with MUP 132, 231 and 232) des gned for those with litt e or no p ano exper ence Emphas s on keyboard tech- n que, s ght read ng, simple accompan ments, and mprov sat on 2 hours per week. May not be taken for aud t Prerequisite· Music major

MUP 132 Class Piano. (1) S
See MUP 131

MUP 133 Class Voice. (1) F, S
A four semester sequence (MUP 134 233, and 234) open to a l stu dents 2 hours per week May not be taken for aud t

MUP 134 Class Voice. (1) F, S
See MUP 133 Prerequ s te: MUP 133 or instructor approva .

MUP 141 Jazz Fundamentals. (1) F
Principles methods and theory of jazz performance, especia y designed for the sma l jazz ensemb e. 2 hours per week.

MUP 142 Jazz Fundamentals. (1) S
Continuation of MUP 141. 2 hours per week

MUP 209 Beginning Choral Conducting. 1) F S
Essentials of chora conduct ng techn ques 2 hours per week

MUP 210 Beginning Instrumental Conducting. 1) S
Essentials of instrumental conduct'ng techn'ques 2 hours per week

MUP 217 Improvisation Workshop. (2) F, S
Emphas s on bas c jazz l terature, chord symbo read ng, melodic pat terns ear tra n ng me od c concepts, and ana ys s of improvised solos. Must be taken n sequence with MUP 218 May not be taken for audit. Prerequ s tes MTC 125; MUP 111 (1 semester)

MUP 218 Improvisation Workshop. (2) F S
Continuat on of MUP 217. Prerequ site· MUP 217

MUP 231 Class Piano. (1) F
See MUP 131

MUP 232 Class Piano. (1) S
See MUP 131

MUP 233 Class Voice. (1) F S
See MUP 133. Prerequis te MUP 134 or nstructor approval

MUP 234 Class Voice. (1) F S
See MUP 133. Prerequis te MUP 233 or nstructor approva

MUP 235 Jazz Piano. (1) F
A 2 semester sequence (w th MUP 236) des gned for jazz keyboard exper ence Emphas's s on chord symbol read ng, s'mple mprov sa t on, and vo c ng 2 hours per week Prerequ s te: MUP 132

MUP 236 Jazz Piano. (1) S
See MUP 235 Prerequisite MUP 132

MUP 250 Diction for Singers. (1) F S
Use of phonet cs n the study of song and opera l terature Language emphasis d ffers each semester. May be repeated for cred t

MUP 301 Advanced Class Piano. (1) F
Requ red for the choral-general concentrat on of the Music Educat on major Open to other mus c majors who have comp eted MUP 232 Emphas s on accompan ments ensemble p ay ng score reading advanced harmon zations, reperto re technique and improvisation 2 hours per week May not be taken for audit Prerequ s tes MUP 232 (or prof c ency) placement exam nation

MUP 302 Advanced Class Piano. (1 S
Requ red for the chora genera concentrat on of the Music Educat on major. Open to other mus c majors who have comp eted MUP 301. A sequential cont nuat on of MUP 301 sk ls that inc ude both group and stud o instruct on 2 hours per week May not be taken for audit. Pre- requ s tes MUP 301 or profic ency) p acement exam nat on

MUP 311 Studio Instruction. (2) F S
See MUP 111.

MUP 319 Recording Studio Techniques. (2) S
Study of both analog and d gital record ng methods Lab t me on record ng conso e and tape mach nes s nc uded Lab

MUP 320 MIDI Workshop. (2) F
Presentat on of hardware and software app cat ons for sequenc ng and music print ng Lab.

MUP 321 Studio Instruction. 1) F, S SS
See MUP 121.

MUP 327 Studio Instruction. (4) F, S
See MUP 127.

MUP 337 Studio Instruction: Piano Accompanying. (2 S
Lessons for Performance majors w th a concentrat on in p ano accom pany ng only. Reperto re to be se ected from voca and nstrumental iterature. 1 hour esson per week May be repeated for cred t Prereq u site p acement exam nat on

MUP 339 Choral Conducting. (2) F S
E ements of chora conducting techn que and nterpretat on 3 hours per week Prerequ s te· MUP 209.

MUP 340 Instrumental Conducting. (2) F
Fundamenta s of score reading and nterpretat on of nstrumenta mus'c 3 hours per week Prerequ s te MUP 210

MUP 344 Chamber Orchestra. (1) F, S
Important masterpieces from a l periods of music are performed throughout the year Membersh p by aud t on May be repeated for credit

MUP 345 Symphony Orchestra. (1) F, S
Open to a l students who can qual fy on the bas s of audit ons w th the director Over a 4-year period the student is ntroduced to the master pieces of symphony orchestra literature. 3 times per week May be repeated for cred t

MUP 346 Sinfonietta. (1) F S
Symphonic orchestra that presents approximately s x concerts annu al y, perform ng masterp eces of the class ca reperto re. 3 t mes per week May be repeated for cred t Prerequ's te: aud tion w th director

MUP 350 Choral Union. (1) F S
Open to a students in the un versity and to interested s ngers n the commun ty by audit on. Preparat on and performance of the arger chora works. 2 hours per week May be repeated for credit.

MUP 352 Concert Choir. (1 F, S
mportant masterp eces from a l per ods of music w l be performed May be repeated for credit. Prerequ site nstructor approval

MUP 353 University Choir. (1) F, S
4 hours per week. May be repeated for credit Prerequ s te nstructor approva .

MUP 355 Men's Chorus. (1) F S
Open to a male students n the univers ty who can qua fy on the bas s of aud t ons Rehearsa and performance of mus c for male voices. 3 hours per week. May be repeated for credit Prerequ s te instructor approva

MUP 357 Women's Chorus. 1) F S
2 hours per week. May be repeated for credit Prerequ s te nstructor approval

MUP 361 Marching and Concert Bands. (1 F, S
Open to a students who can qualify on the bas s of aud tions w th the d rector. Staging of formations and dr ls for footba games and other events (fa); masterpieces of symphonic band terature (spr ng) Meets da ly May be repeated for cred t

MUP 370 Music Theatre: Techniques. (1) F S
Exerc ses and mprov sat ons for the singer actor emphas z ng body awareness, bas c mus c theater performance sk ls and freedom of the voca and breath mechan sms Sect on 1 (Movement for S ngers ; Sect on 2 (Express on), Sect on 3 (Interpretation , Section 4

NOTE: For the Genera Stud es requ rement courses and codes (such as L SQ, C and H) see "General Studies," page 87 For graduat on requ rements see "Un vers ty Graduat on Requirements," page 83 For an exp anat on of add tional omn bus courses offered but not isted n th s cata og, see C assification of Courses," page 60

Adva ced Express on Sect n 5 Advanced Interpretat on) Sect ons 2 through 5 must be taken n sequen e. Each section 3 hours per week May be repeated for cred t

MUP 371 Mus c Theatre: Workshops. 1 F S
Deve opment of spe f c sk s f r mus a dramat c nterpretat on Sec t on 1 (Ar a P eparat on Sect n 2 Br adway) Sect on 3 Broadway Each sect on 1 hour ecture demonstrat on 1 ab per week May be repeated for ed t

MUP 372 Mus c Theatre: Orchestras. (1 F S
Open to a students wh an qua fy on the bas of audit ons w th the nstruct r Pa t c pat n n 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 ed t Prerequ s te nstructor appr va

MUP 373 Mus c Theatre: Performance. 1 F S
Open t a students who can qua fy on the bas s of audit ons w th the stru to Part c pat n n Lyr c Opera Theatre product ons Sect on 1 Pr c pa Ro es ; Sect on 2 Chorus May be repeated for cred t. Pre requ s te nstructor appr va

MUP 374 Music Theatre: Production. (1 F S
Part c pat o n Lyr Opera Theatre pr duct ons Sect on 1 (Voca Per f rmance , Sect on 2 Techn ca Mus c Theatre); Sect o 3 Prob ems n Product on to be taken concurrent y w th MUP 373 Sect on 2 May be repeated for cred t

MUP 376 New Mus c Ensemble. 1 F S
Rehearsa and performance of mu c written i the ast 20 years May be repeated for cred t Prerequ s te nstructor approva

MUP 377 Brass Choir. 1 F S
Spec a z g pub c performance of mus c wr tten for brass nstru me ts 2 hours pe week May be repeated for credit Prerequ s te n tructor approva

MUP 379 Chamber Music Ensembles. 1 F S
Bra s gu tar keyb ard m xed percuss on str ng, voca and wood- w nds ensemb es 2 hour per week May be repeated for cred t Pre requ te nstr ctor approva

MUP 382 Collegium Musicum. 1 N
S gers a d nstrumenta sts spec a z ng n the performance of early and unu ua m s c 2 h urs per week May be repeated for cred t Pre- requ s te nstru tor appr va

MUP 385 Percussion Ensemb e. 1 F S
Rehearsa a d performan e of standard and or g na reperto re for the percuss e e b e and re ated nstruments 2 ho rs per week May be repeated f r cred t Prerequ s te nstruct r approva

MUP 386 Stage Band. 1 F S
Rehearsa and performance of terature for the stage band 4 hours per we k May be repeated f r cred t Prereq s te nstructor approva

MUP 387 Ethnomusicology Ensembles. 1 F S
Perf rman e earn ng experience for the mus c of var ous cu tures of the wor d May be repeated for cred t Prerequ s te know edge of n trument or tru tor appr val

MUP 388 Piano Accompanying. 1 F S
Acc mpany ng ma ors others at the d scret on of nstr ctor P ano accompan ments f nd n vocal and nstrumenta terature d scuss on of sty es and performance pr ct ces exper ence n publ c perfor mance 2 hours per week May be repeated f r cred t

MUP 417 Advanced Improv'sation. 2) F S
Emphas s on ana ys and performance of advanced jazz terature, compos t on conte pora y sty es Must be taken n sequence w th MUP 418 May not be ta en for aud t Prerequ s te MUP 218

MUP 418 Advanced Improv sation. 2 F S
C nt nuat of MUP 417 Prerequ s te MUP 417

MUP 440 Keyboard Harmony. 1 F
Performance r ented ass emphas z ng chord progress ons, harmo- n zat on f gured bass rea zat on sty stic improv sat n transpos tion open score read g a d s ght read ng Prerequ site Performance m or w th a c central on keyboard or nstructor approva

MUP 451 Repertoire 2 F S
L terature ava ab e for performa ce a perf rm ng med a May be repeated f cred t Pre equ s te un or stand ng n major performance f e d

MUP 453 Song Literature. 2 A
ar y Ita an Eng sh German and French art song

MUP 454 Song Literature. 2 A
Amer an, Russ an Span sh, Scand nav an and contemporary song

MUP 481 Performance Pedagogy and Materials. (2 N
Pr nc p es and methods of performance techn ques for each perfor mance f e d May be repeated for cred t Prerequ s te sen or stand ng r r structor approva

MUP 482 Piano Pedagogy II. 2 N
C nt nuat on of MUP 481 (P ano Prob ems and techn ques of teach ng ntermed ate to advanced p ano students Prerequis tes jun or stand ng as piano major 'nstru tor approva

MUP 487 Piano Accompanying. (1) F S
Keyb ard ma'ors P ano acc mpan ments found n vocal and nstru menta terature· d scuss on of sty es and performance pract ces experience n pub c performance 2 hours per week. May be repeated for cred t May not be taken for aud t.

MUP 495 Solo Performance. 0 F, S
For cand dates of a Bache or of Mus c degree n Performance n wh ch 1 2 rec ta is a graduat on requ rement.

MUP 496 Solo Performance. 0 F, S
For cand dates of a Bache r of Music degree n Performance n which a ful rec ta is a graduat on requ rement. Prerequisite MUP 495

MUP 507 Group Piano Practicum. 2 F
Curr cu a mater als and teach ng techn ques for group teach ng at the un vers ty and c mmunity co ege evels Observation supervised tea h ng n gr up p ano

MUP 508 Studio Observation. (1) F S
Week y observat on of stud o teach ng by var ous p ano facu ty Paper as f na requ rement Prerequ s te M M performance pedagogy piano student

MUP 509 Jazz Keyboard Harmony. (1 F
Emphas s on jazz chords and chord progressions harmon zat on, vo c ng and ana ys s of transcript ons Lab Prerequ s te M M. Music Educat on student

MUP 510 Jazz Keyboard Harmony. (1 S
Cont nuat on of MUP 509 Lab Prerequ s te MUP 509

MUP 511 Studio Instruction. 2) F S
F ma ors in Music degree program Bassoon, cel o clar net contra bass cornet euphon um f ute gu ta , harp harps chord, horn, oboe rgan percuss on p ano sax phone trombone trumpet, tuba vio a v o vo ce M n mum ntact of 1 hour p us stud o c ass week y May be repeated f r cred t May ot be taken for aud t Prerequ s tes p a ement exam nat on and aud t on

MUP 517 Advanced Improvisation. (1 F
mprov sat on techn ques w th n the context of advanced 'azz itera- tu e Must be taken in seq en e w th MUP 518 Lab Prerequisites p acement examinat on and aud t on

MUP 518 Advanced Improvisation. (1) S
C nt nuat n of MUP 517 Lab Prerequ s te MUP 517

MUP 521 Studio Instruction. (1 F S, SS
For secondary r m nor instrument nstruction and nonmajors 'n the un vers ty Bassoon ce o c ar et contrabass, cornet, euphon um f ute gu tar, harp harps ch rd, horn oboe organ percuss on piano saxophone trombone, trumpet tuba, v o a v o in vo ce M n mum ontact of 1 2 hour per week May be repeated for credit May not be taken for aud t Prerequ s te p acement exam nat on and aud t on

MUP 527 Studio Instruction. 2 or 4 F S
For Performance majors n Master of Mus c degree program on y Bas s on ce lo, c ar net contrabass corr et e phon um f ute guitar harp harps chord ho n boe o gan percuss on p ano saxophone trombone trumpet tuba v o a vio n vo ce M n mum contact of 1 2 h ur per week May be repeated fo cred t May not be taken for audit. Prerequ s tes placement exam nat on and aud tion

MUP 540 Advanced Conducting. 3 F
Score preparat on and c nduct ng techn ques for nstrumenta music Concentration on study of h'st r'ca styles Requ red of D.M A stu dents n nstrume tal Mus c

MUP 541 The Art Song. 3 N
Sem nar on so o song from ts beg nn ng to the present day

MUP 544 Chamber Orchestra. 1) F, S
mportant masterp eces fr m a per ods of music w be performed throughout the year May be repeated for credit Prerequ s te nstruc- tor approva

MUP 545 Symphony Orchestra (1 F S
Open on the bas s of audit on with the director Masterp eces of sym phony orchestra terature Three t mes per week May be repeated for cred t

MUP 546 Sinfonietta. (1) F S
Symphon c orchestra that presents approx mately six concerts annu al y, perform ng masterp eces of the class cal repertoire 3 t mes per week. May be repeated for cred t Prerequisite· audit on with d rector

MUP 550 Choral Union. (1) F S
Open to a l students n the un versity and to nterested singers n the commun ty by audition. Preparat on and performance of the arger chora works 2 hours per week May be repeated for cred t

MUP 551 Repertoire. (2) N
Literature avai able for performance n al perform ng med a. May be repeated for credit

MUP 552 Concert Choir. (1 F S
Important masterp eces from a periods of mus c w be performed May be repeated for cred t Prerequ s te· nstructor approva .

MUP 553 University Choir. 1) F, S
4 hours per week. May be repeated for cred t Prerequ site: nstructor approva

MUP 555 Men's Chorus. (1) F S
Open to a l ma e students in the un vers ty who can qua ify on the bas s of audit ons Rehearsal and performance of mus c for ma e voices. 3 hours per week May be repeated for credit Prerequ s te: instructor approva .

MUP 557 Women's Chorus. (1) F, S
2 hours per week May be repeated for cred t Prerequ s te: instructor approva

MUP 561 Marching and Concert Bands. (1 F S
Open by audition only Stag ng of format ons and dri ls for footba games and other events (fa); masterpieces of symphon c band iterature (spring). Meets dai y. May be repeated for cred t

MUP 570 Music Theatre: Techniques. 1) F, S
Exercises and improv sat ons for the s ng ng actor emphas z ng body awareness, isolat ons and freedom of the vocal and breath mecha n sms Section 1 (Interpretat on Sect on 2 (Expression); Section 3 (Movement for S ngers) Each Sect on 3 hours per week. May be repeated for cred t

MUP 571 Music Theatre: Workshops. (1 F, S
Development of spec f c ski ls for the musical-dramat'c nterpretat on. Sect on 1 (Ro e Preparat on), Section 2 (Sty es) Sect on 3 (Opera Scenes); Section 4 (Mus ca Comedy), Section 5 (Revue Ensembles). Each section: 1 hour ecture demonstrat on 1 lab per week May be repeated for cred t

MUP 572 Music Theatre: Orchestras. 1) F, S
Open to a l students who can qua fy on the bas s of aud tions w th the nstructor Part c pation 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 Prerequisite: nstructor approval.

MUP 573 Music Theatre: Performance. (1) F, S
Open to a l students who can qua fy on the bas s of aud tions w th the nstructor. Partic pation n Lyric Opera Theatre product ons Sect on 1 (Princ pa Ro es) Sect on 2 (Chorus) May be repeated for credit Prerequ s te instructor approva

MUP 574 Music Theatre: Production. (1) F, S
Partic pat on in Lyr c Opera Theatre product ons Sect on 1 (Voca Performance), Section 2 (Technica Music Theatre); Section 3 (Prob ems n Production) to be taken concurrent y with MUP 373 Sect on 2 May be repeated for cred t

MUP 576 New Music Ensemble. (1) F S
Rehearsa and performance of music wr tten n the ast 20 years May be repeated for credit Prerequ site nstructor approva

MUP 579 Chamber Music Ensembles. (1) F S
Str ng, brass, woodw'nd, percuss on keyboard voca , and m xed ensembles 2 hours per week. May be repeated for cred t. Prerequi site· nstructor approva

MUP 581 Performance Pedagogy and Materials. (2) N
Principles and methods of performance techn ques for each perfor mance f e d May be repeated for credit

MUP 582 Collegium Musicum. (1) N
Singers and nstrumenta ists spec a z ng n the performance of early and unusua music 2 hours per week May be repeated for cred t Pre requisite· nstructor approva

MUP 585 Percussion Ensemble. (1) F S
Rehearsal and performance of standard and or g na reperto re for the percussion ensemble and re ated nstruments. 2 hours per week May be repeated for cred t. Prerequisite· nstructor approva

MUP 586 Stage Band. (1) F S
Rehearsal and performance of iterature for the stage band 4 hours per week. May be repeated for cred t Prerequ s te instructor approval

MUP 587 Ethnomusicology Ensembles. (1) F, S
Performance earning experience for the music of various cu tures of the wor d May be repeated for cred t Prerequisite know edge of nstrument or instructor approval

MUP 588 Piano Accompanying. 1) F, S
Performance majors w th a concentrat on n p ano accompany ng (oth ers at the discret on of the instructor) P ano accompan ments found n vocal and nstrumenta terature d scuss on of sty es and perfor mance pract ces; experience n pub ic performance. 2 hours per week. May be repeated for cred t

MUP 591 Seminar. (1 12) N

MUP 595 Continuing Registration. 1) N

MUP 596 Solo Performance. (1) F, S
For Master of Mus c cand dates n app ed mus c on y May be fu rec ta major operatic ro e, solo performance with orchestra, ensem b e, or lecture recita

MUP 597 Solo Performance. (1) F, S
See MUP 596.

MUP 671 Choral Repertoire. (3) N
Examination of arge choral/orchestral works to determ ne the r mus ca and textual characteristics from a conductor's po nt of v ew

MUP 727 Studio Instruction. (2 or 4) F S
For D.M.A cand dates only M n mum contact of 1 hour per week May be repeated for cred t

MUP 792 Research. (1 12) N

MUP 796 Solo Performance. 1 15 F S
For D M A cand dates on y May be repeated for cred t

MUP 799 Dissertation. 1 15) N

MUSIC (MUS)

MUS 100 Fundamentals of Music Notation. 3 F, S
Prov des non Mus c ma ors w th sufficient symbol iteracy to beg n work n the field of mus ca earning Credit not app icab e toward any Mus c degree

MUS 340 Survey of Music History. (3) F, S, SS
Major composers compos t ons and per ods n the h story of music Credit not appl cab e toward any Mus c degree *General Studies HU H.*

MUS 347 Jazz in America. (3) F S, SS
Current practices employed by contemporary jazz mus c ans· the h s tor ca deve opment of jazz techn ques Cred t not app cable toward any Music degree *General Studies HU*

MUS 354 Popular Music. 3 F, S SS
Emphasis on histor cal, cultura and performance patterns n a variety of popu ar d oms such as but not mited to, rock, folk jazz, and Afro Amer can music May be repeated for credit Cred t not app cable toward any Music degree *General Studies HU*

MUS 355 Survey of American Music. (3) F S, SS
Growth and deve opment of Amer can mus c. Credit not applicab e toward any Music degree. *General Studies· HU H*

MUS 356 Survey of the Musical Theatre. (3) A
Mus c s p ace n the theatre, v ewed n terms of h stor ca mportance and re at ve funct on Credit not appl cable toward any Mus c degree *General Stud es HU.*

NOTE: For the Genera Stud es requ rement courses and codes (such as L, SQ C, and H), see "Genera Studies page 87. For graduat on requ rements see "Un versity Graduat on Requ rements page 83 For an explanation of add t onal omn bus courses offered but not sted in this catalog, see C assification of Courses," page 60

Department of Theatre

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PROFESSORS
BARKER BEDARD ECKARD, G NER KNAPP, MASON, SALDANA, THOMSON, WILLS

ASSOCIATE PROFESSORS
ACKER, EDWARDS, ENGEL HOLLOWAY RISKE V NING

ASSISTANT PROFESSORS
REYES, STERLING THOMSEN YOUEL

FINE ARTS SPECIALIST
TAYLOR

SENIOR LECTURER
HILL

LECTURERS
RV NE, SMITH-DAWSON

The Department of Theatre is a member of the National Association of Schools of Theatre, and the requirements set forth in this catalog are in accordance with the published regulations of the association. For advising purposes, all students registering in a Theatre degree program enroll through the College of Fine Arts. Special advising check sheets, providing complete information regarding require ments and suggested electives, are available in the Depart ment of Theatre office for each degree program

Freshman and sophomores who meet university and departmental standards must receive a grade of "C ' or higher in all major courses and a 2.50 cumulative GPA dur ing their first semester to continue in the B.A Theater pro gram. Students failing to meet these requirements will have one semester of departmental probation to receive a "C" or higher in major courses and raise their cumulative GPA to 2 50 Students failing to meet the above requirements by the end of the first year two semesters) will be asked to seek advisement regarding other majors

THEATRE—B.A.

The major in Theatre consists of 58 semester hours. The following 34 semester hours of core courses are required of all B A degree candidates:

THE	125 Orientat on to Theatre	1
THE	220 Pr nc ples of Dran at c Analysis *L*	3
THE	320 Histor of the Theatre I *HU H*	3
THE	321 History of the Theatre II *HU H*	3
THE	440 Theatre Forms and Contexts	3
THP	102 Fundamentals of Acting	3
THP	217 Theatre Safety	1
THP	218 he Direct r s Vision	3
THP	301 Theatre Production Running Crew	
THP	301 Theatre Production*	1
THP	313 Scenography	3
THP	428 Theatre and the Future	3
Total		28

* One semester hour in a different production option s required

One of the following two courses (three semester hours) is required:

THP	213 Introduction to Technical Theatre	3
THP	214 Introduction to Costuming	3

Three semester hours of departmental approved course work in developing new work is also required (e.g., play writing, solo performance, theatre of the oppressed). Check the department advising office for a list of eligible courses.

Twenty four semester hours of THE and THP electives are selected between the student and advisor to complete the 58 semester hours required in the major General Studies courses make up 45–48 semester hours of the total courses required.

Within the major (including related area studies consid ered part of the major), only courses with a grade of "C" or higher may be applied toward graduation.

Before the junior year, students are evaluated on aca demic and artistic progress. Based on this evaluation, stu dents may remain in the general B.A degree program

Additional elective courses in General Studies are selected with an advisor to meet the total 120 semester hours required for the degree.

Students who transfer 55 semester hours or more are required to enter with and retain a 2.50 GPA n theatre courses and a 2 00 cumulative GPA.

Electives. After satisfying all other requirements, remaining electives to total a minimum of 69 semester hours may be chosen with advisor approval from the list of approved Gen eral Studies courses or any courses in the College of Fine Arts. Lower division courses n a foreign language may also be used as electives. See "College Degree Requirements," page 265, for approved areas of study and the distribution of semester hours as required by the College of Fine Arts

GRADUATION REQUIREMENTS

In addition to fulfilling the major requirements, students must meet all university graduation requirements See ' Uni versity Graduation Requirements," page 83

THEATRE—B.F.A

Theatre Education Concentration

For students seeking secondary school cert fication by the State of Arizona, the B.F.A. degree offers a teacher certifica tion track. This track certifies a teacher for the instruction of theatre to students in grades 7 12 (and an endorsement for K 12 "dramatic arts") in the Arizona public schools. Although the student is officially enrolled in the College of Fine Arts, all professional education courses and institu tional recommendation for certification are provided by the College of Education Professional Teacher Preparation Pro gram (PTPP).

A minor teaching field of 24 to 30 semester hours in such areas as English or communication is not required for the degree but is highly recommended The minor teaching field's department specifies which courses can be applied toward the minor teaching field. The Arizona Department of

Education mandates the minimum number of semester hours required for major areas, approved areas, and endorsements in certification.

The following theatre courses are required:

THE	125 Orientation to Theatre	1
THE	220 Principles of Dramatic Analysis *L*	3
THE	320 History of the Theatre I *HU H*	3
THE	321 History of the Theatre II *HU, H*	3
THP	102 Fundamentals of Acting	3
THP	213 Introduction to Technical Theatre	3
THP	214 Introduction to Costuming	3
THP	217 Theatre Safety	1
THP	218 The Director's Vision	3
THP	301 Theatre Production, Running Crew	1
THP	301 Theatre Production*	1
THP	313 Scenography	3
THP	318 Directing for the Stage	3
THP	494 ST: Theatre of the Oppressed	3
Total		34

* One semester hour in a different production option is required

The following theatre education courses are required for the theatre education concentration:

THE	325 Play Reading for Educational Theatre	
THE	480 Methods of Teaching Theatre	4
THP	311 Improvisation with Youth	3
THP	411 Methods of Teaching Drama	3
THP	481 Secondary School Play Production	3
Total		14

Students are strongly encouraged to voluntarily enroll in additional course work in the practice of the art of theatre. The B.F.A. degree in Theatre with a concentration in theatre education consists of three to six semester hours to meet the first year composition requirement (see "First Year Composition Requirement," page 83); 35 hours of General Studies course work, 34 hours of approved THE and THP courses; 14 hours of approved courses in theatre education; 30 hours of professional education course work, and theatre electives to complete a total of 120 hours

The PTPP, in cooperation with the theatre education coordinator, establishes professional education course work.

Application and Admission. After being formally accepted into the Department of Theatre, a student must meet with the theatre education coordinator to discuss application procedures for the B.F.A. degree in Theatre with a concentration in theatre education.

Acceptance into the program is by interview only. The student must meet with the theatre education faculty to discuss career goals and interests in teaching. If distance prohibits coming to campus, the student may be admitted into the program upon submission of two letters of recommendation and a letter of interest to the theatre education faculty.

Application is normally made at the beginning of the sophomore year; applications for early admission of ASU freshmen are accepted toward the end of the second semester of full time study. Strict deadlines are set for application to the PTPP. Students who express an interest in the theatre education concentration are advised to apply no later than the beginning of the sophomore year. The student is also required to meet admission standards mandated by the PTPP and the Arizona Department of Education for teacher certification (see "Teacher Education," page 175

Although the Department of Theatre may admit a student into the program, the College of Education may reject a student's application for admission into the PTPP, thus removing a student from the B.F.A. degree program. Appeal and reapplication procedures are established by the PTPP.

For retention in the program, a GPA of 3.00 in the major and an overall GPA of 2.50 are required. Retention standards established by the PTPP must also be maintained for students in the teacher certification track.

MINOR

The department offers a minor in Theatre consisting of 22 semester hours of course work. The following courses are required:

THE	100 Introduction to Theatre *HU*	3
THE	320 History of the Theatre I *HU H*	3
THE	321 History of the Theatre II *HU H*	3
THP	101 Introduction to the Art of Acting	3
THP	213 Introduction to Technical Theatre	3
THP	301 Theatre Production	1
Concentration area*		6
Total		22

* Also required are two three hour courses in the same area of concentration. Contact the department for options and course requirements.

Courses ordinarily limited to majors only are available to minors on a second priority basis; that is, minors may not preregister for these courses, but are allowed to register after all majors' needs have been met. All prerequisites for the minor courses must be met (see course listings). Transfer students may transfer up to nine semester hours toward their minor.

ACADEMIC SPECIALIZATION

Secondary Education. Students pursuing the B.A. degree in Education degree in Secondary Education may select the atre as a second teaching field. The second teaching field consists of 30 semester hours including the following courses:

THE	220 Principles of Dramatic Analysis *L*	3
THE	325 Play Reading for Educational Theatre	1
THE	480 Methods of Teaching Theatre	4
THP	101 Introduction to the Art of Acting	3
	or THP 102 Fundamentals of Acting	3
THP	213 Introduction to Technical Theatre	3
THP	218 The Director's Vision	3
THP	301 Theatre Production	1–4
THP	311 Improvisation with Youth	3
THP	411 Methods of Teaching Drama	3
THP	481 Secondary School Play Production	3
Total		24–27

NOTE: For the General Studies requirement courses, and codes such as L, SQ C, and H) see "General Studies" page 87. For graduation requirements see "University Graduation Requirements" page 83. For an explanation of additional omnibus courses offered but not listed in this catalog see "Classification of Courses" page 60

One of the following two courses is also required

THP 214 Introduction to Costuming 3
THP 313 Scenography 3

GRADUATE PROGRAMS

The faculty in the Department of Theatre offer programs leading to the M.A. degree in Theatre; the Master of Fine Arts degree in Theatre with concentrations in performance, scenography, and theatre for youth, the Ph D. degree in Theatre with a concentration in theatre for youth, and, in conjunction with the Department of English, an interdisciplinary Master of Fine Arts degree in Creative Writing playwriting option) See the *Graduate Catalog* for details

THEATRE (THE)

THE 100 Introduction to Theatre. 3 F, S SS
Survey of theatre production from the Greeks to contemporary theatre Lecture discussion guest artists Taught in conjunction with distance learning. Prerequisite nonmajor *General Studies HU*

THE 125 Orientation to Theatre. 1 F
Orientation to university and department resources and procedures Career planning and guidance Attendance and written responses to theatre productions Required for B A Theatre majors Prerequisite Theatre major

THE 220 Principles of Dramatic Analysis. 3 F, S
Analysis evaluation and interpretation of dramatic literature for theatrical production Emphasis on the traditional canon of dramatic literature and traditional structures and forms of drama Prerequisites ENG 101 or 105 , Theatre major *General Studies: L*

THE 300 Film: The Creative Process I. 3 F S SS
Elements of theatrical film cinematography sound, editing directing acting scriptwriting producing, and critic sm 3 hours lecture demonstration via film and videotape *General Studies HU*

THE 301 Film: The Creative Process II. 3 F S
Advanced study of selected films analyzing cinematography sound editing directing acting screenwriting, producing and critic sm Prerequisite THE 300

THE 320 History of the Theatre I. 3 F
Traces major developments in theatre production and dramatic literature from the beginnings to the mid 17th century Lecture student presentations *General Studies HU, H*

THE 321 History of the Theatre II. (3 S
Traces major developments in theatre production and dramatic literature from the mid 17th century to the 21st century Lecture student presentations *General Studies HU H*

THE 325 Play Reading for Educational Theatre. 1 F S
Assigned independent readings in plays for secondary school play production Prerequisite theatre education concentration or written instructor approval

THE 400 Focus on Film. 3 F, S SS
Specialized study of prominent film artists techniques and genres Emphasis on the creative process May be repeated for credit Prereq site ENG 101 or 105

THE 402 Gender Identity in Film. (3 F S, SS
Examination of the representation of gender in Hollywood cinema with particular focus on films from 1970 to the present Prerequisite THE 30

THE 404 Foreign Films and Filmmakers. 3 A
Films and filmmakers from Europe, Asia Australia, Far East South America and Caribbean Emphasis on cultural content and filmmaking philosophies

THE 405 Film: Great Performers and Directors. 3) F S
Examination of processes and influences of one or more great film performers and/or directors May be repeated for credit Prerequisite THE 300

THE 420 History of the American Theatre. 3 F
History of the plays artists and events in the development of American theatre from colonial to modern times *General Studies HU, H*

THE 421 History of the English Theatre. 3 S
History of the artists events and plays in the development of English theatre from medieval times to the present Lecture group and independent work Prerequisite THE 100 or 220 *General Studies L/HU*

THE 424 Trends in Theatre for Youth. 3 N
A survey of the history, literature and contemporary practices in the atre for youth

THE 425 History of Asian Theatre. (3 N
History and production techniques of theatre forms in India China and Japan Prerequisite 6 hours of theatre history or written instructor approval. *General Studies L/HU*

THE 430 History of Costume: Western Tradition. 3 N
Study of major costume styles throughout history of Western civilization and how these fashions reflected society Exploration of how styles can be used by theatrical costumers

THE 431 History of Costume: Non-Western Tradition. 3 N
Study of major costume styles of India, Asia, Eastern Europe and the Middle East and how these fashions reflected society. Exploration of how styles can be used by theatrical costumers

THE 440 Theatre Forms and Contexts. 3 F
Exploration of 20th century modernist theatrical forms and movements and development of alternative strategies for analyzing contemporary theatre and performance Prerequisites THE 220, 320 321 Theatre major

THE 480 Methods of Teaching Theatre. 4) F
Application of materials, techniques, and theories for theatre with ninth- through twelfth grade students Emphasis on curriculum development and praxis Prerequisite theatre education concentration or written instructor approval

THE 500 Research Methods. 1 3 F
Introduction to graduate study in theatre

THE 504 Studies in Dramatic Theory and Criticism. 3) F
Dramatic theory criticism and aesthetics from the classical period to the 19th century. Related readings in dramatic literature Prerequisite. Theatre major.

THE 505 Studies in Dramatic Theory and Criticism. 3 S
Dramatic theory criticism and aesthetics from the 19th century to the present Related readings in dramatic literature. Prerequisite Theatre major

THE 510 Studies in Literature. 1) F, S
Assigned individual readings programs in standard sources and masterpieces in theatre literature Topics may be selected from the following:
a Acting–Directing
b) Criticism
c) Design Technical
(d History
May be repeated for credit in different sections

THE 520 Theatre History and Literature I. 3 F
A survey of history ographical issues, historical periods and theatre literature through the 17th century

THE 521 Theatre History and Literature II. 3 S
A survey of history ographical issues, historical periods, and theatre literature, from the 17th century to present

THE 524 Advanced Studies in Theatre for Youth. 3 F
An in depth study of the history, literature, and contemporary practice of theatre for youth Prerequisite written instructor approval.

THE 591 Seminar. (3 A
Selected topics in child drama community theatre and theatre history Prerequisite written instructor approval

THE 598 Special Topics. 1–4) N
a College Teaching
b Dramatic Analysis
(c Theatre Forms and Contexts

THE 692 Research. (1 12 N

THE 700 Advanced Research Methods. (3 F
Critical review of research development and design of research in theatre and theatre for youth

THE 791 Seminar. (3 N
Selected topics offered on a revolving basis May be repeated for credit when topic changes

THEATRE PERFORMANCE AND PRODUCTION (THP)

THP 101 Introduction to the Art of Acting. (3) F, S SS
Basic princ ples of act ng Top'cs nc ude term no ogy exerc ses, mprov sation and projects n act ng Prerequ s te nonmajor

THP 102 Fundamentals of Acting. (3) F S, SS
Actor awareness, mag native physical and vocal preparation scene and character ana yses, term no ogy, app cation of truthfu acting techn ques, and mono ogue preparat on Stud o Prerequ s te Theatre major.

THP 113 Techniques of Theatrical Makeup. (3 F, S
Techn ques of theatrical makeup age, correct ve masks, and specia effects. 1 hour ecture, 2 hours ab Lab fee required.

THP 194 Special Topics. (1–4) A
Topics may be se ected from the fol ow ng:
(a) Stage Management

THP 207 Acting: The Creative Imagination. (3) F
Development of the actor as an artist, ntroduc ng the use of the cre ative imag nat on through sensory exper ence as ed by Stan s avsk . Studio. Prerequisite instructor approval by 'nterview Prerequisite w th a grade of "C" or h gher THP 102. Pre or corequ s te THE 220

THP 208 Acting: The Reality of Doing. (3) S
Cont nuat on of the nner process, app y ng the techn'ques of Meisner to d scover the creat v ty n the spontaneous exper ence. Prerequ's te· written instructor approva Prerequ s te w th a grade of "B" or h gher. THP 207

THP 213 Introduction to Technical Theatre. *(3) F S*
Procedures of techn cal theatre product on and demonstrat on Top cs include des gn and construction of scenery ight ng, and properties 2 hours ecture, 3 hours ab

THP 214 Introduction to Costuming. (3) F, S
Basic principles of costume des gn, construct on, and survey of selected h stor cal per ods ncluding makeup sty es Costume des gn project and production experience 3 hours lecture, 2 hours lab Pre or corequis te THE 220.

THP 217 Theatre Safety. (1) F S
Modern theatre safety pract ces ncluding scene shop, chem ca e ec- tr ca and r gg ng safety. Prerequisite· Theatre major.

THP 218 The Director's Vision. (3) F, S
H story theory, and pr nc p es of d recting Exam nes d rector s role and respons bi t es p ay selection conceptua izing ground p ans block ng. Prerequ s tes: THE 220; THP 102

THP 272 Introduction to Stage Movement. (3) F, S
Movement vocabu ary and physica train ng n re axat on, al gnment conditioning rhythm, and poise. Prerequ s te THP 101 or 102 or con current registration n THP 102 *or* wr tten nstructor approval.

THP 277 Introduction to Voice for the Actor. (3) F, S
Exerc ses and techn ques to free the vo ce and improve projection. Prerequ s tes THP 101 (or 102) and 272 or wr tten instructor approva Prerequ s te w th a grade of "C" or h gher: THE 220

THP 285 Acting: Beginning Scene Study. (3) F, S
Character ana ys s rehearsa and performance of modern p ays Pre requis te with a grade of "C or h gher THP 102 or nstructor approva Pre or corequ s te: THE 220

THP 294 Special Topics. (1–4) A
(a ntroduction to Playwrit ng
(b) Stage Management

THP 301 Theatre Production. (1–4) F, S SS
Partic'pat on in un versity theatre product ons May be repeated for cred t. Prerequisite wr tten nstructor approval.

THP 307 Acting: Research and Performance. (1 3) A
Act ng in theatre projects product ons or col aborat ve performances *n direct ng classes May be repeated for credit Prerequ s te* instruc- tor approva .

THP 308 Multiethnic Workshop. (3) F, S
Project-oriented workshop provides the ethnic student and others the opportun ty to develop and present works or g'nating from Amer ca s ethn c cu tures Lecture, lab.

THP 311 Improvisation with Youth. (3) F, S
Bas c materials techn'ques and theories for fac itat ng mprovisa tional drama with children and youth Not open to freshmen

THP 312 Puppetry with Children. (3 F, S
Construct on and man pu at on of puppets pract ce n performance skil s Emphasis on educat ona and recreat ona uses of puppetry by and w th ch ldren Lab fee requ red Prerequ s te jun or standing or above requ red

THP 313 Scenography. 3) F, S
The art and pract ce of scenic costume, and l ght ng des gn for the theatre and the med a Prerequ s te THP 213 or 214.

THP 317 Stage Management. (3) F
Readings n stage management and part c pat on as a stage manager n a un vers ty theatre production Prerequ s te wr tten nstructor *approval Prerequ s te w th a grade of C" or h gher THE 220*

THP 318 Directing for the Stage. (3) F S
D rector s approach to text ana ys s and artcu at on of ideas. Bas c too s, rehearsal schedu es stag ng, rehearsa and aud t on tech n ques scene work Prerequ s tes THP 213, 218, nstructor approva

THP 331 Costume Construction. 3) N
Uses of materials and techniques for stage costumes w th actual con *struct on of period appare . Prerequisite· THP 214 or instructor* approva

THP 340 Scene Design. 3) F, S
Studio projects n des gn ng rea stic scenery for the contemporary proscenium stage Prerequ site THP 213 or wr'tten instructor approva Prerequ s te w th a grade of 'C or h gher: THE 220.

THP 345 Lighting Design. (3) F S
Pr nc p es and theory of stage ghting des gn nc ud ng des gn pro cess and execut on, equ pment and ght p ots Lecture, lab. Prerequi site: THP 213 or written instructor approva . Prerequisite w th a grade of "C or h gher· THE 220

THP 350 Sound Design. (3) F
Introduction to the equ pment, process and record ng techniques used n sound design for the theatre Lecture, stud o Prerequisite w th a grade of "C or h gher: THE 220

THP 377 Stage Speech. (2) A
Introduct on of phonet c alphabet and standard speech and d ction 2 hours per week. Prerequ s'te THP 277.

THP 385 Acting: Intermediate Scene Study. (3) A
Scr pt ana ys s and performance of modern class cs Prerequ's te THP 377 or nstructor approva

THP 394 Special Topics. 1–4) A
(a) Beg nning Screenwrit ng
b) Intermed ate P aywr ting
May be repeated for credit.
c) Stage Management

THP 401 Theatre Practicum. (1 3) F, S SS
Product on ass gnments for advanced students of techn ca produc t on stage and business management, and des gn May be repeated *for cred t. Prerequ s te wr tten nstructor approva*

THP 406 Scenography. (3) N
The process of product on col aborat on Taught n conjunct on with THP 519 Prerequisites· THP 214 and 340 and 345 or nstructor approval

THP 411 Methods of Teaching Drama. (3) F
Appl cat on of mater als techniques, and theor es w th grades K–8 youth Regular part c pat on with ch dren Prerequ s'te: THP 311 or wr tten nstructor approval

THP 418 Directing the Actor. (3) F
Practical app cat ons of d recting for the stage Rehearsa and presen tat on of scenes and short p ays. Prerequ s tes· THP 318, instructor approva

THP 428 Theatre and the Future. 3) F, S
Capstone course explor ng v s ons of the future of theatre Results in a project n creat ve or scho ar y form. Prerequ s tes THE 440, sen or status Theatre major

THP 430 Costume Design. (3) N
Princ'ples of costume des gn w th projects in both modern and per od styles Inc udes budgets and fabr c/pattern est mates. Lecture, studio Prerequ s te THP 214

NOTE: For the General Studies requ rement, courses and codes such as L SQ C and H), see "General Studies, page 87 For graduation requirements, see "Un versity Graduation Requirements," page 83. For an exp anat on of add t onal omn bus courses offered but not sted in th s catalog see "C assif cation of Courses," page 60

THP 431 Advanced Costume Construction. (3) A
Specialized training in costume construction problems and crafts with projects in tailoring, millinery, and period accessories. Prerequisites: THP 214 and 331 *or* instructor approval.

THP 435 Advanced Technical Theatre. (3) A
Selection of materials, drafting of working drawings, tool operation, and construction techniques. 2 hours lecture, 2 hours lab. Prerequisites: THP 340 and 345 *or* written instructor approval.

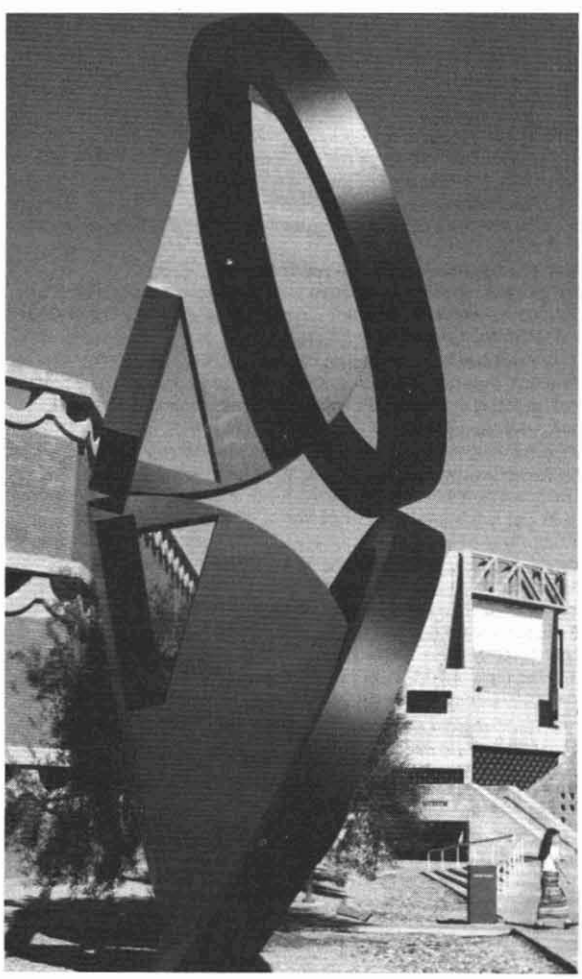
THP 440 Advanced Scene Design. (3) A
Advanced studio projects in designing scenery for a variety of stage forms. Prerequisite: THP 340 or written instructor approval.

THP 441 Scene Painting. (3) N
Studio projects in painting stage scenery. Prerequisite: THP 340 or written instructor approval.

THP 442 Drawing. (3) N
Techniques in drawing and rendering for scenic, costume, and lighting design. Prerequisite: written instructor approval.

THP 444 Drafting for the Stage. (3) N
Fundamentals of and practice in graphic techniques for the stage. Introduction to computer-aided design for the stage. 2 hours lecture, 3 hours studio. Prerequisites: THP 213; written instructor approval.

THP 445 Advanced Lighting Design. (3) N
Specialized techniques in stage lighting. Advanced application of design process, graphic techniques of design presentation, and use of qualities of light. Lecture, class workshops. Prerequisite: THP 345 or written instructor approval.



"Double Ring Column Triangle," a work by Fletcher Benton, is located between the Music Building and Nelson Fine Arts Center.

Tim Trumble photo

THP 450 Theatre Organization and Management. (3) N
Overview of nonprofit arts: organizational design, strategic planning, financial management, and leadership. Prerequisite: THE 220.

THP 460 Playwrights Workshop. (3) F, S
Practice and study of creating characters, dialogue, scenes, plays, and monologues for the stage. May be repeated for credit. Studio, lecture. Prerequisite: written instructor approval.

THP 461 Scripts in Progress. (3) F, S
Studio work with the instructor, centered on revisions of original plays. May be repeated for credit. Studio. Prerequisite: THP 460 or written instructor approval.

THP 472 Advanced Movement for the Stage. (3) A
Movement techniques for the classical and nonrealistic theatre; stage combat and special skills. Prerequisite: THP 272 or instructor approval.

THP 477 Advanced Speech for the Stage. (3) A
Exercises to develop vocal flexibility and power; mastery of elevated American diction and language skills applied to classical and nonrealistic drama; stage dialects. Prerequisite: THP 377.

THP 481 Secondary School Play Production. (3) F
Methods of directing, designing, and coordinating play production experiences at the secondary school level. Off-campus practicum. Prerequisites: THP 318 and theatre education concentration *or* instructor approval.

THP 484 Internship. (1–4) A

THP 485 Acting: Advanced Classical Scene Study. (3) A
Rehearsal and performance of period, classical, and nonrealistic plays. Emphasis on understanding poetic language and strong vocal and physical skills. Prerequisite: THP 385 or instructor approval.

THP 486 The Meisner Approach to Acting. (3) A
Improvisations and exercises developed by Sanford Meisner applied to scene work from selected texts. Studio. Prerequisite: introductory acting classes.

THP 487 Acting for TV and Film. (3) A
Professional television and film acting techniques, terminology, and on-camera experience. Studio. Prerequisite: THP 207 or 285.

THP 488 Audition Techniques. (3) A
Techniques and preparation for stage, commercial, and TV/film auditions utilizing monologues, cold readings, and personal style. Studio. Prerequisite: introductory acting classes.

THP 489 Actor Career Development. (3) A
Familiarization with the business of acting: self-promotional tools and techniques, marketing strategies, finances, interview skills, and actor unions. Studio. Prerequisite: introductory acting classes.

THP 494 Special Topics. (1–4) A
Topics may be selected from the following:
(a) Advanced Acting Techniques
(b) Advanced Scene Painting
(c) Advanced Screenwriting
(d) Advanced Stage Management
(e) Performance and Technology
(f) Problems in Directing
(g) Properties and Dressings Design and Construction
(h) Solo and Collaborative Performance
(i) Solo Performance
(j) Stage Dialects
(k) Standards in the School K–12
(l) Storytelling
(m) Technical Theatre III
(n) Theatre of the Oppressed
(o) Theory and Practice of Performance
(p) Video and Industrial Scene Design

THP 498 Pro-Seminar. (1–6) A
Topics may be selected from the following:
(a) Directing
(b) Projects:
Costume Design
Lighting Design
Properties Design
Scenery Design
Technical Direction
(c) Stage Management
(d) Theatre for Youth Tour
(e) Theatre in Education
Prerequisite: written instructor approval.

THP 501 Performance: Solo Performance. (8) A
Students begin to def ne their m ss on in art Emphas s on the actor as a solo storyte er, speaking as herse f or h mse f Stud o Prerequ s te nstructor approva

THP 502 Performance: Aesthetics of Theatre Art. (8) A
Understand ng and ana yz ng scr pts and performance n order to be an effective actor storyte ler who speaks as a character Projects focus on solo, duet performances Stud o Prerequ site: nstructor approva

THP 503 Performance: The Ensemble. (8) A
The ensemble work ng w th a p aywr ght creates a p ay that addresses soc al ssues through mprov sation and commun ty input. Stud o Prerequ s te nstructor approval

THP 504 Performance: Revisioning the Classics. (8) A
An ensemb e ce ebrates and confronts our c assics for contemporary aud ences C ass nc udes actors scenographers, directors, and dra maturgs. Studio. Prerequ s te nstructor approva

THP 506 Scenography. (3) N
The process of product on co aborat on Taught in conjunction w th THP 519 Prerequisite theatre graduate stand'ng or wr tten nstructor approva

THP 507 Acting: Advanced Research and Performance. 1–3) A
Act ng in advanced theatre projects, productions, or co laborative per formance n d rectng classes May be repeated for cred t. Studio. Pre requ s te nstructor approval

THP 508 Multiethnic Workshop. (3) F S
Advanced workshop for deve opment and presentation of works or g - nat ng out of American ethnic cultures Lecture, ab

THP 509 Singing for Actors. (1 F S
Introduct on of the bas cs of s ng ng techn que Breath contro , reso- nance, art cu ation exp orat on, and expansion of s ng ng range May be repeated for cred t Stud o Prerequ s'te: adm ssion to M F A per- formance program or written instructor approva

THP 511 Improvisation with Youth Workshop. (3) S
Theor es and techn ques of drama w th var ous popu ations of youth Emphas s on how research nforms pract ce. Practicum nc uded Pre- requ s tes THP 411 *or* graduate standing and written instructor approval.

THP 512 Puppetry Workshop. (3) F S
Survey of puppetry n educat on, puppetry as an art form in design and performance Lab fee requ red. Prerequisite· graduate stand ng or wr tten nstructor approval

THP 517 Stage Management Practicum. (3) F
Read'ngs and research n stage management and particlpat on as a stage manager in a Un vers ty Theatre product on Prerequ s te wnt- ten instructor approva

THP 518 Advanced Directing Lab. (3) F S
Active d scovery of direct'ng concepts through pract cal exercises and co aboration deconstruct on of contemporary c ass c terature Exp ores d rector as pr mary artist. Lab. Prerequisite: wr tten nstructor approva .

THP 519 Directing: Works in Progress. 3 S
Advanced projects n d rectng concentrating on a co aborat ve pro- cess between director p aywr ght, actors and designers Focus s pr - mar ly on new scr pts or adaptations of terature. May be repeated for cred t Stud o on s te pract cum. Prerequ s tes THP 418, instructor approva

THP 530 Advanced Costume Design. (3) N
Advanced stud o projects n costume des gn for a variety of production forms Prerequis te wr tten nstructor approval

THP 540 Production Design. (3) A
Des gn for fi m televis on, and business theatre. Prerequisite: written nstructor approva .

THP 545 Lighting Design Applications. (3) N
Advanced stud o projects n stage light ng des gn Prerequ s te. written nstructor approva .

THP 560 Playwright's Workshop. 3) F, S
Pract ce and study of creat ng characters, dialogue, scenes, plays and mono ogues for the stage. May be repeated for cred t Stud o Pre requisite wr tten nstructor approval.

THP 561 Scripts in Progress. 3 F, S
Stud'o work w th the nstructor centered on revis ons of original p ays May be repeated for cred t. Studio. Prerequis te: THP 560 or wr tten instructor approva

THP 562 Literary Management Workshop. 3) F
Advanced terary management for the contemporary theatre, nc ud ing trends n new p ay development festiva s and productions through out the Un ted States Part c pat on in Ar zona P aywr ting Competit on Prerequ s te THP 560 or wr tten nstructor approva

THP 584 Internship. (1 3) A
F eld research and on site train ng in theatre for youth community the atre, and product on techn ques. Prerequ s te written nstructor approva .

THP 593 Applied Project. (1 12) A
Prerequ s te wr tten nstructor approva

THP 594 Conference and Workshop in Child Drama. (3) A
Prerequ s te wr tten nstructor approva

THP 598 Special Topics. (1–4) A
Top cs may be se ected from the fol owing
a) Act ng
(b) Advanced Screenwr t ng
(c) Co lege Teach'ng
Acting
Dramat c Ana ysis
mprovisation w th Youth
Movement
Puppetry
Theatre of the Oppressed
Vo ce
(d) Direct ng
(e) Performance and Technology
(f) So o and Collaborat ve Performance
(g) So o Performance
(h) Stage D alects
(i) Stage Management
(j) Theatre of the Oppressed
(k) Works n Progress
Actor
Playwright
Lecture stud o

THP 611 Improvisation with Youth Seminar. 3 A
Exam nat on of current research, theory and practices in drama with youth Deve opment and execut on of research projects Prerequ s te wr tten nstructor approval.

THP 618 Directing Practicum. (3) A
Pract ca exper ence n direct ng and produc ng an ent re p ay or mus cal for young aud ences Prerequ s te. wr tten instructor approval.

THP 649 Design Studio. (3) F, S
Projects nclude des gn of scenery costume, l ght ng or sound for ab oratory or ma nstage product ons May be repeated for cred t Prereq- u s te wr'tten instructor approval.

THP 684 Internship. (3–6) F, S SS
F eld research n performance mprov sat on w th youth, theatre for youth puppetry and scenography Prerequisite wr tten nstructor approva .

THP 691 Seminar: Scenography. (3) N
Exam nation of and research nto modern concepts and pract ces of scenography. Prerequis te· written nstructor approval

THP 693 Applied Project. (1–12) F S, SS
F nal projects for M F A Theatre candidates n performance, scenog raphy and theatre for youth Prerequ s te wr tten nstructor approva

THP 783 Field Work. (1–12) A
a) Theatre Educat on

NOTE: For the Genera Studies requ rement, courses and codes (such as L, SQ C, and H), see "Genera Studies, page 87 For graduation requ rements, see "Un versity Graduation Requirements," page 83 For an explanation of add t onal omn bus courses offered but not sted n th s catalog see "C assif cation of Courses," page 60.

Graduate College

Bianca L. Bernstein, Ph.D., Dean

www.asu.edu/graduate

Wilson Hall, home of the Graduate College, is located on Orange Mall.

Michael Martin photo

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Through the faculty, Arizona State University's Graduate College offers programs to meet the educational needs of those who already hold baccalaureate and master's degrees While many students prepare for careers in research, the professions, and the arts, others study for personal enrichment. Both part time and full time students are enrolled in 91 master's and 48 doctoral majors encompassing hundreds of concentrations and specialties Other students explore new areas of interest or prepare for career advancements apart from formal degree programs.

The size, strength, and diversity of the graduate community reflect the university's commitment to high quality education. As a major center for graduate education, ASU supports cultural and intellectual activity as well as research in a broad range of arts and sciences and professional disciplines; in addition, the university conducts research addressing the social, cultural, and economic growth and development of Arizona and the Southwest

One distinctive project that magnifies our dedication to graduate students is our Preparing Future Faculty program, funded by the Pew Charitable Trusts and ASU. The program is designed to educate students about faculty roles and prepare doctoral students specifically for faculty positions in colleges and universities across the nation

This past year, about 2,000 ASU graduate students were awarded prestigious fellowships and scholarships, exceeding $3.5 million. These awards were funded by the National Science Foundation, NASA, the Ford Foundation, Fulbright, and other public agencies and private foundations.

ASU assisted more than 2,800 outstanding graduate students through academic and tuition scholarship and other financial support programs The total financial support amounted to $15.5 million, exemplifying the university's commitment to enabling student success.

Our funded programs, together with our more than 30 research centers and institutes, provide assistantships and training for many of our graduate students; further, the centers coordinate conferences, colloquia, and special seminars to heighten the learning experience. The Office of the Vice Provost for Research provides seed money to enable our faculty and students to work at the frontiers of knowledge Such activities continually encourage the creative embrace of change and experimentation.

ASU provides numerous choices in student life, for personal enrichment as well as cultural interaction. Many internationally known speakers present lectures here, bringing together faculty, graduate students, and the community to engage in stimulating dialogue.

Intellectual Environment. More than 10,000 students from all 50 states and more than 100 nations are enrolled in graduate study at the university. The size and diversity contribute to a cosmopolitan setting that is ideal for intellectual discourse and stimulation. As a balance to this large grouping of students, individual graduate programs conduct small colloquia and seminars where students and faculty discuss their work in an intimate, intellectual environment supportive of student development. The result is a spirited, lively atmosphere in which students and faculty members get to know each other through collaborative research and intellectual exchange.

GRADUATE PROGRAMS

Degree Programs

Although graduate degree programs differ in many ways, they all share two important characteristics. First, in comparison to baccalaureate programs, they demand a deeper and broader understanding of a body of knowledge in a recognized discipline or profession Second, in master's and especially in doctoral programs, graduate students prepare to make original contributions to their fields through research and other creative activities of a high order. In contrast, then, to the broad based baccalaureate degree, graduate degrees are specialized ASU offers several types and levels of postbaccalaureate degrees

For admission information and procedures, access the Web site at www.asu.edu graduate admission or refer to the *Application for Graduate Admission* booklet

Master's and Doctoral Work. Many students pursue a master's degree to satisfy their own quest for learning In some disciplines, such as dance or architecture, the master's degree is normally the terminal or final degree In other fields, students enter master's programs as the first step toward more advanced work, such as doctoral studies, which prepare students for a lifetime of intellectual inquiry and creativity or for the application of knowledge to professional practice.

Research Degrees. Students at ASU may pursue research oriented or practice oriented degrees. Research oriented degree programs the Master of Arts (M.A , Master of Science M S.), and Doctor of Philosophy (Ph D prepare students for careers of research and scholarship in governmental, business, and industrial organizations, or in university or college teaching. Students in these programs develop abilities to evaluate existing knowledge critically and extend it into fresh areas of inquiry and scholarship.

Professional Degrees. The professional or practice oriented degree programs have slightly different names and distinct academic missions. The names of the degrees are commonly tied to the academic unit offering the program, for example, Master of Business Administration M B A), Master of Music M.M. , Master of Social Work M S W and Doctor of Public Administration (D.P A . With the objective of preparing students for professional practice, such programs require rigorous preparation in the fundamental literature and scholarship of the field. Some degrees require demonstrated expertise through an internship, an exhibition (art), a performance (dance , or a recital music Examples of ASU fields in which academic units offer professional programs include architecture and design, business, education, engineering, health services administration, law, nursing, public administration, and social work

Nondegree Graduate Study

Many serious students enter graduate studies without intending to obtain a new degree but rather to enhance personal knowledge They may want to advance in their present career, acquire the background to make a career change, or make up academic deficiencies before entering a degree program All graduate students, degree or nondegree enjoy the benefits of cultural and intellectual activities at the university, such as colloquia, seminars, and conferences focusing on the latest scholarship in the field By consulting with

Interdisciplinary Graduate Degrees and Majors Overseen by the Graduate College

Major	Concentration	Degree	Administered By
Creative Writing		M F.A.	Creative Writing Committee
Curriculum and Instruction	Curriculum studies, early childhood education, educational media and computers, elementary education, English education, exercise and wellness education, mathematics education, music education, physical education, reading education, science education, special educa tion	Ph.D.	Interdisciplinary Committee on Curriculum and Instruction
Exercise Science	Biomechanics, motor behavior/sport psychology, physiology of exercise	Ph.D	Committee on Exercise Science
Justice Studies	Criminal and juvenile justice; dispute resolution; law, justice and minority populations; law, policy, and evaluation; women, law, and justice	Ph.D.	Committee on Law and Social Sciences
Science and Engineering of Materials	High resolution nanostructure analysis, solid state device materials design	Ph D.	Committee on the Science and Engineering of Materials
Speech and Hearing Science	Developmental neurolinguistic disorders, neuroauditory processes, neurogerontologic communication disorders	Ph.D.	Committee on Speech and Hearing Science
Statistics		M S.	Committee on Statistics

appropriate academic units, students can learn which courses are suitable to their needs.

For admission information and procedures, access the Web site at www asu edu/graduate/admission or refer to the *Application for Graduate Admission* booklet

Student Services for Nondegree Students. The Graduate College maintains an advising office open year round. See "Graduate Student Support Services," page 308, for more information.

Graduate Studies and University Environment

The Graduate Col ege spans the university in supervising graduate studies and offering all postbaccalaureate degrees except the Juris Doctor, which is administered by the College of Law Since more than 1,600 ASU faculty members teach graduate students in more than 115 instructional units, the Graduate College works closely with the other colleges and academic units. In most cases, graduate instruction is offered by units that also provide related undergraduate programs

Interdisciplinary Study. Although most graduate pro grams are offered by academic units, diverse interdiscipli nary programs cross academic disciplines and come under the supervision of the Graduate College. Many majors are in fields that are still emerging as recognized academic disci- plines and, therefore, do not customarily form the academic basis for departments. Other fields of study are 'nherently interdisciplinary and do not fit well with conventional disci plines around which departments are formed. Curricula must reflect intrinsically broad disciplinary affinities, and faculty must be drawn from more than one academic unit.

Currently, the Graduate College oversees 10 interdiscipli nary programs, several others are planned. Existing pro grams include the Gerontology Program (Certificate in Ger ontology jointly offered by ASU Main and ASU West), Cre ative Writing (M.F.A , Curriculum and Instruction (Ph D) (jointly administered with the College of Education), Exer cise Science (Ph.D.), Justice Studies (Ph.D. , Public Admin istration (D P A.), Science and Engineering of Materials (Ph D.), Speech and Hearing Science (Ph.D), Statistics (M.S.), and Transportation Systems (Certificate in Trans portation Systems).

Other interdisciplinary degree programs include Commu nication (Ph.D.) (administered by the College of Public Pro grams), History and Theory of Art (Ph D. (jointly offered with the University of Arizona (administered by the School of Art), Humanities (M A.) (administered by the College of Liberal Arts and Sciences), and Molecular and Cellular Biology (M.S., Ph.D.) (administered by the College of Lib- eral Arts and Sciences).

Each of these programs utilizes resources and faculty from several disciplines They promote cooperative research and instruction among faculty who share common interests but are housed in different academic units. They allow stu dents to pursue degrees that are intellectually coherent but that bring together diverse strengths of the university. See the "Interdisciplinary Graduate Degrees and Majors Over seen by the Graduate College" table on this page

Creative Writing—M.F.A.

The interdisciplinary Master of Fine Arts degree in Cre ative Writing (options include fiction, nonfiction, playwrit ing, poetry, and screenwriting) is administered by the Cre ative Writing Committee This studio academic program involves the research, creative activ'ty, and teaching interests of faculty of the Departments of English and Theatre to pro vide students with the opportunity to tailor a course of study to fit individual needs, talents, and goals. Students work under the direction of faculty who are practicing, published writers. For more information, see the *Graduate Catalog*.

Curriculum and Instruction Ph.D.

The interdisciplinary Ph.D. degree in Curriculum and Instruct on is administered by the Interdisciplinary Commit tee on Curriculum and Instruction and overseen jointly by the Graduate College and the College of Education. Areas

of concentration are available in curriculum studies early childhood education, educational media and computers, elementary education, English education, exercise and wellness education, music education, physical education, reading education, science education, and special education. For more information, see the *Graduate Catalog*.

Exercise Science—Ph.D.

The interdisciplinary Ph.D. degree in Exercise Science is administered by the Committee on Exercise Science. This individualized interdisciplinary degree integrates graduate courses from a variety of academic units to provide a sound foundation for research leading to a dissertation with concentrations in biomechanics, motor behavior, sport psychology, or physiology of exercise. For more information, see the *Graduate Catalog*.

Gerontology

An interdisciplinary, 24 semester hour Certificate in Gerontology, administered by the Committee on Gerontology, may be earned by graduate students who wish to study the biological, psychological, sociological, and policy related aspects of aging and the economic, health, and social concerns of older people. Students enrolled in the certificate program may simultaneously pursue a major in an academic unit offering a graduate degree or may enter the program as nondegree graduate students. The Certificate in Gerontology provides a broad academic foundation for students who wish to apply the knowledge and skills acquired in their major to a variety of aging related pursuits. For more information, see the *Graduate Catalog*.

For information on the undergraduate minor in Gerontology, see "Gerontology," page 110

GERONTOLOGY (GRN)

GRN 430 Multidisciplinary Approaches to Gerontology. 3 A
Examines literature that each discipline brings to the study of gerontology. Covers both theory and practice. Lecture, discussion.

GRN 431 Caregiving. (3 A
Examines theory and practice of caregiving for the senior population. Lecture, discussion.

GRN 440 Aging and Wellness. 3) F S
One-on-one service experience learning with seniors from the community. May be repeated for credit. Lecture, lab.

GRN 450 Biology of Aging. 3) S
Examines normal biological aging and changes in the functional capabilities of the elderly. Lecture, lab.

GRN 460 Alzheimer's and Related Dementias. 3 F S
Familiarizes students with Alzheimer's disease and related dementias from a caregiver's perspective. Lecture, lab.

GRN 494 ST: Undergraduate Special Topics. 3 F S

GRN 498 PS: Undergraduate Pro Seminar. 3) S

GRN 499 Undergraduate Individualized Instruction. 3 F S SS

GRN 530 Multidisciplinary Approaches to Gerontology. 3 A
Examines literature that each discipline brings to the study of gerontology. Covers both theory and practice. Lecture, discusso

GRN 531 Caregiving. 3) A
Examines theory and practice of caregiving for the senior popu ation. Lecture, discuss on.

GRN 540 Aging and Wellness. 3 F S
One-on-one service experience learning with seniors from the community. May be repeated for credit. Lecture, lab.

GRN 550 Biology of Aging. 3) S
Examines normal biological aging and changes in the functional capabilities of the elderly. Lecture, lab.

GRN 560 Alzheimer's and Related Dementias. 3 F S
Familiarizes students with Alzheimer's disease and related dementias from a caregiver's perspective. Lecture, lab.

GRN 584 Graduate Internship. 3–6) F S, SS

GRN 590 Graduate Reading and Conference. (3 F S SS

GRN 591 Graduate Seminar. (1–6 F S

Justice Studies—Ph.D.

The interdisciplinary Doctor of Philosophy degree program with a major in Justice Studies is administered by the Committee on Law and Social Sciences. The degree program integrates historical, legal, and philosophical approaches with social science training. Areas of concentration include criminal and juvenile justice; dispute resolution, law, justice, and minority populations; law, policy, and evaluation, and women, law, and justice. For more information, see the *Graduate Catalog*.

Science and Engineering of Materials—Ph.D.

The interdisciplinary Ph.D. degree in Science and Engineering of Materials is administered by the Committee on Science and Engineering of Materials. Areas of concentration are available in solid state device materials design and high resolution nanostructure analysis. Emphasis is placed on the applications of chemical thermodynamics, the mechanics of solids, quantum mechanics and transport theory for investigation of the relationships between microstructure and properties of solids, and the dependence of microstructures on processing. For more information, see the *Graduate Catalog*.

SCIENCE AND ENGINEERING OF MATERIALS (SEM)

See the *Graduate Catalog* for the SEM courses.

Speech and Hearing Science—Ph.D.

The interdisciplinary Doctor of Philosophy degree program with a major in Speech and Hearing Science is administered by the Committee on Speech and Hearing Science. Areas of concentration are available in developmental neurolinguistic disorders, neuroauditory processes, and neurogerontologic communication disorders. The purpose of the program is to prepare scholars for careers of basic and applied research in academia or in health care delivery environments. The unifying theme of the program is the influence of aging and changes in neurologic condition on human communication and its disorders. For more information, see the *Graduate Catalog*.

Statistics—M.S.

The interdisciplinary M.S. degree in Statistics is administered by the Committee on Statistics. The program involves faculty and resources from the School of Accountancy and Information Management and the Department of Mathematics. Areas of emphasis include applied statistics, mathematical statistics, statistical computing, statistical modeling, and statistical sampling and survey research. For more information, see the *Graduate Catalog*.

Transportation Systems

The interdisciplinary Certificate in Transportation Systems program is administered by the Committee on Transportation Systems. The objective of this program is to enable existing ASU graduate students and transportation professionals with advanced degrees to examine transportation related issues from a variety of perspectives and in the context of different travel modes. For more information, see the *Graduate Catalog*.

TRANSPORTATION SYSTEMS CERTIFICATE (TRC)

See the *Graduate Catalog* for the TRC courses.

Certificate Programs

A number of certificate programs are offered by various academic units or programs on campus (see the "ASU Certificates" table, page 113)

Research Programs

ASU continues to advance as a major research institution. The Office of the Vice Provost for Research provides leadership in obtaining external funding and in coordinating and administering sponsored projects. Many graduate students receive financial support and gain first hand experience as they participate with faculty members in carrying out these research projects.

Much of this work is associated with campus research centers that help to develop proposals, coordinate activities, and bring together in colloquia and conferences students and faculty with common intellectual interests. Such centers include the Center for Solid State Science, the Manufacturing Institute, the Institute of Human Origins, the Hispanic Research Center, and the Preventive Intervention Research Center For further information on centers and institutes, see "Research Centers, Institutes, and Laboratories," page 31.

Research Facilities

The university lends support to research in diverse ways, including extensive facilities for research and instructional programs. Recently built facilities include an architecture building, a fine arts complex, the Goldwater Center for Science and Engineering, an addition to the Life Sciences Center, and the Computing Commons. The Engineering Research Center, built as part of the Engineering Excellence Program, houses advanced facilities such as the Molecular Beam Epitaxy laboratory and a clean room for microelectronic device fabrication. Other facilities supporting research on campus are the Institute for Studies in the Arts, in the College of Fine Arts; the Facility for High Resolution Electron Microscopy, in the College of Liberal Arts and Sciences; and the Southwest Archaeological Collection, in the Department of Anthropology.

Graduate Student Support Services

Providing academic and professional development support to graduate students is an important part of the Graduate College mission. Services include advising, individual mentoring for disadvantaged students, and financial support, as well as orientation sessions, workshops, career seminars, and research conferences

The Graduate College Student Programs/Services maintains a variety of programs specifically for graduate and nondegree students

Graduate College Financial Assistance Office. The Graduate College Financial Assistance Office meets the needs of graduate and professional students. Students may receive financial services at Wilson Hall, without having to visit other offices on campus Students may obtain general information about graduate financial assistance at ASU, may turn in documents, or receive status information on their student loans Students can also apply for emergency short term loans or pick up forms to report special circumstances Staff members are available to help students with financial assistance concerns Refer to "Financial Aid," page 57, for a full description of graduate financial support and services or visit the Web site at www.asu edu graduate

Advising and Career/Professional Development. Many graduate students have questions and concerns about which degree to pursue; how to combine their student roles with parenting, partnering, and worker roles; and what opportunities and possibilities their degrees may provide upon graduation The Graduate College provides the following resources

Advising The Graduate College's Academic Advising Office supplies general information about policies, procedures, requirements, and support services Appointments are available throughout the year

Students with regular admission status should contact their academic unit for degree program advisement and program of study planning.

Career/Professional Development Seminars. The Graduate College, in conjunction with Counseling and Consultation, offers seminars to groups of graduate students interested in exploring career related subject matters Examples of seminar topics are dual career issues, the impact of values on career decision making, and transferable skills.

Career Planning Services for Graduate Students In conjunction with Career Services and Counseling and Consultation, the Graduate College provides a brochure listing numerous career planning services for graduate student needs This publication is also available at www asu.edu career.

Diversity Programs. The Graduate College's Diversity Programs are designed to increase the number of graduate students from groups underrepresented in their chosen field of study. Students interested in these programs must first go to their respective departments for nomination

Diversity Assistantship Program (DAP) The purpose of this merit based program is to support research and creative activities related to a student's field of study Nominations are made by departments and recipients are supervised by a faculty member.

Academic Support Program (ASP). The purpose of ASP is two fold: financial assistance and peer mentoring. ASP is available primarily to first year students; however, departments are asked to provide a student's subsequent funding The program is based on financial need and the nominations of students by departments Financial support is provided in the form of federal work study to support field related research that is supervised by a faculty member. For additional academic support, a student meets weekly with an assigned peer mentor who is two or more years advanced in the academic program

The Social and Academic Mentor Program The Graduate College Social and Academic Mentor SAM program is designed to recruit top graduate students from domestic, international, and underrepresented populations. Academic units submit applications to the Graduate College to nominate a first year student (mentee) and peer mentor match The mentor, two or more years advanced in the program, promotes the mentee's social and academic integration into graduate school by using a structured format The mentor meets weekly with the mentee and schedules regular monthly meetings with the faculty advisor to discuss the mentee's concerns, progress, accomplishments or department related matters

Orientations. Each semester, the Graduate College hosts orientations for new graduate students and teaching assis tants (TAs).

In addition to the General Orientation, teaching assistants have the opportunity to enrich and enhance their teaching through seminars offered each semester. At least two seminars are mandatory for first time TAs. Among other topics, TAs can attend sessions on teaching lab sciences, human diversity, critical thinking, classroom management, ethical issues, and multimedia applications in the classroom.

Workshops for Undergraduate Students Considering Graduate Education. The Graduate College holds work shops to address the issues that students contemplating graduate study should consider. The purpose of graduate study, the choices among research and professional degrees, the selection of schools to apply to, and the types and sources of financial support are among the topics discussed.

Student Organizations. The Graduate Student Council is part of the Associated Students of Arizona State University (ASASU), the student government for the university. The Graduate Research Support Office represents graduate stu dent interests within ASASU and the Office of Student Life. It assists the Graduate College in planning orientations and other student related activities and funds with the Graduate College small research grants to support graduate students' thesis and dissertation projects. In addition to the Council, many other special interest organizations are open to gradu ate students.

Format Office. The thesis, dissertation, or equivalent is the culmination of an important stage of graduate studies. By researching and writing this final work, graduate students are able to show that they have acquired skills essential to a discipline. The Graduate College publishes a Format Man ual as a guide in preparing the master's or doctoral docu ment.

Publications Program. The Graduate College publishes a number of brochures, fliers, and other items during the year.

Graduate Council

The Graduate Council establishes general policies for graduate programs and serves as an advisory board to the dean. As part of its duties, the council reviews proposals for new degree programs and concentrations, regularly con ducts reviews of established academic programs, and sets policies and general standards for graduate admissions. Six teen faculty and one student serve on the council, represent ing a wide variety of degree programs, with at least one member representing each college in the university An Aca demic Senate representative is also elected to serve. Council members are appointed by the president of the university.

Offices of the Graduate College

The general offices of the college, including those of the dean, admissions, advising, financial assistance, and opera tions are located on the first floor of Wilson Hall in the cen ter of campus. Graduate College offices are open from 8 A.M. to 6 P.M., Monday through Thursday; and 8 A.M. to 5 P.M., on Friday. The Graduate College may also be con tacted by e mail at asugrad@asu.edu or telephone 480 965 3521. The Web address is www.asu.edu/graduate

ADMISSION TO THE GRADUATE COLLEGE

Eligibility

Anyone who holds a bachelor's (or equivalent) or gradu ate degree from a college or university of recognized stand ing is eligible to apply for admission to the Graduate Col lege. Remedies for undergraduate deficiencies may be assigned if the undergraduate degree is based on credits not accepted by ASU, such as life experience or noncredit workshops and seminars.

Graduate College Requirements

Generally, an applicant must have a GPA of 3 00 (scale is 4.00 A), or the equivalent, in the last two years of work leading to the bachelor's degree. A student who enters a graduate degree program is expected to have undergraduate educational experiences, including general education stud ies, that are similar to those required for the baccalaureate degree at ASU

Requirements of the Academic Unit

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

Submission of an Application

For admission information and procedures, access the Web site at www.asu.edu graduate admission or refer to the *Application for Graduate Admission* booklet. Students may apply via the Web, by mail, or by fax.

Application Fee

Each application for entry to ASU graduate programs must be accompanied by a nonrefundable application fee. The fee is $45 to apply for admission to a degree program and $15 to apply for nondegree studies. For admission information and procedures, access the Web site at www.asu.edu/graduate admission, or refer to the *Applica tion for Graduate Admission* booklet.

International Applicants

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

International applicants must meet the requirements of the Graduate College as well as those of the degree pro grams to which they apply. Applicants from outside the United States are also required to submit additional materi als and should follow the procedures described in the *Appli cation for Graduate Admission* booklet, or access the Web site at www asu.edu/graduate admission. International applicants should read this information carefully to become familiar with all the requirements they must meet and should consult it often for the 'nstructions they must follow in submitting materials. The *Graduate Catalog* provides essential information about ASU and its graduate programs, but applicants can also consult the ASU listings in *Peter*

son's Graduate Education Directory and in the *Directory of Graduate Programs* (published by the Educational Testing Service)

TOEFL Requirement. Among the additional materials required of international students are scores from English language examinations. All applicants whose native language is not English must submit a score from the Test of English as a Foreign Language (TOEFL). The TOEFL can be waived if the undergraduate degree is earned from an English speaking institution. For a complete list of TOEFL requirements, see the *Graduate Admissions* booklet or refer to the Web site at www.asu.edu/graduate/admission.

Among the additional materials required of international students are scores from English language examinations. All applicants whose native language is not English must submit a score from the Test of English as a Foreign Language (TOEFL). All international applicants who do not speak English as a primary language and who wish to apply for teaching assistantships must pass an examination that certifies their skill in speaking English: either the Test of Spoken English (TSE), which may be taken in the student's home country, or the Speaking Proficiency English Assessment Kit (SPEAK) test, which is administered at ASU. Some degree programs also require TSE or SPEAK scores of applicants whose native language is not English. For specific information about TSE requirements, contact the head of the academic unit.

As required by the U.S. Immigration and Naturalization Service, international applicants must also verify that they have the financial resources to cover their expenses during graduate study at ASU. The Financial Guarantee form is available in the *Application for Graduate Admission* booklet. It can also be accessed through the Graduate College Web site at www.asu.edu/graduate/admission. International applicants must see that the form with a verification from a bank or sponsoring organization is completed and submitted to Graduate Admissions. The I-20 or the IAP66 (documents needed to obtain a student visa) are issued only after the completed, properly verified Financial Guarantee form has arrived. International students may enroll at ASU only if they have been admitted to a degree program, a certificate program, or the postbaccalaureate teacher education program. They must meet all appropriate immigration standards and requirements.

Applications are processed when they are received. However, international applicants should submit all materials in December or January in order to begin study the following fall semester and in August or September in order to begin study the following spring semester. An application fee of $45 (in U.S. funds) must accompany the formal application, which otherwise is not processed.

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

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

Additional Information

The Graduate College does not have deadlines. Applications are processed as they are received. However, many academic units have specific and early deadlines, many units review applications once a year, usually in January or February for fall admission. Applicants are urged to contact the academic units regarding deadlines.

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

Notice of Admission Decisions

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

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

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

Admission Classifications

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

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

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

Nondegree Admission. A student not interested in earning a degree or not yet ready to apply to a particular degree program may enroll as a nondegree student. The application process is streamlined and does not require submission of transcripts or test scores. For nondegree admission information and procedures, access the Web site at www.asu.edu/graduate/admission or refer to the *Application for Graduate Admission* booklet. Students may apply electronically. A maximum of nine hours taken at ASU while in this category

Enrollment Verification Guidelines for Graduate Students

	Full Time	Half Time	Less Than Half-Time
Regular semester			
Graduate	9 or more hours	5–8 hours	4 or fewer hours
Graduate assistant*	6 or more hours	—	—
Five-week summer session			
Graduate	3 or more hours	2 hours	1 hour
Graduate assistant*	2 or more hours	1 hour	
Eight-week summer session			
Graduate	5 or more hours	3–4 hours	2 or fewer hours

* For enrollment verification purposes, "graduate assistant" is a generic term that includes graduate assistants, teaching assistants, research assistants, graduate associates, teaching associates, and research associates

may be applied toward a master's degree if appropriate for the student's program of study.

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

Recognition of a Degree

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

Definition of a Unit of Credit

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

GRADUATE COLLEGE PROCEDURES

Change in Graduate Degree Program

A change from one graduate degree program to another requires a new application to the Graduate College. The usual admission procedures are followed. For details on matters relating to the application fee, see "Application Fee," page 309.

Readmission to the Graduate College

Any graduate student who has not been in attendance at the university for one or more semesters must submit an application for readmission to the Graduate College. The application should be submitted at least one month before the beginning of the semester in which the student plans to reenter. For details on readmission and other matters relating to the application fee, refer to the *Application for Graduate Admission* booklet, or access the Web site at www.asu edu graduate admission.

Determination of Catalog Requirements

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

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

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

Registration

Graduate students, like all university students, register during the intervals indicated in the *Schedule of Classes* issued by the Office of the Registrar. Details regarding registration and course drop add procedures are also provided in the *Schedule of Classes*. Day and evening graduate classes, offered on or off campus, during the two regular semesters and the summer sessions, are considered part of the regular program.

InTouch, the ASU touch tone telephone system for registration and fee payment, and the online registration system, accessed at any registrar site, ease the enrollment process.

Audit Enrollment

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

Withdrawal Policies and Procedures

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

Failure to withdraw officially from a course results in a grade of "E," which is used in the computation of the GPA. The *Schedule of Classes* lists the procedures for withdrawal.

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

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

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

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

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

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

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. Refer to the current *Summer Sessions Bulletin* for course load limit for five week and eight week sessions. An audited course is counted in the student's maximum load.

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

All graduate students doing research, working on theses or dissertations, taking comprehensive or final examinations, or using university facilities or faculty time must be registered for a minimum of one semester hour of credit (not audit) that appears on the program of study or is an appropriate graduate level course, such as 595, 695, or 795 Continuing Registration.

Doctoral students fulfilling residence requirements for the Doctor of Philosophy and Doctor of Musical Arts degrees must be enrolled full time (nine semester hours minimum or six semester hours for research assistants or teaching assistants) during the specified period. See "Residency Classification Procedures and Policies," page 51, and specific degree requirements for fulfilling residence requirements for other doctoral degree programs.

Summer Course Loads. Refer to the current *Summer Sessions Bulletin* for course load limit for five week and eight week sessions.

Enrollment Verification Guidelines. The registrar is responsible for verifying enrollment according to the general guidelines, see "Enrollment Verification Guidelines for *Graduate Students*" table, page 311.

GRADUATE COLLEGE DEGREE REQUIREMENTS

Graduate Advising

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

Grading

The "Grades" table, page 313, defines grades and gives their values.

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

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

Graduate course work (500-, 600-, and 700-level courses) reported as an "I" (incomplete) must be completed within one calendar year. At the time the "I" grade is given, the student must complete a "Request for Grade of Incomplete"

form. The form first serves as a record of the "I" grade and the work required to complete it. When the student has completed the work, the form then serves as a change of grade authorization

If the work specified on the form is not completed within one calendar year, the "I" grade (500 , 600 , and 700 level courses) becomes part of the student's permanent transcript. The student is not allowed to complete the course work as specified on the "Incomplete" form. The student may, however, repeat the course after the "I" has become permanent, by reregistering, paying fees, and fulfilling all course requirements. The grade for the repeated course appears on the transcript but does not replace the permanent "I."

Grades

Grade	Definition	Value
A	Excellent	4.00
B	Good	3 00
C	Passing	2.00
D	No graduate credit	1.00
E	Failure	0.00
W	Withdrawal[1]	
I	Incomplete	
X	Audit	
Y	Satisfactory	
Z	Course in progress[2]	

[1] This grade is given whenever a student officially withdraws

[2] This grade is usually given pending completion of courses.

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

University Policy for Student Appeal Procedures on Grades

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

A. The aggrieved student must first undergo the informal procedure of conferring with the instructor, stating the evidence (if any) and reasons for questioning that the grade received was not given in good faith. The instructor is obliged to review the matter, explain the grading procedure utilized, and show how the grade in question was determined. If the instructor is a graduate assistant and this interview does not resolve the difficulty, the student may then go to the faculty member in charge of the course (regular faculty member or director of the course sequence) with the problem.

B If the grading dispute is not resolved in step A, the student may appeal to the department chair or other appropriate chair of the area within the department (if any). The department chair may confer with the instructor to handle the problem Step B applies only in departmentalized colleges.

C If these discussions are not adequate to settle the matter to the complainant's satisfaction, the student may then confer with the dean of the college concerned (or the dean designate), who will review the case. If unresolved, the dean or designate may refer the case to the college academic grievance hearing committee to review the case formally. In most instances, however, the grievance procedure does 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 is taken by the dean after full consideration of the committee's recommendation. Grade changes, if any are recommended, may be made by the dean. The dean shall inform the student, instructor, department chair if any), the registrar, and the grievance committee of any action taken.

Scholarship

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

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

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

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

Graduate Credit Courses

Courses at the 500, 600, and 700 levels are graduate credit courses. Courses at the 400 level apply to graduate degree requirements when appearing on an approved program of study However, 400 level courses are not graduate courses by definition and cannot be certified as such for purposes of employment or transferring to other institutions.

Reserving of Course Credit by Undergraduates. Seniors at ASU within 12 semester hours of graduation may enroll

in a 400 level or graduate course and reserve the credit for possible use in a future graduate program. The course can not be used to meet a baccalaureate graduation requirement. Before registration in the class, the student must submit a Graduate College Petition form requesting credit reserva tion; the form must be signed by the student's advisor, the head of the academic unit offering the class, and the dean of the Graduate College.

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

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

Transfer credit taken before admission to a graduate degree program at ASU Main or East is nondegree credit. Nondegree credit taken at ASU Main or East 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 doctoral programs.

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

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

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

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

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

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

Graduate Supervisory Committees

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

Academic professionals (e.g., research scientists, research engineers), nontenure-track faculty (e.g., adjunct professors, research professors), and individuals granted affiliated faculty status through established university proce dures may serve as cochairs, members, or extra members of thesis and dissertation committees upon approval by the Graduate College. Individuals who are recommended by an academic unit as eligible to serve as a cochair must meet the criteria established by the academic unit and be approved by the Graduate College.

Upon the recommendation of the committee chair and head of the academic unit, ASU West tenured (or tenure track) faculty may serve on master's and doctoral commit tees at ASU Main. ASU West tenured (or tenure track) fac ulty may serve as cochairs for theses and dissertations at ASU Main upon the recommendation of the head of the aca demic unit and approval of the dean of the Graduate Col lege. Cochairs must meet the academic unit's criteria for chairing theses and dissertations.

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

Foreign Language Requirements

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

Students who are required to demonstrate proficiency in a foreign language must pass a foreign language examination specific to their particular graduate program. The examina tions are administered three times each year by the Depart ment of Languages and Literatures, which certifies language competency. Students planning to take the examination must register in the Graduate College at least one month in advance of the examination date. The chair of the student's supervisory committee is responsible for providing the Department of Languages and Literatures with materials

from which the examination is then prepared. The chair should submit or recommend relevant books or journals of approximately 200 pages in length in the desired foreign language

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

Theses and Dissertations

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

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

Graduate students and their supervisory committee chairs jointly select a style guide or journal format representative of the field of study. The Graduate College allows certain flexibility in the format of the manuscript, but Graduate College and library guidelines must be followed

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

Application for Graduation

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

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

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

Summer Sessions

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

Dates and Deadlines

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

Student Responsibility

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

ACADEMIC INTEGRITY

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

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

The university academic integrity policy, available in the Office of the Senior Vice President and Provost, or as part of the *Student Affairs Policies and Procedures Manual* STA 104 01, at www.asu.edu aad manuals sta/sta104-01 on the Web

MISCONDUCT IN SCHOLARLY RESEARCH AND CREATIVE ACTIVITIES

Students are expected to maintain the highest standards of integrity and truthfulness in scholarly research and creative activities Misconduct in scholarly research and creative activities includes, but is not limited to, fabrication, falsifi cation or misrepresentation of data, and plagiarism. Miscon duct by any student may result n suspension or expulsion from the university and other sanctions as specified by the individual colleges. Policies on misconduct are available in the Office of the Vice Provost for Research and on the Web at www asu edu aad manuals rsp rsp111.html.

Graduate College Policies and Procedures

For more detailed information on Graduate College poli cies and procedures, see the current *Graduate Catalog*.

Policies and Procedures of the Graduate Council Appeals Board

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

Graduate College Policies and Procedures

For more detailed information on the Graduate Council appeals policies and procedures, see the current *Graduate Catalog*.

One of many fountains located on campus, this one near the College of Business.

Michael Martin photo

ASU Graduate Degrees

Graduate degrees, majors, and concentrations offered at ASU Main, ASU East, and ASU West are shown in the table below. The table includes only officially approved concentrations; other informal areas of study may be available.

ASU Graduate Degrees

Degree/Major	Concentration	Campus
Master of Accountancy and Information Systems (M.A.I.S.)		
Accountancy and Information Systems	—	Main
Master of Architecture (M.Arch.)		
Architecture		Main
Master of Arts (M.A.)		
Anthropology	Archeology, bioarcheology, linguistics, medical anthropology, museum studies, physical anthropology, social-cultural anthropology	Main
Art	Art education, art history	Main
Communication		Main
Criminal Justice		West
Curriculum and Instruction[1]	Bilingual education, communication arts, early childhood education, elementary education, English as a second language, Indian education, mathematics education, multicultural education,[2] reading education, science education, secondary education, social studies education	Main
Educational Psychology[1]		Main
English	Comparative literature, English linguistics, literature and language, rhetoric and composition	Main
French	Comparative literature, language and culture, literature	Main
Geography	—	Main
German	Comparative literature, language and culture, literature	Main
History	Asian history, British history, European history, Latin American history, public history, U.S. history, U.S. Western history	Main
Humanities		Main
Learning and Instructional Technology[1]		Main
Mathematics		Main
Music	Ethnomusicology, music history and literature, music theory	Main
Philosophy		Main
Political Science	American politics, comparative politics, international relations, political theory	Main
Religious Studies		Main
Social and Philosophical Foundations of Education		Main
Sociology		Main
Spanish	Comparative literature, language and culture, linguistics, literature	Main

[1] This major is offered toward more than one degree at the same level

[2] Applications are not being accepted at this time

[3] This major has formalized concentration(s); other areas of study are available

[4] This collaborative program is offered by the three state universities

[5] This major is jointly offered with the University of Arizona.

[6] Students apply to this degree program through the College of Law, not the Graduate College.

ASU Graduate Degrees (continued)

Degree/Major	Concentration	Campus
Special Education[1]		Main
Theatre	—	Main
Master of Business Administration (M.B.A.)		
Business Administration	—	Main West
Master of Computer Science[1] (M.C.S.)		
Computer Science		Main
Master of Counseling (M.C.)		
Counseling		Main
Master of Education (M.Ed.)		
Counselor Education	—	Main
Curriculum and Instruction[1]	Bilingual education, communication arts, early childhood education, elementary education, English as a second language, Indian education, mathematics education, multicultural education,[2] reading education, science education, secondary education, social studies education	Main
Educational Administration and Supervision[1]	—	Main West
Educational Media and Computers[2, 3]	Business education	Main
Educational Psychology[1]	—	Main
Elementary Education	Bilingual education, educational media and computers, ESL education, reading	West
Higher and Postsecondary Education	Higher education	Main
Learning and Instructional Technology[1]		Main
Secondary Education	Educational media and computers	West
Special Education	Gifted, mildly handicapped, multicultural exceptional, severely multiply handicapped	Main
	Infants and young children	West
Master of Engineering[4] (M.E.)		
Engineering		Main
Master of Environmental Planning (M.E.P.)		
Environmental Planning	Urban planning	Main
Master of Fine Arts (M.F.A.)		
Art	Ceramics, drawing, fibers, intermedia, metals, painting, photographic studies, photography, printmaking, sculpture, wood	Main
Creative Writing		Main
Dance		Main
Theatre	Performance, scenography, theatre for youth	Main
Master of Health Services Administration (M.H.S.A.)		
Health Services Administration	—	Main

[1] This major is offered toward more than one degree at the same level

[2] Applications are not being accepted at this time

[3] This major has formalized concentration(s), other areas of study are available

[4] This collaborative program is offered by the three state universities

[5] This major is jointly offered with the University of Arizona

[6] Students apply to this degree program through the College of Law, not the Graduate College.

ASU Graduate Degrees (continued)

Degree/Major	Concentration	Campus
Master of Mass Communication (M.M.C.)		
Mass Communication	—	Main
Master of Music (M.M.)		
Composition		Main
Music Education	Choral music, general music, instrumental music, jazz studies	Main
Performance	Music theatre/opera musical direction, music theatre/opera performance, performance pedagogy, piano accompanying, solo performance (instrumental, keyboard, voice)	Main
Master of Natural Science (M.N.S.)		
Natural Science	Biology, chemistry, geology, mathematics, microbiology, physics, plant biology	Main
Master of Physical Education (M.P.E.)		
Physical Education	—	Main
Master of Public Administration (M.P.A.)		
Public Administration	Public information management, public management, public policy analysis and evaluation, urban management and planning	Main
Master of Public Health (M.P.H.)		
Public Health[4]	Health administration and policy	Main
Master of Science (M.S.)		
Aerospace Engineering[1]	—	Main
Agribusiness	Agribusiness management and marketing, food quality assurance	East
Bioengineering		Main
Biology[3]	Ecology	Main
Building Design	Computer aided design, energy performance and climate responsive architecture, facilities development and management	Main
Chemical Engineering[1]	Biomedical and clinical engineering, chemical process engineering, chemical reactor engineering, energy and materials conversion, environmental control, solid state processing, transport phenomena	Main
Chemistry	Analytical chemistry, biochemistry, geochemistry, inorganic chemistry, organic chemistry, physical chemistry, solid state chemistry	Main
Civil Engineering[1]		Main
Communication Disorders		Main
Computer Science[1]		Main
Construction	Management, construction science, facilities	Main
Economics		Main
Electrical Engineering[1]		Main
Engineering Science[1]		Main
Environmental Resources	GIS/remote sensing, natural resource management, range ecology	East
Exercise Science/Physical Education		Main
Family Resources and Human Development	Family studies Human nutrition	Main East

[1] This major is offered toward more than one degree at the same level

[2] Applications are not being accepted at this time.

[3] This major has formalized concentration(s); other areas of study are available.

[4] This collaborative program is offered by the three state universities

[5] This major is jointly offered with the University of Arizona

[6] Students apply to this degree program through the College of Law, not the Graduate College.

ASU Graduate Degrees (continued)

Degree/Major	Concentration	Campus
Geology		Main
Industrial Engineering[1]		Main
Information Management		Main
Justice Studies	—	Main
Materials Engineering[1]		Main
Materials Science[1]		Main
Mechanical Engineering[1]		Main
Microbiology		Main
Molecular and Cellular Biology		Main
Nursing	Adult health nursing, community health nursing, community mental health/psychiatric nursing, family health nursing, nursing administration, parent-child nursing, women's health	Main
Physics		Main
Plant Biology[3]	Ecology, photosynthesis	Main
Recreation		Main
Statistics		Main
Master of Science in Design (M.S.D.)		
Design	Graphic design, industrial design, interior design	Main
Master of Science in Engineering (M.S.E.)		
Aerospace Engineering[1]	—	Main
Chemical Engineering[1]	Biomedical and clinical engineering, chemical process engineering, chemical reactor engineering, energy and materials conversion, environmental control, solid state processing, transport phenomena	Main
Civil Engineering[1]		Main
Electrical Engineering[1]		Main
Engineering Science[1]		Main
Industrial Engineering[1]		Main
Materials Engineering[1]		Main
Mechanical Engineering		Main
Master of Science in Technology (M.S.Tech.)		
Technology	Aeronautical engineering technology, aviation human factors, aviation management technology, computer systems engineering technology, electronic systems engineering technology, environmental technology management, information technology, instrumentation and measurement technology, management of technology, manufacturing engineering technology, mechanical engineering technology, microelectronics engineering technology, security engineering technology	East
Master of Social Work (M.S.W.)		
Social Work		Main
Master of Taxation (M.Tax.)		
Taxation		Main
Master of Teaching English as a Second Language (M.TESL)		

[1] This major is offered toward more than one degree at the same level.

[2] Applications are not being accepted at this time

[3] This major has formalized concentration(s); other areas of study are available.

[4] This collaborative program is offered by the three state universities.

[5] This major is jointly offered with the University of Arizona.

[6] Students apply to this degree program through the College of Law, not the Graduate College.

ASU Graduate Degrees (continued)

Degree/Major	Concentration	Campus
Master of Teaching English as a Second Language (M.TESL)		
Teaching English as a Second Language	—	Main
Doctor of Education (Ed.D.)		
Curriculum and Instruction[1]	Bilingual education, communication arts, curriculum studies, early childhood education, elementary education, English as a second language, Indian education, mathematics education, multicultural education,[2] reading education, science education, secondary education, social studies education	Main
Educational Administration and Supervision		Main
Higher and Postsecondary Education	Higher education	Main
Doctor of Musical Arts (D.M.A.)		
Music	Choral conducting, music composition, music education, solo performance (instrumental, keyboard, voice)	Main
Doctor of Philosophy (Ph.D.)		
Aerospace Engineering		Main
Anthropology	Archaeology, physical anthropology, social-cultural anthropology	Main
Bioengineering		Main
Biology[3]	Ecology	Main
Business Administration	Accountancy, finance, health services research,[2] information management, management, marketing, supply chain management	Main
Chemical Engineering	Biomedical and clinical engineering, chemical process engineering, chemical reactor engineering, energy and materials conversion, environmental control, solid state processing, transport phenomena	Main
Chemistry	Analytical chemistry, biochemistry, geochemistry, inorganic chemistry, organic chemistry, physical chemistry, solid-state chemistry	Main
Civil Engineering		Main
Communication	Communicative development, intercultural communication, organizational communication	Main
Computer Science		Main
Counseling Psychology	—	Main
Curriculum and Instruction[1]	Curriculum studies, early childhood education, educational media and computers,[2] elementary education, English education, exercise and wellness education, mathematics education, music education, physical education, reading education, science education, special education	Main
Economics		Main
Educational Leadership and Policy Studies		Main
Educational Psychology	Lifespan development and learning; measurement, statistics, and methodological studies; school psychology	Main
Electrical Engineering		Main

[1] This major is offered toward more than one degree at the same level.

[2] Applications are not being accepted at this time

[3] This major has formalized concentration s); other areas of study are available

[4] This collaborative program is offered by the three state universities

[5] This major is jointly offered with the University of Arizona.

[6] Students apply to this degree program through the College of Law, not the Graduate College

ASU Graduate Degrees (continued)

Degree/Major	Concentration	Campus
Engineering Science	—	Main
English	Literature, rhetoric/composition and linguistics	Main
Environmental Design and Planning	Design; history, theory, and criticism; planning	Main
Exercise Science	Biomechanics, motor behavior/sport psychology, physiology of exercise	Main
Family Science [3]	Marriage and family therapy	Main
Geography	—	Main
Geology	—	Main
History	Asian history, British history, European history, Latin American history, U.S. history	Main
History and Theory of Art[5]	—	Main
Industrial Engineering	—	Main
Justice Studies	Criminal and juvenile justice; dispute resolution; law, justice, and minority populations; law, policy, and evaluation; women, law, and justice	Main
Learning and Instructional Technology[1]	Instructional technology, learning	Main
Mathematics	—	Main
Mechanical Engineering	—	Main
Microbiology	—	Main
Molecular and Cellular Biology	—	Main
Philosophy	—	Main
Physics	—	Main
Plant Biology[3]	Ecology, photosynthesis	Main
Political Science	American politics, comparative politics, international relations, political theory	Main
Psychology	Behavioral neuroscience, clinical psychology, cognitive/behavioral systems, developmental psychology, environmental psychology, quantitative research methods, social psychology	Main
Science and Engineering of Materials	High-resolution nanostructure analysis, solid-state device materials design	Main
Social Work	—	Main
Sociology	—	Main
Spanish	Cultural studies, literature	Main
Speech and Hearing Science	Developmental neurolinguistic disorders, neuroauditory processes, neurogerontologic communication disorders	Main
Theatre	Theatre for youth	Main
Doctor of Public Administration (D.P.A.)		
Public Administration	—	Main
Juris Doctor[6] (J.D.)	—	Main

[1] This major is offered toward more than one degree at the same level.

[2] Applications are not being accepted at this time.

[3] This major has formalized concentration(s); other areas of study are available.

[4] This collaborative program is offered by the three state universities.

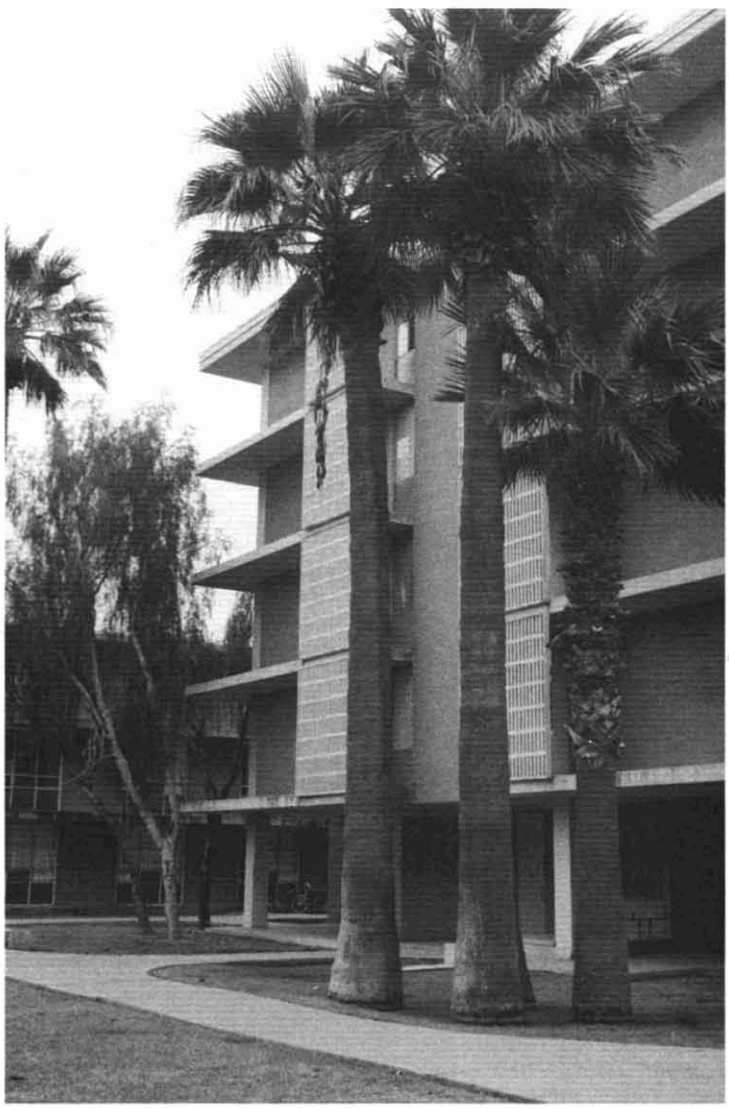
[5] This major is jointly offered with the University of Arizona.

[6] Students apply to this degree program through the College of Law, not the Graduate College.

Craig and Barbara Barrett Honors College

Ted Humphrey, Ph.D., Dean

www.asu.edu/honors



Best Hall, one of the Honors Halls of Residence

Tim Trumble photo

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MISSION

The Craig and Barbara Barrett Honors College is a community of learners dedicated to superior undergraduate education based on the pursuit of excellence, respect for the individual, commitment to integrity, and service to society.

The college offers talented, motivated students educational opportunities designed to enrich and further their personal academic and career goals. It is a portal through which academically talented students gain unique access to the university's human and physical resources. Transdisciplinary in nature, the college develops curricular and other learning opportunities to meet general and disciplinary undergraduate educational objectives. The college supports undergraduate research, encourages study abroad, guides students to relevant internships, mentors applicants for fellowships and scholarships, and assists students with application to graduate school.

Unique in Arizona and the Southwest, the college serves students seeking degrees at Main, in Tempe; ASU West, in northwest Phoenix, and ASU East, Williams Campus, in southeast Mesa. Students across the university can take advantage of the university's full resources with the assurance of consistently distinguished teaching and research and with commensurately rigorous expectations for performance.

Students from all disciplinary colleges and academic majors enroll in the Craig and Barbara Barrett Honors College. The Colleges of Business, Engineering and Applied Sciences, Liberal Arts and Sciences, Public Programs, and Nursing offer particularly strong programs. The College of Architecture and Environmental Design and the School of Social Work developed the nation's first honors curricula in their disciplines. Students with majors in the Colleges of Education and Fine Arts can also choose from a wide range of exciting courses, especially at the lower division.

CURRICULUM

Students seeking to graduate from the Honors College must also graduate from a disciplinary college. The ASU honors curriculum normally allows students to finish all requirements within the 120 semester hours of credit usually required for graduation.

The first two years of the honors curriculum typically focus on General Studies. The second two years concentrate on the student's academic major and lead to graduation from both a disciplinary college and the Honors College. Participating in this part of the curriculum allows students to complete an extended creative or research project appropriate to their academic interests while fulfilling their honors thesis requirement. In conceiving and completing this project, each student works closely with a faculty mentor to identify and develop an original concept that extends and integrates the student's work in a discipline.

SPECIAL PROGRAMS

Office of National Scholarship Advisement

The Office of National Scholarship Advisement (ONSA) assists honors and other high achieving students by identifying nationally competitive programs appropriate to each person's intellectual and career goals, nurturing these prospective applicants, and advancing their candidacy. This office, administered by the college, serves the entire ASU community. ASU students regularly earn distinction in the most rigorous and prestigious scholarship competitions. Many pursue enhanced degree programs and research projects under the auspices of Goldwater or Truman Scholarships. Other students undertake postgraduate study in the United States and abroad as Rhodes, Marshall, Fulbright, Udall, National Science Foundation, or Mellon Scholars. Many others have been recognized by a range of postgraduate awards, fellowships, and assistantships. *This office does not administer any need or merit based student financial assistance.* For more information on ONSA programs, call 480 965 5894.

Study Abroad

Honors College students have exclusive access to three summer study abroad programs (one in Britain, one in Paris) and one that travels to Athens, Rome, and Tunis and to the ASU International Programs office, which offers more flexible course registration and transfer arrangements. These plans allow students to earn honors credit while overseas.

Internships/Mentorships

Students in the Honors College may participate in special internship opportunities or mentoring by leaders in government, industry, and the private sector throughout metropolitan Phoenix. For more information, call 480/965 2359.

Events/Programming

Honors College students participate in a range of cultural enrichment activities and are offered discounted tickets to selected performing arts events throughout Arizona, monthly lunches and dinners with the dean, and special access to the most important contributors to contemporary thought who visit ASU. Each year the college hosts the university's premier scholar in residence program, The Centennial Lecture. Past guests include novelist Carlos Fuentes, paleontologist Steven Jay Gould, psychiatrist Robert Coles, microbiologist Lynn Margulis, and essayist Susan Sontag.

The college is home to the John J. Rhodes Chair, which is designed to bring to the college persons who have significantly contributed to civic life and distinguished themselves as public service leaders. Students have unique opportunities to engage intellectually with these outstanding visiting lecturers. In 1998, the college was honored to have Dr. Henry A. Kissinger serve as the inaugural chair.

ADDITIONAL BENEFITS

The Honors College and all its facilities and services are fully available to every student, regardless of where he or she lives. The Honors Halls of Residence offer students an integrated living learning environment; faculty and academic advisors serve the students there. Classrooms, recreational and study lounges, and a computing lab compose the principal facilities of the college.

Honors students receive priority at preregistration and have extended checking out privileges in the campus libraries. Honors courses in disciplinary departments are typically limited to 22 students. Honors courses (HON) are usually limited to 18.

Students can receive transcript recognition for lower division honors studies. Students who meet all upper-division requirements of both their disciplinary college and the Honors College receive transcript recognition of that accom

plishment, as well as special acknowledgment in the gradu ation ceremonies and collegiate honors convocations

Participants in the Honors College have diverse interests and strong records of success. Many go on to the nation's finest graduate and professional programs, including Chi cago, Cornell, Harvard, Michigan, MIT, Northwestern, Stanford, UC Berkeley, Virginia, Wisconsin, and Yale. Many students have published portions of their honors the ses and have presented their work at the national and regional meetings of scientific and honors societies.

ADMISSION

Students who have demonstrated high levels of academic achievement at the high school or university level are invited to apply for admission to the Honors College. All candidates for admission must file a separate application to the college.

Applicants are initially evaluated on the basis of their high school GPA (Arizona Board of Regents GPA based on 16 competency courses), high school class rank, and perfor mance on the SAT or ACT; or a student may possess other talents that contribute to academic leadership and commu nity service. Continuing ASU or transfer students are evalu ated on their college GPA

The typical first year student in the college has the fol lowing profile: high school GPA of 3.75; top six percent of his or her high school graduating class; and 28 compos te on the ACT or 1270 composite on the SAT.

Continuing and transfer students who have completed at least 12 semester hours of study with a cumulative GPA of at least 3.25 (4.00 – A) may apply for admission to the col lege. In general, the college admits students entering with a 3.25 GPA and no more than 45 semester hours completed, or a 3.33 GPA and no more than 60 semester hours com pleted, or a 3 40 GPA with more than 60 semester hours completed Community college transfer students who have *graduated from their institution's honors programs are* encouraged to apply.

All students who believe they can better succeed at the university by participating in the Honors College are encouraged to apply. Application forms and additional information about the college and its activities are available by calling the college's office at 480/965 2359

RETENTION

Honors students must maintain high standards of aca demic performance and show progress toward completion of graduation requirements in their disciplinary majors and the Honors College. Students must complete an average of one honors course each semester. The associate dean of the college must approve any deviation from this standard Good standing in the Honors College requires students to maintain the following cumulative ASU GPAs (4 00 A)

1 less than 45 semester hours, 3.25;
2 between 45 and 80 semester hours, 3 33, and
3 above 80 semester hours, 3.40

A student with a lower cumulative ASU GPA is placed on probation and is withdrawn from the college if he or she does not make reasonable progress in raising the cumulative GPA during the following semester. Students who fail to complete at least one honors course in two semesters may be placed on inactive status. A student on inactive status within the college is not eligible for honors housing, extended library privileges, early registration, or honors *internship placement Reinstatement to active status* requires a formal application and appointment with an hon ors advisor

COURSES

Only courses in which a student earns at least a grade of "C" may be used to meet Honors College requirements.

Freshmen and students entering the college with fewer than 45 semester hours of course work must take HON 171 and 172 The Human Event This cross disciplinary seminar acquaints them with ideas that form the foundation of a uni versity education and emphasizes critical thinking, discus sion, and writing.

Students entering the college after completing 45 semes ter hours must take HON 371, 374, or 394, junior level sem inar courses introduce them to critical thinking, discussion, and writing in a topical area chosen by the instructor.

Departmental courses carrying footnote number 19 in the *Schedule of Classes* are limited to honors students and oth ers who receive special permission from the instructor to enroll Enrollment in these courses is limited. Compared to their non honors equivalents, these courses are designed to offer a richer, more comp ex intellectual experience appro priate to the discipline and the level of the course for all stu dents enrolled. Other disciplinary honors courses group honors students in small cohorts to work on research projects of common interest.

Departmental courses carrying footnote number 18 in the *Schedule of Classes* allow honors students to contract with the instructor of designated non honors courses to earn hon ors credit by pursuing enrichment activities, which may include supplemental sessions with the instructor. Footnote 18 contracts must be filed during the first four weeks of class and completed during the semester in which the course *is offered. Each contract form offers guidelines to aid stu* dents and faculty in developing appropriate contracts.

Course numbers listed in the *Schedule of Classes* as 298, 492 Honors Directed Study, 493 Honors Thesis, 497 Honors Colloquium, and all classes with the HON prefix are reserved for Honors College students and always carry foot note 19. Students may receive credit for more than one of each of these courses in a given department.

Departmental courses with the number 493 are reserved for honors students completing their honors theses A stu dent may enroll for these courses only with the approval of the sponsoring academic department and of the faculty member who serves as the student's thesis director Course numbers listed in the *Schedule of Classes* as 493 fulfill the student's literacy and critical inquiry (L) General Studies requirement Honors College students may also enrol in graduate level courses that automat cally earn honors credit.

All courses a student takes for honors credit may be used toward graduation, even if the student does not graduate from the Honors College

HONORS TRANSCRIPT RECOGNITION

All courses used to fulfill lower d vision or upper divi sion/graduation requirements for the Honors Co lege must carry earned letter grades of at least "C " A "Y" grade does not meet college requirements

Lower Division

To receive transcript recognition for lower division honors work, students must complete 18 semester hours of honors course work within 60 earned semester hours with a cumulative ASU GPA greater than or equal to 3.40 (4.00 = A)

Courses *must* include HON 171 and 172 The Human Event. Courses that earn automatic honors credit, although not carrying a footnote number 19 in the *Schedule of Classes*, include ENG 105 (any section), CHM 117 and 118 (any section), and MAT 290 and 291 (any section).

Students may apply upper division honors course work toward lower division requirements, however, those classes may not also be used to meet Honors College upper division/graduation requirements.

Upper Division/Graduation from the Honors College

To graduate from the Honors College, students must

1. complete HON 171 and 172 The Human Event for continuing ASU or transfer students with less than 45 hours of credit *or* one of the following upper division seminar courses: HON 371 Freedom and Authority, 374 Black and White Atlantic, or 394 Special Topics for continuing or transfer students with 45 or more hours of credit;
2. complete 18 additional semester hours of upper division honors course work for an earned letter grade, which must include three to six semester hours of Honors Thesis and six semester hours outside the academic major and which may include graduate courses;
3. complete ASU graduation requirements in an academic major, and
4. earn a cumulative ASU GPA greater than or equal to 3.40 (4.00 = A).

Craig and Barbara Barrett Honors College

Ted Humphrey
Dean
(IRISH 121) 480/965-2359
www.asu.edu/honors

PROFESSOR
HUMPHREY

SENIOR LECTURERS
FACINELLI, STANFORD

LECTURERS
BEGGS, BRUHN, BURKE, DALTON, HEINDL, PICKUS, RANERO-ANTOLIN, SUSSER

HONORS (HON)

HON 171 The Human Event. 3 F, S
Landmarks of the social and intellectual development of the human race, with emphasis on Western civilization. Enrollment restricted to members of the Craig and Barbara Barrett Honors College. Consult the Honors College for applicability to disciplinary college distribution requirements. *General Studies L/HU, H*

HON 172 The Human Event. 3) F, S
Continuation of HON 171 with emphasis on the Renaissance through the modern period. *General Studies L/HU, H*

HON 371 Freedom and Authority. 3) F, S
Historical overview of concepts of liberty, responsibility, and power in Western societies, emphasizing 18th- to 20th century developments. Seminar.

HON 374 Black and White Atlantic. 3) F, S
Examination of development (18th to 20th century) and cultural manifestations of Black/White race relations within the U.S. and between the U.S. and other nations. Seminar.

HON 394 Special Topics. 3 F, S, SS

HON 485 Biosphere 2—Study Opportunity. (1-18) F, S
For students participating in the ASU sponsored program at Biosphere 2.

College of Law

Patricia D. White, J.D., Dean

www.law.asu.edu

The College of Law's Great Hall

Tim Trumble photo

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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

ORGANIZATION

Law Building and Law Library

The John S Armstrong Law Building is in the central campus near other colleges of the university and Hayden Library. The Law Building provides every modern facility for legal education and has been described by experts on planning law buildings as setting a new standard in functional design

The award winning John J. Ross William C Blakley Law Library, named in memory of two prominent Phoenix attorneys, is one of the finest law libraries in the Southwest, with a collection of more than 351,000 volumes and microform volume equivalents. The collection includes a broad selection of Anglo-American case reports and statutes as well as legal treatises, periodicals, encyclopedias, digests, citators, and administrative materials. The collection includes growing special collections in the areas of international law, Indian law, Mexican law, and law and technology. The library is also a selective U.S. government depository.

The library is housed in a dramatic, functional building that opened in August 1993. The building provides accessible shelving for the expanding collections and comfortable study space at carrels, tables, and lounge seating located throughout the library. The library has a 30 station computer lab as well as LEXIS and WESTLAW rooms which contain 10 stations each; 27 meeting and study rooms, a microforms facility; and a classroom.

Students also have ready access to the other campus libraries, including the Charles Trumbull Hayden Library, the Daniel E Noble Science and Engineering Library, the Architecture and Environmental Design Library, and the Music Library. The collections of the university libraries comprise more than 3 million volumes.

Special Programs

Center for the Study of Law, Science, and Technology. The ASU Center for the Study of Law, Science, and Technology is a multidisciplinary research center founded by the Arizona Board of Regents in 1984. The center publishes research studies, sponsors seminars and symposia, and houses visiting scholars and teachers Through these programs, the center seeks to contribute to the formulation and improvement of law and public policy affecting science and technology and to the wise application of science and technology in the legal system.

The College of Law offers a substantial number of courses in the law, science, and technology area including bioethics, law and psychiatry, environmental law, health care law, intellectual property, land use regulation, law and evolutionary biology, law and medicine, law and social science, mass communication, natural resources law, patent law, regulatory problems in law, science and technology, and water law. Each semester, the center publishes a student guide to other less obvious courses that contain science and technology issues. In recent semesters this guide has listed courses in AIDS and the law, commercial law, employment law, law and the handicapped, antitrust, statistical proof in employment discrimination litigation, and several courses offered by other departments on campus available for registration by law students In addition to regular course offerings, students can arrange independent studies with supervising faculty on topics of special interest to them. The center also invites guest speakers from legal or scientific fields to visit with interested law students, generally during the noon hour

In cooperation with the American Bar Association Section on Science and Technology and under the leadership of a faculty editor, second and third year students edit *Jurimetrics: The Journal of Law, Science and Technology* Student editors do both editorial work on submitted articles and original writing for publication in the journal.

Clinical Programs. The College of Law's Clinical Program is a rigorous in house program that provides third year students, under the close supervision of an ASU faculty member, the opportunity to represent clients in court. Four live client clinics, the Law School Civil Practice Clinic, the Prosecutor Clinic, the Public Defender Clinic, and the Mediation Clinic, provide students with an opportunity to choose from civil or criminal representation or to serve as mediators in disputes that are resolved outside the court system.

The Law School Civil Practice Clinic operates as a functioning law firm within the college, while the Prosecutor and Public Defender Clinic students work in offices located within agencies or courthouses. Second year students are offered "simulation based" courses in Lawyering Theory and Practice in preparation for enrollment in a live client clinic. Other simulation courses include Trial Advocacy, Pre Trial Practice, and Negotiation.

Indian Legal Program. The College of Law offers an Indian Legal Program intended to serve tribal courts and governments by providing information on legal issues, and to provide education and generate scholarship on Indian law. Through a Certificate in Indian Law, the college provides its students with a quality legal education and an opportunity to gain specific knowledge and expertise in Indian law.

Students at the College of Law have the opportunity to participate in all phases of the Indian Legal Program and gain in depth understanding of the legal issues affecting Indian tribes and people. Courses on Federal Indian law and seminars on advanced Indian law topics such as tribal law, economic development, American Indian cultural resources protection, and tribal environmental law are part of the curriculum Students also have the opportunity to participate in internships with local tribal courts, the Native American Rights Fund, the U.S. Department of the Interior, or the Senate Committee on Indian Affairs in Washington, D.C. This variety of academic and work experience provides the students an outstanding legal education with a firm grounding in both the theoretical and practical aspects of Indian law.

ADMISSION

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 and (2) a score on the Law School Admission Test (LSAT), administered by Law Serv ices, Box 2000, Newtown, Pennsylvania 18940, in centers throughout the country.

For more information regarding admission, call 480 965 7207 or write

ADMISSIONS OFFICE
COLLEGE OF LAW
AR ZONA STATE UNIVERSITY
PO BOX 877906
TEMPE AZ 85287-7906

JURIS DOCTOR DEGREE

The College of Law offers a three-year program of pro fessional studies at the graduate level leading to the degree of Juris Doctor.

For more information on the degree and courses, see the *Graduate Catalog*.

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 pro gram, the course of study is prescribed and incorporates the time proven techniques of legal education. This first year gives students 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, first-year students are assigned to small sections In the Legal Research and Writing pro gram, first year students prepare legal briefs and memo-randa and receive feedback through the use of practice examinations. The program focuses on the development of writing and organizational skills necessary for success in law school and in the practice of law. The second and third years cover a wide range of courses varying in format as well as subject matter, allowing students to pursue both the basic subjects of law study and more specialized interests. By offering great freedom in the selection of subjects, the educational experience of the second and third years is in sharp contrast to the curriculum of the first year. In addition, the college offers a number of faculty-supervised clinical education programs and a program of supervised extern ships.

Retention Standards. To be eligible to continue in the Col lege of Law, students must maintain a cumulative weighted GPA of 70 or higher at the end of each semester or summer session. Any student who fails to achieve a 70 GPA in any one semester, regardless of the cumulative GPA, is automat ically placed on probation. Continuation of enrollment by probationary students is upon such terms and conditions as the college may impose.

A student whose cumulative GPA falls below the required level or whose semester GPA is less than 70 in two consecu tive semesters is dismissed but may apply to the Office of the Dean for readmission The Office of the Dean refers the application to a faculty Committee on Readmission. Where the GPA deficiency is slight and evidence of extenuating cir cumstances is convincing, readmission may be granted on a probationary status after a review of the reasons contribut ing to unsatisfactory performance and a finding that there is substantial prospect for acceptable academic performance Cont nuation in school thereafter may be conditioned on achieving a level of performance higher than the overall 70 GPA. Further detailed information concerning the college's retention standards can be found in the *Bulletin of the Col lege of Law.*

Honor Code. The legal profession, a self regulating associ ation, depends on the integrity, honor, and personal morality of each member. Similarly, the integrity and value of an ASU College of Law degree depends on a reputation for fair competition The college's *Honor Code* is intended as a measure to preserve the integrity of the school's diploma and to create an arena in which students can compete fairly and confidently. Copies of the *Honor Code* are available from the assistant dean in the college's Student Services Office

ACCREDITATION

The college is fully accredited by the American Bar Asso ciation and is a member of the Association of American Law Schools.

MORE INFORMATION

Further detailed information concerning the course of study, admission practices, expenses, and financial assis-tance can be found in the *Bulletin of the College of Law*. To request the bulletin or application forms, call 480 965 7207 or write

ADMISS ONS OFFICE
COLLEGE OF LAW
ARIZONA STATE UN VERSITY
PO BOX 877906
TEMPE AZ 85287-7906

For general information about the College of Law, call 480 965-1474 or access the college's Web site at www.law.asu.edu.

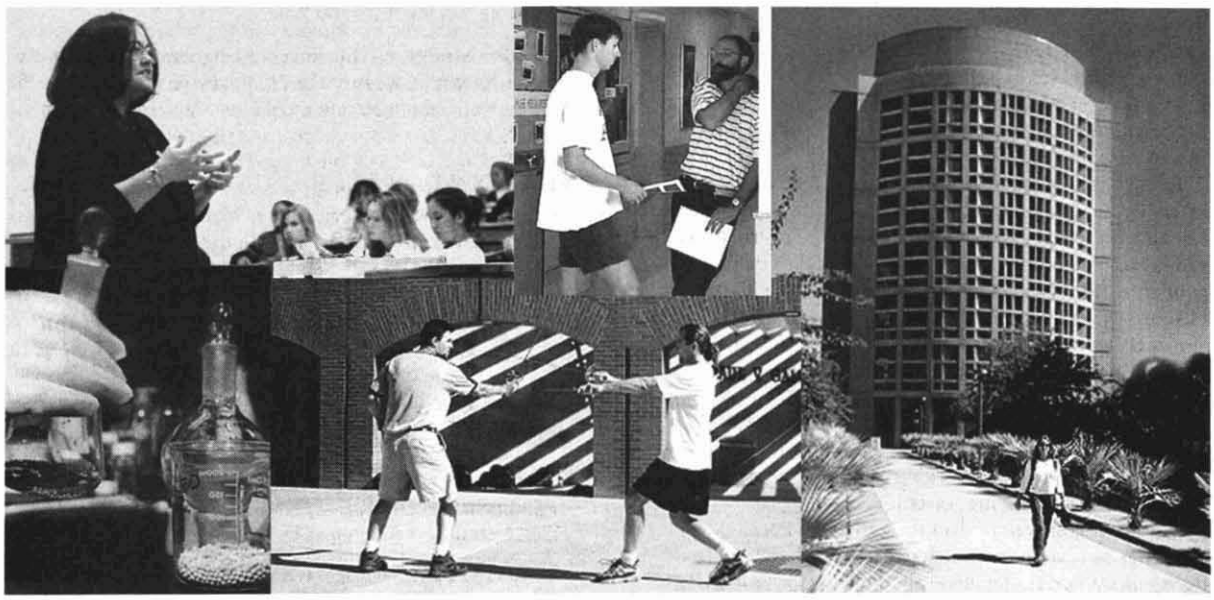
LAW (LAW)

See the *Graduate Catalog* for the LAW courses.

College of Liberal Arts and Sciences

Gary S. Krahenbuhl, Ed.D., Dean

www.asu.edu/clas



The College of Liberal Arts and Sciences offers programs that encompass the humanities, social and behavioral sciences, and natural sciences.

Clockwise from top center: Michael Martin photo, John MacIsaac photos (two); Tim Trumble photos (two)

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PURPOSE

Like all major research universities, Arizona State University provides the means for undergraduates to acquire a liberal education, an education that broadens students' understanding in the major areas of human knowledge while providing students with in depth knowledge in their chosen areas of focus. While the professional schools and colleges can and do provide for important dimensions of a liberal education, the central academic setting for accomplishing this basic university purpose is the College of Liberal Arts and Sciences (CLAS). The college provides a particularly rich and varied set of opportunities for students to gain the kind of liberal education that helps to prepare them for a lifetime of continued learning and application of knowledge in a diverse and ever-changing world.

As a consequence of the wide range of subjects CLAS offers in the humanities, the natural sciences and mathematics, and the social and behavioral sciences, instruction is provided in a number of core areas for undergraduate students from all of the other colleges. Students with majors in business, education, engineering, nursing, and other professional colleges rely on CLAS for basic foundation courses CLAS also offers the majority of courses meeting the General Studies requirement

CLAS initiated and continues to participate actively with the University Honors College It also offers advising to undergraduates who are working out their undergraduate programs or are planning for graduate studies

Most of the university faculty's engagement in the discovery and creation of knowledge and its dissemination occurs in CLAS As an integral part of this activity, CLAS offers a wide range of graduate training programs leading to a master's or doctoral degree For graduate degree application information, see the *Graduate Catalog* and contact either the Graduate College or the academic unit in which the degree of interest would be earned, the latter in order to receive detailed information on particular degree requirements.

ORGANIZATION

CLAS consists of 23 academic departments, several interdisciplinary programs, seven centers, and several research institutes and laboratories The college offers 38 programs leading to a bachelor's degree, 28 programs leading to a master's degree, 21 programs leading to a doctoral degree, and interdisciplinary graduate programs in cooperation with other colleges. Undergraduate customized interdisciplinary degrees are also available in the college.

For more information, visit the college's Web site at www.asu.edu/clas.

ADMISSION

Any entering ASU student who has met the minimum university entrance requirements can be admitted to CLAS. Students with fewer than 50 earned hours of credit can, if they wish, be admitted as "no preference" students. Students with 50 or more hours must declare a major to be accepted into the college.

Any student with a cumulative GPA of at least 2.00 who is currently registered in good standing in another college at ASU and who wishes to major in a subject offered by CLAS and to follow a program of study in the major may transfer into the college. (Students wishing to transfer into the majors of Computer Science or Economics must have an ASU cumulative GPA of at least 2 50. The student transfers by applying and being initially advised in the Office for Academic Programs, SS 111 Students admitted from other ASU colleges are under mandatory advising during the first semester and must take courses leading directly to a degree in CLAS Failure to follow mandated advice on course selection can result in enrollment and registration problems, including cancellation and holds

Transfer Students. The university standards for evaluation of transfer credit are listed under "Transfer Credit," page 65 All students who meet the university standards are admissible to CLAS, but students desiring to major in either Computer Science or Economics must have transfer GPAs of at least 2 50 Transfer students are urged to contact the relevant academic department or the Office for Academic Programs, SS 111, to ensure a smooth transition to CLAS. Students who have transferred courses from institutions other than Arizona community colleges must have their transcripts evaluated by an advisor in SS 111. Students who have attended only Arizona community colleges have evaluations performed in the department of the major.

Courses transferred from two year (community) colleges are accepted as lower division credit only. Students are urged to choose their community college courses carefully, in view of the fact that a minimum of 45 semester hours of work taken at the university must be upper division credit (see "Community Colleges," page 65).

"Undecided" or "Undeclared" Majors. Students in CLAS are not required to select a major upon entering the college as freshmen or at any time thereafter until the semester in which 60 semester hours are earned. Until such "no preference" students have chosen a major, they are advised through Cross College Advising Services, in the Undergraduate Academic Services Building. It is important to consult an academic advisor before any enrollment activity Before or during the semester in which they earn 60 semester hours, students *must* select their major and transfer into the appropriate department.

Note: Students who wish to enter a program of study that has a rigidly structured curriculum should be aware that delay in choosing a major could result in added time and cost in the completion of requirements.

ADVISING

All students are urged to seek advising in the appropriate college unit before registration. Students must follow the calendar published in the *Schedule of Classes* each semester for information regarding enrollment, adding dropping classes, and withdrawals.

Regular Advising. All students are strongly urged to seek advising in the appropriate college unit before registration

Advising Locations. CLAS students should seek routine advising at the locations shown in the "Advising Locations" table, page 332.

The Office for Academic Programs, located in SS 111, is the central resource center for academic information in the college Requests from students, departmental advisors, and faculty for clarification of rules, procedures, and advising

needs of the college and university should be directed to that office.

Advising Locations

Student	Location
Declared majors	Department of major
No preference; no preference, prelaw	Cross College Advising Services, UASB (480/965 4464)
No preference, premedical	LSC 206C (480/965 2365)

Mandatory Advising. The following categories of Liberal Arts and Sciences students *must* receive advising and *must* be cleared on the Mandatory Advising Computer System (MACS before their classes are scheduled

1. students in their first semester at ASU;
2. students on probation;
3. students with a cumulative GPA of less than 2.00,
4. students who have admissions deficiencies;
5. other students with "special admissions" status; and
6. students who have been disqualified (these students are allowed to attend ASU summer and winter sessions only and must be advised in the Office for Academic Programs, SS 111).

Students in the above mandatory advising categories should consult an advisor in the appropriate advising location listed in the previous section. Students with admission deficiencies are carefully monitored to ensure that they take courses that eliminate their deficiencies. Students are encouraged to check their mandatory advising status each semester before attempting registration transactions.

Advising for Preprofessional Programs

Professional Field	Office Where Advisor Is Located
Dentistry[1]	Pre Health Professions, LSC 206C
Foreign service	Department of chosen major
Health physics	Pre Health Professions, LSC 206C
Law	Office for Academic Programs, SS 111
Medicine[1]	Pre-Health Professions, LSC 206C
Ministry	Department of Religious Studies, LL 641
Occupational therapy	Pre Health Professions, LSC 206C
Optometry [1]	Pre Health Professions, LSC 206C
Osteopathy	Pre Health Professions, LSC 206C
Pharmacy	Pre Health Professions, LSC 206C
Physical therapy	Pre Health Professions, LSC 206C
Podiatry[1]	Pre-Health Professions, LSC 206C

Students preparing for a career in these areas should register in the Pre Health Professions office, 480 965 2365

No school in Arizona offers a program in dentistry, optometry, or podiatry Students interested in pursuing these professions should confer with the Pre Health Profession advisor concerning out of state schools where they may complete their training

Advising for Preprofessional Programs. Special advising is available for students planning to enter the fields listed in the "Advising for Preprofessional Programs" table, on this page The professional programs shown in the table are not majors in themselves, that is, there are no majors called "premedical," "prelaw," etc In each program, the student must eventually select an established major in CLAS or in one of the other colleges.

DEGREES

Majors. Programs leading to the B.A. and B S. degrees are offered by CLAS, with majors in the subjects listed in the "College of Liberal Arts and Sciences Baccalaureate Degrees and Majors" table, page 333. Each major is administered by the academic department indicated.

Minors. Although not required for graduation, special college approved minors are available in most departments Check department program descriptions for details. Minors offered by departments must have at least 18 hours of designated courses, including at least 12 hours of upper division work. The college requires a grade of at least "C" in all upper division courses in the minor Some departments have stricter requirements A minimum of six upper division hours in the minor must be taken in residence at ASU Main.

University policies prohibit the "double counting" of courses from the major for the minor. Specific questions concerning double counting, as well as general questions about the approval processes for minors, should be taken up with an academic advisor in the department offering the minor or the Office for Academic Programs, SS 111.

Refer to the CLAS portion of the "ASU Minors" table, page 111

UNIVERSITY GRADUATION REQUIREMENTS

In addition to fulfilling college and major requirements, students must meet all university graduation requirements. For complete information, see "University Graduation Requirements," page 83.

General Studies Requirement

All students enrolled in a baccalaureate degree program must satisfy a university requirement of a minimum of 35 hours of approved course work in General Studies, as described in "General Studies," page 87 Note that a l three General Studies awareness areas are required Consult your advisor for an approved list of courses.

General Studies courses are listed in the "General Studies Courses" table, page 90, in the course descriptions, in the *Schedule of Classes*, and in the *Summer Sessions Bulletin*

COLLEGE DEGREE REQUIREMENTS

CLAS degree requirements are more extensive than the General Studies requirement Additional course work in the humanities, natural sciences and mathematics, and social and behavioral sciences is required. Students are encouraged to consult with an academic advisor in planning a program to ensure that they meet all necessary requirements

College of Liberal Arts and Sciences Baccalaureate Degrees and Majors

Major	Concentration	Degree	Administered By
African American Studies	Humanities arts, politics and society, social and behavioral sciences	B A	African American Studies Program
Anthropology		B.A.	Department of Anthropology
Asian Languages (Chinese/Japanese)		B A	Department of Languages and Literatures
Biochemistry		B.S.	Department of Chemistry and Biochemistry
Biology	Biology and society	B.S.	Department of Biology
Chemistry		B.A., B.S.	Department of Chemistry and Biochemistry
Chicana and Chicano Studies	Humanities/cultural sciences, social sciences/policy	B.A.	Department of Chicana and Chicano Studies
Clinical Laboratory Sciences	—	B.S.	Department of Microbiology
Computer Science		B S	Department of Computer Science and Engineering
Conservation Biology		B.S.	Department of Biology
Economics		B.A., B.S.[2]	Department of Economics
English	Linguistics, literature	B.A.	Department of English
Exercise Science/ Physical Education	Exercise and wellness, exercise science, physical education	B S	Department of Exercise Science and Physical Education
Family Resources and Human Development	Family studies/child development	B.S.	Department of Family Resources and Human Development
French		B.A	Department of Languages and Literatures
Geography	Meteorology climatology, urban studies	B.A., B.S.	Department of Geography
Geology		B.S.	Department of Geology
German		B.A.	Department of Languages and Literatures
History		B.A	Department of History
Humanities		B.A.	Interdisciplinary Humanities Program
Integrated Studies		B A , B.S.	College of Liberal Arts and Sciences
Italian		B.A	Department of Languages and Literatures
Mathematics		B.A	Department of Mathematics
Mathematics	Computational mathematical sciences	B.S.	Department of Mathematics
Microbiology		B.S.	Department of Microbiology
Molecular Biosciences/ Biotechnology		B.S.	Departments of Microbiology and Plant Biology
Philosophy	Ethics, history and philosophy of science	B A	Department of Philosophy
Physics	Emphasis: astronomy Options: I, II	B.S.	Department of Physics and Astronomy
Plant Biology	Environmental science and ecology, plant biochemistry and molecular biology, urban horticulture	B.S	Department of P ant Biology
Political Science	Public policy advocacy and lobby ing, public policy analysis	B.A., B.S.	Department of Political Science
Psychology		B.A , B S	Department of Psychology
Religious Studies		B.A.	Department of Religious Studies
Russian		B.A.	Department of Languages and Literatures
Sociology		B.A.	Department of Sociology
Spanish		B.A.	Department of Languages and Literatures
Speech and Hearing Science	—	B.S.	Department of Speech and Hearing Science
Women's Studies		B.A., B S.	Women's Studies Program

The department is in the Colle,e of Engineerin and Applied Sciences, which also offers this ma or, with different requirements.

The department is in the College of Bu iness which also offers this major, with different requirements

To graduate from CLAS a student must satisfy separate requirements of two kinds In addition to the General Studies requirement *major requirements* involve concentrated course work in one field, CLAS graduation requirements ensure the student demonstrates proficiency in a second language. In addition, these requirements expose the student to other liberal arts and sciences outside the major field

I. Major Requirements. Each student is required to select a major from among the fields of study offered by CLAS. The requirements for completion of the major are described under departmental listings.

A The major department may require up to 45 semester hours of course work The minimum is 30 hours. A maximum of 15 additional hours may be required in related courses and prerequisites No more than 60 semester hours of course work may be required to complete the major, related courses, and prerequisites Some departments require calculus level mathematics, up to five of these semester hours may be excluded from the 60 hour maximum because they satisfy the mathematics proficiency requirement. A minimum of 12 upper division hours in the major must be taken in residence at ASU Main

B No credit is granted toward fulfilling major or minor requirements in any upper division course in that subject field unless the grade in that course is at least a "C." In CLAS the assignment of a grade of "Y" indicates a level of performance that would have resulted in a grade of at least "C" had the normal grading scheme been used In addition, each major in CLAS requires students to earn a "C" grade minimum in the math courses used to fulfill the General Studies math requirement. Please see the individual departments for other minimum grade requirements.

In addition, each major in CLAS requires students to earn a "C" minimum in the math course used to meet the General Studies math requirement Please see the individual departments for other minimum grade requirements

C Major fields of study are classified into the following three divisions:

1 Humanities
- African American Studies
- Asian Languages Chinese Japanese
- Chicana and Chicano Studies
- English (Linguistics students must take two upper division literature or film courses to meet CLAS graduation requirements in Humanities)
- French
- German
- Humanities
- Italian
- Philosophy
- Religious Studies
- Russian (Only meets CLAS graduation requirements in Humanities if at least two upper division literature or civilization courses are taken.)
- Spanish

2 Natural sciences and mathematics:
- Biology
- Biochemistry
- Chemistry
- Clinical Laboratory Sciences
- Computer Science
- Conservation Biology
- Geology
- Mathematics
- Microbiology
- Molecular Biosciences/Biotechnology
- Physics
- Plant Biology

3. Social and behavioral sciences:
- African American Studies
- Anthropology
- Chicana and Chicano Studies
- Economics
- Exercise Science/Physical Education (Students majoring in this field must satisfy the CLAS graduation requirements in all three divisions
- Family Resources and Human Development (Students majoring in this field must satisfy the CLAS graduation requirements in all three divisions)
- Geography
- History
- Political Science
- Psychology
- Sociology
- Speech and Hearing Science Students majoring in this field must satisfy the CLAS graduation requirements in all three divisions
- Women's Studies

II. CLAS Graduation Requirements. The purpose of the CLAS graduation requirements is to ensure that the student is introduced to disciplines outside the division of the major. A list of major fields and their respective divisions is given under I.C

Unless the major field notes otherwise in I.C, students are considered to have fulfilled the CLAS graduation requirements in the division of the major

Students majoring in Exercise Science/Physical Education, Family Resources and Human Development, and Speech and Hearing Science must satisfy CLAS

graduation requirements in social behavioral sciences as well as in the other two divisions. Students majoring in African American Studies or Chicana and Chicano Studies satisfy either the CLAS graduation require ments in the humanities or the social and behavioral sci ences, depending upon their concentrations.

Students majoring in Anthropology, Geography, or Psychology may not use ASM courses in the case of Anthropology majors, GPH courses in the case of Geography majors, or PSY courses in the case of Psy chology majors to satisfy the CLAS graduation require ments in the natural sciences and mathematics.

Note· Courses used to fill the university General Studies requirement may not be used to fill CLAS grad uation requirements in the humanities, social and behavioral sciences, and the natural sciences and math ematics.

A. Humanities (six to nine semester hours). Each stu dent is required to complete two to three courses of at least three semester hours each. Course prefixes are identified in the following section. At least two courses must be at the 300 or 400 level.

   Course prefixes for the CLAS graduation requirement in the Humanities:

   1. AFH (African American Studies Program)
   2. CSH (Department of Chicana and Chicano Studies)
   3. ENG (Department of English; any literature course, including ENG 200 and 218)
   4. CHI, FLA, FRE, GER, GRK, HEB, ITA, JPN, LAT, POR, RUS, SPA (Department of Lan guages and Literatures; FLA 150 or any litera ture or "civilization" course at the 300 level or above)
   5 HUM (Interdisciplinary Humanities Program)
   6 HPS, PHI (Department of Philosophy)
   7. REL (Department of Religious Studies)
   8. WSH (Women's Studies Program)

   Whether the student is required to take six or nine semester hours to fill the CLAS graduation require ments in the humanities depends upon the number of courses used to fill the humanities component of the university General Studies requirement If the student elects to take nine semester hours to fill the General Studies component, he or she is required to take a minimum of six semester hours of upper-division course work from the above prefixes to fill the CLAS graduation requirements in the humani ties. Similarly, if the student elects to take only six semester hours to fill the General Studies compo nent, he or she is required to take a minimum of nine semester hours, of which a minimum of six semester hours must be in the upper division of course work from the above prefixes to fill the CLAS graduation requirements in the humanities.

B. Natural sciences and mathematics (six semester hours).

   Course prefixes for the CLAS graduation requirements in the natural sciences and mathe matics:

   1. ASM (Department of Anthropology)
   2 BIO (Department of Biology)
   3. BCH, CHM (Department of Chemistry and Biochemistry)
   4. CSE (Department of Computer Science and Engineering)
   5. GPH (Department of Geography)
   6 GLG (Department of Geology)
   7. MAT (Department of Mathematics)
      Note: Only mathematics courses for which MAT 117 or a higher level mathematics course is a prerequisite may be used to satisfy the CLAS graduation requirements in Natural Sci ences and Mathematics. Mathematics courses for which MAT 117 is a prerequisite may be used to satisfy CLAS graduation requirements in the natural sciences and mathematics, even if they were also used to demonstrate mathemat ics proficiency, another component of the CLAS graduation requirements discussed in II.D.
   8. MIC (Department of Microbiology)
   9. AST, PHS, PHY (Department of Physics and Astronomy)
   10. PLB, MBB (Department of Plant Biology)
   11. PSY (Department of Psychology)

C. Social and behavioral sciences (six to nine semester hours). Each student is required to complete two to three courses of at least three semester hours each. Course prefixes are identified in the following sec tion. At least two courses must be at the 300 or 400 level

   Course prefixes for the CLAS graduation requirements in the social and behavioral sci ences:

   1. AFS (African American Studies Program)
   2. ASB (Department of Anthropology)
   3 CSS (Department of Chicana and Chicano Studies)
   4. ECN (Department of Economics)
   5. GCU (Department of Geography)
   6. HIS (Department of History)
   7. PGS (Department of Psychology)
   8. POS (Department of Political Science)
   9. SOC (Department of Sociology)
   10 WST (Women's Studies Program)
      Note. Before the 1999 2000 edition of the *General Catalog*, all Women's Studies courses were listed as WST. Consult an advisor to ver ify if an earlier WST course should be consid ered WSH or WST.

   Whether the student is required to take six or nine semester hours to fill the CLAS graduation require ments in the social and behavioral sciences depends upon the number of courses used to fill the social

and behavioral sciences component of the univer sity General Studies requirement. If the student elects to take nine semester hours to fill the General Studies component, he or she is required to take a minimum of six semester hours of upper division course work from the listed prefixes to fill the CLAS graduation requirements in the social and behavioral sciences. Similarly, if the student elects to take only six semester hours to fill the General Studies component, he or she is required to take a minimum of nine semester hours, of which a mini mum of six semester hours must be in the upper division of course work from the listed prefixes to fill the CLAS graduation requirements in the social and behavioral sciences.

D. Each student is required to demonstrate proficiency by completing courses in a second language. Each student must demonstrate proficiency by complet ng the courses specified below with a grade of "C" or higher in each course. Second language course requirements consist of
   1. completion of second language course work at the intermediate level (202 or equivalent, though some languages require both semesters at the intermediate level to be taken to demon strate proficiency; see the Department of Lan guages and Literatures listings for greater spec ification);
   2 a foreign language course at the 300 level or higher taught in the foreign language and hav ing 202 or its equivalent as a prerequisite,
   3 completion of secondary education at a school in which the language of instruction is not English; or
   4. completion of SHS 202 American Sign Lan guage IV or its equivalent.

III. General Electives. Most CLAS majors can meet all of the above requirements with fewer than 120 semester hours required for graduation The remaining hours are general electives that may be selected from any of the departments of CLAS and from the offerings of the other colleges.

Program of Study/Declaration of Graduation. The pro gram of study declaration of graduation, which is required by university regulations during the semester in which an undergraduate earns the 87th hour, must be filed and approved at least two weeks before the preregistration period for the subsequent semester. Students are expected to follow the approved program of study or to receive early college approval for proposed changes to the program of study. Students should contact the Office for Academic Pro grams, SS 111, regarding college graduation rules and dead lines. Deadlines for filing a program of study declaration of graduation after enrolling in the 87th hour are March 1 and October 1 of each year. Students with 87 hours must have a college approved program of study declaration of gradua tion before registering for the next semester

Credit Requirement. All candidates for graduation in the B.A and B.S degree curricula are required to complete at least 120 semester hours, of which at least 45 hours must consist of upper division courses. A minimum ASU cumula tive GPA of 2.00 is required for graduation.

Course Load. The normal course load is 15 16 semester hours. First semester freshmen and entering transfer stu dents are not permitted to register for more than 18 semester hours in the initial semester Other students who wish to register for more than 18 hours must have a GPA of at least 3.00 and must file a petition in the Office for Academic Pro grams, SS 111, before registration. Any petition for an over load in excess of 21 hours must be presented to the Stan dards Committee of the college. No student should assume that his or her petition will be granted for overload.

SPECIAL CREDIT OPTIONS

Pass/Fail Grade Option. The pass fail grade option is intended to broaden the education of Liberal Arts and Sci ences undergraduates by encouraging them to take advanced courses outside their specialization. A mark of "P" contributes to the student's earned hours but does not affect the GPA. A failing grade is computed into the GPA.

Only CLAS students with at least 60 semester hours may take courses under the pass fail option. The option may be used under the following conditions

1. enrollment for pass fail needs the approval of the instructor and the college;
2. enrollment under this option must be indicated dur ing registration and may not be changed after the late registration period; and
3 a maximum of 12 hours taken for pass fail may be counted toward graduation.

Students may not enroll under the pass fail option in the following courses:

1. those taken to satisfy the second language or First Year Composition requirements;
2. those in the student's major, minor, or certificate program;
3. those counted toward or required to supplement the major,
4 those counted as 499 Individualized Instruction;
5. those taken for honors credits; or
6. those counted toward satisfying the CLAS gradua tion requirements or the General Studies require ment

Audit Grade Option. A student may choose to audit a course in which he or she attends regularly scheduled class sessions but earns no credit. The student should obtain the instructor's approval before registering for the course For more information, see "Grading System," page 76.

Note: This grade option may not be changed after the drop add period.

Independent Learning. Study by independent learning is not a normal part of a degree program, special circum stances must exist for a resident student to take independent learning courses Any enrollment in such courses must have the prior approval of the college.

College of Liberal Arts and Sciences Graduate Degrees and Majors

Major	Concentration	Degree	Administered By
Anthropology	Archaeology, bioarchaeology, linguistics, medical anthropology, museum studies, physical anthropology, social cultural anthropology	M.A.[1]	Department of Anthropology
Anthropology	Archaeology, physical anthropology, social-cultural anthropology	Ph.D.	Department of Anthropology
Biology[2]	Ecology	M.S., Ph.D.	Department of Biology
Chemistry	Analytical chemistry, biochemistry, geochemistry, inorganic chemistry, organic chemistry, physical chemistry, solid-state chemistry	M.S., Ph.D.	Department of Chemistry and Biochemistry
Communication Disorders		M.S.	Department of Speech and Hearing Science
Creative Writing		M.F.A.[3,4]	Creative Writing Committee
English	Comparative literature, English linguistics, literature and language, rhetoric and composition	M.A.	Department of English
English	Literature, rhetoric/composition and linguistics	Ph.D.	Department of English
Exercise Science	Biomechanics, motor behavior sport psychology, physiology of exercise	Ph.D.[3]	Committee on Exercise Science
Exercise Science/ Physical Education		M.S.	Department of Exercise Science and Physical Education
Family Resources and Human Development	Family studies, human nutrition	M.S.	Department of Family Resources and Human Development
Family Science[2]	Marriage and family therapy	Ph.D.	Department of Family Resources and Human Development
French		M A.	Department of Languages and Literatures
Geography	—	M.A., Ph.D.	Department of Geography
Geology		M S., Ph.D.	Department of Geology
German	Comparative literature, language and culture, literature	M.A.	Department of Languages and Literatures
History	Asian history, British history, European history, Latin American history, public history, U.S. history, U S. Western history	M A	Department of History
History	Asian history, British history, European history, Latin American history, U.S. history	Ph.D.	Department of History
Humanities		M.A.[3]	Graduate Committee on Humanities
Mathematics	—	M.A., Ph.D.	Department of Mathematics
Microbiology		M S., Ph.D.	Department of Microbiology
Molecular and Cellular Biology	—	M.S., Ph.D.	Interdisciplinary Committee on Molecular and Cellular Biology

Graduate students in the School of Justice Studies and the Department of Anthropology are able to receive a concurrent M S degree in Justice Studies and M A. degree in Anthropology

[2] This major has formalized concentration(s), other areas of study are available

[3] This program is administered by the Graduate College. See the *Graduate Catalog*.

[4] Fiction, nonfiction, poetry, and screenwriting are options for students in this program offered by the faculty in the Department of English. Playwriting is also an option in this program offered by the faculty in the Department of Theatre.

College of Liberal Arts and Sciences Graduate Degrees and Majors (continued)

Major	Concentration	Degree	Administered By
Natural Science	Biology	M.N S	Department of Biology
	Chemistry	M.N.S.	Department of Chemistry and Biochemistry
	Geology	M N.S	Department of Geology
	Mathematics	M.N.S.	Department of Mathematics
	Microbiology	M.N.S.	Department of Microbiology
	Physics	M.N.S.	Department of Physics and Astronomy
	Plant biology	M.N.S.	Department of Plant Biology
Philosophy		M.A., Ph.D.	Department of Philosophy
Physical Education		M.P.E.	Department of Exercise Science and Physical Education
Physics	—	M.S., Ph.D.	Department of Physics and Astronomy
Plant Biology[7]	Ecology, photosynthesis	M.S , Ph D.	Department of Plant Biology
Political Science	American politics, comparative politics, international relations, political theory	M.A., Ph.D.	Department of Political Science
Psychology	Behavioral neuroscience, clinical psychology, cognitive/behavioral systems, developmental psychology, environmental psychology, quantitative research methods, social psychology	Ph.D.	Department of Psychology
Religious Studies	—	M.A.	Department of Religious Studies
Science and Engineering of Materials	High resolution nanostructure analysis, solid state device materials design	Ph.D.[3]	Committee on the Science and Engineering of Materials
Sociology		M.A., Ph.D.	Department of Sociology
Spanish	Comparative literature, language and culture, linguistics, literature	M A	Department of Languages and Literatures
Spanish	Cultural studies, literature	Ph.D.	Department of Languages and Literatures
Speech and Hearing Science	Developmental neurolinguistic disorders, neuroauditory processes, neurogeron tologic communication disorder	Ph.D.[3]	Committee on Speech and Hearing Science
Statistics		M.S.[3]	Committee on Statistics
Teaching English as a Second Language		M.TESL	Department of English

Graduate students in the School of Justice Studies and the Department of Anthropology are able to receive a concurrent M S degree in Justice Studies and M A. degree in Anthropology.

This major has formalized concentration s ; other areas of study are available

This program is administered by the Graduate College See the *Graduate Catalog*.

[4] Fiction, nonfiction, poetry, and screenwriting are options for students in this program offered by the faculty in the Department of English. Playwriting is also an option in this program offered by the faculty in the Department of Theatre.

ACADEMIC STANDARDS

The standards for GPA and the terms of probation, dis qualification, reinstatement, and appeal are identical to those of the university as set forth under "Retention and Academic Standards," page 79, except that the disqualified student in CLAS is suspended for at least two regular semesters at the university When students are placed on probation, one of three things can happen:

1. the student may raise his or her cumulative GPA to a 2.00 or better by taking new classes and be removed from probation after the fall or spring semester;
2. the student may receive the required semester GPA, but not raise the cumulative GPA to the 2.00 level in which case, the student may continue on probation, earning the required semester GPA, for as many semesters as it takes to raise the cumulative GPA above 2 00; or
3. the student may fail to achieve the required semester GPA and be disqualified.

Students with cumulative GPAs of less than 2.00 who leave the university for a semester or more are not automati cally readmitted. Such students, as well as all disqualified students, should contact the Office for Academic Programs, SS 111, regarding procedures and guidance for reinstatement and returning to good standing By following recom mendations and meeting established standards for summer school work or course work at other institutions, the

possibility of successful reinstatement is enhanced. Academic discipline is one of the functions of the Office for Academic Programs, SS 111. All students having academic difficulties of any kind should contact this office. Also available in this office is information on policies and procedures of the college on academic honesty, student grievances with respect to grades and various petitions regarding college standards and graduation requirements.

Academic honesty is expected of all students in all examinations, papers, academic transactions, and records. The possible sanctions include, but are not limited to, appropriate grade penalties, loss of registration privileges, disqualification, and dismissal.

STUDENT RESPONSIBILITIES

Any student enrolling in courses offered by CLAS is expected to follow the rules and deadlines specified in this catalog and the current *Schedule of Classes*. Students are urged to meet with their departmental academic advisors before registration. Students with additional questions or problems are also urged to meet with advisors in the Office for Academic Programs, SS 111, regarding the academic rules of the college and the university.

SPECIAL PROGRAMS

University Honors College. CLAS works closely with the University Honors College, which affords qualified undergraduates opportunities for enhanced educational experiences. For a complete description of the University Honors College requirements and opportunities, see "University Honors College," page 323.

Integrated Studies. An Integrated Studies major leading to the B.A. or B.S. degree provides students of outstanding ability in the humanities, natural sciences and mathematics, and social and behavioral sciences opportunities to pursue courses of studies that cut across departmental boundaries and focus on specific topics or problem areas. Completion of 32 semester hours at ASU with a GPA of at least 3.25 and three letters of recommendation from ASU faculty members are required for admission. For more information about degree requirements, contact the Office for Academic Programs, SS 111.

Washington Semester Program. Students have a variety of opportunities for practicum and internship experiences that enable them to meld classroom learning with practical application. Among the several individual departmental programs that provide internships for majors, the Department of Political Science is the ASU sponsor of the Washington Semester Program. The program provides students a one semester opportunity to study in Washington, D.C., through any one of several programs sponsored by the American University. The program is available to outstanding juniors or seniors and requires careful planning with an academic advisor early in the student's career. For more information, call the Department of Political Science, 480 965 6551.

Military Officer Training. The Departments of Aerospace Studies and Military Science offer programs leading to commissions in the armed forces, but they do not offer majors or minors. For more information, see the appropriate department descriptions in this catalog.

Certificate Programs and Areas of Emphasis

Seventeen certificates are available from units in CLAS, and one collegewide Enriched College Degree certificate is available to any major in the college as shown in the "CLAS Certificates" table, on this page. Areas of emphasis are also available in some of the same subjects (e.g., Latin American Studies).

CLAS Certificates

Certificate Program	Administered By	Page
Enriched College Degree	CLAS	340
African American Studies	African American Studies Program	345
Asian Studies[1]	Center for Asian Studies	340
East Asian Studies	Center for Asian Studies	340
Health Physics	Pre-Health Professions Office	340
History and Philosophy of Science	Department of Philosophy	416
Jewish Studies	Jewish Studies Committee	340
Latin American Studies[1]	Latin American Studies Center	340
Medieval and Renaissance Studies	Arizona Center for Medieval and Renaissance Studies (ACMRS)	340
Medieval Studies[2]	ACMRS	
Museum Studies[2]	Department of Anthropology	
Renaissance Studies[2]	ACMRS	—
Russian and East European Studies[1]	Russian and East European Consortium	341
Scandinavian Studies	Department of Languages and Literatures	341
Scholarly Publishing	Department of History	
Southeast Asian Studies	Program for Southeast Asian Studies	341
Translation	Department of Languages and Literatures	392
Women's Studies[2]	Women's Studies Program	341
Writing	Department of English	364

[1] Emphases are also available in these programs.

[2] For more information, see the *Graduate Catalog*.

Enriched College Degree. CLAS offers an Enriched College Degree certificate, available to any major within the college.

The Enriched College Degree certificate consists of a minimum of 15 semester hours of a minimum of "C" grade credit. The certificate consists of

1. a theme track composed of a three-course sequence outside the student's major, characterized by an identifiable theme of intellectual relevance for students;
2. a bridge course selected to address the relationships among areas of inquiry and means of acquiring knowledge; and
3. an upper division course in spoken English to provide a meaningful opportunity for substantive oral presentations.

For more information, contact the CLAS Office for Academic Programs, SS 111, or call 480 965 6506.

Asian Studies. An Asian Studies certificate is offered through the Center for Asian Studies.

Students must complete two years (20 semester hours) of an Asian language plus 30 additional hours of Asian area studies courses selected from core Asian studies courses or courses with a significant focus on Asia chosen in consultation with the Center for Asian Studies advisor. Students whose native language is an Asian language or who have otherwise mastered an Asian language may elect to take four additional Asian studies courses in place of the elementary and intermediate language classes. Language requirements may be selected from Chinese, Indonesian, Japanese, Korean, Thai, and Vietnamese.

An East Asian Studies certificate is also available. Students must complete two years (20 semester hours) of Chinese or Japanese plus 30 additional semester hours of East Asian area studies courses, these courses must be selected from the core East Asian curriculum or must be courses with a significant focus on East Asia chosen in consultation with the Center for Asian Studies director.

Note: Students whose native language is Chinese or Japanese or who have otherwise mastered these languages may elect to take four additional East Asian studies courses in place of the elementary and intermediate language courses

The center houses a comprehensive library and is involved in student and faculty exchange programs with several Asian universities as well as serving as a liaison with various Asian organizations.

For more information, contact the Center for Asian Studies, WHALL 105, 480 965 7184.

Health Physics. The curriculum of health physics involves work in CLAS and the College of Engineering and Applied Sciences. The purpose of the concentration is to serve undergraduate students who wish to prepare themselves for careers in health physics. To qualify for professional status, a health physicist needs a B.S. degree in one of the physical or life sciences and a group of specialized courses in physics, mathematics, chemistry, engineering, and biology.

A Certificate of Concentration in Health Physics is awarded for the successful completion of a B.S. degree in a physical or life science that follows a prescribed program. Inquiries about the program should be addressed to the Pre Health Professions Office, LSC 206C, 480 965 2365, where academic advising is available.

Jewish Studies. The Jewish studies program is designed with the following goals in mind:

1. to examine the history and culture of the Jews;
2. to provide a model for interdisciplinary teaching and research;
3. to generate and facilitate research on Judaica,
4. to provide the community with programs, courses, and research furthering the understanding of Judaica; and
5. to stand as an example of the university's commitment to a program of meaningful ethnic studies on a firm academic base

The Certificate of Concentration in Jewish Studies may be combined with a major in any college. For information about the program, refer to the Department of History or the Department of Religious Studies.

Latin American Studies. The Latin American Studies certificate program is designed to give students an understanding of culture, economies, political structures, and the history of Latin American nations. The Departments of Anthropology, Economics, Geography, History, Languages and Literatures (Spanish and Portuguese), Political Science, and the College of Business offer courses that combine to make up the interdisciplinary certificate. Students must complete 30 hours of upper division courses from the above departments colleges with a concentration in Latin America. 15 hours in the major subject and 15 hours in other disciplines. The certificate requires Spanish or Portuguese proficiency through the 313 level of conversation and composition. Only language courses above 313 in literature and civilization will count toward a major or interdisciplinary areas of preparation. Spanish and Portuguese courses above 313 in grammar and phonology will not count toward the major requirements.

The Latin American Studies Center offers the area of emphasis for students who do not wish to attain a high level of language proficiency.

For more information, visit the Latin American Studies Center at SS 213, or call 480 965 5127

Medieval and Renaissance Studies. An undergraduate Certificate in Medieval and Renaissance Studies is offered by the Arizona Center for Medieval and Renaissance Studies (ACMRS). In addition to the course work and examinations required in a student's major field of interest, the following minimum requirements must be fulfilled to earn the certificate:

1. six to eight semester hours of classical Latin and six to eight semester hours of Latin (classical and/or medieval) or of a vernacular language of the period (e.g., Old English, Old Norse, Old French, Renaissance Italian);
2. six to eight semester hours of course work in medieval and renaissance studies outside the major discipline;
3. three semester hours of thesis on a topic concerning the Middle Ages or Renaissance. The thesis may be

used to fulfill the Honors College thesis requirement for students enrolled in the Honors College; and

4. a minimum of a "C" average in all course work leading to the certificate.

Students interested in the certificate program need to complete an application form before being accepted into the program. Applications are available by calling ACMRS at 480 965-5900.

See the *Graduate Catalog* for information about the Certificate in Medieval Studies and the Certificate in Renaissance Studies, and "Arizona Center for Medieval and Renaissance Studies (ACMRS)," page 35, for information about the center.

Museum Studies. See the *Graduate Catalog* or contact the Department of Anthropology for more information.

Russian and East European Studies. Undergraduate students may complete an interdisciplinary certificate program leading to a bachelor's degree with a major in the chosen field with an emphasis in Russian and East European studies. The requirements for the Russian and East European Studies certificate comprise (1) three years (22 hours) of Russian or another Eurasian or East European language and (2) 30 upper division semester hours in Russian/East European area related course work.

At least three disciplines must be represented in the area related course work, and at least 12 hours must be outside the Department of Languages and Literatures (i.e., non RUS and non FLA courses) Fulfillment of these requirements is certified by the Russian and East European Studies Consortium and is recognized on the transcript by a bachelor's degree with "Major in [Discipline], Emphasis in Russian and East European Studies." The purpose of this undergraduate certificate program is to encourage students majoring in a chosen discipline to develop special competency in Russian or East European language and area studies. A major in any department may elect this emphasis.

For further information, contact the program coordinator of the Russian and East European Studies Consortium at 480 965-4188.

Scandinavian Studies. Students admitted to undergraduate degree programs in any field are eligible for the Scandinavian Studies certificate program. In addition to the course work and examinations required in the student's major, the student is responsible for fulfilling the following minimum requirements (21 semester hours) before the certificate is issued:

1. six semester hours of Norwegian or Swedish at the 200 level or above,
2. three semester hours in SCA 250 Introduction to Scandinavian Culture;
3. nine semester hours of upper division course work in Scandinavian Studies outside the student's major discipline;
4. a minimum of a "C" average in all course work leading to the certificate; and
5. three semester hours in an independent study thesis on a topic concerning Scandinavian Studies The thesis may be used to fulfill the Honors College thesis requirement for students enrolled in the Honors College.

Students who test out of the basic language courses would under advisement take other approved courses to fulfill the minimum requirement of 21 semester hours.

Scholarly Publishing. See the *Graduate Catalog* for information on this certificate program.

Southeast Asian Studies. A Certificate in Southeast Asian Studies is available to any undergraduate student. The certificate program offers two options: (1) an area studies specialization emphasizing courses in the social sciences and humanities and requiring one year of Indonesian, Thai, or Vietnamese and (2) a language specialization requiring a two year sequence in a Southeast Asian language and a proportional number of area studies courses.

Students wishing to study a Southeast Asian language other than those offered on campus may transfer credits earned at the Southeast Asian Studies Summer Institute, a consortium for intensive language and area studies, or at other accredited programs. Qualified students may request placement testing on other national languages of the region, administered in accordance with the national American Council of Teachers in Foreign Languages (ACTFL) guidelines.

The ASU curriculum includes

1. language instruction in Indonesian, Thai, or Vietnamese;
2. ASB GCU/HIS/POS/REL 240 Introduction to Southeast Asia;
3. HIS 308 Modern Southeast Asia;
4. electives in the social sciences and humanities on the history, geography, culture, politics, and religion of the region; and
5. a culminating capstone seminar in which the students share multidisciplinary approaches to the region and integrate knowledge of Southeast Asia with their respective disciplinary orientations.

Courses counting toward the Certificate in Southeast Asian Studies fulfill requirements for undergraduate majors and General Studies in the social and behavioral sciences, humanities, literacy, and global and historical awareness areas. A two year sequence in Southeast Asian language study meets the foreign language requirement for undergraduates in CLAS.

The Program for Southeast Asian Studies is a federally funded National Resource Center for Southeast Asia. For more information, contact the Program for Southeast Asian Studies, LL 9 (Basement), 480 965-4232.

Translation. See "Certificate Program in Translation," page 392, for information about the Certificate in Translation.

Women's Studies. Women's Studies provides our students with an intensive interdisciplinary liberal arts education that enables them to write well, think critically, and analyze problems effectively. Our students take a variety of courses, including a capstone seminar requiring original research and writing and an internship that helps them prepare for life after college. Original undergraduate research is encouraged, and some courses involve students in studying community problems and formulating policy solutions.

A Certificate of Concentration in Women's Studies is awarded for the successful completion of WST 100 (or 300) and 498 and an additional 15 semester hours from the list of approved women's studies courses, only six hours of which may also be applied toward the student's major.

Inquiries about the program should be addressed to the Women's Studies Program, EC A209, 480/965-2358, where the current list of approved courses is available.

GENERAL INFORMATION

Research Centers. To expand educational horizons and to enrich the curriculum, CLAS maintains the following research centers:

Arizona Center for Medieval and Renaissance Studies
Cancer Research Institute
Center for Asian Studies
Center for Meteorite Studies
Center for Solid-State Science
Center for the Study of Early Events in Photosynthesis
Exercise and Sport Research Institute
Hispanic Research Center
Institute of Human Origins
Latin American Studies Center

See "Research Centers, Institutes, and Laboratories," page 31, for more information.

The faculty also offers the following LIA course to familiarize students with available resources and services for research purposes.

LIBERAL ARTS AND SCIENCES (LIA)

LIA 191 First-Year Seminar. (1–3) N

For information on LIA courses, see the current *Schedule of Classes* or contact the Office for Academic Programs, SS 111, 480/965-6506.

Bateman Physical Sciences Center

Frank Chuang photo

Department of Aerospace Studies

Air Force ROTC

Col. Ronald Scott Jr.
Chair
(TC 324) 480/965-3181
www.asu.edu/clas/afrotc

PROFESSOR
SCOTT

ASSISTANT PROFESSORS
EVANCHO, GAGE, KORBAS

PURPOSE

The Department of Aerospace Studies curriculum consists of the general military course and history for freshmen and sophomores (AES 101, 103, 201, 203) and the professional officer course for juniors and seniors (AES 301, 303, 401, 403).

General Qualifications. A man or woman entering the Air Force Reserve Officers' Training Corps (AFROTC) must be the following:

1. a citizen of the United States (noncitizens may enroll but must obtain citizenship before commissioning),
2. of sound physical condition; and
3. at least 17 years of age for scholarship appointment or admittance to the Professional Officer Course (POC).

Additionally, scholarship recipients must be able to fulfill commissioning requirements by age 27. If designated for flying training, the student must be able to complete all commissioning requirements before age 26 and a half; persons in other categories must be able to complete all commissioning requirements before age 30.

FOUR-YEAR PROGRAM (GMC AND POC)

A formal application is not required for students entering the four year program. A student may enter the program by simply registering for one of the general military course (GMC) classes at the same time and in the same manner as other courses. GMC students receive two semester hours for each AES 100- and 200-level class completed for a total of eight semester hours. GMC students not on AFROTC scholarship incur no military obligation. Each candidate for commissioning must pass an Air Force aptitude test and a physical examination and be selected by a board of Air Force officers. If selected, the student then enrolls in the POC the last two years of the AFROTC curriculum. Students attend a four week field training course at an Air Force base normally between the sophomore and junior years. Upon successful completion of the POC and the college requirements for a degree, the student is commissioned in the U.S. Air Force as a second lieutenant. The new officer then enters active duty or may be granted an educational delay to pursue graduate work.

TWO-YEAR PROGRAM (POC)

The basic requirement for entry into the two year program is that the student have two academic years of college work remaining, either at the undergraduate or graduate level. Applicants seeking enrollment in the two year program must pass an Air Force aptitude and medical examination and be selected by a board of Air Force officers. After successfully completing a six week field training course at an Air Force base, the applicant may enroll in the professional officer course (POC) in the AFROTC program. Upon completion of the POC and the college requirements for a degree, the student is commissioned.

Qualifications. The following requirements must be met for admittance to the POC:

1. The four year student must successfully complete the general military course and the four week field training course.
2. The two year applicant must complete a six week field training course.
3. All students must pass the Air Force Officer Qualifying Test (AFOQT)
4. All students must pass the Air Force physical examination.
5. All students must maintain the minimum GPA required by the college.
6. All students must meet the physical fitness requirements.

Pay and Allowances. POC members in their junior and senior years receive $200 per month for a maximum of 20 months of POC attendance. Students are also paid to attend field training. In addition, uniforms, housing, and meals are provided during field training at no cost to the student. Students are reimbursed for travel to and from field training.

Scholarships. AFROTC offers scholarships annually to outstanding young men and women on a nationwide competitive basis. Scholarships can cover college tuition for nonresident students and provide an allowance for books, fees, supplies and equipment, and a monthly tax free allowance of $200. Scholarships are available on a four-, three-, or two year basis. To qualify for a four- or three year scholarship, a student must be a U.S. citizen and submit an application before December 1 of the senior year in high school. Interested students should consult their high school counselors or call AFROTC at ASU for application forms to be submitted to

HQ AFROTC
MAXWELL AFB
AL 36112 6663

Students enrolled in AFROTC at ASU are eligible for a limited number of three- or two year scholarships. Those

NOTE: For the General Studies requirement, courses, and codes (such as L, SQ, C, and H), see "General Studies," page 87. For graduation requirements, see "University Graduation Requirements," page 83. For an explanation of additional nonbusiness courses offered but not listed in this catalog, see "Classification of Courses" page 60.

students interested must apply through the Department of Aerospace Studies Consideration is given to academic grades, the score achieved on the AFOQT, and physical fitness. A board of officers considers an applicant's personality, character, and leadership potential.

AEROSPACE STUDIES (AES)

AES 101 Air Force Today I. (2) F
Introduction to U S Air Force and AFROTC Topics include the Air Force mission and organization customs and courtesies, officership and professionalism

AES 102 Leadership Lab. (0) F
Emphasis on common Air Force customs and courtesies drill and ceremonies health and physical fitness through group participation. Corequisite. AES 101.

AES 103 Air Force Today II. (2) S
Continuation of AES 101 Topics include the Air Force mission and organization customs and courtesies, officer opportunities officership, and professional sm. Prerequisite: AES 101 or department approval

AES 104 Leadership Lab. 0) S
Continuation of AES 102 with more in depth emphasis on learning the environment of an Air Force officer. Corequisite AES 103.

AES 201 The Evolution of USAF Air and Space Power I. (2 F
Further preparation of the AFROTC candidate Topics include Air Force heritage and leaders communication skills ethics leadership, quality Air Force and values Prerequisite AES 103 or department approval

AES 202 Leadership Lab. (0) F
Application of advanced drill and ceremonies issuing commands knowing flag etiquette, and developing directing, and evaluating skills to lead others Corequisite AES 201

AES 203 The Evolution of USAF Air and Space Power II. (2 S
Continuation of AES 201 Topics include the Air Force mission and organization customs and courtesies, officer opportunities officership, and professional sm. Prerequisite· AES 201 or department approval

AES 204 Leadership Lab. 0) S
Continuation of AES 202 with an emphasis on preparation for field training Corequisite AES 203

AES 301 Air Force Leadership Studies I. (3 F
Study of communication skills eadership and quality management fundamentals, leadership ethics, and professional knowledge required of an Air Force officer Prerequisite· AES 203 or department approval *General Studies L*

AES 302 Leadership Lab. (0) F
Advanced eadership experiences applying eadership and management principles to motivate and enhance the performance of other cadets. Corequisite AES 301

AES 303 Air Force Leadership Studies II. 3) S
Continuation of AES 301. Topics include: communication skills ethics, eadership professional knowledge, and quality management required of an Air Force officer Prerequisite: AES 203 or department approval *General Studies L*

AES 304 Leadership Lab. (0 S
Continuation of AES 302 with emphasis on planning the military activities of the cadet corps and applying advanced eadership methods. Corequisite AES 303

AES 401 National Security Affairs. (3) F
Examines advanced ethics, Air Force doctrine, national security process and regional studies Special topics include civilian control of the military, military justice and officership Prerequisite AES 303 or department approval *General Studies· L*

AES 402 Leadership Lab. 0) F
Advanced leadership experience demonstrating earned skills in planning and controlling the military activities of the corps Corequisite. AES 401

AES 403 Preparation for Active Duty II. (3) S
Continuation of AES 401 Topics include civilian control of the military doctrine ethics military justice, the national security process and officership Prerequisite AES 401 or department approval.

AES 404 Leadership Lab. 0 S
Continuation of AES 402 with an emphasis on preparation for transition from civilian to military fe Corequisite AES 403

African American Studies Program

Leanor Boulin Johnson
Director
(AG 201) 480 965-4399
www.asu.edu/clas/aframstu

CORE FACULTY

Associate Professor: Boulin Johnson
Assistant Professor Ramey
Clinical Associate Professor Cox

AFFILIATED FACULTY

Anthropology
Senior Lecturer Winkelman

Art
Professor. Young

Education
Associate Professor: Hood
Assistant Professors: Fisher, Matthews

English
Professor: Lester;
Associate Professors. Chancy, DeLamotte Miller
Assistant Professor: Fuse

Family Resources and Human Development
Associate Professor Wilson

History
Associate Professor: Hendricks

Human Communication
Assistant Professor: Davis

Humanities
Assistant Professor. Lund

Journalism and Telecommunication
Associate Professor: Bramlett Solomon

Justice Studies
Professors Romero, Zatz

Life Sciences
Associate Professor: Graves (ASU West)

Music
Professor Sunkett

Political Science
Associate Professor. Mitchell

Psychology
Faculty Associate Obleton

Religious Studies
Associate Professor: Moore

Sociology
Associate Professor Keith;
Assistant Professor Rhea

African American Studies (AAS) is interdisciplinary and focuses on people of African descent throughout the world. Focus is given to the diversity of past and present experiences of those who live in the United States as well as in Africa, the Caribbean, South America, and Central America. As an institutional program with a bidisciplinary emphasis, AAS is structured to

1. prepare students of all ethnicities to better understand, value, and more effectively participate in our increasingly diverse society;
2. combine knowledge of the African diaspora with intellectual and practical training in specific areas for the purpose of creating more effective community and global partnerships; and
3. provide students with a foundation for advanced studies in a variety of fields. While the program is dedicated to scholarly research, teaching, and creative activities, it also seeks to build partnerships with community based programs and organizations within Arizona and utilize channels for informing policies which affect the life of Blacks in the diaspora.

AFRICAN AMERICAN STUDIES—B.A.

Course Requirements. The major in African American Studies requires 45 semester hours of course work. A minimum of 30 semester hours must be AFH, AFR, and AFS courses. The remaining course work must be in a related field approved by an AAS advisor. All majors must take 18 hours in the following core courses:

AFH 353 African American Literature Beginnings Through the Harlem Renaissance *L/HU C* . . 3
or AFH 354 African American Literature Harlem Renaissance to the Present *L/HU, C* (3)
AFR 210 Introduction to African American Studies 3
AFR 429 African American Studies Theory and Methods. 3
AFR 490 Field Studies in the Diaspora 3
or AFR 498 Pro Seminar (3)
AFS 363 African American History I *SB, C, H* 3
AFS 364 African American History II *SB, C, H* 3

Within the 45 semester hours, AAS majors must also take 12 semester hours in one of three concentrations: social and behavioral sciences, humanities arts, or politics and society. These courses are in addition to the required 18 core course semester hours. Of the remaining course work, 15 hours must be taken in related courses (i.e., non African American Studies' prefixes). These courses must be selected from the concentrations (at least one from each concentration) in consultation with the major advisor.

In addition, AAS majors are required to take a minor or a certificate program of a minimum of 18 hours in another academic field

CERTIFICATE IN AFRICAN AMERICAN STUDIES

Course Requirements. The certificate requires 24 semester hours. Fifteen core hours must be taken from the following courses:

AFH 353 African American Literature Beginnings Through the Harlem Renaissance *L/HU, C* 3
or AFH 354 African American Literature Harlem Renaissance to the Present *L/HU C* (3)
AFR 210 Introduction to African American Studies 3
AFR 429 African American Studies Theory and Methods. 3
AFS 363 African American History I *SB, C, H* . . 3
AFS 364 African American History II *SB C, H*. 3

In addition, one course from each of the three concentrations (i.e., social and behavioral sciences, humanities arts, politics and society) must be taken. These courses are in addition to the required core courses Courses should be selected in consultation with the major advisor.

MINOR IN AFRICAN AMERICAN STUDIES

Course Requirements. The minor requires 18 semester hours. All African American Studies minors must take nine core hours from the following courses:

AFH 353 African American Literature: Beginnings Through the Harlem Renaissance *L/HU, C* 3
or AFH 354 African American Literature Harlem Renaissance to the Present *L/HU, C* (3)
AFR 210 Introduction to African American Studies 3
AFS 363 African American History I *SB, C H* 3
or AFS 364 African American History II *SB C, H* 3)

In addition, one course from each of the three concentrations (i.e., social and behavioral sciences, humanities arts, politics and society) must be taken. These courses are in addition to the required core courses. A minimum of 12 hours of upper division courses is required. Courses should be selected in consultation with the major advisor.

AFRICAN AMERICAN STUDIES (AFH)

AFH 353 African American Literature: Beginnings Through the Harlem Renaissance. (3) F
Thematic and cultural study of African American literature through the Harlem Renaissance. Cross-listed as ENG 353 Credit is allowed for only AFH 353 or ENG 353. *General Studies· L/HU C*

AFH 354 African American Literature: Harlem Renaissance to the Present. (3) S
Thematic and cultural study of African American literature from the Harlem Renaissance to the present Cross listed as ENG 354 Credit is allowed for only AFH 354 or ENG 354. *General Studies L/HU C*

AFRICAN AMERICAN STUDIES (AFR)

AFR 191 First Year Seminar. (1 3) N

AFR 194, 294, 394, 494, 598 Special Topics. (1–4) N

AFR 210 Introduction to African American Studies. (3) F
Examination of the political, historical and cultural origins of African American studies as an academic discipline Lecture, discussion

AFR 298, 492 Honors Directed Study. (1–6 N

AFR 429 African American Studies Theory and Methods. (3) S
Examines social and behavioral science theories and methodological procedures pertaining to African Americans Prerequisite senior standing.

AFR 484, 584, 684, 784 Internship. (1–12 N

AFR 490 Field Studies in the Diaspora. (3) S
Introduction to methods and principles of research applied to Black communities within and outside Arizona. Involves working with field officer and faculty. Lecture, field study Prerequisite senior standing. Pre- or corequisite: AFR 429

NOTE: For the General Studies requirement, courses and codes (such as L, SQ, C, and H) see "General Studies," page 87. For graduation requirements see "University Graduation Requirements" page 83 For an explanation of additional ominous courses offered but not listed in this catalog, see Classification of Courses" page 60

AFR 493 Honors Thesis. (1–6 N
General Studies L

AFR 497 Honors Colloquium. 1–6) N

AFR 498 Pro-Seminar. 3 S
Top c is se ected by nstructor n consultation w th the student Des gned to ntegrate and deve op research sk s. Requ red for majors. Prerequ site Sen or stand ng Pre or corequ s te. AFR 429

AFR 499 Indiv dualized Instruction. 1 3) N

AFRICAN AMERICAN STUDIES (AFS)

AFS 363 African American History I. 3 F
The Afr can Amer can n Amer can h story, thought and cu ture from s avery to 1865 Cross sted as H S 363 Cred t s allowed for only AFS 363 or H S 363 *General Stud es SB C H*

AFS 364 African American History II. 3 S
The Afr can Amer can n Amer can history thought, and cu ture from 1865 to the present Cross sted as H S 364 Cred t 's a lowed for on y AFS 364 or HIS 364 *Genera Stud es SB, C H*

Department of Anthropology

John K. Chance
Chair
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www.asu.edu/clas/anthropology

REGENTS' PROFESSOR
TURNER

PROFESSORS
ALVAREZ, BAHR, BRANDT, CARR, CHANCE, CLARK, COWG LL, EDER, HUDAK, JOHANSON KINT GH, KOSS CHIO NO, MARTIN MARZKE, MERBS, NASH, REDMAN SP ELMANN, STARK WILL AMS

ASSOCIATE PROFESSORS
BARTON FALCONER HEGMON K MBEL B NELSON M NELSON R CE

ASSISTANT PROFESSORS
BAKER, HAENN, JONSSON, LOCKWOOD, STEADMAN WELSH

SENIOR LECTURER
WINKELMAN

ASSOCIATE RESEARCH PROFESSOR
SIMON

ASSISTANT RESEARCH PROFESSORS
McCARTNEY REED

ANTHROPOLOGY—B.A.

Course Requirements. The Anthropology major consists of 45 semester hours of which 36 must be in anthropology and nine in related fields. At least 18 of the semester hours must be in upper division courses 300–400 level). Three of the nine hours in related fields must be in statistics. Related fields are determined by the students in consultat on with his or her advisor No ASU courses are automatically classed as related, and no courses are automatically classed as unrelated. In effect, and depending on the student's own program and special interests, any ASU (or other university) course may be defined as related. Course requirements for the major are distributed as follows:

Required Courses

ASB 102	Introduction to Cultural and Social Anthropology *SB G*	3
ASB 222	Buried Cit es and Lost Tribes Our Hun an Heritage *HU SB G H*	3
	or ASB 223 Buried Civilizations of the Americas *HU SB G H* 3	
ASM 101	Human Origins and the Development of Cu ture *SB*	3
Total		9

Distribution Requirements

Archaeology	6
Archaeology physical anthropology	3
Ethnographic	3
Linguistics	3
Physical anthropo ogy	6
Social/cultural	6

Related Fields
Statistics and related fields 6

Elective
Anthropology . . 3

Course work in anthropology completed at other institu tions is evaluated through the Anthropology Undergraduate Advising Office. The College of Liberal Arts and Sciences requires that transfer students complete at least 12 hours of upper division course work at ASU in the department of their major to be eligible for graduation.

In addition to a cumulative GPA of 2 00 or higher, all Anthropology students must obtain a minimum grade of "C" in all upper and lower division Anthropology courses and all related fields.

Each student's program of study must be approved by his or her advisor in consultation with the student. Consultation with the advisor is recommended each semester.

Latin American Studies Certificate or Emphasis. Stu dents majoring in Anthropology may elect to pursue a Latin American Studies certificate or emphasis, combining courses from the major with selected outs de courses of wholly Latin American content. See "Latin American Stud ies," page 340, for more information.

Certificate in Museum Studies. See the *Gradu ate Cata log* or contact the Department of Anthropology for more information.

MINOR IN ANTHROPOLOGY

The Anthropology minor requires 18 semester hours. Two courses, ASB 102 and ASM 101, are required. The other 12 hours must be upper division and represent at least two of the three subfields of anthropology. The three subfields include sociocultural anthropology and linguistics), archae ology, and physical anthropology. At least one course in each of the subfields selected should be drawn from the "Distribution Requirements" course tab e, on this page, for archaeology, physical anthropology, and sociocultural lin guist cs A minimum grade of "C" is required for all courses taken for an Anthropology minor

The minor in Anthropology provides students with a great deal of flexibility in selecting courses. The program has been designed to allow students to focus on areas within the discipline which articulate well with their major All stu

dents interested in the Anthropology minor are encouraged to discuss the options available with the anthropology undergraduate advisor, whose office is located in ANTH A111.

SECONDARY EDUCATION—B.A.E.

Social Studies. The major teaching field consists of 63 semester hours, of which 30 hours must be in the anthropology courses required for the B A. degree. Of the remaining hours, two groups of 15 hours are to be taken in related social sciences Psychology or a single natural science may be used as one of the 15 hour fields SED 480 is taken to provide the remaining three hours.

Anthropology	30
SED 480 Special Methods of Teaching Social Studies	3
Social sciences	15
Social sciences natural sciences, or psychology	15
Total	63

The minor teaching field consists of 24 semester hours in anthropology. Courses ASB 102 and ASM 101 and two upper division courses in each subfield (archaeology, physical anthropology, and social cultural anthropology are required.

GRADUATE PROGRAM

The faculty in the Department of Anthropology offer programs leading to the M A and Ph.D. degrees. See the *Graduate Catalog* for requirements

ANTHROPOLOGY (ASB)

ASB 102 Introduction to Cultural and Social Anthropology. (3) F, S
Principles of cultural and social anthropology with illustrative materials from a variety of cultures The nature of culture Social political, and economic systems religion aesthetics, and language *General Studies SB, G*

ASB 202 Ethnic Relations in the United States. 3) F S
Processes of intercultural relations systems approach to history of U S interethnic relations; psychocultural analysis of contemporary U S ethnic relations *General Studies C, H*

ASB 210 Sex, Marriage, and Evolution. (3 F
Examination of the sexual nature and behavior of humans from both a biological and an anthropological point of view

ASB 211 Women in Other Cultures. (3) N
Cross-cultural analysis of the economic social, political and religious factors that affect women's status in traditional and modern societies. *General Studies HU SB G.*

ASB 222 Buried Cities and Lost Tribes: Our Human Heritage. (3) S
Archaeology through its most important discoveries human origins Pompeii King Tut the Holy Land Southwest Indians and methods of field archaeology *General Studies HU SB G, H*

ASB 223 Buried Civilizations of the Americas. (3) F S
Archaeology through examination of several ancient civilizations of Meso- South and North America *General Studies HU SB G, H.*

ASB 231 Archaeological Field Methods. 4) S
Excavation of archaeological sites and recording and interpretation of data. Includes local field experience. 2 hours lecture, 8 hours lab Prerequisite ASM 101 or instructor approval *General Studies SG*

ASB 240 Introduction to Southeast Asia. (3 F
An interdisciplinary introduction to the cultures, religions, political systems geography, and history of Southeast Asia. Cross-listed as GCU 240 H S 240 POS 240 REL 240 Credit is allowed for only ASB 240 or GCU 240 or HIS 240 or POS 240 or REL 240. *General Studies: G.*

ASB 242 Asian American Experiences: An Anthropological Perspective. 3) F
The historical and contemporary experiences of Asian Americans in terms of the anthropological concepts of culture, ethnicity and adaptation. *General Studies L C.*

ASB 250 Anthropology Topics. 3) S
Covers five areas of anthropological inquiry Emphasizes library research, critical analysis and communication skills relevant to upper division anthropology course work Prerequisites: ASB 102 ASM 101 (or equivalent completion of the First Year Composition requirement. *General Studies L*

ASB 302 Ethnographic Field Study in Mexico. (3) SS
Fieldwork study of cultural adaptation, Mexican culture United States Mexican culture conflict ethnographic research methods and location Lecture discussion field research Prerequisite. SPA 101 or equivalent *General Studies L/SB G*

ASB 311 Principles of Social Anthropology. 3) S
Comparative analysis of domestic groups and economic and political organizations in primitive and peasant societies. *General Studies SB*

ASB 314 Comparative Religion. (3) F S
Origins elements, forms, and symbolism of religion a comparative survey of religious beliefs and ceremonies the place of religion in the total culture Prerequisite. ASB 102 or instructor approval

ASB 319 The North American Indian. (3 A
Archaeology ethnology and linguistic relationship of the Indians of North America Does not include Middle America Prerequisite ASB 102 or instructor approval.

ASB 320 Indians of Arizona. (3) F
The traditional cultures and the development and nature of contemporary political economic and educational conditions among Arizona Indians

ASB 321 Indians of the Southwest. (3) S
Cultures of the contemporary Indians of the Southwestern United States and their history antecedents. Prerequisite: ASB 102 or instructor approval *General Studies L/SB C H*

ASB 322 Indians of Mesoamerica. (3) S
History tribes and folk cultures Prerequisite ASB 102 or instructor approval. *General Studies. SB G.*

ASB 323 Indians of Latin America. 3) F
Indigenous cultures of the Amazon, the Andean region Central America, and southern Mexico Lecture discussion. Prerequisite ASB 102 or instructor approval *General Studies. SB G.*

ASB 324 Peoples of the Pacific. (3) N
Peoples and cultures of Oceania focusing particularly on societies of Melanesia Micronesia, and Polynesia. Prerequisite ASB 102 or instructor approval. *General Studies G.*

ASB 325 Peoples of Southeast Asia. (3) F
A cultural ecological perspective on the peoples of mainland and insular Southeast Asia. Subsistence modes, social organization and the impact of modernization Prerequisite: ASB 102 or instructor approval *General Studies G*

ASB 326 Human Impacts on Ancient Environments. (3 S
A world survey of successful and unsuccessful ancient societies and their impacts on the environment *General Studies SB H*

ASB 330 Principles of Archaeology. (3) F S
Methods and theories for reconstructing and explaining the lifeways of prehistoric peoples Prerequisite 3 hours of archaeology *General Studies SB*

ASB 333 New World Prehistory. 3) F
The variety of archaeological patterns encountered in the Western Hemisphere Covers the period from the appearance of humans in the New World to European contact covers the area from Alaska to Terra del Fuego Prerequisite completion of the First-Year Composition requirement Prior or corequisite 1 upper division ASU course. *General Studies L/SB*

NOTE: For the General Studies requirement courses and codes (such as L, SQ C and H) see "General Studies, page 87 For graduation requirements see University Graduation Requirements ' page 83. For an explanation of additional omnibus courses offered but not listed in this catalog see Classification of Courses ' page 60.

ASB 335 Prehistory of the Southwest. (3 F S
Anthropo og ca understand ngs of major cu tura processes and events n the preh story of the Amer can Southwest us ng ev dence from archaeology *General Stud es SB, C, H*

ASB 337 Pre-Hispanic Civilization of Middle America. (3) S
Preconquest cu tures and c v' zat ons of Mexico The Aztecs Mayas, and the r predecessors Prerequ s te ASM 101 or nstructor approva *General Stud es HU SB G, H.*

ASB 338 Archaeology of North America. 3 N
Or g n spread, and deve opment of the preh stor c ndians of North Amer ca up to the h stor c tribes Does not nclude the Southwest Pre requ s te ASM 101 or instructor approva *Genera Stud es: SB H*

ASB 350 Anthropology and Art. 3) A
Art forms of peop e in re at onsh p to the r soc al and cultura sett ng Prerequ s te ASB 102 or 'nstructor approva

ASB 351 Psychological Anthropology. (3 S
Approaches to the nterre at ons between the persona ty system and the soc ocu tura env ronment Prerequ s te ASB 102 or nstructor approva . *General Stud es· SB*

ASB 353 Death and Dying in Cross-Cultural Perspective. 4 F
Human st c and sc ent f c study of ag ng, s ckness, dy ng death funer als and gr ef and the r ph osophy and eco ogy n non-Western and Western cu tures 3 hours lecture 1 hour d scuss on *General Stud es HU SB, G*

ASB 355 Shamanism, Healing and Consciousness. 3) S
Wor d v ews pract ces, and r es of shamans and trad t ona and con temporary hea ers exp anatory b opsycho og ca mode s of con- sc ousness *Genera Stud es HU SB*

ASB 361 Old Wor d Prehistory I. 3 F
B osoc a evo ut on n the P e stocene emphas z ng technologica ach evements and the re at onsh p between techno ogy and environ ment n western Europe sub Saharan Afr ca Prerequ s te ASM 101 or nstructor approva *Genera Stud es H.*

ASB 362 Old World Prehistory II. 3 S
Trans t on from hunt ng and co ect ng societ es to domest cat on econ- om es· estab shment of sett ed v age fe emphas z ng the Near East Egypt Southwest Europe Prerequ s te: ASM 101 or instructor approval *Genera Stud es· H*

ASB 400 Cultural Factors in International Business. 3 S
Anthropo og cal perspectives on nternat onal bus ness re at ons app ed pr nc ples of cross-cultura commun cat n and management reg ona approaches to cu ture and bus ness *General Stud es G*

ASB 411 Kinsh p and Social Organization. 3 S
Mean ngs and uses of concepts referr ng to k nsh p, consangu n ty affinity descent a iance and res dence n the context of a survey of the variet es of soc a groups marr age ru es and k nsh p term no og- cal systems. Prerequis te 6 hours of anthropo ogy or nstructor approva

ASB 412 History of Anthropology. (3) F
H stor cal treatment of the deve opment of the cu ture concept and ts express on n the ch'ef theoret ca trends n anthropology between 1860 and 1950. Prerequ s te ASB 102 or nstructor approva . *Genera Stud es L/SB*

ASB 416 Econom'c Anthropology. 3 F
Econom c behav or and the economy in pre ndustr a societ es· descr pt on and c ass f cation of exchange systems re at ons between product on exchange systems, and other soc etal subsystems Pre requ s te ASB 102 or nstructor approva *Gene a Stud es· L/SB*

ASB 417 Politica Anthropology. 3 A
Comparat ve exam nat on of the forms and processes of po it ca orga- n zat on and act v ty n pr m t ve peasant and comp ex societ es Pre requ s te ASB 102 or nstructor approval

ASB 462 Medical Anthropology: Culture and Health. 3 F
Ro e of culture n health, ness and cur ng· hea th status prov der re at ons, and ind genous hea 'ng pract ces in Un ted States ethn c groups Lecture, discuss on *Genera Stud es C*

ASB 471 Introduction to Museums. (3 F
H story ph losophy, and current status of museums Exp oration of co lect ng preservat on exh bit on educat on, and research act vit es n d fferent types of museums. Prerequ s tes ASB 102 and ASM 101 *or* instruct r approva *Genera Stud es L*

ASB 480 Introduction to Linguistics. (3 F
Descr pt ve and h stor ca l ngu st cs Survey of theor es of human an guage emphas z ng synchron c ngu st cs *General Stud es SB*

ASB 481 Language and Culture. 3) S
Appl cat on of ngu st c theor es and f nd ngs to non ngu st c aspects of cu ture, language change psychol nguist cs Prerequ s te ASB 102 or nstructor approval *General Studies SB*

ASB 483 Sociolinguistics and the Ethnography of Communication. (3) N
Re ationsh ps between l nguist c and soc a categor es functiona ana ysis of anguage use ma ntenance and d vers ty; nteract on between verba and nonverba commun cat on Prerequ s tes ASB 480 and ENG 213 (or FLA 400) *or* nstructor approval *General Stud- ies· SB.*

ASB 485 U.S.-Mexico Border in Comparative Perspective. (3) S 2001
Exp ores the mu ticu tura and soc a dimens ons of communit es a ong the U S Mex co border emphas z ng social organ zat on m grat on cu ture, and front er deology Prerequ site 6 hours of anthropo ogy or nstructor approval.

ASB 501 Applied Medical Anthropology. 3) F
Overv ew of anthropo ogy's app icat ons in med c ne and ts adapta t ons to U S. ethnic popu ations. Requ res research project n med cal sett ng Lecture, sem nar Prerequisite: graduate stand ng or instructor approval

ASB 502 Health of Ethnic Minorities. (3) S
Preva ence of l ness, r sk factors hea th eco ogy and med cal and nd genous treatments Lecture, sem nar Prerequ s te graduate stand ng or instructor approval

ASB 503 Advanced Medical Anthropology. (3) F
Theory n Med ca Anthropo ogy and cross-cu tura stud es that lus- trate part cular theor es Lecture sem nar Prerequ s te graduate stand ng or nstructor approval

ASB 504 Ethnic Relations. (3) F
Structural processes of ntergroup re at ons methods for nvest gat ng psychocu tura d mensions of ethnicity w th focus upon U S ethnic groups Lecture sem nar Prerequ s te graduate stand ng or instructor approva

ASB 505 Culture and Psychiatry. (3) F
Psych atry as a cu tural phenomenon and nd genous def n t ons and treatments of mental d sorders across cu tures Lecture sem nar Pre requ s te graduate stand ng or nstructor approval

ASB 506 Gender, Emotions, and Culture. 3 S
Re ationsh ps among gender and emot on across cultures Lecture, sem nar Prerequ s te graduate stand ng or nstructor approva

ASB 529 Culture and Political Economy. (3) N
Or g n and spread of Western cap ta 'sm and ts impact on non-West- ern societ es Ethnograph c and h stor cal case stud es are ut ized Prerequ site graduate stand ng

ASB 530 Ecological Anthropology. (3) A
Re at ons among the popu at on dynam cs soc a organizat on cu - ture and env ronment of human popu at ons, w th spec a emphas s on hunter gatherers and extensive agr cu tural sts

ASB 532 Graduate Field Anthropology. 2–8) S
Independent research on a spec f c anthropo og ca prob em to be se ected by the student n consu tat on with the staff May be repeated for cred t Prerequ s tes ASM 338 or equ valent, nstructor approval

ASB 536 Ethnohistory of Mesoamerica. 3) N
Ind genous societ es of southern Mex co and Guatema a at Span sh contact and the r postconquest transformat on Emphas s s on the Aztec Emp re Prerequ s te graduate stand ng

ASB 537 Topics in Mesoamerican Archaeology. (3) N
Chang ng organ zat on of pre Co umb an c vi zations in Mesoamer ca s exp ored through nterpret ve ssues such as reg ona ana ysis ch efdoms urban sm, and exchange Prerequ s te instructor approval

ASB 540 Method and Theory of Sociocultural Anthropology and Archaeology I. 3) F
Basic 'ssues concern ng concepts of soc'al and ethnic groups cultura and soc o og ca theory and the nature of anthropo og cal research Prerequ site nstructor approval

ASB 541 Method and Theory of Social and Cultural Anthropology. 3 S
Continuation of ASB 540. Prerequisite· ASB 540 or instructor approva

ASB 542 Method and Theory of Archaeology II. 3 S
Mode s of human evo ut on cu ture change and nterpretat on of hunter gatherer and tr ba societ es ceram c, l th c and fauna mater als Prerequ s te nstructor approva

ASB 543 Method and Theory of Archaeology III. (3 F
Covers concepts of soc a comp exity a ong with economy, demography and soc a dynam cs fo lowed by archaeo og cal research design Prerequ s te nstructor approva

ASB 544 Settlement Patterns. (3) N
Spatial arrangement of res dences act v ty s tes and commun t es over andscape Emphas s on natural and cultura factors nfluenc ng settlement patterns Prerequ s te nstructor approva

ASB 546 Pleistocene Prehistory. (3) F
Development of soc ety and cu ture n the O d Wor d dur ng the P e stocene epoch, emphas z ng technological change through t me and the re ationsh p of people to the r environment Prerequ s te ASB 361 or equ valent

ASB 547 Issues in Old World Domestication Economies. 3 S
Archaeolog ca ev dence for trans tions in O d World subs stence econom es from hunting and gather ng to dependence on domest cated plants and anima s. Prerequ site: ASB 362 or equ va ent

ASB 550 Economic Archaeology. 3) N
Preh stor c economies n hunter gatherer tr ba and complex soc et es Subs stence strategies craft production and spec a zation, and exchange covered Prerequ s te· 'nstructor approva

ASB 551 Prehistoric Diet. (3) N
ncludes (1 a crit ca rev ew of techn ques for recover ng d etary 'nfor mation and (2) theoret ca mode s concerned w th exp a n ng d et and nutr t on Prerequ s te: nstructor approva

ASB 555 Complex Societies. (3) S
Structural var ations in h erarch ca y organ zed soc'et es a ong w th or g ns, dynam cs and col apse, are exam ned. Seminar.

ASB 559 Archaeology and the Ideational Realm. 3) N
"Post processua ' and other views concern ng relevance of menta phenomena for understand ng sociocu tura change Various approaches to nferring preh stor c mean ngs

ASB 563 Hunter-Gatherer Adaptations. (3) N
Evo ution of preh storic hunter gatherer societies n the O d and New Wor ds from the most anc ent t mes through protoh stor c ch efdoms. Prerequ s te instructor approval.

ASB 567 Southwestern Archaeology. (3) S
Broad coverage of Southwestern cu tura developments focus ng on current debates and r gorous use of archaeo ogica data n making cultura inferences

ASB 568 Intrasite Research Strategies. 3 F
Research issues w thin a s ng e s te context Top cs nc ude quantita t ve spatial ana ysis s te def n t on, samp ng d str but onal ana ysis and substant ve interpretat on.

ASB 571 Museum Principles. (3 F
History ph osophy and current status of museums Exp oration of col ecting preservation exh b t on, educat on, and research activit es in different types of museums. Prerequisites· ASB 102 and ASM 101 *or* nstructor approval

ASB 572 Museum Collection Management. 3 S
Pr ncip es and pract ces of acqu s tion documentat on, care, and use of museum co lections reg strat on cata og ng and preservat on methods; lega and eth ca issues Prerequ s te ASB 571 or nstructor approval.

ASB 573 Museum Administration. (3) S
Forma organizat on and management of museums governance personne matters fund ra s ng and grantsmansh p, egal and eth ca ssues Prerequisite· ASB 571 or nstructor approva

ASB 574 Exhibition Planning and Design. (3) S
Exh b t on ph osophies and deve opment; processes of p ann ng, des gn ng, staging nsta l ng, eva uat ng and d sassembl ng temporary and ong term exhib ts. Prerequ s tes. ASB 571 and 572 *or* instructor approval.

ASB 575 Computers and Museums. (3 F
Basics of museum computer appl cat on, hardware and software; fun damenta s of database management ssues of research, co ect ons management, and adm'nistration

ASB 576 Museum Interpretation. (3 F
Processes of p ann ng, mp ementing document ng and eva uat ng educat ona programs in museums for varied aud ences—ch dren, adu ts and spec a nterest groups Lecture d scuss on Prerequisite: ASB 571

ASB 577 Principles of Conservation. 3 S
Preservat on of museum objects. nature of mater a s env ronmenta contro s and causes of degradat on rec gniz ng prob ems, damage, and so ut ons; proper care of objects. Prerequ s tes ASB 571 and 572 *or* nstructor approva

ASB 579 Critical Issues in Museum Studies. (3 F
Current debates of museum pract'ce from an anthropo og ca perspect ve. ssues of co ection presentat on, authent c ty, and author ty are addressed. Sem nar Prerequisite ASB 571 or nstructor approva .

ASB 591 Sem'nar. 3) N
Se ected top cs n archaeo ogy ingu stics and soc a cu tural anthropo ogy
(a Archaeo og cal Ceramics
(b Archaeo ogy of North Amer ca
(c Cu tura Anthropology
(d) Cu ture and Persona ty
e Evo ut on and Cu ture
(f) Historica Archaeo ogy
(g nterdepartmenta Sem nar
h Language and Cu ture
( ) L ngu st cs
(j) Museum Stud es
k) Prob ems n Southwestern Archaeo ogy
) Prob ems n Southwestern Ethno ogy
(m Social Anthropo ogy

ANTHROPOLOGY (ASM)

ASM 101 Human Origins and the Development of Culture. (3) F, S
Phys cal anthropo ogy and archaeo ogy Ev dence and processes of human evolut on and of culture change Pr mates Foss l hom nids and the r too s Race var at on and hered ty Env ronment and human b o ogy Preh stor c cu ture and soc'ety. *General Stud es· SB*

ASM 241 Biology of Race. (3) F S
Human var at on and its interpretation in an evo ut onary context

ASM 246 Human Origins. (3) F
H story of d scover es and chang ng nterpretat ons of human evolution Earl est ancestors to emergence of modern humans Human ty's p ace n nature

ASM 301 Peopling of the World. (3) S
Course reviews a ev dence for human dispersa dur ng the last 100 000 years, or g ns of anguage, cultures, races and beg nn ngs of modern humans Prerequ s te ASM 101 *Genera Studies SB*

ASM 338 Anthropological Field Session. 2–8) S
Anthropologica field techniques ana ysis of data and preparat on of f e d reports May be repeated for cred t Prerequ s te nstructor approva

ASM 341 Human Osteology. (4) F
Osteology human paleonto ogy and osteometry. Descript on and ana ys s of archaeo og ca and contemporary human populations 3 hours lecture 3 hours lab Prerequisite ASM 101 or instructor approva

ASM 342 Human Biological Variation. 4 S
Evolut onary nterpretat ons of bio og ca var at on n v ng human popu at ons w th emphas s on anthropo og ca genet cs and adaptation Nutrit on and d sease and their re ation to genet cs and behav or. 3 hours lecture 3 hours lab Prerequis tes ASM 101 and MAT 106 (or equ va ent) *or* nstructor approva *General Studies SG*

ASM 343 Primatology. (3) F
Evo ut on and adaptat ons of nonhuman pr mates emphas z ng soc a behav or Inc udes mater a from foss ev dence and f e d and abora tory stud es in behavior and b ology Prerequ s te ASM 101 or nstructor approval.

NOTE: For the Genera Stud es requ rement, courses, and codes such as L SQ C and H , see General Stud es" page 87 For graduat on requ rements see "Un'vers ty Graduat on Requirements, page 83. For an exp anat on of add tiona omn bus courses offered but not isted n th s cata og, see "C assification of Courses, page 60

ASM 344 Fossil Hominids. 3 N
Anc ent Afr can Asian and European human and pr mate ske eta denta and cultura remains Human b o og ca behav ora , and cu tura evo ut on Prerequisite ASM 101 or instructor approva *Genera Stud es. H*

ASM 345 Disease and Human Evolution. 3) F
Interact on of peop e and pathogens from preh stor c t mes to the present w th emphas s on d sease as an agent of genet c se ection Prerequ s te ASM 101 or nstructor approva

ASM 348 Social Issues in Human Genetics. (3) S
Moral and soc a mpl cat ons of deve opments n genet c sc ence par t cu ar y as they affect reproduct on, med c ne, and evolut on. *General Stud es SB*

ASM 365 Laboratory Methods in Archaeology. (4 N
Techn ques of art fact ana ys s Bas c archaeo og ca research tech n ques methods of report wr t ng May be repeated for cred t for tota of 8 hours. Prerequ s te ASM 101 or nstructor approval.

ASM 435 Archaeological Pollen Analysis. (3) F
Theory methodology and pract ce of pol en ana yt c techn ques Com pares uses n botany geo ogy, and archaeology. 2 hours ecture, 3 hours ab possib e f e d trips Prerequ site nstructor approval.

ASM 450 Bioarchaeology. (3) S
Surveys archaeo og cal and phys ca anthropo og ca methods and theories for eva uat ng ske eta and bur a rema ns to reconstruct b o cu tura adaptation and ifeways Prerequisite: ASM 101 or nstructor approval.

ASM 452 Dental Anthropology. 4 F
Human and pr mate dental morphology, growth evo ut on, and genet cs W thin and between group var ation Dental patho ogy and behav ora cu tura d etary factors 3 hours ecture 3 hours ab Pre requisite· nstructor approva *General Studies SG*

ASM 454 Comparative Primate Anatomy. (4) S
Funct ona anatomy of the cran a dental, and ocomotor apparatus of primates nclud ng humans emphas z ng the relat on of morpho ogy to behav or and env ronment 3 hours ecture, 3 hours ab d ssections, demonstrat ons. Prerequ s te nstructor approva

ASM 455 Primate Behavior Laboratory. (3 N
nstruct on and pract ce in methods of observation and ana ys s of pr mate behav or D scuss'on of the re at onsh p between class work on capt ve an ma s and f e d techn ques for study ng free-ranging groups D rected read ngs 6 hours ab Prerequ s tes ASM 343 nstructor approval *General Stud es: L*

ASM 465 Quantification and Analysis for Anthropologists. (3) S
Stat st ca quant tat ve and geometr c strateg es for env s on ng and exp or ng archaeo og cal, phys cal anthropo ogica b oarchaeolog ca and soc ocu tura data Un var ate and mu tivariate methods Prerequ s tes ntroductory stat stica course nstructor approva

ASM 472 Archaeological Ceramics. (3) N
Ana ysis and dent ficat'on of pottery wares types and var et es Sys- tems for ceram c c ass f cat on and cultura nterpretation 2 hours ec ture, 3 hours ab Prerequ s te. nstructor approva

ASM 507 Anthropological Study of Disease. (3) A
In depth ntroduct on to the study of d sease processes from an anthropo og cal perspective Lecture sem nar Prerequ s te graduate stand ng or nstructor approva

ASM 548 Geoarchaeology. (3 F
Geo og c context re evant to archaeolog ca research Top cs nc ude sed ments, depos t on env ronments so s, anthropogenic and b o gen c depos ts and quaternary chrono ogy Prerequ s te instructor approva

ASM 555 Advanced Human Osteology. 3 N
Laboratory and f e d techn ques n dea ng w th the human ske eton Emphas s on preparat on, dent ficat on rad ography sect on ng, m croscopy and data process ng 1 hour lecture 6 hours lab Prereq uisite· ASM 341 or nstructor approva

ASM 565 Quantitative Archaeology. (3) S
Formal methods of structur ng, cod fy ng and ana yz ng data for archaeolog ca prob ems Des gn ng research to yield data amenab e to product ve ana ysis

ASM 566 Advanced Topics in Quantitative Archaeology. 3) F
Archaeo og cal ssues assoc ated w th quant tat ve ana ys s, e.g Bayesian and Monte Carlo approaches, s mulat on, divers ty May be repeated for cred t Prerequ s te ASM 565 or nstructor approva

ASM 573 Lithic Analysis. 3) N
Analys s and nterpretat on of chipped stone art facts. Focus on both techn ques and under y ng concepts and the r app cat on to rea co ections. Prerequ s te nstructor approva

ASM 591 Seminar. 3 N
Se ected top cs n archaeo ogy and phys a anthropo ogy
a) B oarchaeo ogy
b) Evo ution and Cu ture
c Interdepartmental Sem nar
d Phys cal Anthropo ogy
e) Pr mates and Behav or

Department of Biology

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REGENTS' PROFESSOR
ALCOCK

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SENIOR RESEARCH PROFESSIONAL
KAZILEK

ACADEMIC PROFESSIONAL
DOUGLAS

RESEARCH PROFESSOR
PEARSON

RESEARCH ASSOCIATE PROFESSOR
DAV DSON

BIOLOGY—B.S.

The major in Biology consists of a minimum of 43 semester hours in biology, and a minimum of 17 semester hours in related fields, plus a three semester hour mathe matics proficiency. Required major courses are as follows:

BIO	193 The Nature of Biological Science *SQ* . .	...4
	or BIO 181 General Biology *SQ* 4)	
	and BIO 182 General Biology *SG* 4	
BIO	320 Fundamentals of Ecology	3
BIO	340 Genera Genetics	4
BIO	53 Cell Biology	3
BIO	360 Animal Physiology	4
	or MIC 360 Bacterial Physiology 3	
	or PLB 308 Plant Physiology 4	

BIO 370 Vertebrate Zoology 4
or BIO 385 Comparative Invertebrate Zoology (4)
or MIC 206 Microbiology Laboratory *SG** (1
and MIC 220 Bio ogy of Microorganisms (3)
or PLB 300 Comparative Plant Diversity *L/SG* (4
BIO 445 Organic Evolution 3

Total 25

* Both MIC 205 and 206 must be taken to secure SG credit

The remaining hours to bring the total to 43 are selected from among upper division courses in BIO, MIC, and PLB, in consultation with a Department of Biology advisor. The major must include at least three upper-division laboratory courses, and at least one upper division course in plant biology (PLB) or microbiology MIC). Required courses in related fields plus math proficiency are as follows.

CHM 113 General Chemistry *SQ* 4
CHM 115 General Chemistry with Qualitative Analysis *SQ*.... . . .5
Choose between the combinations of organic chemistry
courses below .... .4 or 8
CHM 231 Elementary Organic Chemistry *SQ* 3)
CHM 235 Elementary Organic Chemistry Laboratory *SQ*[1] 1)
or
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)
MAT 210 Brief Calculus *MA*..... 3
or any calculus
PHY 101 Introduction to Physics *SQ*. . 4
or PHY 111 General Physics *SQ*- (3
and PHY 112 General Physics *SQ*[2] 3)
and PHY 113 General Physics
Laboratory *SQ*[2] 1
and PHY 114 General Physics
Laboratory *SQ*[2] 1

Total . .. . .20 or 24

Both CHM 231 and 235 must be taken to secure SQ credit

[2] Both PHY 111 and 113 or PHY 112 and 114 must be taken to secure SQ credit

CONSERVATION BIOLOGY—B.S.

The major in Conservation Biology consists of a minimum of 45 semester hours in the required major courses and a minimum of 13 hours in related fields, plus a three semester hour mathematics proficiency Required courses are as follows

BIO 193 The Nature of Biological Science *SQ*..... 4
or BIO 181 General Biology *SQ* (4)
and BIO 182 General Biology *SG* (4
BIO 317 Conservation Biology 3
BIO 320 Fundamentals of Ecology 3
BIO 340 General Genetics 4
BIO 360 Animal Physiology 4
BIO 410 Techniques in Wildlife Conservation Biology *L*.... . 3
BIO 411 Advanced Conservation Biology I 3
BIO 412 Advanced Conservation Biology II 3
BIO 415 Biometry *CS* 4

Total 31

The remaining hours to bring the total to 45 will be selected from among relevant upper division courses in BIO and PLB courses or in related departments, in consultation with the Department of Biology. Required courses in related fields plus math proficiency are as follows:

CHM 113 General Chemistry *SQ* 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* . 5
Choose between the combinations of organic chemistry
courses below .... 4 or 8
CHM 231 Elementary Organic Chemistry *SQ** (3)
CHM 235 Elementary Organic Chemistry Laboratory *SQ** (1
or
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)
MAT 210 Brief Calculus *MA*. 3
or any calculus

Total .... 16 or 20

* Both CHM 231 and 235 must be taken to secure SQ credit

Concentration in Biology and Society

The major in Biology with a concentration in biology and society is intended for students with a strong interest in life sciences and in the interaction between life sciences and the society within which science is done. This option consists of a minimum of 44 semester hours in life sciences and societal interface courses, and 12 hours in related fields, plus a three semester hour mathematics proficiency. Required courses are as follows:

BIO 193 The Nature of Biological Science *SQ* 4
or BIO 181 General Biology *SQ* (4
and BIO 182 General B ology *SG* (4
BIO 311 Biology and Society 3
BIO 320 Fundamenta s of Ecology 3
or BIO 445 Organic Evolution 3
BIO 340 General Genetics 4
BIO 419 Research Colloquium in Biology and Society *L* . . 6
MAT 210 Brief Calculus *MA* 3
or any calcu us

Total 23

The remaining courses to complete the major are determined by the student in consultation with a biology and society advisor and must be distributed in the following areas:

1. 12 hours of upper division electives from BIO, MIC, PLB;
2. 12 hours of interface courses from an approved list from at least three of these areas: ethics, history of science, philosophy of science, and social issues;
3. 11 hours of physical sciences CHM recommended , and
4. four hours of an approved course in statistics

MINOR IN BIOLOGY

The Biology minor consists of 24 semester hours, including BIO 193 The Nature of Biological Science or BIO 181

NOTE: For the Genera Studies requirement courses, and codes (such as L SQ C, and H , see "Genera Stud es" page 87 For graduat on requ rements, see "Un vers ty Graduat on Requ rements," page 83. For an exp anat on of add t ona omn bus courses offered but not sted n this catalog, see "Class f cat on of Courses" page 60

General Biology and BIO 182 General Biology, and 16 to 20 hours selected with approval of an advisor in the Department of Biology; at least 12 hours must be in the upper division. Courses not available for credit in the Biology major cannot be used for the minor (e.g., BIO 100 The Living World and BIO 201 Human Anatomy and Physiology I). This minor is not available to students majoring in the life sciences.

SECONDARY EDUCATION—B.A.E.

Biological Sciences. The major teaching field consists of a minimum of 40 semester hours and at least 22 hours in supporting courses. Required major courses are as follows:

BIO	193	The Nature of Biological Science *SQ*	4
		or BIO 181 General Biology *SQ* (4) and BIO 182 General Biology *SG* (4)	
BIO	320	Fundamentals of Ecology	3
BIO	340	General Genetics	4
BIO	360	Animal Physiology	4
BIO	370	Vertebrate Zoology	4
		or BIO 385 Comparative Invertebrate Zoology (4	
		or PLB 300 Comparative Plant Diversity *L/SG* (4	
		or PLB 310 The Flora of Arizona (4	
BIO	445	Organic Evolution	3
MIC	206	Microbiology Laboratory *SG**	1
MIC	220	Biology of Microorganisms	3
PLB	308	Plant Physiology	4
Total			30

* Both MIC 205 and 206 must be taken to secure SG credit.

The remaining courses in the major (six hours minimum) should be selected to reflect a balance between BIO and PLB courses. Required supporting courses are as follows:

BIO	316	History of Biology Conflicts and Controversies *H*	3
		or HPS 330 History of Biology. Conflicts and Controversies *H* (3)	
CHM	113	General Chemistry *SQ*	4
CHM	115	General Chemistry with Qualitative Analysis *SQ*	5
GLG	102	Introduction to Geology II (Historical) *SG, H*	3
		or GLG 300 Geology of Arizona 3	
MAT	170	Precalculus *MA*	3
PHY	101	Introduction to Physics *SQ*	4
		or PHY 111, 112 General Physics *SQ*- (6)	
		and PHY 113 114 General Physics Laboratory *SQ*- 2)	
Minimum total			22

Both GLG 102 and 104 must be taken to secure SG credit

' Both PHY 111 and 113 or PHY 112 and 114 must be taken to secure SQ credit

BIO 480 is required in the professional education program

The minor teaching field consists of 24 semester hours as follows BIO 181, 182; 16 additional hours in BIO, MIC, and PLB courses selected to reflect a balance across the disciplines and subdisciplines in biology. BIO 480 is required in addition to the 24 semester hours in biological sciences.

GRADUATE PROGRAM

The faculty in the Department of Biology offer programs leading to the degrees of Master of Natural Science, M.S., and Ph.D. (with a concentration in ecology for the M.S. and the Ph.D.). See the *Graduate Catalog* for requirements.

The department participates in the interdisciplinary program for the M.S. and Ph D. degrees in Molecular and Cellular Biology See the *Graduate Catalog* for more information

BIOLOGY (BIO)

BIO 100 The Living World. 4) F, S, SS
Principles of biology Cannot be used for major credit in the biological sciences. 3 hours lecture 3 hours lab *General Studies SQ*

BIO 120 Human Physiology. (4) N
Basic concepts of general science are discussed using current issues and basic concepts of human physiology as a focus. Cannot be used for major credit in biological sciences 3 hours lecture, 3 hours lab *General Studies SG*

BIO 181 General Biology. 4) F, S SS
Biological concepts emphasizing fundamental principles and the interplay of structure and function at the molecular, cellular, organismal and population levels organization Secondary school chemistry strongly recommended. 3 hours lecture 3 hours lab Prerequisite biological sciences major or preprofessional student in health-related sciences *General Studies SQ*

BIO 182 General Biology. (4) F S, SS
Continuation of BIO 181 Secondary school chemistry strongly recommended Prerequisite BIO 181 *General Studies SG*

BIO 193 The Nature of Biological Science. (4) N
Creative and critical thinking skills in biological research, nature of biological knowledge role of experimentation, predictions hypotheses theories, values Lecture, lab discussion. Prerequisite. high school biology *General Studies. SQ*

BIO 201 Human Anatomy and Physiology I. (4) F S, SS
Structure and dynamics of the human mechanism. Cannot be used for major credit in the Department of Biology. 3 hours lecture 3 hours lab *General Studies. SG*

BIO 202 Human Anatomy and Physiology II. (4) F S SS
Continuation of BIO 201. Cannot be used for major credit in the Department of Biology. 3 hours lecture 3 hours lab Prerequisite. BIO 201 or instructor approval.

BIO 218 Medical History. (1) N
Brief survey of humankind's important inventions and discoveries in the art and science of medicine Illustrating interrelationships of medical ideas

BIO 241 Human Genetics. (4) F
Introduction to basic concepts in genetics as they are applied to human heredity Cannot be used for major credit in the Department of Biology 3 hours lecture 3 hours lab Prerequisite: a course in the life sciences *General Studies SG*

BIO 300 Natural History of Arizona. (3) F S
Plant and animal communities of Arizona Cannot be used for major credit in the biological sciences. Prerequisite: junior standing.

BIO 301 Field Natural History. (1 N
Organisms and their natural environment. 2 weekend field trips, field project Cannot be used for major credit in the biological sciences. Prerequisite BIO 300

BIO 302 Cancer and Heart Disease. (3) F
Incidence and mortality statistics for cancer and heart disease; host and environmental risk factors, diagnosis treatment and prevention strategies Cannot be counted toward a Biology major Prerequisites· 12 hours in life sciences and CHM 231 (or equivalent) and an L course *or* instructor approval *General Studies L*

BIO 303 Radiation and Life. (3) S
Benefits and risks of radiation exposure in society medical applications, food irradiation, nuclear power, solar UV, population health effects Cannot be counted toward a Biology major. Prerequisites: 12 hours in life sciences and CHM 231 or equivalent) and an L course *or* instructor approval *General Studies. L.*

BIO 304 Radiation Medicine and Biology. (3) F
Uses of radiation in medicine, including CT diagnostic x-ray MRI nuclear medicine ultrasound; biological effects of radiation with emphasis on cancer Prerequisites 12 hours in life sciences and PHY 112 and an L course *or* instructor approval *General Studies L.*

BIO 310 Special Problems and Techniques. 1 3) F S
Qua f ed undergraduates may nvest gate a spec f c b o og ca prob- em under the d rect on of a facu ty member May be repeated for a total of 6 semester hours Prerequ s tes forma conference w th the nstructor; approva of the prob em by the nstructor and department cha r

BIO 311 Biology and Society. (3) S
Explores nteract'ons between b o og cal sc ences and society, e g., b omedica environmenta eth cal, historica lega phi osoph ca po tica , and social ssues Lecture d scussion Prerequ s te BIO 193 (or BIO 100) *or* BIO 181 and 182

BIO 316 History of Biology: Conflicts and Controversies. (3) A
Focuses on 19th and 20th centur es, cons der ng b ology as a d sc pl ne evolut on, and prob ems of hered ty deve opment, and ce l the ory Cross- isted as HPS 330 Cred t s al owed for on y B O 316 or HPS 330 *General Studies· H.*

BIO 317 Conservation Biology. 3 F
The sc ent f c and technica means for management maintenance, protect on, and restorat on of bio ogical resources on th's p anet. Prerequisite 8 hours of b ology

BIO 318 History of Medicine. 3) A
Sc entif c study of the human body, chang ng theories of d sease, evo lut on of pract cal op n ons on treatment, and the emerg ng nst tut on a ization of medica pract ce Cross 'sted as HPS 331 Cred t s a lowed for on y B O 318 or HPS 331 *General Studies: H.*

BIO 319 Environmental Science (Nonmajor). 3) F
Env ronmental and b o og cal concepts used to understand ecologica systems w th spec fic references to prob ems caused by humans Cannot be used for major cred t n the bio ogica sc ences. Cross sted as PLB 320 Cred t is al owed for on y BIO 319 or PLB 320 *Gen eral Stud es G*

BIO 320 Fundamentals of Ecology. 3) F S
Organ zat on funct on ng, and deve opment of ecolog ca systems; energy f ow; biogeochemica cyc 'ng env ronmenta re ations; popu a t on dynam cs Prerequ s te B O 182 or instructor approva

BIO 321 Introductory Ecology Laboratory. (3) S
Laboratory and fie d observat ons and exper ments to test current con cepts and theor es n eco ogy Lab. Pre or corequ s te: B O 320 *Gen eral Studies L*

BIO 331 Animal Behav'or. 3 F
Evolut onary genet c, phys o og cal, and eco og ca bases of an mal behav or. Prerequis te BIO 182 r equ va ent

BIO 336 Sociobiology. (3) S
Survey of an mal and human soc a behav or exam ned from an evo u t onary perspect ve. Su tab e for nonmajors. B O 331 s recommended.

BIO 340 General Genetics. (4) F S SS
Sc ence of hered ty and varat on 3 hours lecture 1 hour recitat on Prerequ s te. B O 182

BIO 341 Genetic Analysis. 5 N
General genet cs sc ence of hered ty and var at on using crit cal nqu ry. 3 hours ecture 6 hours lab Not open to students who have taken B O 340. Lecture, ab Prerequisites· B O 182 193 (or equ va ent).

BIO 343 Genetic Engineering and Society. (4 F
Introduction to genet c eng neer ng w th emphas s on appl cat ons gene therapy DNA f ngerpr nting bioremediat on, transgen c an ma s and plants) 3 hours lecture 3 hours lab Cross l sted as MBB 343 Cred t s a lowed for on y B O 343 or MBB 343. Prerequ s te B O 181 or equ va ent

BIO 344 Origins, Evolution, and Creation. (3) F
Exam nes sc entif c, myth c, and rel g ous ideas re ating to orig ns par t cu ar y human). P ace of ant evo ut on sm and sc entif c creationism" in Amer can cu ture Lecture, discuss on Cross sted as HPS 311 HUM 371 REL 383 Cred t s al owed for only BIO 344 or HPS 311 or HUM 371 or REL 383

BIO 346 The Darwinian Revolution. (3) S
ntel ectua and cu tural history of Darw n sm and modern evolut onary theory and the r mpact on 19th- and 20th-cent ry thought Lecture, d scuss on. Cross l sted as HPS 332/HUM 372 Cred t s a lowed for on y BIO 346 or HPS 332 or HUM 372

BIO 351 Developmental Anatomy. (3) F
Genera deve opmenta b ology embryology and comparat ve struc ture of organ systems, i lustrated main y by vertebrate examp es Prerequisite BIO 182.

BIO 352 Laboratory In Vertebrate Developmental Anatomy. (2) F, S
Morphology of representat ve embryon c and adult vertebrates 2 3 hour labs. B O 351 recommended. Prerequ s te B O 182

BIO 353 Cell Biology. (3) F
Survey of ma or top cs n ce l b o ogy, inc ud ng structura b ochem ca and mo ecular aspects of cel function Prerequ site BIO 182

BIO 360 Animal Physiology. 4 F S
Physiologica mechan sms of the higher vertebrates 3 hours ecture 3 hours ab. Prerequisites B O 182 CHM 115 MAT 117

BIO 370 Vertebrate Zoology. (4 F, S
Character stics, c ass fication evolut on, and natura h story of the ma or groups of vertebrate an ma s 3 hours lecture 3 hours ab Pre requisite BIO 182

BIO 385 Comparative Invertebrate Zoology. (4) F
Characterist cs, fe cyc es adaptat ons, and evo ut on of nvertebrate an mals 3 hours ecture, 3 hours lab Prerequ s te BIO 182 or nstruc tor approva

BIO 386 General Entomology. (4) N
Form act'v t es and c ass f cat on of nsects 3 hours ecture, 3 hours lab Prerequ s te B O 182

BIO 394 Special Topics. 2 3) N
Top cs of current or spec'al nterest n one or more aspects of an mal b o ogy. Topics vary Prerequ s te jun or stand ng.

BIO 406 Computer Applications in Biology. 3) F
Computer ana ysis techniques n biology emphas z ng data entry, management and analys s, and graph c portrayal Employs ma nframe and m crocomputers 2 hours ecture, 3 hours ab. Cross isted as PLB 432 Cred t is al owed for on y BIO 406 or PLB 432. Prerequ sites: B O 182 and MAT 117 (or 210) *or* nstructor approval. *General Studies: CS.*

BIO 410 Techniques in Wildlife Conservation Biology. (3) F
F e d and ana yt cal techniques used n eva uating popu ation struc ture, viab l ty and env ronmental mpacts. Lecture ab Prerequ s tes: BIO 317 and 320 *or* 'nstructor approva *General Studies L*

BIO 411 Advanced Conservation Biology I. (3) F
Princ p es of conservat on sc ence, b o ogy of threatened spec es, management principles that meet conservat on goals, emphasizing North American ecosystems Prerequisites B O 317 320

BIO 412 Advanced Conservation Biology II. (3) S
Globa b od vers ty patterns processes and conservation g obal env - ronmental change sustainab e use of natural resources emphasizing internationa approaches to conservat on b ology. Prerequisites. B O 317, 320.

BIO 415 Biometry. (4) F
Stat st ca methods app ed to b o ogical problems, des'gn of exper ments, estimat on, sign'f cance, ana ysis of var ance regression cor relat on, ch' square, and b'oassay the use of computers. Does not sat sfy laboratory requirements for the bera arts general studies pro gram 3 hours ecture 3 hours lab Prerequ s te MAT 210 or equ va- ent *General Studies· CS*

BIO 416 Professional Values in Science. (2 3) A
Cons'ders ssues related to values in sc ence such as col aborat on finances, egal 'ssues, media mentor ng, ownersh p of deas, sc ent f c ntegrity D scuss on, student projects Cross- sted as HPS 410 Cred t s a lowed for on y B O 416 or HPS 410 *General Studies. L.*

BIO 419 Research Colloquium in Biology and Society. (3–6) F, S
Deve ops critica think ng ab l ties, research methods and writing sk l s for research n the nteractions between b o og cal sc ences and soci- ety Discussion Prerequ s te B O 311 or instructor approva *General Stud es. L*

BIO 420 Field Zoology. (3) N
Exper ence in zoolog ca f eld techniques. Requ res weekend or onger f e d tr ps Prerequ s te 'nstructor approva

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NOTE: For the Genera Studies requirement courses and codes (such as L, SQ, C, and H), see "General Stud es" page 87. For graduat on requ rements, see Un vers ty Graduat on Requirements" page 83 For an explanation of add tiona omn bus courses offered but not l sted n this catalog see "Class f cat on of Courses," page 60

BIO 423 Popu ation and Community Ecology. (3 N
Organization and dynam cs f popu at on and commun t es empha- sizing an ma s. The ret ca and emp r cal approaches Prerequis te BIO 320 or nstructor approva

BIO 424 Mathemat'cal Models in Ecology. 4 S
Mathemat cal model ng of popula ons commun ties, and ecosystems nc uding case stud es and student des gned projects. 3 hours ecture, 3 hours ab Prerequ s tes BIO 320 any calcu us course

BIO 425 Animal Ecology. (3) N
Phys o og ca and behav ora adaptat ons of nd v dual an ma s to both ab otic and b ot c env ronments Prerequ s te B O 320

BIO 426 Limnology. (4) S
Structure and funct on of aquat c ecosystems, w th emphas s on fresh water akes and streams 3 hours ecture 3 hours lab or f e d trip. Prerequ s te BIO 320 or nstructor approva *Genera Stud es L*

BIO 428 Biogeography. 3) F
Environmenta and h stor ca processes determ n ng d str but ona pat terns of an ma s and plants, emphasiz ng terrestr a l fe Prerequ s tes B O 182 (or equ va ent , jun or standing *Genera Stud es L*

BIO 431 Human Development and Fertility. (3 S
Globa nf uences of human popu ation deve opment on the human env ronment nc ud ng understand ng human fert ty and c nical nflu ences on fert ty D scussion presentat on Prerequ s te general b o ogy

BIO 435 Research Techniques in Animal Behavior. 3) N
Exper menta and f e d stud es of an ma behav or descr pt on and quant fication of an ma behav or and nterpretat on of behav or w th n an evo ut onary framework 1 hour ecture, 6 hours lab Prerequ s te· B O 331 *General Stud es. L*

BIO 441 Cytogenetics. 3 F
Chromosomal basis of nheritance Cross l sted as PLB 412 Cred t s al owed for on y BIO 441 or PLB 412 Prerequ s te BIO 340.

BIO 442 Cytogenetics Laboratory. (2) F
M croscop c ana ys s of meios s, m tos s, and aberrant ce d v s on 6 hours lab Cross- sted as PLB 413 Cred t s a lowed for on y B O 442 or PLB 413 Pre or corequisite. BIO 441 or PLB 412

BIO 445 Organic Evolution. (3) F
Processes of adapt ve change and spec at on n sexua popu ations. Prerequ site: B O 241 or 340.

BIO 446 Principles of Human Genetics. 3 A
Mo ecu ar and ce lular analys s of the human genome Prerequ s te BIO 340. *General Stud es L*

BIO 450 Advanced Developmenta Biology. (3 S
Current concepts and exper menta methods nvo v ng d fferent at on and b osynthetic act v t es of ce s and organ sms w th examp es from m croorgan sms plants, and an ma s Prerequ s te B O 351

BIO 453 Animal Histology. (4) S
M croscop c study of an ma t ssues. 3 hours ecture, 3 hours ab. Prerequisite: B O 182 or instructor approva

BIO 454 Aquatic Insects. (3 N
Systemat cs and eco ogy of aquat c nsects Prerequ s te BIO 386

BIO 464 Photobiology. (3 F
Princ p es under y ng the effects of ght on growth deve opment, and behav or of p ants anima s and m croorgan sms. Cross sted as PLB 440 Credit is a owed f r on y BIO 464 or PLB 440. Prerequisites: CHM 231 (or 331 12 hours of courses n ife sc ences.

BIO 465 Neurophysiology. 3 S
Deta ed treatment of ce lular and organismal neurophys o ogy and nervous system funct on Prerequ s te BIO 360

BIO 466 Neurophysiology Laboratory. (2) N
Intrace u ar and extrace u ar e ectrophys o og cal record ng tech niques h sto og ca preparat ons and dye fi 'ng techn ques 6 hours ab Pre- or corequ s te BIO 465

BIO 470 Systematic Zoology. 4 S 2001
Ph osophy theory pract ce of nterpret ng anima d vers ty ncluding spec es concepts spec at on nomenc ature and evo utionary and phy ogenet c class f cat on emphas z ng phy ogenetics 3 hours lec ture 3 hours ab Prerequ s tes· jun or stand ng; 18 hours n fe sc ences. *Genera Stud es L.*

BIO 471 Ornithology. 3 S 2001
The b o ogy of b rds 2 hours ecture, 3 hours lab weekend f e d tr ps Prerequ s te· B O 370 or nstructor approva

BIO 472 Mammalogy. (4) F
C assification structure, habits, eco ogy and d str but on of mammals emphas z ng North Amer can forms 3 hours lecture 3 hours ab or f e d tr p, weekend f e d tr ps Prerequisite BIO 370 or nstructor approval.

BIO 473 Ichthyology. 3) S 2001
Systemat cs and biology of recent and ext nct f shes. 2 hours lecture 3 hours ab or field trip weekend f e d trips required. Prerequ s tes B O 370 and 425 *or* nstructor approva

BIO 474 Herpetology. (3) S
Systemat cs and biology of recent and ext nct rept es and amphibi ans 2 hours ecture, 3 hours lab or field tr p Prerequ s te· BIO 370

BIO 480 Methods of Teaching Biology. (3) S
Methods of nstruct on exper mentation organization and presenta- t on of appropriate content 'n b o ogy Prerequ s te· 20 hours in the bio- ogica sc ences.

BIO 494 Special Topics (1–4) N
(a) Cel Biotechnology

BIO 495 Undergraduate Thesis. (3) F, S, SS
Gu ded research cu m nat ng in the preparat on of an undergraduate thesis based on supervised research done in th s and prev ous semesters Prerequ sites at least 3 hours of B O 310 (or 499) formal conference with nstructor, nstructor and department chair approva .

BIO 499 Individualized Instruction. (1 3) F, S

BIO 502 Transmission Electron Microscopy. (3) F
Theory, use and methods of prepar'ng b o og cal mater a s for trans- m ss on e ectron microscopy. Mater a s fee Lecture, ab. Prerequisite: nstructor approval.

BIO 505 Scanning Electron Microscopy. (3) S
Theory use, and methods of preparing b'olog ca materials for scan- n ng e ectron microscopy. Mater a s fee 2 hours ecture, 3 hours lab Prerequ s te nstructor approval

BIO 508 Scientific Data Presentation. (2) S
Techniques necessary for presentation of scientific data used n jour- nal pub ications, grant proposals and v sua presentations Lecture, ab Prerequ s te nstructor approva

BIO 520 Biology of the Desert. (2) N
Factors affect ng p ant and an ma l fe n the desert reg ons and adap tat ons of the organ'sms to these factors Prerequ site· 10 hours of b o og ca sc ences or nstructor approva

BIO 522 Populations: Evolutionary Ecology. (3) N
Pr nc p es of popu ation b ology and community eco ogy w thin an evo- lut onary framework 2 hours ecture 2 hours rec tation. Prerequ s tes. B O 320 415 (or MAT 210) 545.

BIO 524 Ecosystems. (3) F 2001
Structure and funct on of terrestrial and aquatic ecosystems, with emphas s on productiv ty energet cs biogeochemica cyc ng, and systems ntegrat on Prerequ s te: B O 320 or equ va ent

BIO 526 Quantitative Ecology. (3) N
Samp ng strategies, spat al pattern analys s, species divers ty class - f cat on, and appl cat ons of mu tivariate techniques to eco ogy. 2 hours ecture 3 hours lab Prerequ s tes BIO 415 (or equ va ent); a course n ecology

BIO 529 Advanced Limnology. (3) N
Recent iterature deve opments, methods, and imnologica theory· f e d and ab app cat on to some particu ar top c in mnology. Prereq- uisite B O 426

BIO 543 Molecular Genetics. (3) F
Nature and funct on of the gene; emphasis on the mo ecular bas s of inher tance and gene expression in procaryotes and eucaryotes. Pre- requis tes B O 340 a course n organ c chemistry.

BIO 545 Populations: Evolutionary Genetics. (3) N
Mathematical mode s in the descr ption and analys s of the genetics of popu at ons Prerequ s tes: BIO 320 and 415 and 445 *or* instructor approva

BIO 547 Techniques in Evolutionary Genetics. (4) N
Pract cal exper ence n modern techniques for the study of evo ution Lecture, ab Prerequisites B O 340 445 nstructor approval

BIO 550 Advanced Cell Biology. (3) S
App cat ons of contemporary e ectron m croscop c and biochem cal/ mo ecu ar techn ques for study ng eukaryotic cel functions. Mecha- n sms of ntrace lular prote n traff ck ng. Prerequ s tes· BIO 353 (or 360 or equ va ent or PLB 360)· CHM 231 (or 331 or equ va ent).

BIO 551 Biomembranes. (3) N
Structure and function of biological membranes, emphasizing synthesis, fluidity, exocytosis, endocytosis, and cell responses to hormones and neurotransmitters. Prerequisites: BIO 353 (or equivalent); CHM 231 (or 331 or equivalent).

BIO 552 Developmental Genetics. (3) S
Genetic approaches to the analysis of development during the life cycle of eukaryotic organisms, and the role of genes in the unfolding of the differentiated phenotype. Prerequisite: BIO 340.

BIO 560 Comparative Physiology. (3) N
The analysis of function in invertebrates and vertebrates, emphasizing evolutionary trends in physiological systems. Prerequisite: BIO 360 or equivalent.

BIO 566 Environmental Physiology. (3) N
Physiological responses and adaptations of animals to various aspects of the physical environment. Prerequisites: BIO 320, 360.

BIO 568 Mammalian Physiology. (3) N
Detailed treatment of mammalian organ system functions emphasizing integrative mechanisms. Prerequisite: BIO 360 or equivalent.

BIO 569 Cellular Physiology. (3) N
Emphasizing the molecular basis for cell structure and function. Prerequisites: BIO 360; organic chemistry.

BIO 584 Internship. (1–12) F, S

BIO 591 Seminar. (1–3) F, S
Topics such as the following are offered:
(a) Adaptations
(b) Behavior
(c) Cell Biology
(d) Ecology
(e) Evolution
(f) Genetic Engineering
(g) Genetics
(h) Physiology
May be repeated for credit.

View of the Agricultural building from the courtyard of the College of Business

Michael Martin photo

Department of Chemistry and Biochemistry

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REGENTS' PROFESSORS
ANGELL, BUSECK, MAYER, C. MOORE, O'KEEFFE, PETTIT

PROFESSORS
ALLEN, BALASUBRAMANIAN, BIEBER, BIRK, BLANKENSHIP, FUCHS, GLAUNSINGER, GLICK, GUST, HOLLOWAY, LOHR, McMILLAN, A. MOORE, T. MOORE, MUNK, PETUSKEY, ROSE, SKIBO, STEIMLE, WILLIAMS, WOODBURY

ASSOCIATE PROFESSORS
KOUVETAKIS, WOLF

ASSISTANT PROFESSORS
BOOKSH, CAUDLE, FRANCISCO, GOULD, HAYES, RANKO

CHEMISTRY—B.A.

The B.A. degree in Chemistry consists of 46 semester hours. Required courses are as follows:

Choose between the course combinations below	9 or 8
CHM 113 General Chemistry *SQ* (4)	
CHM 115 General Chemistry with Qualitative Analysis *SQ* (5)	
— *or* —	
CHM 117 General Chemistry for Majors I *SQ** (4)	
CHM 118 General Chemistry for Majors II *SQ** (4)	
Choose between the course combinations below	9 or 8
CHM 317 Organic Chemistry for Majors I* (3)	
CHM 318 Organic Chemistry for Majors II* (3)	
CHM 319 Organic Chemistry Laboratory for Majors I* (1)	
CHM 320 Organic Chemistry Laboratory for Majors II* (1)	
— *or* —	
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)	
CHM 325 Analytical Chemistry	3
CHM 326 Analytical Chemistry Laboratory	1
CHM 341 Elementary Physical Chemistry	3
CHM 343 Physical Chemistry Laboratory	1
CHM 453 Inorganic Chemistry	3
CHM electives	3
Minimum total	30

* CHM 117, 118, 317, 318, 319, and 320 are strongly recommended for qualified students.

NOTE: For the General Studies requirement, courses, and codes (such as L, SQ, C, and H), see "General Studies," page 87. For graduation requirements, see "University Graduation Requirements," page 83. For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses," page 60.

Related courses must include the following

MAT 270 Calculus with Analytic Geometry I *MA*	4
MAT 271 Calculus with Analytic Geometry II *MA*	4
PHY 111 General Physics *SQ*[1]	3
PHY 112 General Physics *SQ*[1]	3
PHY 113 General Physics Laboratory *SQ*[1]	1
PHY 114 General Physics Laboratory *SQ*[1]	1
Total	16

Equivalent courses may be taken in place of MAT 270 and 271

[2] More advanced PHY courses may be taken in place of PHY 111, 112, 113, and 114

[3] Both PHY 111 and 113 or PHY 112 and 114 must be taken to secure SQ credit

The remaining courses to complete the major are determined by students in consultation with their advisors

CHEMISTRY—B.S.

The program consists of 45 semester hours in chemistry and 20 hours of related courses outside the major. Required courses are as follows.

Choose between the course combinations below	9 or 8
CHM 113 General Chemistry *SQ* 4)	
CHM 115 General Chemistry with Qualitative Analysis *SQ* (5)	
or	
CHM 113 General Chemistry *SQ* 4)	
CHM 116 General Chemistry *SQ* (4)	
or	
CHM 117 General Chemistry for Majors I *SQ** (4	
CHM 118 General Chemistry for Majors II *SQ** (4)	
Choose between the course combinations below	8
CHM 317 Organic Chemistry for Majors I* (3)	
CHM 318 Organic Chemistry for Majors II* 3	
CHM 319 Organic Chemistry Laboratory for Majors I*	
CHM 320 Organic Chemistry Laboratory for Majors II* 1	
or	
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)	
Total	16 or 17

* CHM 117, 118, 317 318, 319, and 320 are strongly recommended for qualified students.

Additional required chemistry courses are as follows:

CHM 240 Introduction to Physical Chemistry	3
CHM 325 Analytical Chemistry	3
CHM 326 Analytical Chemistry Laboratory	1
CHM 327 Instrumental Analysis	3
CHM 328 Instrumental Analysis Laboratory	2
CHM 345 Physical Chemistry I[2]	3
CHM 346 Physical Chemistry II[2]	3
CHM 348 Physical Chemistry I *L*[2]	1
CHM 349 Physical Chemistry Laboratory II *L*[2]	1
CHM 452 Inorganic Chemistry Laboratory *L*[2]	1
CHM 453 Inorganic Chemistry	3
CHM 460 Biological Chemistry	3
Chemistry elective choose from the courses below	2
CHM 392 Introduction to Research Techniques 1 3)	
CHM 424 Separation Science 3)	
CHM 431 Qualitative Organic Analysis 3)	
CHM 471 Solid State Chemistry 3)	
CHM 481 Methods of Teaching Chemistry 3	
CHM 481 Geochemistry (3	
CHM 485 Meteorites and Cosmochemistry 3	
Total	29

[1] Completion of MAT 274 and 342 satisfies the CHM 240 requirement

CHM 348, 349, and 452 must all be taken to secure L credit.

Additional required related field courses are as follows

MAT 270 Calculus with Analytic Geometry I *MA*	4
MAT 271 Calculus with Analytic Geometry II *MA*	4
MAT 272 Calculus with Analytic Geometry III *MA*	4
PHY 121 University Physics I: Mechanics *SQ*	3
PHY 122 University Physics Laboratory I *SQ*	
PHY 131 University Physics II Electricity and Magnetism *SQ**	3
PHY 132 University Physics Laboratory II *SQ*[3]	
Total	2

Both PHY 121 and 122 must be taken to secure SQ credit

Both PHY 131 and 132 must be taken to secure SQ credit

A course in a computer language, such as CSE 181 Applied Problem Solving with Visual BASIC or CSE 183 Applied Problem Solving with FORTRAN is strongly recommended.

Transfer students are interviewed and advised of possible preparatory work They must contact the department to arrange for the interview in advance of registration See "College Degree Requirements," page 332

American Chemical Society Certification. A student who satisfactorily completes the B S. degree program is certified by the Department of Chemistry and Biochemistry to the American Chemical Society (ACS) as having met the specific requirements for undergraduate professional training in chemistry. Graduates meeting ACS guidelines can receive a certificate to indicate this fact

BIOCHEMISTRY—B.S.

The program consists of 36 semester hours in chemistry and 27 semester hours of related courses Required courses are as follows:

Choose between the course combinations below	9 or 8
CHM 113 General Chemistry *SQ* (4	
CHM 115 General Chemistry with Qualitative Analysis *SQ* (5	
or	
CHM 113 General Chemistry *SQ* 4)	
CHM 116 General Chemistry *SQ* 4)	
or	
CHM 117 General Chemistry for Majors I *SQ* 4	
CHM 118 General Chemistry for Majors II *SQ** 4	
Choose between the combinations of courses below	8
CHM 317 Organic Chemistry for Majors I 3	
CHM 318 Organic Chemistry for Majors II 3)	
CHM 319 Organic Chemistry Laboratory for Majors I* 1	
CHM 320 Organic Chemistry Laboratory for Majors II 1	
or	
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	

Total ..... 16 or 17

* CHM 117, 118, 317, 318, 319, and 320 are strongly recommended for qualified students.

Additional required chemistry courses are as follows:

BCH 461 General Biochemistry 3
BCH 462 General Biochemistry 3
BCH 463 Biophysical Chemistry 3
BCH 464 Biophysical Chemistry Laboratory 2
BCH 467 Analytical Biochemistry Laboratory *L* 3
CHM 341 Elementary Physical Chemistry* 3
Chemistry elective (choose from the courses below) 3
BCH 494 ST: Topics in Nucleic Acids Biochemistry 3)
BCH 494 ST: Topics in Protein Biochemistry 3
CHM 327 Instrumental Analysis (3
CHM 424 Separation Science 3)
CHM 431 Qualitative Organic Analysis (3
CHM 453 Inorganic Chemistry (3)
CHM 471 Solid-State Chemistry 3)

Total 20

* CHM 345 may be taken in place of CHM 341.

Additional required related field courses are as follows:

BIO 193 The Nature of Biological Science *SQ* 4
BIO 340 General Genetics 4
BIO 353 Cell Biology 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
PHY 121 University Physics I: Mechanics *SQ* 3
PHY 122 University Physics Laboratory I *SQ*[1] 1
PHY 131 University Physics II Electricity and Magnetism *SQ*[2] 3
PHY 132 University Physics Laboratory II *SQ*[2] 1

Total 27

Both PHY 121 and 122 must be taken to secure SQ credit

[2] Both PHY 131 and 132 must be taken to secure SQ credit

Additional biology courses selected from BIO 343, 351, 360, 441, 450, and 465 are strongly recommended Other biology courses may be substituted.

Additional biochemistry and chemistry courses, including CHM 392 Introduction to Research Techniques, may be taken by students and should be chosen in consultation with an advisor.

MINOR IN CHEMISTRY

A minor in Chemistry is awarded to students who complete the following required courses.

CHM 113 General Chemistry *SQ*[1] 4
CHM 115 General Chemistry with Qualitative Analysis *SQ*[1] 5
or CHM 116 General Chemistry *SQ*[1] 4)
CHM 325 Analytical Chemistry 3
CHM 326 Analytical Chemistry Laboratory 1
Choose between the course combinations below. ..... 7 or 8
BCH 361 Principles of Biochemistry 3)
CHM 231 Elementary Organic Chemistry *SQ*[2] (3
CHM 235 Elementary Organic Chemistry Laboratory *SQ*[2] (1)
or
CHM 331 Genera Organic Chemistry (3)
CHM 332 Genera Organic Chemistry 3
CHM 335 General Organic Chemistry Laboratory 1)
CHM 336 General Organic Chemistry Laboratory 1)
Choose between the course combinations below 4 or 8
CHM 341 Elementary Physical Chemistry 3)
CHM 343 Physical Chemistry Laboratory (1
or
CHM 345 Physical Chemistry I 3)
CHM 346 Physical Chemistry II 3)
CHM 348 Physical Chemistry Laboratory I (1
CHM 349 Physical Chemistry Laboratory II (1

Minimum total 24

[1] Equivalent courses may be taken in place of CHM 113, 115, or 116

[2] Both CHM 231 and 235 must be taken to secure SQ credit

SECONDARY EDUCATION—B.A.E.

Chemistry. Students may pursue one of two options for the chemistry major teaching field.

Option One. The academic specialization consists of 43 semester hours in chemistry plus work in related fields. Required courses are as follows

BCH 361 Principles of Biochemistry 3
CHM 113 General Chemistry *SQ* 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* 5
CHM 325 Analytical Chemistry 3
CHM 326 Analytical Chemistry Laboratory 1
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
CHM 341 Elementary Physical Chemistry 3
or CHM 345 Physical Chemistry I 3)
and CHM 346 Physical Chemistry II 3)

Total 27

The remaining chemistry courses to complete the specialization are determined by students in consultation with their advisors.

Additional required related field courses are as follows:

MAT 270 Calculus with Analytic Geometry I *MA* 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
PHY 111 General Physics *SQ** 3
PHY 112 General Physics *SQ** 3
PHY 113 General Physics Laboratory *SQ** 1
PHY 114 General Physics Laboratory *SQ** 1

Total 16

* Both PHY 111 and 113 or PHY 112 and 114 must be taken to secure SQ credit

Option Two. The academic specialization consists of 30 semester hours of chemistry, which includes all of the required chemistry courses listed in option one and selection of the corresponding option in either mathematics or physics, that is, completion of an additional 30 semester

NOTE: For the General Studies requirement, courses, and codes (such as L, SQ, C and H) see "General Studies page 87 For graduation requirements see "University Graduation Requirements" page 83 For an explanation of additional omnibus courses offered but not listed in this catalog see "Classification of Courses," page 60

hours in the chosen area as specified by the department selected

Minor Teaching Field The minor teaching field consists of the following required courses:

CHM 113 General Chemistry *SQ*	4
CHM 115 General Chemistry with Qualitative Analysis *SQ*	5
Choose between the courses or combinations below	11 or 8
BCH 361 Principles of Biochemistry	
CHM 233 Elementary Organic Chemistry *SQ* (3)	
CHM 325 Analytical Chemistry 3	
CHM 326 Analytical Chemistry Laboratory 1	
or	
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	
CHM 344 Elementary Physical Chemistry	3
Total	20 or 21

* Both CHM 233 and 235 must be taken to secure SQ credit

The remaining courses to complete the specialization are determined by students in consultation with their advisors.

GRADUATE PROGRAMS

The faculty in the Department of Chemistry and Biochemistry offer programs leading to the degrees of Master of Natural Science, M.S., and Ph.D. See the *Graduate Catalog* for requirements

The department participates in the interdisciplinary program for the M.S. and Ph.D. degrees in Molecular and Cellular Biology For more information, contact the program office, LSE 411, 480 965-0143

BIOCHEMISTRY (BCH)

BCH 361 Principles of Biochemistry. 3 F SS
Structures properties and functions of proteins enzymes nucleic acids carbohydrates and lipids the utilization and synthesis of these materials by living systems and the relationship of these processes to energy production and utilization. Not open to students who have taken BCH 461 Credit is allowed for only BCH 361 or 461 Prerequisite CHM 231 or 318 or 332

BCH 367 Elementary Biochemistry Laboratory. 1 F SS
Qualitative quantitative analyses of constituents of biological systems enzyme activity measurements and metabolic studies 1 hour conference 3 hours lab Prerequisite or corequisite BCH 361 or instructor approval

BCH 461 General Biochemistry. 3 F
Structure chemistry and metabolism of biomolecules and their role in the biochemical processes of living organisms Credit is allowed for only BCH 361 or 461 Prerequisites: CHM 318 or 332 and 341 or 346 *or* instructor approval

BCH 462 General Biochemistry. 3 S
Continuation of BCH 461 Prerequisite BCH 461 or instructor approval

BCH 463 Biophysical Chemistry. 3 S
Principles of physical chemistry as applied to biological systems Prerequisite CHM 341 or 346

BCH 464 Biophysical Chemistry Laboratory. 2 F
Introduction to physical methods in modern biochemistry Prerequisite: BCH 463

BCH 467 Analytical Biochemistry Laboratory. 3 S
Quantitative analysis separation and purification of biomolecules Applications of chemical and physical methods to the characterization of biological macromolecules 1 conference 1 hour lecture, 5 hours lab Prerequisite: BCH 461 Corequisite BCH 462 *General Studies L*

BCH 494 Special Topics. 1–4 N
a Topics in Nucleic Acids Biochemistry 3
b Topics in Protein Biochemistry 3

BCH 563 Biophysical Chemistry. 3 N
Physical chemistry of macromolecules, especially proteins nucleic acids and polysaccharides Thermodynamics hydrodynamics and spectroscopy of and their relation to structure Prerequisite BCH 462; CHM 346

BCH 568 Molecular Mechanisms of Photosynthesis. 3 S
Structure and function of photosynthetic complexes mechanism of energy conversion in plants bacteria and model systems Cross-listed as PLB 558 Credit is allowed for only BCH 568 or PLB 558 Prerequisite instructor approval

CHEMISTRY (CHM)

CHM 101 Introductory Chemistry. 4 F S, SS
Elements of general chemistry. Adapted to the needs of students in nursing home economics agriculture and physical education Recommended for General Studies credit Normally followed by CHM 231 3 hours lecture, 1 hour discussion 2 hours lab Credit is allowed for *only* CHM 101 107 113, 114 or 117 *General Studies SQ*

CHM 107 Chemistry and Society. 4 F S
General chemical principles and concepts presented in context of social and technological issues e.g. energy pollution global warming and others 3 hours lecture 1 hour discussion 2 hours lab Credit is allowed for *only* CHM 101 107 113, 114 or 117 *General Studies SQ*

CHM 113 General Chemistry. 4 F S SS
Principles of chemistry Adapted to the needs of students in the physical biological and earth sciences 3 hours lecture 1 hour discussion, 2 hours lab 1 year of high school chemistry recommended Credit is allowed for *only* CHM 101, 107 113 114 or 117 Prereq site MAT 106 or 3 semesters of high school algebra *General Studies SQ*

CHM 114 General Chemistry for Engineers. 4 F S
One semester college chemistry with emphasis toward engineering 3 hours lecture 1 hour discussion 2 hours lab. Students without high school chemistry or chemical engineering majors must enroll in the CHM 113 116 sequence instead of CHM 114 Credit is allowed for *only* CHM 101 107 113 114 or 117 and for *only* CHM 114, 115 116 or 118 Prerequisites MAT 106 or 3 semesters of high school algebra 1 year of high school chemistry. *General Studies SQ*

CHM 115 General Chemistry with Qualitative Analysis. 5 F S SS
Continuation of CHM 113 Equilibrium theory chemistry of metals nonmetals and metalloids and the introduction to organic chemistry Laboratory includes qualitative analysis. 3 hours lecture 2 hours discussion 4 hours lab Credit is allowed for *only* CHM 114 115, 116 or 118 Prerequisite CHM 113 or 2 years of high school chemistry *General Studies SQ*

CHM 116 General Chemistry. 4 F S
Continuation of CHM 113 Equilibrium theory chemistry of metals nonmetals and metalloids and the introduction to organic chemistry 3 hours lecture 1 hour discussion 2 hours lab Credit is allowed for *only* CHM 114, 115, 116, or 118 Prerequisite CHM 113 or 2 years of high school chemistry. *General Studies SQ*

CHM 117 General Chemistry for Majors I. 4 F
Atomic and molecular structure properties and physical states of matter thermodynamics kinetics acids and bases chemical analysis and stoichiometry. 3 hours lecture 1 conference 2 hours lab Credit is allowed for *only* CHM 101 107 113 114 or 117 Prerequisites 3 years of high school mathematics minimum of 1 year of high school physics Prerequisite with a grade of B or higher, minimum of 1 year of high school chemistry *General Studies SQ*

CHM 118 General Chemistry for Majors I. 4 S
Continuation of CHM 117 3 hours lecture 1 conference 2 hours lab Credit is allowed for *only* CHM 114 115 116, or 118 Prerequisite CHM 117 Corequisite MAT 270 *General Studies SQ*

CHM 231 Elementary Organic Chemistry. 3 F S
Survey of organic chemistry with emphasis on the reactivity of basic functional groups Credit is allowed for *only* CHM 231 317 or 331 Prerequisite with a grade of B or higher CHM 101 or 114 or 115 or 116 or 117 or 1 year of high school chemistry *or* instructor approval *General Studies SQ if credit also earned in CHM 235*

CHM 235 Elementary Organic Chemistry Laboratory 1 F S
Organic chemistry experiments in synthesis purification analysis and identification Lab Prerequisite CHM 231 *General Studies SQ (if credit also earned in CHM 231*

CHM 240 Introduction to Physical Chemistry. (3) S
ntroduces mathemat cal computat ona methods n chem ca k netics, thermodynam cs quantum chemistry. Mathemat ca based computer laboratory 2 hours ecture 4 hours ab Prerequ s te w th a grade of "C" or higher MAT 272.

CHM 302 Environmental Chemistry. (3) S
Exp ores major environmental ssues problems and solut ons from ana yt ca and chemistry perspect ves. Prerequ s tes CHM 114 or 115 or 116 or 118) 231 (or 331).

CHM 317 Organic Chemistry for Majors I. (3) F
Structures react on mechanisms and k net cs and systemat c synthe ses of organic compounds Cred t s a lowed for *only* CHM 231 317, or 331. Prerequisite CHM 115 or 118. Corequ s te· CHM 319.

CHM 318 Organic Chemistry for Majors II. (3) S
Cont nuat on of CHM 317 Credit is a owed for *only* CHM 318 or 332. Prerequ s te CHM 317 Corequ site CHM 320.

CHM 319 Organic Chemistry Laboratory for Majors I. (1) F
Emphas s on mechanisms k net cs and products of organ c reac- t ons 1 conference, 3 hours ab Cred t is al owed for *only* CHM 319 or 335 Pre or corequ s te. CHM 317

CHM 320 Organic Chemistry Laboratory for Majors II. (1) S
Cont nuat on of CHM 319 1 conference, 3 hours ab Credit is al owed for *only* CHM 320 or 336. Prerequisite: CHM 319. Corequ s te CHM 318

CHM 325 Analytical Chemistry. (3) F SS
Principles and methods of chem'cal analys s. Prerequisite CHM 115 or 116.

CHM 326 Analytical Chemistry Laboratory. (1) F SS
Exper ments in chem'cal analys s. 4 hours ab Corequ s te CHM 325

CHM 327 Instrumental Analysis. 3) S
Principles of instrumenta methods n chem ca ana ys s. E ectroana- yt ca and opt cal techn ques. Prerequisites: CHM 325 326 Pre- or corequisite CHM 346.

CHM 328 Instrumental Analysis Laboratory. (2) S
Exper ments n chemical analysis by e ectroana yt ca and optica techniques. 6 hours lab Corequ s te CHM 327

CHM 331 General Organic Chemistry. (3) F, S SS
Chem stry of organ c compounds Cred t s al owed for *only* CHM 231, 317 or 331 Prerequ s te· CHM 115 or 116 or 118

CHM 332 General Organic Chemistry. (3) F S, SS
Cont nuat on of CHM 331. Cred t s a owed for *only* CHM 318 or 332 Prerequ s te. CHM 331.

CHM 335 General Organic Chemistry Laboratory. (1) F, S SS
Microsca e organ c chem ca exper ments in separation techn ques, synthes s, ana ys s and dent f cat on, and re ative react v ty 4 hours ab Cred t s al owed for *on y* CHM 319 or 335 Corequ s te· CHM 331

CHM 336 General Organic Chemistry Laboratory. (1 F, S, SS
Cont nuat on of CHM 335. 4 hours ab Cred t s a lowed for *only* CHM 320 or 336. Prerequ s te CHM 335 Corequisite CHM 332.

CHM 341 Elementary Physical Chemistry. (3 F
Thermodynam cs equi br um states of matter so utions, and chem cal k netics. For students in premedical, biological, and educat ona curricula. Prerequ sites: CHM 115 (or 114 or 118 or 325), 231 (or 331), MAT 271 PHY 112.

CHM 343 Physical Chemistry Laboratory. (1) F
Phys cal chem stry exper ments 1 hour conference, 3 hours ab. Cred t s a lowed for *only* CHM 343 or CHM 348 and 349 Corequisite: CHM 341 or 345.

CHM 345 Physical Chemistry I. (3) F
Introduction to quantum chemistry w th app ication to e ectronic struc- ture and dynamics of atoms and molecu es. Prerequ s te CHM 240 or MAT 272 and 274 w th grades of "C" or higher)

CHM 346 Physical Chemistry II. 3) S
Introduct on to equ l br um and statist cal thermodynamics. Laws of thermodynamics, equations of state, multicomponent chem ca and phase equ ibria and e ectrochem stry Prerequ s te CHM 345 Coreq- u s te: MAT 274

CHM 348 Physical Chemistry Laboratory I. (1) F
Laboratory exper ments in spectroscopy and computat onal chem stry 4 hours lab Pre or corequ site: CHM 345. *General Studies· L (if credit also earned in CHM 349 and 452)*

CHM 349 Physical Chemistry Laboratory II. (1) S
Laboratory exper ments in thermodynam cs, e ectrochemistry, and computat ona chem stry 4 hours ab. Pre or corequ s te CHM 346. *General Studies: L (if credit also earned n CHM 348 and 452).*

CHM 392 Introduction to Research Techniques. (1 3) F, S, SS
Instrumental methods and ph osophy of research by actual particip tion n chemica research projects May be repeated for a tota of 6 semester hours Prerequ s tes approvals of adv sor and research supervisor.

CHM 424 Separation Science. (3) N
Bas c theory and practical aspects of gas, qu d, on-exchange, and ge permeat on chromatographies, and other mportant industr al and research techn ques 2 hours ecture 4 hours ab Prerequ s te CHM 318 or 332 or 345 or nstructor approva

CHM 431 Qualitative Organic Analysis. 3) S
Systematic dent f cat on of organ c compounds 1 hour lecture 6 hours lab Prerequisites· CHM 118 (or 326) and 320 (or 336) *or* instructor approval.

CHM 452 Inorganic Chemistry Laboratory. (1 2) S
Preparation and character zation of typ'ca norgan c substances, emphas z ng methods and techniques 1 conference, 5 hours lab Pre requisite: nstructor approva *General Studies L (if cred t also earned in CHM 348 and 349).*

CHM 453 Inorganic Chemistry. (3) S
Princ p es and app cations of norgan c chem stry. Prerequ s te CHM 341 or 346

CHM 460 Biological Chemistry. (3) S
Structure and funct on of macromolecu es and the r involvement in the process ng of energy and nformation by ving ce ls Prerequ s tes CHM 318 346, 453

CHM 471 Solid-State Chemistry. (3) F
Crysta chemistry, thermodynam cs and electrochem stry of sol ds nonsto ch ometric compounds, diffus on and sol d state react ons crysta growth and selected top cs Pre or corequ'site: CHM 346 or instructor approval

CHM 480 Methods of Teaching Chemistry. (3) S
Organ zat on and presentat on of appropriate content of chemistry preparation of reagents exper ments and demonstrat ons organ za t on of stock rooms and laboratories· experience in prob em solving Prerequ s te nstructor approval.

CHM 481 Geochemistry. (3) F
Origin and d str but on of the chem ca e ements. Geochem cal cycles operating n the earth s atmosphere, hydrosphere, and l thosphere. Cross sted as GLG 481 Cred't is al owed for on y CHM 481 or GLG 481 Prerequ s te CHM 341 (or 346) or GLG 321.

CHM 485 Meteorites and Cosmochemistry. (3) N
Chemistry of meteorites and the r relat onship to the orig n of the earth, so ar system, and un verse. Cross sted as GLG 485. Credit s al owed for only CHM 485 or GLG 485.

CHM 494 Special Topics. (1–4) N
(a) Chem stry of Global C imate Change (3)

CHM 501 Current Topics in Chemistry. (1) F S
May be repeated for cred t Prerequisite: nstructor approva

CHM 521 Computer Enhanced Analytical Chemistry. (3) N
Overview of chemometr c tools n ana yt'ca chemistry, includ ng mu t - variate ca ibrat on spectra deconvolut on, and exper mental des gn 2 hours lecture, 4 hours ab

CHM 523 Advanced Analytical Chemistry. (3) A
Theoretical principles of ana ytical nstrumentation and measure ments Prerequ s tes CHM 325 and 346 *or* nstructor approva .

CHM 525 Spectrochemical Methods of Analysis. (4) N
Theoretical and pract ca cons derations invo v ng the use of opt ca nstruments for chem ca ana yses Emphas s on state of the art trends 3 hours lecture 3 hours lab Prerequisite: CHM 346 or nstruc tor approva

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NOTE: For the Genera Studies requirement courses, and codes (such as L SQ C, and H), see "General Studies," page 87. For graduation requ rements, see Un vers ty Graduat on Requ rements," page 83 For an exp anation of add t onal omn bus courses offered but not l sted n this catalog see Class f cat on of Courses page 60

CHM 526 X-ray Methods of Analysis. (4) N
Theoret ca and pract cal considerat ons nvolv ng the use of X-ray d f- fract on and spectroscopy for chemical and structura ana yses 3 hours lecture 3 hours ab Prerequ s te CHM 346

CHM 527 Electrical Methods of Chemical Analysis. (4) N
Theoret cal and pract cal cons derations of polarograph c, potent o- metric amperometric techn ques ncluding modern e ectrochem ca methods 2 hours ecture, 6 hours ab Prerequ s te. CHM 346.

CHM 531 Advanced Organic Chemistry I. (3) F
React on mechan sms reaction k netics, near free energy relat on sh ps trans t on state theory, molecu ar orb tal theory, and Woodward Hoffmann rules Prerequ s tes CHM 318 or 332) 346

CHM 532 Advanced Organic Chemistry II. (2) S
Continuat on of CHM 531. Prerequisite CHM 531.

CHM 537 Organic Reactions. (3) S
Important synthet c reactions of organic chemistry emphas z ng recent y d scovered react ons of preparat ve value. Prerequ s te CHM 531

CHM 541 Advanced Thermodynamics. (3) F
Equ br um thermodynam cs, chem cal reactions, and phase equ l b- r a Introduct on to stat st ca thermodynamics cr't ca phenomena and kinet cs Prerequisite: CHM 346

CHM 545 Quantum Chemistry I. (3 F
Basic quantum theory, chem ca bond ng, and molecu ar structure Prerequ s te CHM 346.

CHM 546 Quantum Chemistry II. (3) S
Quantum theory of rate processes Principles of spectroscopy and non near opt cs. Prerequ site CHM 545

CHM 548 Chemical Kinetics. (2) N
Kinetic theory and rate processes. Prerequisite: CHM 545.

CHM 553 Advanced Inorganic Chemistry. (3) S
Princ p es of modern norgan c chemistry and the r appl cat ons over the ent re per od c system Prerequ s tes CHM 346 and 453 *or* equ v a ents

CHM 556 Topics in Inorganic Chemistry. (3) N
May be repeated for cred t. Prerequis tes CHM 553 nstructor approva

CHM 579 Topics in Solid-State Chemistry. (3) N
May be repeated for cred t Prerequisite. instructor approval

CHM 582 Topics in Geochemistry and Cosmochemistry. (3) N
Topics of current interest for students n chem stry and other f e ds Samp ng of data and thought concern ng phase equ ibria e ement d str but on, meteorites the Earth and other p anets May be repeated for cred t Prerequisite: instructor approva .

CHM 583 Phase Equilibria and Geochemical Systems. 3) N
Natural reactions at high temperatures and pressures s l cate, sulf de, and ox de equi br a. Cross l sted as GLG 583. Credit is al owed for on y CHM 583 or GLG 583.

CHM 593 Applied Project. (1 12) N
(a) G ass B owing

Department of Chicana and Chicano Studies

Vicki L. Ruiz
Chair
(GHALL 212) 480/965-5091
www.asu.edu/clas/chicana

PROFESSORS
CANDELAR A MONTIEL, PADILLA, RU Z

ASSOCIATE PROFESSOR
ESCOBAR

ASSISTANT PROFESSORS
ALDAMA, GUT ÉRREZ, MAGANA

The Chicana and Chicano Studies program is an interdis ciplinary degree program that examines the experiences, culture, artistic endeavors, and current status of people of Mexican descent living in the United States. The curriculum focuses on the practical application of Chicana and Chicano Studies (CCS) for career development in selected profes sions and service to the community based on an understand ing of the humanities, social sciences, and the arts.

CHICANA AND CHICANO STUDIES—B.A.

The major in Chicana and Chicano Studies requires 45 semester hours of course work. A minimum of 30 semester hours must be CCS, CSH, and CSS courses. The remaining course work must be in a related field to be approved by an advisor. All CCS majors must take 15 semester hours in the following core courses:

CCS 101 Introduction to Chicana and Chicano Studies *C* . . 3
CCS 111 Introduction to Chicana and Chicano Culture *C* 3
CCS 498 Pro Seminar 3
Two semester sequence in Chicana and Chicano history 6

Within the 45 semester hours, CCS majors must also take 18 semester hours in one of two concentrations humani ties cultural studies or social sciences policy and 12 hours in the other concentration for a total of 45 semester hours.

Majors are expected to fulfill the college's language requirement in Spanish. Although the department advisor can make exceptions on a case by case basis, all majors must demonstrate proficiency in Spanish.

All Chicana and Chicano Studies majors must take an established minor or credential of at least 18 semester hours in another field.

CHICANA AND CHICANO STUDIES MINOR

The Chicana and Chicano Studies minor requires 18 semester hours of course work. All Chicana and Chicano Studies minors must take the following courses.

CCS 101	Introduction to Chicana and Chicano Studies *C* . or CCS 111 Introduction to Chicana and Chicano Culture *C* (3	3
HIS 430	20th Century Chicano History *SB C, H* . . .	3
Total	. . . . .	6

Students must also take at least three credits in both CCS concentrations: humanities cultural studies and social sciences policy

Within the 18 semester hour requirement, students must take a minimum of 12 semester hours in CCS, CSH, and CSS courses. Any courses taken in a related field must be approved by an advisor.

CHICANA AND CHICANO STUDIES (CCS)

CCS 101 Introduction to Chicana and Chicano Studies. (3) F
Historical and contemporary issues in the Chicana and Chicano community, focus on economic, social, political and cultural status of Chicanas and Chicanos in the U.S. *General Studies: C*

CCS 111 Introduction to Chicana and Chicano Culture. 3 S
Interdisciplinary analysis of customs, values, belief systems, and cultural symbols; special attention is given to cultural continuity and change. *General Studies C*

CCS 300 Chicana and Chicano Culture and Society. (3) F
Intensive analysis of how Mexican American writers, artists, filmmakers, entertainers and academicians have interpreted aspects of the Chicana and Chicano experience *General Studies C*

CCS 445 Teaching Chicana and Chicano Studies in Native Language. (3) A
Approaches/techniques for infusion of Chicana and Chicano Studies content into elementary and secondary bilingual curriculum Taught in Spanish. Prerequisite: proficiency in Spanish

CCS 446 Teaching Chicana and Chicano Studies in the Schools. (3) A
Approaches/techniques for infusion of Chicana and Chicano Studies content into elementary and secondary curriculum; designed for teachers who will work with Chicana and Chicano students

CCS 498 Pro-Seminar. (3) A
Required courses for majors on topic selected by instructor writing intensive course related to the development of interdisciplinary research skills

CHICANA AND CHICANO STUDIES (CSH)

CSH 210 Chicana and Chicano Poetry. (3) S
Writing seminar on Chicana and Chicano poetics and intensive creative writing workshop Workshop seminar

CSH 220 Chicana and Chicano Cultural Expression. 3 A
Interrelation between economic, social and political status and forms of artistic expression, fine, music dance, drama literature and graphic arts.

CSH 310 Chicana and Chicano Folklore. 3) A
Analysis of Chicana and Chicano folk beliefs, traditions and practices. *General Studies· HU C.*

CSH 350 Mexican and Mexican American Artistic Production. (3) A
Overview of Mexican and Mexican American artistic production from colonial times to present emphasis on religious and folk art

CSH 351 Contemporary Chicana and Chicano Art. 3) A
Intensive analysis of contemporary Chicana and Chicano art movement as appraised within the context of contemporary American art and the art of Mexico *General Studies· HU C*

CSH 363 Chicana and Chicano Literature. (3) F
Development of Chicana and Chicano literature study of genres and themes; attention to literary antecedents Cross listed as ENG 363 Credit is allowed for only CSH 363 or ENG 363. *General Studies L/HU C.*

CSH 485 Chicana Writers. 3) A
Critical reading of Mexican American women authors, emphasis on contemporary post-1970) poetry novels short stories and essays *General Studies L/HU C*

CSH 498 Pro-Seminar. 3) A
Required course for majors on topic selected by instructor, writing intensive course related to the development of interdisciplinary research skills.

CHICANA AND CHICANO STUDIES (CSS)

CSS 315 Chicano Family Structures and Perceptions. 3 A
Traditional and changing family relationships· emphasis on gender and intergenerational relations and impact of modern society on traditional family values

CSS 330 Chicana and Chicano Politics. 3) A
Historical/contemporary analysis of Chicana and Chicano political ideologies, attitudes, strategies and movements relations with governmental agencies, participation in political process *General Studies C*

CSS 331 Contemporary Issues in the Chicana and Chicano Community. 3) S
Historical demographic, and sociological overview of the status of Chicanas and Chicanos in the U.S. and of salient issues affecting that community *General Studies C*

CSS 336 Issues in Immigration and Migration. 3 A
Historical contemporary overview of Mexican immigration into and within the U.S factors affecting population movement settlement patterns and immigrants' incorporation into society. *General Studies C, H*

CSS 340 Chicanas and Chicanos in the U.S. Economy. 3) S
Historical contemporary analysis of Chicanas and Chicanos' relationship with the American economic system emphasis on impact of changing American economy on Chicana and Chicano community *General Studies C*

CSS 432 Issues in Chicana and Chicano Gender. (3 A
Analysis of social construction of gender identities emphasis on impact of American and Mexican cultural values on normative gender relations *General Studies C*

CSS 490 Field Studies in the Chicana and Chicano Community. (3) A
Introduction to principles and methods of qualitative research applied to the Chicana and Chicano community

CSS 498 Pro-Seminar. (3 A
Required course for majors on topic selected by instructor writing intensive course related to the development of interdisciplinary research skills

Computer Science

A major in Computer Science is offered in both the College of Liberal Arts and Sciences and the College of Engineering and Applied Sciences. For faculty and course descriptions, see "Department of Computer Science and Engineering," page 230.

COMPUTER SCIENCE—B.S.

The program in Computer Science consists of 34 hours of core course work and 15 semester hours of senior level breadth courses in the major. Also required are 18 semester hours of technical elective and mathematics courses approved by the department. The university requirement for literacy and critical inquiry is to be met in part by ECE 400 or a departmental L.

NOTE: For the General Studies requirement courses, and codes such as L SQ C and H) see "General Studies," page 87 For graduation requirements, see "University Graduation Requirements, page 83 For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses, page 60

A minimum cumulative GPA of 2.50 is required to begin upper division work in the major A minimum grade of "C" is required in all CSE courses used for degree credit.

For more information, contact an advisor in the Office for Academic Programs, SS 111, or the Computer Science and Engineering Advising Center in GWC 224

The degree is accredited by the Computer Science Accreditation Board, so more than 120 semester hours are required to complete the degree.

Economics

The College of Liberal Arts and Sciences and the College of Business offer a B.A. or B.S. degree in Economics. Faculty, course descriptions, and the major requirements in the College of Business are listed under "Department of Economics," page 158

ECONOMICS—B.A. OR B.S.

The program in Economics consists of 45 semester hours of course work, 24 of which, at a minimum, must be in economics, and the remainder in closely related fields to be selected from the "Approved List of Related Field Courses" in consultation with the faculty advisor.

The following lower division courses are required and must be counted as part of the 45-hour major:

ECN 111	Macroeconomic Principles *SB*	3
ECN 112	Microeconomic Principles *SB*	3
MAT 210	Brief Calculus *MA*	3
STP 226	Elements of Statistics *CS*	3
Total		12

While MAT 210 meets the minimum mathematics requirement to major in Economics, all Economics majors who anticipate going on to graduate school in economics or in business or to law school are encouraged to take MAT 270 Calculus with Analytic Geometry I Majors are encouraged to pursue further course work in mathematics. MAT 270 may be taken in lieu of MAT 210.

To qualify for upper division course work in economics, the Economics major must earn a minimum grade of "C" in each of the previously listed courses, have junior class standing (56 semester hours), and have a minimum cumulative GPA of 2.50. ECN 313 Intermediate Macroeconomic Theory and ECN 314 Intermediate Microeconomic Theory are required and should be taken after the completion of the previously listed courses and before other upper division courses in economics.

Credit earned by an Economics major in ECN 484 Economics Internship, whether as a legislative intern or through the Department of Economics Internship Program (and ECN 493 Honors Thesis), may not be used to satisfy the minimum 24 hours of economics course work requirement. However, up to six hours of ECN 484 and 493 may be used to meet the related fields requirement. See "College Degree Requirements," page 332.

Latin American Studies Certificate or Emphasis. Students majoring in Economics may elect to pursue a Latin American Studies Certificate or Emphasis, combining courses from the major with selected outside courses of wholly Latin American content. See "Latin American Studies," page 340, for more information

MINORS IN ECONOMICS

Minor in General Economics. The minor in General Economics consists of 18 semester hours of credit which includes ECN 111 and ECN 112 plus any 12 hours of upper division economics courses for which all prerequisites have been met.

Minors in General Economics are encouraged to take calculus and statistics, which are prerequisites for ECN 313 Intermediate Macroeconomic Theory and ECN 314 Intermediate Microeconomic Theory so that these courses might be included in the minor The College of Business does not permit its professional program students to enroll in this minor.

Minor in Economics for Students Planning a Career in Law. One of the most dramatic recent developments in law is the integration of economic analysis in legal theory and decision making. Curricula at all major law schools reflect this change. Consequently, future lawyers are being trained with courses that rely increasingly on microeconomic theory and econometrics.

The applications of economics to law have moved beyond the traditional areas of antitrust and regulation. First year law courses now include microeconomic theory with applications to contracts, torts, criminal law, property, and constitutional law

The minor in Economics for Students Planning a Career in Law provides an opportunity for prospective law students to take courses that provide them with analytical tools essential for the study of law. The prelaw minor consists of a minimum of 18 semester hours. The College of Business does not permit its professional program students to enroll in this minor.

Required courses are as follows:

ECN 111	Macroeconomic Principles *SB*	3
ECN 112	Microeconomic Principles *SB*	3
ECN 314	Intermediate Microeconomic Theory *SB*	3
ECN 450	Law and Economics *L*	3
ECN 453	Government and Business	3
Total		15

Also required is at least one additional course from the following:

ACC 316	Management Uses of Accounting	3
ECN 421	Earnings and Employment *L/SB*	3
ECN 480	Introduction to Econometrics *CS*	3
ECN 494 ST	Public Choice	3
FIN 361	Managerial Finance	3

SECONDARY EDUCATION—B.A.E.

The minor teaching field consists of 21 semester hours. ECN 111 Macroeconomic Principles and ECN 112 Microeconomic Principles and MAT 210 Brief Calculus are required. The remainder must be approved by the advisor in consultation with the student.

Social Studies. See "Social Studies," page 438.

GRADUATE PROGRAMS

The faculty in the Department of Economics offer programs leading to the M.S. and Ph.D. degrees See the *Graduate Catalog* for requirements.

For faculty and course descriptions see "Department of Economics," page 158

Department of English

(LL 542) 480/965-3168
www.asu.edu/clas/english

REGENTS' PROFESSORS
DUBE RIOS

PROFESSORS
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ASSISTANT PROFESSORS
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SENIOR LECTURERS
COOK, COOPER, DUGAN, D. M. MAHONEY, OBERMEIER, SUDOL

LECTURERS
DUERDEN, DWYER, HEENAN, NORTON, RAY, WHEELER

ACADEMIC PROFESSIONAL
GLAU

ENGLISH—B.A.

The faculty in the Department of English offer courses in comparative literature, creative writing, English as a second language, English education, English linguistics, literature and language, and rhetoric and composition. Undergraduate degrees include the B.A. degree in English, with a concentration in either linguistics or literature, and a Secondary Education Bachelor of Arts in Education degree. The faculty also offer a Writing Certificate. Students interested in creative writing are encouraged to use electives to pursue a creative writing emphasis. Students should work with their advisors to design individual programs of study that take full advantage of the diversity within the department as well as interdisciplinary and multicultural contexts available in the college and university

The B.A. degree in English with a concentration in linguistics consists of 42 semester hours. Required courses are as follows:

ENG 200 Critical Reading and Writing About Literature *L/HU* 3
ENG 213 Introduction to the Study of Language 3
ENG 221 Survey of English Literature *HU, H* 3
or ENG 222 Survey of English Literature *HU, H* 3)
or ENG 241 American Literature *HU* 3
or ENG 242 American Literature *HU* (3
ENG 312 English in Its Social Setting *HU SB*..... 3
ENG 313 Phonology and Morphology 3
ENG 314 Modern Grammar 3
ENG 413 History of the English Language *HU*..... 3
ENG 414 Studies in Linguistics (repeated for a total of nine semester hours 9

Twelve additional hours are electives, chosen in consultation with the student's advisor. These courses must be at the 200 level or above At least one must be a three credit course in a modern language other than English at the 400 level or above. A grade of "C" or higher is required in all courses taken for the major. *No course may be used to satisfy more than one requirement.*

The B.A degree in English with a concentration in literature consists of 45 semester hours. Required courses are as follows.

ENG 200 Critical Reading and Writing About Literature *L/HU* 3
ENG 221 Survey of English Literature *HU H* 3
ENG 222 Survey of English Literature *HU H* 3
ENG 241 American Literature *HU* 3
ENG 242 American Literature *HU* 3
ENG 421 Shakespeare *HU* 3
Upper division course in critical theory (3
Upper division course in gender, American ethnic literatures, and/or postcolonial studies (3
Course in the history and/or structure of language 3
Upper division course in literature before 1660 exclusive of ENG 421 (3
Upper division course in literature between 1660 and 1900 3
Upper division course in literature after 1900 (3

Courses may be used to satisfy more than one requirement. Additional hours needed to complete the 45 hours are free electives chosen from the department's offerings at the 200 level and above. At least 18 of the 45 hours must be taken at the 300 or 400 level A grade of "C" or higher is required in all courses taken for the major

MINORS

The minor in English with a Concentration in Linguistics consists of 24 semester hours. Required courses are as follows:

ENG 200 Critical Reading and Writing About Literature *L/HU* 3
ENG 213 Introduction to the Study of Language 3

NOTE: For the General Studies requirement courses, and codes (such as L, SQ, C, and H) see "General Studies" page 87 For graduation requirements see University Graduation Requirements, page 83 For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses, page 60.

ENG 221 Survey of English Literature *HU, H* . 3
or ENG 222 Survey of English Literature *HU H* 3)
or ENG 241 American Literature *HU* 3)
or ENG 242 American Literature *HU* (3
ENG 312 Engl sh in Its Soc al Setting *HU SB* 3
ENG 314 Modern Grammar . . . 3
ENG 413 H story of the English Language *HU* 3

The six additional hours are electives chosen from the department's offerings, with at least one course (three hours) required at the 300 or 400 level A grade of "C" or higher is required in all courses for the minor.

The minor in English with a Concentration in Literature consists of 24 semester hours Required courses are as fol lows:

ENG 200 Critical Reading and Writing About Literature *L/HU* . . 3
ENG 221 Survey of English Literature *HU, H* . 3
or ENG 222 Survey of English Literature *HU H* 3)
ENG 241 American L terature *HU* 3
or ENG 242 American Literature *HU* 3)
ENG 421 Shakespeare *HU* 3

Also required are two upper division courses in literature six hours) and two electives (six hours) chosen from among the department's offerings, with at least one course (three hours) at the 300 or 400 level. A grade of "C" or higher is required in all courses taken for the minor

WRITING CERTIFICATE

The Writing Certificate consists of 19 semester hours. Initial entry into the program requires a minimum GPA of 3 00 in English 101 and 102, 105, or 107 and 108. Students must also have completed at least 30 hours of course work and must have a minimum GPA of 3 00. Required courses are as follows:

ENG 216 Persuasive Writing on Public Issues *L* 3
or ENG 412 Professional Writing 3
ENG 301 Writing for the Professions *L* 3
ENG 372 Document Production *L* 3
ENG 472 Rhetorical Studies 3
ENG 484 Writing Internship 3
ENG 498 PS Portfolio 1

Tota 16

Also required is an additional writing course in English (three hours) or a writing or design course three hours) selected from courses across campus All students are required to submit a portfolio before receiving the certifi cate.

SECONDARY EDUCATION—B.A.E.

The major teaching field consists of 42 semester hours in English. Required courses are as follows:

ENG 200 Critical Reading and Writing About L terature *L/HU* 3
ENG 212 English Prose Style *L* 3
or ENG 215 Strategies of Academic Writing *L* 3)
or ENG 216 Persuasive Writing on Public Issues *L* 3
or ENG 217 Writing Reflective Essays *L* (3)
ENG 221 Survey of English Literature *HU, H* 3
ENG 222 Survey of English L terature *HU, H* 3
ENG 241 American Literature *HU* 3
ENG 242 An erican Literature *HU* 3
ENG 312 English in Its Social Setting *HU SB*... . 3
or ENG 314 Modern Grammar 3
ENG 421 Shakespeare *HU*. 3
ENG 471 Literature for Adolescents *HU* 3
ENG 480 Methods of Teaching Eng ish 3

Total 30

Also required is one course in women's literature or American ethnic literature. N ne additional hours are free electives chosen from Department of English offerings, six hours of which must be in the upper division ENG 471 and 480 must be taken before student teaching

The minor teaching field consists of the follow ing required courses

ENG 200 Critical Reading and Writ ng About Literature *L/HU* 3
ENG 212 English Prose Style *L*. 3
or ENG 215 Strategies of Academ c Writing *L* 3
or ENG 216 Persuasive Wr ting on Public Issues *L* (3)
or ENG 217 Writing Reflective Essays *L* 3
ENG 221 Survey of English Literature *HU H* 3
or ENG 222 Survey of Eng ish literature *HU H* 3
ENG 241 American Literature *HU* 3
or ENG 242 American Literature *HU* 3
ENG 312 English in Its Social Settin *HU SB* 3
or ENG 314 Modern Grammar 3
ENG 471 Literature for Adolescents *HU* 3
ENG 480 Methods of Teaching English 3
Upper division English e ective 3

Total 24

These courses are also recommended for Elementary Education majors

GRADUATE PROGRAMS

The faculty in the Department of English offer programs leading to the M A. degree in English (with concentrations in comparative literature, English linguistics, literature and language, and rhetoric and composition , Master of Fine Arts degree in Creative Writing options include fiction, nonfiction, poetry, and screenwriting), Master of Teaching English as a Second Language degree, and Ph.D. degree in English with concentrations in literature, rhetoric composi tion, and linguistics. See the *Graduate Catalog* for require ments.

ENGLISH (ENG)

ENG 101 First-Year Composition. (3) F S SS
Discovering organ z ng, and deve op ng ideas n re at on to the wr ter's purpose, subject and aud ence Emphas s on modes of wr t- ten d scourse and effect ve use of rhetor ca pr nc p es Foreign stu dents, see ENG 107 Prerequ s te see Un vers'ty Test ng Requ rements" page 72, and "First Year Compos t on Requ rement page 83

ENG 102 First-Year Composition. 3) F S SS
Crit cal read ng and wr t ng; emphas's on strateg es of academ c d s course Research paper requ red Foreign students see ENG 108 Prerequ's te w th a grade of "C" or h gher: ENG 101

ENG 105 Advanced First-Year Composition. 3 F S
A concentrated compos t on course for students w th s per r wr t ng ski s, ntens ve reading research papers og ca and rhetor cal effec tiveness. Not open to students w th cred t n F rst Yea Compos t on Prerequ s te· see "Un vers ty Test ng Requ rements" page 72 and "F rst Year Compos tion Requ rement page 83.

ENG 107 English for Fore gn Students. (3) F, S
For students from non Eng sh speaking countr es who have stud ed Engl sh n the r nat ve countr es, but who requ re pract ce n the id oms of Eng ish ntens ve read ng writ ng and d scuss on Satisf es the graduation requ rement of ENG 101

ENG 108 English for Foreign Students. 3 F S
For fore gn students' crit ca read ng and wr t ng strategies of aca dem c d scourse Research paper requ red Sat sf es graduation requ rement of ENG 102 Prerequ s te w th a grade of "C or h gher ENG 107

ENG 114 English Grammar and Usage. (3) F S
The fundamenta s of Eng sh grammar word and phrase structure) and of Eng sh usage (punctuat on, grammat ca correctness)

Complet on of the First Year Composit on requ rement is a prerequi site for all Eng ish courses above the 100 eve

ENG 200 Critical Reading and Writing About Literature. 3 F, S
Introduction to the term no ogy, methods and objectives of the study of l terature, with practice n nterpretation and eva uat on Prerequ site Engl sh major or m nor *Genera Stud es L/HU.*

ENG 201 World Literature. (3) F
The class ca and medieva per ods. Se ect ons from the great l tera- ture of the wor d n trans at on and ectures on the cu tural backgr und *General Stud es HU H.*

ENG 202 World Literature. (3) S
The Renaissance and modern per ods Se ect ons from the great ter- ature of the world n translat on and ectures on the cu tural back- ground. *General Studies HU, H*

ENG 204 Introduction to Contemporary Literature. (3) A
Poetry fict on drama, and possib y other genres *Genera Stud es HU.*

ENG 210 Introduction to Creative Writing. (3) F S
Beg nn ng wr t ng of poetry f ct n and drama (both stage and screen) Separate sect ons for each genre Each genre may be taken once

ENG 212 English Prose Style. (3) N
Ana ys s and pract ce of wr t ng n var ous class cal and modern prose styles. Prerequ s te Eng sh major *or* approva of adv sor and nstruc- tor Prerequ s te w th a grade of "B or h gher: ENG 102. *General Stud ies. L*

ENG 213 Introduction to the Study of Language. 3 F, S
Language as code; phonet cs phonology morpho ogy and syntax the exicon· anguage acqu s tion socio ngu st cs.

ENG 215 Strategies of Academic Writing. 3 F, S
Advanced course n techn ques of ana yz ng and wr t ng academ c expos tory prose Writ ng is research based *General Stud es· L*

ENG 216 Persuasive Writing on Public Issues. (3) F, S
Advanced course n techniques of analyz ng and wr t ng persuasive arguments addressing top cs of current pub c nterest Papers are research based *Genera Studies· L.*

ENG 217 Writing Reflective Essays. (3) F S
Cr tical exam nation of the nf uences d scourse has on formation of dentity; narrat ve analyses of self and cu ture *General Studies L*

ENG 218 Writing About Literature. (3) F S
Advanced writ ng course requiring analyt ca and expos tory essays about f ct on poetry, and drama For non Eng sh majors *General Studies· L*

ENG 221 Survey of English Literature. 3) F S
Med eva Renaissance and 18th-century iterature Emphas s on major wr ters and their works n the r terary and h stor cal contexts. *General Stud es. HU H.*

ENG 222 Survey of English Literature. 3 F, S
Romantic V ctor an and 20th century terature Emphasis on major writers and the r works n the r iterary and h storica contexts *General Studies HU, H*

ENG 241 American Literature. (3) F S
From co on a t mes to the C v l War nc ud ng the growth of nat ona ism and romant c sm *General Stud es· HU*

ENG 242 American Literature. (3) F S
From the C vi War to the present Deve opment of real sm, natura sm and modern sm and contemporary trends n prose and poetry. *Gen eral Stud es HU*

ENG 245 Popular Culture Issues. (3) F, S
Se ected top cs n various forms of popular cu ture re ated to wr tten texts May be repeated for cred t when top c var es *Genera Studies L*

ENG 294 Special Topics. (1–4) N

A term paper or equivalent out of class written work is requ red n all upper-div s on (300 and 400 level) ENG courses

ENG 301 Writing for the Professions. (3) F S
Advanced pract ce n wr ting and ed t ng expos tory prose. Pr mar ly for preprofess onal majors *General Stud es· L.*

ENG 303 Classical Backgrounds of English Literature. 3) N
Se ected readings of Greek and Lat n terature in trans ation empha siz ng forms, ideas, and myths as they re ate to l terature n Eng sh *General Stud es· HU*

ENG 307 Utopian Literature. (3 N
Selected works from the present to the c ass ca per od nclud ng *Walden Two, Walden, Utopia* and *The Republ c General Studies· L/ HU H.*

ENG 310 Intermediate Creative Writing. (3) F S
Separate sect ons for f ct on and poetry May be taken once for poetry, once for fict on Lectures, writ ng assignments discussion crit c sm Prerequ s te ENG 210 or instructor approva

ENG 312 English in Its Social Setting. (3) S
Introduct on to the sociol ngu st c study of the Eng sh anguage. *Gen eral Studies HU SB.*

ENG 313 Phonology and Morphology. 3 S
ntroduct on to Eng sh morphology phono ogy, etymo ogy, and pho netic aspects of rhyme, al iterat on and other sound-based terary dev ces

ENG 314 Modern Grammar. (3) F S
Modern descr ptive mode s of Eng sh grammar

ENG 321 Introduction to Shakespeare. (3) F, S
Shakespeare s major comedies h stories and traged es *General Stud es L/HU*

ENG 331 American Drama. (3) A
Major works n the deve opment of Amer can drama from its beg n nings to the present *General Stud es L*

ENG 332 Major American Novels. (3) A
Novels from the 19th century to the present studied n the r h stor ca and cu tura contexts *Genera Studies· L.*

ENG 333 American Ethnic Literature. (3 A
Exam nat on of Amer ca's mu t ethn c dentity through works of itera ture that dep ct Amer can ethn c, gender and c ass sens b l ties *Gen eral Stud es. L C*

ENG 345 Selected Authors or Issues. 3–4 N
D fferent topics may be offered F m top cs w th ab may carry 4 cred ts Repeat cred t for d fferent top cs

ENG 352 Short Story. (3) F S
Deve opment of the short story as a iterary form; ana ys s of ts tech n que from the work of representat ve authors. *General Stud es. HU.*

ENG 353 African American Literature: Beginnings Through the Harlem Renaissance. (3) F
Thematic and cu tural study of Afr can American terature through the Har em Renaissance Cross- isted as AFH 353. Credit is a owed for only AFH 353 or ENG 353 *Genera Stud es. L/HU C*

ENG 354 African American Literature: Harlem Renaissance to the Present. (3) S
Themat c and cu tural study of Afr can American terature from the Harlem Rena ssance to the present Cross sted as AFH 354 Cred t s a owed for only AFH 354 or ENG 354. *Genera Stud es L/HU C*

ENG 355 History of the Drama. 3 N
Development of European drama from the Greek to the Romant c period *General Studies. L/HU.*

NOTE: For the General Stud es requirement courses, and codes (such as L SQ, C and H) see "Genera Stud es page 87 For graduat on requ rements see Univers ty Graduat on Requ rements" page 83 For an exp anat on of add t ona omn bus courses offered but not l sted n th s cata og see "Class f cat on of Courses" page 60

ENG 356 The Bible as Literature. (3) F, S
Read ngs n O d and New Testaments emphas z ng ideas l terary types, and sources as they appear n l terature *General Stud es HU*

ENG 357 Introduction to Folklore. (3) N
Survey of the h story genres and dynam cs of folklore, w th emphas s on oral trad tions *General Stud es HU*

ENG 359 American Indian Literatures. (3) N
Selected oral trad tions of American nd ans and the r nf uences on contemporary Native American terary works. *General Studies. L/HU, C*

ENG 361 Silent Film. (4) F
Deve opment of motion pictures from 1850 through 1930 3 hours ec ture screenings. *General Studies: HU.*

ENG 362 Sound Film Genres. 4) S
Exam nat on of the Western the horror f m, the comedy and other genres 3 hours ecture, screen ngs. *General Stud es HU*

ENG 363 Chicana and Chicano Literature. (3) F
Development of Ch cana and Ch cano terature study of genres and themes attent on to terary antecedents. Cross sted as CSH 363 Credit is al owed for on y CSH 363 or ENG 363. *General Stud es L/ HU, C.*

ENG 372 Document Production. (3) F, S
ntroduction to document des gn and product on Practice n cr tique and n writ ng the content of pub cat'ons. Lecture, d scuss on Prereq u s te F rst-Year Compos t on or nstructor approval *General Stud es L*

ENG 374 Technical Editing. (3) F, S
Fundamenta s of edit ng techn ca and profess ona materials Ro e of ed tors in analyz ng rev s ng and po ish ng manuscr pts. Successfu writer ed tor d alogues. Prerequis tes ENG 101 and 102 *or* equ va ent

Eng ish majors and minors are expected to have completed ENG 200 before taking 400-level literature courses

ENG 400 History of Literary Criticism. (3) N
Major cr t cs and cr t cal trad t ons n the western wor d. Prerequ s'te: 6 hours of l terature or instructor approval *General Studies HU.*

ENG 405 Style and Stylistics. (3) N
L'ngu st'c, rhetorica , and l terary approaches to the analys s of style n poetry, fiction, and other forms of wr tten d scourse

ENG 409 Advanced Screenwriting II. (3) N
Appl cat'on of the principles taught n a comp ete feature engih screenp ay

ENG 411 Advanced Creative Writing. (3) F S
Separate poetry and f ct on workshops for exper enced wr ters emphas z ng nd v dual sty e. May be taken once for poetry once for fict on. Prerequ s te ENG 310 or nstructor approva

ENG 412 Professional Writing. (3) N
Lectures and conferences concern ng techn ques of wr t ng for pub cat on. Prerequ s te ENG 310 or instructor approva

ENG 413 History of the English Language. 3) A
Deve opment of Engl sh from the ear est t mes to the modern period Prerequ s te' jun or stand ng or nstructor approva *Genera Studies HU*

ENG 414 Studies in Linguistics. (3 F, S
The relationship of l nguist cs to terature, gender power and other soc a issues May be repeated for cred t. Prerequ s te jun or standing

ENG 415 Medieval Literature. (3 N
Med'eva Eng ish l terature n trans at on, from *Beowulf* to Ma ory (excluding Chaucer), emphasizing cu tura and ntel ectua back grounds nc udes continental works. Prerequ s te: ENG 221 or instructor approval. *General Studies HU*

ENG 416 Chaucer: *Canterbury Tales.* (3) A
Chaucer's anguage his ast work and ts re ationsh p to cont nenta and nsular trad tions Prerequ s te ENG 221 or nstructor approva *General Studies' HU*

ENG 417 Chaucer: *Troilus and Criseyde and the Minor Works.* 3) N
Chaucer's language h s major poem and his ear y works n their medieval context. Prerequ s te ENG 221 or nstructor approva *Gen eral Stud'es' HU*

ENG 418 Renaissance Literature. (3) F
Top cs authors, and themes in Eng sh iterature 1485–1603 Prereq uisite' ENG 221 or nstructor approva *General Studies L/HU*

ENG 419 English Literature in the Early 17th Century. (3) F
Top cs authors, and themes n Eng ish terature, 1603–1660. Prereq u s te ENG 221 or nstructor approva . *Genera Studies L/HU*

ENG 421 Shakespeare. 3) F, S
A se ect on of comed es h st r es and traged es Prerequ s te ENG 221 or nstructor approva *General Stud es HU*

ENG 422 Studies in Shakespeare. 3 A
Top cs for c ose exam nation n selected dramat c and/or nondramatic works May be repeated for cred t when top cs vary Prerequ s te' ENG 421 or nstructor approva *Genera Stud es HU*

ENG 423 Renaissance Drama. 3) S
Top cs authors, and themes n the drama of the Tudor and early Stuart periods Prerequ s te ENG 221 or nstructor approva *General Stud ies L/HU*

ENG 424 Milton. 3) A
Se ected prose and poetry, emphas z ng *Parad se Lost Parad se Rega ned* and *Samson Agon stes* Prerequ s te ENG 221 or nstruc tor approval. *General Stud es' HU*

ENG 425 Stud es in Engl'sh Romanticism. (3) F
A genres of Romant c terature n cu tura contexts, B ake to the death of Wordsworth. May be repeated for cred t *General Stud es' HU*

ENG 426 Victorian Poetry. 3 F
Poetry of the second ha f of the 19th century. May nc ude such poets as Tennyson, Brown ng, and Arno d Prerequ s te ENG 222 or nstruc tor approval. *General Stud'es L/HU*

ENG 427 Restoration and Early 18th Century. 3 N
Wr ters and movements n the nondramat c l terature of the Rest ra t on and ear y 18th century Prerequ s te' ENG 221 or instructor approval. *General Studies HU*

ENG 428 The Later 18th Century. 3 N
Wr ters movements and bo ks during the second ha f of the 18th century Prerequ s te ENG 221 or nstructor approva *General Stud ies HU*

ENG 430 Victorian Cultural Backgrounds. 3) N
Soc a re igious, and other cultura issues of the per od May nc ude Car y e, Rusk n, Darw n, Arno d Pater and Morr s. Prerequ s te ENG 222 or nstructor approval. *Genera Stud es L/HU*

ENG 435 19th-Century American Poetry. (3 N
Themes and developments n Amer can poetry to 1900 nc ud ng Poe, Whitman, and D ck nson. *General Stud es HU.*

ENG 439 Restoration and 18th-Century Drama. (3 S
Eng sh drama 1600–1800 Prerequ s te ENG 221 or nstructor approval *General Stud es HU*

ENG 440 Studies in American Literature to 1815. 3 N
Thought and express on from the time of f rst contact to 1815 May be repeated for cred t Prerequis'te' ENG 241 or instructor approva *Gen eral Studies HU*

ENG 441 20th-Century American Drama. 3 N
Amer can drama s nce Wor d War espec a y exper mental tech n ques Prerequ s te ENG 241 or 242 or nstructor approval. *General Stud es' HU.*

ENG 442 20th-Century British and Irish Poetry. 3) N
Theory and pract ce of poetry s nce 1900. Prerequ site ENG 222 r nstructor approva

ENG 443 American Poetry, 1900–1945. (3) N
Developments in theory and pract ce of major poets Prerequ site ENG 241 or 242 or instructor approva *General Studies HU.*

ENG 444 Studies in American Romanticism, 1830–1860. (3) F
Cu tural express on n works of representat ve wr ters May be repeated for cred t Prerequ s te ENG 241 or nstructor approval. *Gen era Studies HU*

ENG 445 Studies in American Realism, 1870–1910. (3) S
Wr ters and nfluences that shaped the deve opment of terary real sm May be repeated for cred t Prerequ s te ENG 242 or instructor approval *General Stud es L/HU*

ENG 448 20th-Century British and Irish Novel. (3) N
Theory and pract ce of the nove s n e 1900. Prerequ s te ENG 222 or nstructor approva *Genera Stud es HU*

ENG 451 The Novel to Jane Austen. (3 N
From orig ns of prose f ct on through the 18th century. *General Stud ies. HU H.*

ENG 452 The 19th-Century Novel. 3) S
May nc ude such nove sts as Austen D ckens E ot, and Conrad. *Gene a St dies· HU*

ENG 453 The American Novel to 1900. 3 N
The r se and deve opment of the n ve to Dre ser Prerequ s te ENG 241 or instructor approva *Genera Stud es HU*

ENG 454 The American Novel, 1900–1945. 3) N
Deve opments in theory and pract ce of ma or nove sts Prerequ s te ENG 241 or 242 or instructor approva *Genera Stud es: HU.*

ENG 455 The Form of Verse: Theory and Practice. 3 N
Types h story, cr t c sm, and schoo s of theory of metr cal form. Ana y sis of yr c narrat ve and dramat c poetry.

ENG 457 American Poetry Since 1945. 3 A
Ma or Amer can poets of the per od Deve opments n theory and prac t ce Prerequ s te ENG 241 or structor approva *General Stud es HU*

ENG 458 American Nove Since 1945. 3 N
Major nove sts of the per od Deve pments n theory and pract ce Prerequ s te ENG 242 or nstructor approva *General Stud es L/HU*

ENG 460 Western American Literature. 3 A
Cr t ca exam nat on f deas and trad t on of the terature of the west ern Un ted States nc ud ng the nove *Gene a Stud es· L/HU.*

ENG 461 Women and Literature. 3 N
Se ected top cs n l terature by or about women May be repeated for cred t when topics vary *Genera Stud'es. HU.*

ENG 462 20th Century Women Authors. 3 N
Cr t ca exam nat on of terature by 20th century women wr ters May be repeated for cred t when top cs vary *Genera Stud es· HU*

ENG 463 European Drama from Ibsen to 1914. 3 N
C ef cont nenta and Br tish dramat sts of the per od emphas z ng the beg nn ngs and deve opment of rea sm *General Stud es HU*

ENG 464 European Drama from 1914 to the Present. 3 N
Ch ef cont nenta and Br t sh dramatists of the per od emphas z ng exper menta techniques *Genera Stud es HU*

ENG 470 Symbols and Archetypes in Children's Literature. 3) F
Various cr t ca approaches and recurr ng themes are stud ed n rela t on to class ca and contemporary ch dren's terature Lecture d s cuss on read ng

ENG 471 Literature for Adolescents. 3 F S
Prose and poetry that meet the nterests and capab t es of un or h gh and h gh schoo students Recent terature stressed A pass ng grade of at least C requ red before students are perm tted to student teach n Engl sh *Genera Stud es. HU.*

ENG 472 Rhetorical Stud'es. 3 F S
Deve opments n theory and practice of major rhetor cal nqu r es Sem nar, workshop Prerequ s te jun or stand ng

ENG 480 Methods of Teaching English: Composition. 3 F SS
Methods of nstruct on, organizat on and presentat on of appropr ate content in the teach ng of compos t on and other wr t ng sk s

ENG 482 Methods of Teaching English: Language. 3 S
Methods of nstruct on, organ zat on and presentat'on of appropr ate content n anguage and u age for jun or and sen or h gh schoo s Lec ture d scuss on, ab

ENG 484 Writing Internship. 3 F S
Tutor ch ldren n after schoo programs n the commun ty and ass st them w th read ng homework, and computer sk s. Three afternoons a week from 3 00 p m to 5 00 p m , Monday through Thursday

ENG 498 Pro-Seminar. 1 N
(a Portfo o

ENG 500 Research Methods. 3 A
Methodo ogy and resource mater a s for research Ana ys s of cr t c sm and scho arsh p nc ud ng eva uat on of sources

ENG 501 Introduction to Comparative Literature. 3 N
Prob ems methods and pr nc p es ustrated by se ected cr tica essays and terary texts

ENG 502 Contemporary Crit'cal Theory. 3 A
An advanced survey of major schools of 20th century terary and cr t- cal theory Lecture d scuss on Cross- sted as HUM 549 Cred t s al owed fo on y ENG 502 or HUM 549

ENG 507 Old English. 3 N
E ements of O d Eng sh grammar w th selected read ngs

ENG 508 Old English Literature. (3) N
Intens ve terary ngu stic and cultura study of O d English l terature May be repeated for credit when topics vary Prerequ s te ENG 507

ENG 509 Middle English. 3) N
A study of the princ'pa d a ects of the anguage with se ected read ngs. Prerequ s te graduate stand'ng

ENG 512 The Teaching of Composition. (3) N
The theory and pract ce of teach ng wr t ng at a evels Emphas s on current research Prerequ s tes· teach ng exper ence· nstructor approva

ENG 515 Middle English Literature. (3 N
Eng sh terature from the 12th through the 15th centur es exc us ve of Chaucer Prerequisite· ENG 509 or nstructor approval

ENG 517 Contemporary Rhetorical Theory. (3) A
nvest gat on of the work of such mportant rhetor ca theorists as Burke, Tou min Perelman Gates, and Cixous

ENG 520 Renaissance Literature. 3) N
Poetry and prose of the Eng sh Rena ssance exc ud ng drama.

ENG 521 Shakespeare. (3) A
A se ect on of comedies h stor es, and traged es presented n the con text of terary h story and cr t ca theor es w th an emphasis on class ca and med eva backgrounds

ENG 525 American Literary Criticism. (3) N
Ana ys s and d scuss on of eading historical and cr t ca interpreta- t ons of Amer can iterature from the beg nn ngs to the present

ENG 530 Classical Rhetoric and Written Composition. 3) F
Re at onsh p of major texts in class ca rhetoric to developments in compo t on theory, terary theory and pract ce through the 19th cen- tury

ENG 531 Rhetorical Theory and Literary Criticism. (3) S
ntensive study of major rhetorica theor sts of the 20th century n such areas as terary cr t cism, discourse theory, and compos t on theory

ENG 532 Composition Theory. (3) N
ntens ve study n the rhetor ca categories of nvent on arrangement sty e a ms, modes and forms of written d scourse

ENG 545 Studies in English Literature. (3) N
Th s course offers selected authors or ssues and may be repeated for cred t

ENG 547 Studies in American Literature. (3) N
Th s course offers selected authors or ssues and may be repeated for cred t

ENG 549 Studies in Comparative Literature. 3) N
Th s course offers selected authors or ssues and may be repeated for cred t

ENG 550 Contemporary Comparative Literature. (3) N
Comparat ve stud es n modern l terature n Eng sh and other iitera- tures n translat on. May be repeated for credit when content var es.

ENG 560 Studies in Dramatic Forms. (3) F N
Se ected top cs in dramatic and c nematic terature, h story, cr ticism, theory, and cross d sc p inary study. May be repeated for credit when top cs vary Lecture stud o

ENG 571 Advanced Study in Literature for Adolescents. (3) N
H story and crit c sm of ado escent l terature Prerequis te ENG 471 or nstructor approval

ENG 573 Censorship and Literature. (3) N
The h story of censorsh p pr mar y n the United States, and s'gn f cant court dec s ons that affected wr ters and books

ENG 580 Practicum. (1 12) N

ENG 591 Seminar. (3) F, S
Se ected top cs regular y offered n the var ous areas of Eng sh stud- es.

ENG 594 Conference and Workshop. (1 12) N

ENG 598 Special Topics. (1–4) N

ENG 599 Thesis. (1 12) N

NOTE: For the Genera Stud es requ re ent cou ses and codes (such as L SQ C, and H), see Genera Studies, page 87 For graduat on requ rement , see "Un vers ty Graduat on Requ rements, page 83. For an exp anat on of add t onal omn bus courses offered but not sted n th s cata og see C ass f cat on of Courses,' page 60

LINGUISTICS (LIN)

See the *Graduate Catalog* for the LIN courses.

WRITING ACROSS THE CURRICULUM (WAC)

WAC 101 Introduction to Academic Writing. 3 F S
Combines c assroom and suppleme ta nstruction to teach academ c genres of wrt ng, nc ud ng def n t on summary, and ana ys s

WAC 107 Introduction to Academ'c Writing for International Stu dents. (3 F S
For students from non Eng sh speak ng c untr es Comb nes c ass room and supp ementa nstruct on w th ntens ve read ng wr t ng and d scuss on

Department of Exercise Science and Physical Education

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EXERCISE SCIENCE/PHYSICAL EDUCATION—B.S.

The B S degree in Exercise Science/Physical Education consists of 42 semester hours, including 21 semester hours of required EPE core courses (EPE 110 may be repeated for credit) The remaining 21 semester hours of EPE and other courses are prescribed by the specific concentration the stu dent selects

The required EPE core courses are as follows.

EPE	110 Movement Analysis Laboratory	6
EPE	200 Introduction to Exercise Science and Physical Education	3
EPE	335 Biomechanics	3
EPE	340 Physiology of Exercise	3
EPE	345 Motor and Developmental Learning	3
EPE	352 Psychosocial Aspects of Physical Activity	3
Total		21

Each EPE core course has specific prerequisite courses that must be taken before taking the respective core course These prerequisite courses include the followins

BIO	201 Human Anatomy and Physiology I *SG*	4
BIO	202 Human Anatomy and Physiology II	4
CHM	101 Introductory Chemistry *SQ*	4
MAT	117 College Algebra *MA*	3
PGS	101 Introduction to Psychology *SB*	3
PHY	111 General Physics *SQ*	3
Total		21

* Both PHY 111 and 113 must be taken to secure SQ credit

All prerequisite and EPE courses must be completed with a minimum grade of "C " The requirements for the specific concentrations are described below.

Majors must elect either the exercise science, exercise and wellness, or physical education concentration

Exercise and Wellness Concentration. Candidates for the exercise and wellness concentration must complete 21 semester hours beyond the required EPE core courses by taking the following·

EPE	300 Foundations of Exercise and Wellness *L*	3
EPE	320 Program Development and Leadership	3
EPE	420 Exercise Testing	3
EPE	425 Exercise Prescription	3
EPE	484 Internship	6
Total		18

Three semester hours must be selected from an approved list of concentration elect ves that includes EPE courses and courses from nutrition, computer science statistics, and business/communication

Exercise Science Concentration. Candidates for the exer cise science concentration must complete 21 semester hours beyond the core courses in the n ajor fie d, at least 12 of which must carry EPE prefixes, be upper division courses, and concern the theoretical subjects of the core. The remain ing nine semester hours may carry either EPE prefixes or prefixes from related disciplines selected with the advice and consent of a faculty advisor. Act vity courses may not be used to fulfill part of the 21 semester hour requirement. No more than six semester hours may be in independent study courses.

Physical Education Concentration. Candidates must com plete 21 semester hours beyond the EPE core courses, 12 of which must carry EPE prefixes from the required course list below.

EPE	361 Physical Education in the Secondary School	3
EPE	376 Physical Education for the Elementary School	3
EPE	382 Physical Education for the Atypical Student.	3
EPE elective		3
Total		12

* See advisor for approved electives

The ren aining nine semester hours of related course work can carry either EPE psycho ogy, specia education, child development, and/or education prefixes Activity courses (EPE 110) n ay be used to fulfill part of the 21 semester hour requirement additional four semester hours

The Student Recreation Complex extols the benefits of good physical health with state-of-the-art facilities. H. Val Peterson photo

maximum). No more than six semester hours may be taken in internship. Internship experiences may only be in elementary and secondary school teaching and coaching settings. A maximum of six semester hours may be in independent study.

EXERCISE SCIENCE/PHYSICAL EDUCATION MINOR

The minor in Exercise Science/Physical Education consists of the core sequence in exercise science and physical education as follows, plus all prerequisite courses:

EPE	110	Movement Analysis Laboratory	6
EPE	200	Introduction to Exercise Science and Physical Education	3
EPE	335	Biomechanics	3
EPE	340	Physiology of Exercise	3
EPE	345	Motor and Developmental Learning	3
EPE	352	Psychosocial Aspects of Physical Activity	3
Total			21

SECONDARY EDUCATION—B.A.E.

Physical Education. Candidates for the B.A.E. degree are required to complete the following courses in physical education in addition to the required EPE core courses:

EPE	361	Physical Education in the Secondary School	3
EPE	376	Physical Education for the Elementary School	3
EPE	382	Physical Education for the Atypical Student	3
EPE	480	Methods of Teaching Physical Education	3
EPE elective*			3
Total			15

* See advisor for approved electives.

Students must also complete a four-semester Physical Education Teacher Preparation Program professional sequence in the College of Education (38 semester hours). Entry into this degree program requires filing an application, passing scores on a Pre-Professional Skills Test (PPST) or American College Test (ACT), 56 semester hours of completed university study, and a minimum GPA of 2.50. See "College of Education," page 174, for additional requirements.

GRADUATE PROGRAMS

The faculty in the Department of Exercise Science and Physical Education offer programs leading to the Master of Physical Education degree and the M.S. degree in Exercise Science/Physical Education. The department also participates with the Graduate College in the program leading to the Ph.D. degree in Exercise Science and with the College of Education and the Graduate College in the program leading to the Ph.D. degree in Curriculum and Instruction with concentrations in exercise and wellness and in physical education. See the *Graduate Catalog* for requirements.

EXERCISE SCIENCE/PHYSICAL EDUCATION (EPE)

A $5.00 towel and locker fee is required each semester by students using towel and locker facilities for physical education classes and intramural activities.

Physical education activity classes (EPE 105, 205, 305, 310) may not be taken for audit. Excessive absences and/or tardiness are considered disruptive behavior.

EPE 100 Introduction to Health and Wellness. (3) F, S, SS
Current concepts of health and wellness. Cross-listed as HES 100. Credit is allowed only for EPE 100 or HES 100.

EPE 105 Physical Education Activity. (1) F, S, SS
Beginning instruction in a wide variety of sports such as aerobics, aquatics, racquet sports, physical conditioning, and golf. 3 hours/week. "Y" grade only. May be repeated for credit.

EPE 191 First-Year Seminar. (1–3) F, S

EPE 110 Movement Analysis Laboratory. (1–2) F, S, SS
Practical application of biomechanical, physiological, psychological, and learning principles in the analysis of skill acquisition and performance. May be repeated for credit. Prerequisites: EPE 105 proficiency; ESPE major.

EPE 200 Introduction to Exercise Science and Physical Education. (3) F, S, SS
Introduction to the disciplines and professions associated with ESPE, including an overview of historical and philosophical foundations.

EPE 205 Physical Education Activity. (1) F, S, SS
Intermediate levels. Continuation of EPE 105. 3 hours/week. May be repeated for credit.

NOTE: For the General Studies requirement, courses, and codes (such as L, SQ, C, and H), see "General Studies," page 87. For graduation requirements, see "University Graduation Requirements," page 83. For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses," page 60.

EPE 283 Prevention and Care of Athletic Injuries. 3) F
Taping njury recognit on, emergency care and observation proce dures in ath et c tra n ng Prerequisites: B O 201 202

EPE 290 Sports Officiating. (3) F
Rules and mechan cs of officiat ng used in footba l, basketba l, and vol eyba

EPE 292 Sports Officiating. (3) S
Ru es and mechan cs of officiat ng used in softba l (s ow and fast pitch) basebal and track and field.

EPE 300 Foundations of Exercise and Wellness. (3) F
Analys s of research n var ous d scipl nes which contribute to health promotion and we ness *General Stud es L*

EPE 301 Fitness for Living. 1 F, S
App cat on of pr nc p es of phys ca activity to persona fitness test ng and program p anning for peop e of a l ages. Te ecampus course Not open to Exerc se Sc ence and Phys ca Educat on majors or to stu dents who have cred t for EPE 325

EPE 305 Physical Education Activity. (1) F S SS
Advanced leve s Cont nuat on of EPE 205 w th nstructor's approva 3 hours a week. May be repeated

EPE 310 Collegiate Sports. (1 F, S
Part c pation in men's or women s intercol eg ate competit on May be repeated for 4 cred ts 1 per year. "Y E grade

EPE 320 Program Development and Leadership. (3) S
Princ p es of p anning organ z ng promot ng, and ead ng f tness and we lness programs For majors on y

EPE 325 Fitness for Life. (3) F S
Physical f tness and benefits of exercise w th emphas s on se f evalua tion and personal zed program plann ng for a fetime Not open to stu dents w th credit in EPE 301

EPE 334 Functional Anatomy and Kinesiology. (3) S
Muscles, bones jo nts, and nerves and how they produce movement. Emphas's on musc e orig ns nsert ons act ons and nnervations. Lecture lab Prerequ s te B O 201

EPE 335 Biomechanics. (3) F, S SS
Bas c anatom cal and mechan ca pr nc p es appl ed to human move ment. Emphas s is placed on k nemat c and kinet c concepts. Lecture, recitation ab. Prerequ sites BIO 201; MAT 117; PHY 111

EPE 340 Physiology of Exercise. (3) F, S SS
Phys olog ca mechanisms of acute responses and chronic adapta t ons to exerc se Lecture, rec tat on, lab Prerequ s tes BIO 202; CHM 101.

EPE 345 Motor and Developmental Learning. (3 F S, SS
Pr nciples of motor ski acqu s tion across the fe span focus ng on the learner and the learn ng environment. Lecture, rec tation ab Prerequ s tes· BIO 201; PGS 101

EPE 348 Psychological Skills for Optimal Performance. (3) F S SS
App cat on of psychologica techniques and the r use to mprove effectiveness and performance n sport and related areas

EPE 352 Psychosocial Aspects of Physical Activity. (3) F S SS
nterrelat onsh ps between physica act vity and psychosoc a vari ab es nc ud ng soc a ization cu tural va ues aggress on, and mot va t on nc udes the psycho ogical benef ts of physica act v ty and exercise adherence Lecture rec tat on. Prerequisites B O 201; PGS 101

EPE 361 Physical Education in the Secondary School. 3) F, S
Current trends and theories, such as e ect ve programs, coed c asses lega ssues contract teach ng, curriculum and adm n strat on

EPE 370 Advanced First Aid. (3) N
Assessment management treatment of wounds, njuries, shock poi- son ng, burns sudden lness emergency rescue, and card opu mo- nary resusc tation Lecture ab

EPE 376 Physical Education for the Elementary School. (3) F, S
Scope and va ues of phys ca education n the e ementary schoo Methods, materials and pract ce n teach ng activit es for primary, intermed ate, and upper grades

EPE 382 Physical Education for the Atyp cal Student. (3) F, S, SS
Teach ng ndiv dua s with hand capp ng cond t ons phys ca sk ls and activit es Prerequisites BIO 201, 202.

EPE 412 Biomechanics of the Skeletal System. (3) F
Biomechan cs of t ssues, structures, and major joints of the muscu loskeleta system. D scuss on of njury mechan sms. Lecture d scus- s'on some abs Prerequ s te *EPE 335* or instructor approval

EPE 413 Qualitative Analysis in Sport Biomechanics. 3) S
Developing systemat c approach for detect ng and correct ng errors n human performance us ng anatom ca and mechan cal princ ples. Lec ture lab Prerequ s te: EPE 335

EPE 414 Electromyographic Kinesiology. (3) F
Muscu ar contr but ons to human movement, musc e mechanics, elec trophys o og cal basis, and practical appl cat on of electromyography Lecture d scussion Prerequ s tes EPE 335, 340, nstructor approval *General Studies. L*

EPE 420 Exercise Testing. (3 F, S SS
Theoret cal bas s and pract cal appl cat on of screen ng exerc se test ng, est mates of energy expenditure, and interpretation of resu ts Lecture stud o Prerequ s te EPE 340.

EPE 425 Exercise Prescription. 3) S
Theoret ca bases for and app cat on of genera princ p es of exerc se prescript on to various ages fitness leve s, and hea th states Prereq u s te EPE 420.

EPE 440 Exercise Biochemistry. 3) F
Study of b oenergetics and metabo ism of ce lu ar (ske eta musc e, heart and l ver) organel es and prote ns dur ng exercise Prerequisite: EPE 340

EPE 441 Physiology of Women in Sport. (3) S
Physiolog ca aspects of women engaging n physical act vity Factors affect ng performance and hea th throughout fe are emphasized Pre requ s te EPE 340. *General Stud es· L.*

EPE 442 Physical Activity in Health and Disease. (3) F
The ro e of phys ca act v ty and physical fitness 'n the deve opment of morb dity and morta ity throughout the human l fe span Prerequ s tes. B O 201 202 EPE 340 *General Studies L*

EPE 443 Exercise Endocrinology. (3) S
Discuss ons of current research and theory concern ng hormonal *changes during exerc se* Lecture, d scuss on *Prerequ s te·* EPE 340 or nstructor approva *General Stud es L*

EPE 444 Metabolic Adaptations to Exercise Training. (3) F S, SS
Exam nation of phys o og c adaptat ons to exerc se tra n ng as they re ate to metabo sm and t ssue funct ons Prerequ s te EPE 340

EPE 448 Applied Sport Psychology. 3) S
Psychologica theories and techn ques app ed to a sport to enhance the performance and personal growth of ath etes and coaches Lec ture d scuss on Prerequisite EPE 352 or equ va ent *Genera Stud ies. L*

EPE 452 Exercise Psychology. (3) S
Contemporary research and theory as related to human behav or and health in an exerc se sett ng Prerequisite EPE 352

EPE 460 Theory of Strength Training. (3) S
Research and theor es on deve op ng muscu ar strength programs for developing muscu ar strength. Lecture, d scuss'on Prerequisites. EPE 335 340 *General Studies· L.*

EPE 478 Student Teaching in Secondary Schools. 3–12) F S
The practice of teach ng The relat onship of pract ce and theory n teaching Prerequ s te: two comp ete semesters of b ock or equ va ent

EPE 480 Methods of Teaching Physical Education. (3) F, S
Methods of instruction organ zat on, and presentation of appropr ate content n elementary and secondary physica education Concurrent w th student teaching or nstructor approval Prerequ s tes EPE 361 376

EPE 484 Internship. 6) N

EPE 485 Advanced Techniques of Athletic Training. (3) S
An advanced course n ath et c training des gned for students seek ng NATA cert f cat on. Emphas s on therapeut c moda t es and rehab ta t on procedures. Prerequ s tes· EPE 283, 370; CPR certif cation

EPE 500 Research Methods. (3) F
An ntroduct on to the bas c aspects of research nc ud ng prob em se ection iterature review nstrumentat on, data handl ng, methodo ogy and the wr ting of research reports and artic es

EPE 501 Research Statistics. (3) S
Statist cal procedures samp ng techniques; exerc se test ng, exercise prescr pt on, hypothes s testing and experimenta des gns as they re ate to research publ cations

EPE 505 Applied Exercise Physiology Techniques. (3) F
Invest gative techn ques used n the appl ed exerc se physio ogy abo- ratory. Emphas s on pulmonary function, body compos t on, and car- d oresp ratory assessment Lecture, lab. Prerequ s te EPE 340.

EPE 510 Introduction to Biomechanics Research Methods. (3) F
Appl cat on of mechan'cs to human movement ana ys s Inc udes con- s derat on of two-dimens'ona mag ng techn ques force measure- ment e ectromyography, and data process ng methods. Lecture, d scuss on, some labs Prerequ s te EPE 335 or 'nstructor approval.

EPE 520 Sport Psychology. (4) F
Current research in sport psycho ogy. ncludes quest onnaire, psycho phys o og cal, and behav oral research techn ques. Lecture d scus s on. Prerequ s tes: EPE 448, 500

EPE 521 Motor Development, Control, and Learning. (4) S
Theory and research on motor ski acquis tion ncluding learn ng/con tro and deve opment (e , growth ch ldren and exerc se and deve op ment earning). Lecture, d scuss on, some labs Prerequisites: EPE 345, 500, 501

EPE 522 Exercise Psychology. (3) S
Contemporary research and theory as re ated to human behav or and hea th in an exercise sett ng. Lecture d scussion. Prerequisite: EPE 500.

EPE 530 Exercise Physiology. (3) F
mmed ate and ong-term adaptat ons to exercise with special refer ence to tra n ng and the ro e of exercise n cardiovascu ar health Pre requ site: EPE 340

EPE 531 Physiology of Women in Sport. (3) S
Phys o og ca aspects of women engaging n phys cal activity. Factors affect ng performance and hea th throughout ife are emphasized. Pre- requ s te EPE 340

EPE 534 Sports Conditioning. (3) F
Bases of sports condition ng nc ud ng aerob c and anaerobic power strength, flex b l ty and analys s of condition ng components for sports.

EPE 536 Physiology of Physical Activity, Exercise and Chronic Disease. (3) F, S
Ro e of phys o og ca mechanisms assoc ated with acute and ong- term physical exercise and its inf uence on chronic disease and wel - ness

EPE 542 Health Promotions. (3) S
Theory and research concern'ng f tness and we ness programs n nutr tion, phys cal activity, smok ng cessation, and stress manage- ment

EPE 544 Fitness/Wellness Management. (3) F
Development of the f'tness/wel ness industry P anning, organ z ng, promoting, and manag ng fitness/wel ness programs.

EPE 561 Administration of Athletics. (3) N
Manag ng an ath et c program nc ud ng financ ng, budget pol c es, stag ng, and promot on of ath et c contests schedu es trave nsur ance and current ath etic trends

EPE 570 Programs and Special Topics in Adapted Physical Education. (3) F
Contemporary adapted, developmental, remedia , and correct ve phys cal education programs; understand ng of prnc ples, prob ems, and recent deve opments n th s area

EPE 572 Trends and Issues in Physical Education. (3) S
Literature, research and pract ces n contemporary physical educa- t on, including f nances, Tit e IX, teaching and coaching philosoph es school organ zat on, and nonteaching physical education programs.

EPE 573 Curriculum and Instruction in Secondary Physical Education. (3) F
Current curr cu um and nstruct on pract ces and research n second ary schoo physica education Prerequ s te: ESPE major or teach ng experience.

EPE 574 Analysis of Teaching Behavior in Sport and Physical Education. (3) N
Use of systematic d rect observation techniques in analyz ng and evaluating nstruct on in sport and phys cal education Lecture ab

EPE 575 Teaching Lifetime Fitness. (3) S
Organ z ng and mplement ng phys cal f tness programs in the schoo s w th emphas s on nd vidual problem so v ng.

EPE 576 Physical Education for Elementary School Children. (3) F
Current pract ces and research pertain ng to e ementary school physi- cal education programs

EPE 578 Student Teaching in Secondary Schools. (6–12) F, S
The practice of teaching Re ationsh p of theory and practice n teach- ng Prerequ s te comp etion of a l requ red course work or equ valent prior to student teach ng

EPE 599 Thesis. (1 12) N

EPE 610 Advanced Topics in Biomechanics. (3) S
Three-d mens onal mag ng techn ques, data analysis theory, and nte- grat on of b omechan cs research tools nc udes or ginal research project Lecture d scuss on, some labs. Prerequ site. EPE 510 or nstructor approva

EPE 620 Developmental Motor Skill Acquisition. (3) S 2001
Cognit ve motor theories of learning/performance appl ed to ch ldren's motor skill acqu s tion Study of know edge development and research analys s/techn ques Lecture discuss on. Prerequisite: EPE 521.

EPE 621 Motor Learning/Control. (3) F
D scuss on of contemporary research issues n motor learn ng and contro Inc udes behav oral and neurophys o og ca issues Lecture discuss on. Prerequisite: EPE 521

EPE 642 Exercise Epidemiology. (3) S
Physical act v ty, exerc se and physical fitness and the deve opment of chronic disease. Not open to students who have taken EPE 442. Pre requis tes: EPE 340, 500, 501.

HEALTH SCIENCE (HES)

HES 100 Introduction to Health and Wellness. (3) F S, SS
Current concepts of health and wel ness. Cross l sted as EPE 100. Cred t s allowed for only EPE 100 or HES 100.

Students who satisfactorily complete selected HES 494 courses are eligible to qualify for a certificate of accom plishment from the Centers for Disease Control, U.S. Department of Health and Human Services. See "Omnibus Courses," page 60, for information on 494 and other omni bus courses

NOTE: For the General Stud es requ rement, courses, and codes (such as L, SQ, C and H) see "Genera Studies," page 87. For graduation requ rements see "Univers ty Graduation Requirements," page 83. For an exp anation of addit'onal omn bus courses offered but not l sted in th s cata og see "C ass fication of Courses," page 60.

Department of Family Resources and Human Development

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ASSISTANT PROFESSORS
ESTRADA, FROSCH HANISH, MADDEN-DERD CH, UPDEGRAFF

SENIOR LECTURER
WEIGAND

LECTURER
BODMAN

FAMILY RESOURCES AND HUMAN DEVELOPMENT—B.S.

For the B S degree in Family Resources and Human Development at ASU Main, students must pursue the con centration in family studies child development.

Family Studies Child Development

The concentration in family studies child development consists of the following core courses:

CDE	232	Human Development *SB*	3
CDE	430	Infant/Toddler Development in the Family *SB*	3
CDE	498	Pro Seminar	3
		or FAS 498 Pro Seminar 3	
FAS	331	Marriage and Family Re ationships *SB*	3
FAS	361	Introduction to Family Child Research Methods *L*	3
FAS	370	Family Ethnic and Cu tural Diversity *SB C*	3
FAS	431	Parent Adolescent Relationships *SB*	3
FAS	435	Advanced Marriage and Family Relationships *L/SB*	3
FAS	440	Fundamentals of Marriage and Family Therapy	3
FON	100	Introductory Nutrition	3
Total			30

In addition, 15 hours of electives must be taken, with at least nine hours from the following

CDE	337	Early Childhood Intervention	3
CDE	338	Child Development Practicum	2–4
CDE	437	Observational and Natural st c Methods of Studying Children *L/SB*	3
CDE	444	Children and Poverty	3
CDE	498	Pro Seminar	3
		or FAS 498 Pro Seminar (3	
		or FAS 499 Individualized Inst uction 3	
FAS	330	Personal Growth n Human Relationships *SB*	3
FAS	332	Human Sexuality *SB*	3
FAS	390	Supervised Research Experience	1 3
FAS	432	Family Development	3
FAS	436	Conceptual Frameworks in Family Studies	3
FON	450	Nutrition in the Life Cycle	3
FAS	484	Internship	1 3

The remaining courses are selected in consultation with an advisor.

FAMILY RESOURCES AND HUMAN DEVELOPMENT MINOR

The minor in Family Resources and Human Development consists of 18 semester hours in which students specialize in family studies child development.

At least 12 of the 18 hours must be in upper division courses

Students take the following courses:

CDE	232	Human Development *SB*	3
CDE	337	Early Childhood Intervent on	3
FAS	331	Marriage and Family Relationships *SB*	3
FAS	440	Fundamentals of Marriage and Family Therapy	3
Total			12

Two courses or six semester hours) must be selected from the following.

CDE	430	Infant/Toddler Development in the Family *SB*	3
CDE	444	Children and Poverty	3
FAS	370	Family Ethnic and Cultural Diversity *C*	3
FAS	431	Parent Adolescent Relat onships *SB.*	3
FAS	498	Pro Seminar	3

SECONDARY EDUCATION—B.A.E.

Family Resources and Human Development (Home Economics). The major teaching field consists of 42 semester hours in family resources and human development and six hours in interior design Major courses required are as fol lows:

CDE	232	Human Development *SB*	3
CDE	337	Early Childhood Intervention	3
FAS	330	Personal Growth in Human Relationships *SB*	3
FAS	331	Marriage and Family Relationships *SB*	3
FAS	431	Parent Adolescent Relationships *SB*	3
FON	100	Introductory Nutrition	3
FON	142	Applied Food Principles	3
FRD	451	Field Experience	1 12
HEE	461	Presentations in Home Economics	3
HEE	480	Methods of Teaching Home Economics	3–4
HEE	481	Teaching Occupational Home Economics	3
Total			31–43

Also required are two interior design courses.

The College of Education has additional requirements for teacher certification Arizona Teacher Proficiency Exam (professional knowledge only); 35 hours within the Profes sional Teacher Preparation Program; and the following courses:

POS	110	Government and Politics *SB*	3
		or POS 310 American National Government *SB* 3	
POS	311	Arizona Constitution and Government	2
		or POS 417 The Arizona Political System *SB* 3	

Applications to this program are not being accepted at this time

GRADUATE PROGRAMS

The faculty in the Department of Family Resources and Human Development offer programs leading to the M.S. and Ph.D. degrees. See the *Graduate Catalog* for requirements.

CHILD DEVELOPMENT (CDE)

CDE 232 Human Development. (3) F, S
Lifespan development from conception through adulthood with emphasis on family influences. Recognition of individuality within the universal pattern of development. Prerequisites: PGS 101; SOC 101 *General Studies, SB.*

CDE 337 Early Childhood Intervention. (3) F
Explores how child development theory affects practice with children and families; *emphasizing development of young children and early* intervention. Prerequisite: CDE 232 or equivalent.

CDE 338 Child Development Practicum. 2–4) F, S
Supervised practicum in the Child Development Laboratory preparing students for work in child care centers and agencies serving young children and families. Laboratory Pre- or corequisite: CDE 337

CDE 430 Infant/Toddler Development in the Family. (3) F
An examination of the development of infants/toddlers, the socialization processes of families and the interactions of these processes. Prerequisite: CDE 232 or equivalent. *General Studies: SB*

CDE 437 Observational and Naturalistic Methods of Studying Children. 3) N
In depth examination of implementing observational and naturalistic studies of children in a variety of settings. 2 hours lecture, 3 hours lab. Prerequisites: CDE 430 6 hours of psychology *General Studies L/SB.*

CDE 444 Children and Poverty. (3) F
The impact that poverty has on children and their families. 2 hours lecture, 3 hours lab. Prerequisites: CDE 232 (or equivalent 6 hours of upper division social science credits

CDE 498 Pro-Seminar. 3 N

CDE 499 Individualized Instruction. (3 N

CDE 531 Theoretical Issues in Child Development. (3 S
Major developmental theories related research, and their application to family interaction. Prerequisites: CDE 430 and 437 (or equivalent or instructor approval.

CDE 533 Research Issues in Child Development. (3) S
An in depth exploration and critique of research focusing on child development in a family setting. Prerequisites: CDE 531 FAS 500

CDE 534 Applied Child Development. (3) S
Integration of research and theory on child development, risk and resilience to understand developmental problems and provide a foundation for intervention strategies. Prerequisites: CDE 531 FAS 500.

CDE 634 Advanced Applied Child Development. (3 S
Advanced training in research and theory based approaches to developing and evaluating prevention programs for children at risk. Prerequisite: CDE 534 or instructor approval

FAMILY STUDIES (FAS)

FAS 301 Introduction to Parenting. 3) F, S
Integrated approach to understanding parenting and parent child interactions. Tenets on course. Prerequisites: PGS 101; SOC 101 (or equivalent

FAS 330 Personal Growth in Human Relationships. (3) F, S
Personal development and behavior as related to competency in interpersonal relationships with in the family. Processes of family interaction. Prerequisites PGS 101 SOC 101 (or equivalent) *General Studies: SB*

FAS 331 Marriage and Family Relationships. (3) F, S
Issues challenges, and opportunities relating to present day marriage and family living. Factors influencing interrelationships within the family. Prerequisite course in psychology or sociology *General Studies. SB*

FAS 332 Human Sexuality. 3 F S
Relationship of sexuality to family life and to major social issues. Emphasis on developing healthy positive, and responsive ways of integrating sexual and other aspects of human living. Prerequisite PGS 101. *General Studies SB*

FAS 361 Introduction to Family Child Research Methods. (3) S
Examines basic methods applied to family child research critiques current research literature and applies methods in current topics. Prerequisites CDE 232 FAS 331 *General Studies L*

FAS 370 Family Ethnic and Cultural Diversity. (3) S
An integrative approach to understanding historical and current issues related to the structure and internal dynamics of diverse American families. Prerequisite PGS 101 or SOC 101 *General Studies. SB, C*

FAS 390 Supervised Research Experience. (1 3) F, S SS
Practical firsthand experience with current faculty research projects in family studies or child development. "Y grade only" may be repeated for total of 6 hours. Prerequisites FAS 361 3.00 GPA in major, approval of supervising faculty member before registration.

FAS 431 Parent-Adolescent Relationships. 3) F
Dynamics of the relationships between parents and adolescents. Developmental characteristics of adolescence and the corresponding adult stage. Prerequisites CDE 232 FAS 331. *General Studies SB*

FAS 432 Family Development. (3) N
Normative changes in families over time from formation until dissolution. Emphasis on the marital subsystem in middle and later years. Prerequisites CDE 232 and FAS 331 *or* instructor approval

FAS 435 Advanced Marriage and Family Relationships. (3) F
Recent research issues and trends relating to marriage and family interaction influence of family composition physical environment family patterns and values on family dynamics. Prerequisites FAS 331, 361 *General Studies. L/SB*

FAS 436 Conceptual Frameworks in Family Studies. (3) S
Approaches to study families focusing on systems interactional exchange, conflict and developmental frameworks. Application to diverse individual and family situations. Prerequisites CDE 232; FAS 331, 361

FAS 440 Fundamentals of Marriage and Family Therapy. 3) S
Introduction to the fundamental orientations of marriage and family therapy

FAS 457 Third-World Women. (3) F
Economic sociopolitical and demographic context for understanding the roles of third world women in health family work education and community. Prerequisite: 6 hours of social science credit or instructor approval

FAS 484 Internship. (1 3) N

FAS 498 Pro-Seminar. (3 N

FAS 499 Individualized Instruction. 3) N

FAS 500 Research Methods. (4) F
Purposes of research Experimental design methods of data collection and thesis proposal development Includes practical application research laboratory 3 hours lecture, 3 hours lab

FAS 530 Introduction to Marriage and Family Therapy. 3) F
Introduction of major marriage and family therapy orientations Review history theory application and outcome research for each orientation. Prerequisite admission to graduate program in FRHD with a concentration in family studies or instructor approval

FAS 531 Family Theory Development. (3 S
Historical and current approaches to theory development evaluation and application in family studies. Prerequisite FAS 435 or instructor approval

FAS 536 Dysfunctional Marriage and Family Relationships. (3) N
A critical review of current theory and empirical evidence connecting marital and family interaction patterns with aberrant behavior. Prerequisite PGS 466 or PSY 573 (or equivalent or instructor approval

FAS 537 Interpersonal Relationships. 3 F
Critical examination of current theoretical and research developments in the area of interpersonal relationships. Applications for research and intervention emphasized. Prerequisite FAS 435 (or equivalent) or instructor approval

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NOTE: For the General Studies requirement courses and codes (such as L, SQ, C and H) see "General Studies, page 87 For graduation requirements, see "University Graduation Requirements' page 83 For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses page 60.

FAS 538 Advanced Techniques in Marriage and Family Therapy. (3) N
An n depth rev ew of assumpt ons and advanced techn ques associated w th contemporary marriage and fami y therapy approaches. Pre requ s te a graduate- evel course n marnage and fam y therapy or nstructor approva

FAS 539 Research Issues in Family Interaction. (3) F
Critica review of current and past research in the area of fam ly dynamics. Emphasizes nteractional processes with'n the fam ly Prerequ site FAS 435 (or equ valent) or nstructor approva

FAS 540 Assessment in Marriage and Family Therapy. (3) S
Instruction in the assessment and outcome eva uation of couples and fami es nvo ved n marital and fam y therapy. Lecture, lab Prerequisites FAS 500 (or equ va ent), PSY 530; nstructor approva

FAS 580 Marriage and Family Therapy Practicum. (3) F S
Supervised cl nical experience n marnage and fam ly therapy; ncludes development of assessment and outcome evaluat on ski ls Lecture ab
(a) First semester 3)
(b) Second semester (3)
(c) Th rd semester (3)
Prerequ s te nstructor approva

FAMILY RESOURCES AND HUMAN DEVELOPMENT (FRD)

FRD 451 Field Experience. (1 12) N
Supervised field placement in the area of student's concentration with a commun'ty business or agency. Students must make arrangements w th instructor 1 semester n advance of enro ment. Prerequisites comp etion of 60 hours; instructor approva

HOME ECONOMICS EDUCATION (HEE)

HEE 461 Presentations in Home Economics. (3) F
Presentation and demonstration techn ques n teach ng home eco nom cs Deve opment of aud ov'sua materials for home economics content areas Prerequisites: junior stand ng instructor approval.

HEE 480 Methods of Teaching Home Economics. (3–4) F
nstruct on, organ zat on, presentation and evaluation of subject matter in home economics HEE students reg ster for 4 semester hours Dietet c students reg ster for 3 semester hours.

HEE 481 Teaching Occupational Home Economics. 3) S
Career orientation related to home econom cs cooperative work-related nstruction, programs and youth c ub advisement associated with secondary home econom cs programs May include f e d trips Prerequisite Fami y Resources and Human Deve opment major or minor.

Department of Geography

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REGENTS' PROFESSOR
GRAF

PROFESSORS
ARREOLA, BALL NG, BRAZEL, BURNS, COMEAUX, DORN, GOBER, Ó hUALLACHÁIN PASQUALETT

ASSOCIATE PROFESSORS
ALDRICH CERVENY, FALL, KUBY, McHUGH

ASSISTANT PROFESSORS
ELLIS, SIERRA MALDONADO, WENTZ

LECTURER
HUMBECK

Geography is a discipline that brings together the physi cal and human dimensions of the world in the study of places, people, and environments. The mission of the Department of Geography is the creation, dissemination, and application of geographic knowledge and scholarship in a liberal arts and sciences tradition

Undergraduate students may choose to pursue a B A degree in Geography, B S degree in Geography, B A.E. degree in Secondary Education, or minor in Geography. A grade of "C" or higher is necessary in all required Depart ment of Geography courses. Both B A and B.S. degrees in Geography consist of 45 semester hours. A minor consists of 18 semester hours.

GEOGRAPHY—B.A.

A student choosing a B.A. degree in Geography may be interested in a liberal arts and sciences focus on the breadth of the field. A B.A. degree may also focus on a geographic region. In either case, the student crafts an individualized program of study in consultation with an advisor.

The 45–47 hours for a B.A. degree consist of classes in core geographic knowledge (9 11 semester hours), geo graphic skills (12 hours), a regional course (three hours), and electives (12 hours), for a minimum of 36 hours in geography At least 18 hours in geography must be in upper division courses. The remaining nine hours are made up of electives from geography classes or related fields of study, chosen in consultation with an advisor

Core Geographic Skills

GCU 495 Quantitative Methods in Geography *CS*	3
GCU 496 Geographic Research Methods *L*	3
GPH 371 Cartography *CS*	3
GPH 491 Geographic Field Methods	3
Choose one spatial analysis course GCU or GPH 300 or above) in consultation with an advisor	3
Total	15

Geographic Region
Choose one of the courses below, in consultation with an advisor... 3
- GCU 322 Geography of U S and Canada *SB, C* (3)
- GCU 323 Geography of Latin America *SB G* 3
- GCU 325 Geography of Europe *SB, G* (3)
- GCU 326 Geography of Asia *SB, G* 3
- GCU 327 Geography of Africa *SB, G* 3
- GCU 328 Geography of M ddle East and North Africa *SB, G* (3)
- GCU 332 Geography of Australia and Oceania *SB G* (3)
- GCU 344 Geography of Hispanic Americans *SB C* (3)
- GCU 421 Geography of Arizona and Southwestern United States *SB C* (3)
- GCU 423 Geography of South America *SB G* (3
- GCU 424 Geography of Mexico and M ddle America *SB G* (3)
- GCU 425 Geography of the Mexican American Borderland *L/SB, G* (3)
- GCU 426 Geography of Russia and Surroundings *SB, G* 3)
- GCU 433 Geography of Southeast Asia (3)
- GPH 433 Alpine and Arctic Environments *G* 3)

A student can design, in consultation with an advisor, a general B.A. degree in Geography In addition, there are three cooperative programs whereby a student receives a B.A. degree in Geography and an emphasis in Asian Stud ies, Southeast Asian Studies, or Latin American Studies.

Asian and Southeast Asian Emphasis. Students majoring in Geography may elect to pursue an Asian or Southeast Asian emphasis combining courses from the major with selected courses of wholly Asian or Southeast Asian con tent. The Asian program requires 30 semester hours of Asian content courses, selected from the list drawn up by the Center for Asian Studies. Also required is knowledge of an Asian language; this is deemed to be fulfilled by 20 semester hours or equivalent in Chinese, Indonesian, Japa nese, Thai, or Vietnamese The Certificate in Southeast Asian Studies is awarded to Geography students who emphasize regional studies specialization in Geography and one year of Indonesian, Thai, or Vietnamese. For more information, see "Asian Studies," page 340, and "Southeast Asian Studies," page 341.

Latin American Studies Emphasis. Students majoring in Geography may elect to pursue a Latin American studies concentration combining courses from the major with selected outside courses of wholly Latin American content At least 30 upper division semester hours of the program must be in Latin American content courses, including 15 hours in geography (or in courses approved by the Department of Geography advisor) and 15 in other disciplines. A reading knowledge of Spanish or Portuguese is required and a reading knowledge of the other language is suggested. The program must be approved by the Latin American Studies Center. See "Latin American Studies," page 340, for more information.

GEOGRAPHY—B.S.

The 45–47 hours for a B S. degree consist of classes in core geographic knowledge (9 11 semester hours), core geographic skills (15 hours), and electives (12 hours) for a minimum of 36 hours in geography. At least 18 hours in geography must be in upper division courses. The remaining 9 12 hours are to be made up of electives from geogra phy classes or related fields of study, chosen in consultation with an advisor.

Core Geographic Skills
- GCU 495 Quantitative Methods in Geography *CS* ... 3
- GCU 496 Geographic Research Methods *L*... 3
- GPH 371 Cartography *CS* ... 3
- GPH 491 Geographic Field Methods... 3
- Choose one spatial analysis course GCU or GPH 300 or above in consultation with an advisor... 3

Total ... 15

Technique Class
Choose one of the courses below, in consultation with an advisor ... 3
- GPH 372 Air Photo Interpretation (3)
- GPH 373 Geographic Information Science 3)
- GPH 471 Cartographic Design (3)

Students seeking the B.S. degree take the required core of eight courses The remaining four courses (12 hours) of geography electives and 9 12 hours of geography or related fields of study vary among the options available for a B.S degree in Geography. There are two specific departmental concentrations: meteorology climatology and urban studies. In addition, a student can design, in consultation with an advisor, an individualized B.S degree emphasizing other areas within the major.

Meteorology-Climatology Concentration. See an under graduate advisor in the Department of Geography for the latest National Weather Service certification requirements. The required courses for the meteorology climatology concentration include a minimum of 39 semester hours in geography plus eight hours of related mathematics:

Core Courses
- GCU 102 Introduction to Human Geography *SB* 3
- GCU 121 World Geography *SB, G* ... 4
- GCU 495 Quantitative Methods in Geography *CS* ... 3
- GCU 496 Geographic Research Methods *L*... 3
- GPH 111 Introduction to Physical Geography *SQ* ... 4
  or GPH 411 Physical Geography (3
- GPH 371 Cartography *CS*... 3
- GPH 373 Geographic Information Science *CS* 3
  or another three hour techniques course if GPH 373 is taken to meet a core requirement
- GPH 491 Geographic Field Methods... 3
- Choose one spatial analysis course GCU or GPH 300 or above) in consultation with an advisor ... 3

Total ... 28 29

Required Meteorology Courses
- GPH 213 Introduction to Meteorology II ... 3
- GPH 215 Introduction to Meteorology Laboratory II. ... 1
- GPH 409 Synoptic Meteorology I ... 4
- GPH 410 Synoptic Meteorology II... 4

NOTE: For the General Studies requ rement, courses and codes (such as L SQ C and H), see "General Stud es" page 87 For graduation requ rements, see "Univers ty Graduation Requ rements," page 83 For an exp anat on of add tional omn bus courses offered but not l sted n th s cata og see "Class f cat on of Courses" page 60

GPH 412 Physical Climatology 3
or GPH 413 Meteorological Instruments and Measurement 3)
or GPH 414 Climate Change *G* 3)

Total 15

Mathematics and Physics-Related Courses

MAT 270 Calculus with Analytic Geometry I *MA* 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
PHY 121 University Physics I Mechanics *SQ*[2] 3
PHY 122 University Physics Laboratory I *SQ* 1
PHY 131 University Physics II Electricity and Magnetism *SQ*[3] 3
PHY 132 University Physics Laboratory II *SQ* 1

Total 20

Three semester hours in transfer courses can also fulfill this requirement.

[2] Both PHY 121 and 122 must be taken to secure SQ credit

[3] Both PHY 131 and 132 must be taken to secure SQ credit

Urban Studies Concentration. The required courses for the urban studies concentration are as follows:

Core Courses

GCU 102 Introduction to Human Geography *SB* . 3
GCU 121 World Geography *SB G** 4
GCU 495 Quantitative Methods in Geography *CS* 3
GCU 496 Geographic Research Methods *L* 3
GPH 111 Introduction to Physical Geography *SQ* 4
or GPH 411 Physical Geography 3)
GPH 371 Cartography *CS* 3
GPH 373 Geographic Information Science 3
or another three hour techniques course if GPH 373 is taken to meet a core requirement
GPH 491 Geographic Field Methods 3
Choose one spatial analysis course (GCU or GPH 300 or above) in consultation with an advisor 3

Total 28 29

Required Urban Geography

Choose one of the courses below 3
GCU 351 Population Geography *SB, G* (3)
GCU 357 Social Geography *SB* (3)
GCU 364 Energy in the Global Arena *SB G* (3
GCU 441 Economic Geography *SB* (3
GCU 442 Geographical Analysis of Transportation *SB* (3
One upper division or graduate level GCU course chosen in consultation with an advisor (3)
Choose two of the courses below 6
GCU 359 Cities of the World I *SB, G, H* 3
GCU 360 Cities of the World II *SB G* (3
GCU 444 Geographic Studies in Urban Transportation *SB* 3)
GCU 494 ST. Geography of Phoenix (3)
GCU 361 Urban Geography *SB* 3
GCU 484 Internship 3
or one upper division elective course outside the department in a related field of study chosen in consultation with an advisor 3

Urban geography total 15

* Three semester hours in transfer courses can also fulfill this requirement.

SECONDARY EDUCATION—B.A.E.

The Department of Geography, in conjunction with the College of Education, offers courses toward a Bachelor of Arts in Education degree The B A E degree consists of 45 semester hours, of which a minimum of 30 must be in geography and 15 in a related teaching field or fields. The following courses are required:

GCU 102 Introduction to Human Geography *SB* 3
GCU 121 World Geography *SB G** 4
GPH 111 Introduction to Physical Geography *SQ* . 4
or GPH 411 Physical Geography 3

Total 10–11

* Three semester hours in transfer courses can also fulfill this requirement

In conjunction with an advisor, students choose remaining credits from three groups of human, physical, and regional courses.

MINOR IN GEOGRAPHY

A minor in Geography is awarded to students who complete a minimum of 18 hours in geography. A letter grade of "C" or higher is required for all courses taken for the minor.

The following lower division courses are required

GCU 102 Introduction to Human Geography *SB* 3
GPH 111 Introduction to Physical Geography *SQ* 4
or GPH 411 Physical Geography 3

Total 6–7

The remaining courses are selected in conjunction with an advisor At least one course should be a geographic skill, for example, map reading (GPH 271), cartography (GPH 371), air photo interpretation GPH 372), geographic field methods (GPH 491), or a class in geographic information science (GPH 373). At least four courses should be upper division classes in human, physical, or regional geography.

CULTURAL GEOGRAPHY (GCU)

GCU 102 Introduction to Human Geography. (3) F S
Systematic study of human use of the earth Spatial organization of economic, social, political and perceptual environments. *General Studies· SB*

GCU 121 World Geography. 4) F, S
Description and analysis of area variations in social economic and political phenomena in major world regions *General Studies· SB, G*

GCU 141 Introduction to Economic Geography. (3) F
Production distribution and consumption of various types of commodities of the world and relationships to the activities of humans. *General Studies SB G*

GCU 200 Orientation to Geography. (1 F
Basic introduction to the Department of Geography faculty undergraduate graduation requirements, and possible jobs and skills in geography Cross listed as GPH 200. Credit is allowed for only GCU 200 or GPH 200

GCU 240 Introduction to Southeast Asia. (3 F
An interdisciplinary introduction to the cultures, regions, political systems, geography and history of Southeast Asia Cross listed as ASB 240/HIS 240 POS 240 REL 240 Credit is allowed for only ASB 240 or GCU 240 or H S 240 or POS 240 or REL 240 *General Studies· G.*

GCU 253 Introduction to Cultural and Historical Geography. (3) N
Cultural patterns including such phenomena as language, religion and various aspects of material culture Origins and diffusion and diversion of the world into cultural areas *General Studies· SB G*

GCU 294 Special Topics. 4) A
Topics include global awareness

GCU 322 Geography of U.S. and Canada. 3) F
Spat al d str but on of re evant phys cal, econom c and cu tura phe nomena n the United States and Canada *General Stud es SB C*

GCU 323 Geography of Latin America. (3) F
Spatial d stribution of re evant phys cal econom c, and cu tura phe nomena n South, M dd e and Car bbean America *General Stud es SB G*

GCU 325 Geography of Europe. (3 A
Broad and systematic overv ew of Europe emphas z ng phys ca eco nom c and cu tura phenomena. *General Studies. SB G*

GCU 326 Geography of Asia. 3) F
Spatial d stribution of re evant phys ca econom c, and cu tura phe nomena n Asia, exclud ng the former Sov et Un on. *General Studies: SB G*

GCU 327 Geography of Africa. (3 N
Spat a distribution of re evant phys ca , econom c, and cu tura phe nomena in Afr ca *General Studies· SB, G.*

GCU 328 Geography of Middle East and North Africa. (3) N
Spat a d'stribut on of re evant phys ca econom c and cultura phe nomena n the M dd e East and North Afr ca Prerequ'site: GCU 121 or 'nstructor approva *Genera Stud es SB, G.*

GCU 332 Geography of Australia and Oceania. 3) A
Spat a d'str but on of re evant phys ca econom c and cu tura phe-nomena in Austral a New Zealand and Pac f c Is ands *General Stud 'es. SB G*

GCU 344 Geography of Hispanic Americans. (3 S
Examines the home ands m grations settlements andscapes ro es, and se ected cu tura trad t ons of Hispan c Americans *General Stud·ies SB C*

GCU 350 The Geography of World Crises. (3) F S
Contemporary world crises v ewed from a perspective of geograph c concepts and techn ques. *General Studies· SB, G*

GCU 351 Population Geography. (3) F
Demograph c patterns spat a tempora and structural nvest gat on of the re at onsh p of demograph c var ab es to cultura econom c and env ronmental factors. *General Stud es· SB G*

GCU 352 Political Geography. (3) N
Relat onsh p between the soc ophys ca environment and the state. *General Stud es SB, G*

GCU 357 Social Geography. 3 A
Env ronmental perception of ndividua s and groups The spat a aspect of soc a and phys ca environments is stressed. *General Stud ies: SB*

GCU 359 Cities of the World I. (3) F
H stor ca evo ution of urban patterns and structures in the Middle East, Ind a, Southeast As a China, Japan and Europe *Genera Stud ies. SB G H*

GCU 360 Cities of the World II. (3) N
H stor ca evo ut on of urban patterns and structures n Lat n Amer ca North America, Sub-Saharan Africa and Austra asia. *General Stud es: SB, G*

GCU 361 Urban Geography. (3 F, S
Externa spat a relat ons of cit es nterna c ty structure, and spat'al aspects of urban prob ems n var ous parts of the wor d part cu ar y n the United States *General Stud es SB*

GCU 364 Energy in the Global Arena. (3) S
Product on transportat on, and consumpt on of energy emphas z ng the electric p wer ndustry and ts env ronmenta prob ems *Genera Stud es SB, G.*

GCU 394 Special Topics. (1–4 F S

GCU 421 Geography of Arizona and Southwestern United States. (3) F S
Geography of the Southwest w th an emphas s on Ar zona D v ded nto physica geography h story people and economy *Genera Stud ies SB, C*

GCU 423 Geography of South America. 3) S
Prerequisite: GCU 323 or nstructor approva *General Stud es SB, G*

GCU 424 Geography of Mexico and Middle America. (3) A
Central Amer ca and Mexico. Prerequ s te GCU 323 or instructor approva . *General Stud es SB G.*

GCU 425 Geography of the Mexican American Borderland. (3) S
Geography of a binat ona and b cu tural region Exam nat on of sett e ment boundary issues ethn c subreg ons popu ation change ndus trial development and urban growth *General Studies· L/SB, G*

GCU 426 Geography of Russia and Surroundings. (3) N
Exam nes the geography of Russ a and other post-Sov et states Pre-requ s te: GCU 121 or nstructor approva *General Studies SB G*

GCU 433 Geography of Southeast Asia. (3) S
Exam nes the b'ophys ca and soc a features of Southeast As an nat ons and peoples Prerequ s te GCU 326 or instructor approva

GCU 441 Economic Geography. 3) A
Spat a d str but on of pr mary, secondary and tertiary econom c and product on act vit es Prerequ s te GCU 141 or nstructor approva *General Studies. SB*

GCU 442 Geographical Analysis of Transportation. (3) S
Networks modes econom cs and f ows at the urban nat onal and nternat onal scales Prerequ s te GCU 141 or 441 *General Studies SB*

GCU 444 Geographic Studies in Urban Transportation. 3) S
Current urban transportat on ssues n metropo itan Phoen x Lecture team project Prerequ s te: GCU 361. *General Studies SB.*

GCU 453 Recreational Geography. (3) N
Exam nation of prob ems surround ng the organ'zat on and use of space for recreat on ntroduc ng geograph c f e d survey methods of data co lect on and ana ys s. Saturday f e d trips may be requ red

GCU 455 Historical Geography of U.S. and Canada. (3) N
Geographical perspect ve on the evo ution of the Un ted States and Canada from pre-Co umb an t mes to ear y 20th Century *General Stud es SB, H*

GCU 474 Public Land Policy. (3) F
Geographic aspects of federa pub c ands pol cy, management and issues Emphasis on western w derness and resource deve opment prob ems *General Stud es. SB*

GCU 484 Internship. 3 N

GCU 494 Special Topics. (3 N
a) Geography of Phoen x

GCU 495 Quantitative Methods in Geography. (3) F S
Stat stical techn ques app ied to the ana ys s of spat a distr butions and re at onsh ps Introduct on to models and theory n geography Prerequ s te MAT 119 *General Stud es CS*

GCU 496 Geographic Research Methods. (3) F S
Sc entific techniques used n geograph c research Prerequ s tes· GCU 495, GPH 371, 491 *General Studies L*

GCU 515 Human Migration. 3 F
Econom c, po t ca socia , and geographic factors under y ng popula-t on movements M grat on se ectivity streams and counter streams abor migrat on, and m grat on dec s on making Lecture, sem nar Pre requ s te GCU 351 or 'nstructor approval

GCU 526 Spatial Land-Use Analysis. (3) N
Determ nation class f cat on and analysis of spat a var ations n land-use patterns Exam nat on of the processes affect ng land use change Prerequ s te 15 hours of geography or nstructor approva

GCU 529 Contemporary Geographic Thought. (3) F
Comparat ve eva uation of current ph osophy concern ng the nature and trends of geography Prerequ sites 15 hours of geography nstructor approva

GCU 585 Advanced Research Methods in Geography. (3) S
Spec al zed research techn ques and methodologies n econom c pol t cal, or cu tural geography

GCU 591 Seminar. 1 3) F S SS
Se ected topics n econom c po t ca or cu tural geography F eld trips may be requ red

GCU 596 History of Geographic Thought. (3 F
H stor ca deve opment of geograph c thought from pre-Greek days to the ear y 20th century

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NOTE: For the Genera Stud es requ rement courses and codes su h as L SQ C, and H) see "Genera Studies page 87 For graduat on requirements, see 'Un vers ty Graduat on Requ rements page 83 For an explanat on of add t ona omn bus courses offered but not sted in th s cata og see C assif cat on of Courses page 60

GCU 599 Thesis. (6) N

PHYSICAL GEOGRAPHY (GPH)

GPH 111 Introduction to Physical Geography. (4) F S
Spat a and funct onal relat onsh ps among c mates, andforms, so ls water and p ants 3 hours lecture 3 hours ab Field tr ps are requ red *General Studies· SQ*

GPH 200 Orientation to Geography. (1) F
Basic introduct on to the Department of Geography facu ty undergrad uate graduation requ rements, and possib e jobs and sk s n geography Cross-l sted as GCU 200 Cred t s a lowed for on y GCU 200 or GPH 200.

GPH 210 Society and Environment. (3) F
Exam nes the nteraction between social processes, key env ronmen tal ssues and nature s ro e as a resource at g obal and reg ona scales *General Studies G*

GPH 211 Landform Processes. (3) S
Geograph c character st cs of landforms and earth surface processes emphas z ng eros on, transportat on depos t on, and mpl cat ons for human management of the env ronment Prerequisite GPH 111 *General Studies L*

GPH 212 Introduction to Meteorology I. 3) F
Fundamenta s of weather and c mate 'nc ud ng basic atmospher c processes and elements Students whose curr cu a require a abora tory course must a so register for GPH 214. Prerequ s te GPH 111 or instructor approva *General Stud es. SG (if cred t also earned in GPH 214)*

GPH 213 Introduction to Meteorology II. (3) S
Fundamentals of meteorolog cal/cl matological analys s, including ter m no ogy and symbo ogy Recommended for meteoro ogy c imato ogy program students Prerequ site GPH 212 or instructor approva

GPH 214 Introduction to Meteorology Laboratory I. (1) F
Introduct on to bas c meteorological/cl matological data and measure ments. 3 hours ab. Suggested concurrent enrol ment n GPH 212 *General Studies. SG (if cred t also earned in GPH 212)*

GPH 215 Introduction to Meteorology Laboratory II. (1) S
Fundamentals of Meteorological/cl matological map analys s and nterpretation Recommended for meteorology c imato ogy program students. May be taken concurrently w th GPH 213. Prerequ s te· GPH 214 or nstructor approval.

GPH 271 Maps and Map Reading. (3) A
Map types, uses im tat ons and evo ut on Commun cation v a paper and digita med um. Nav'gation nterpretat on, project ons sources symbo s, c assification case, hand ng.

GPH 314 Global Change. (3) F
Response of Earth s natura systems (atmosphere hydrosphere tho sphere, biosphere) to past env ronmental change and effects of potent a future changes *General Stud es· G*

GPH 371 Cartography. (3) F S
Ph losophy and practica aspects of map product on commun cat ons symbo sm, data man pu ation presentat on, dec s on mak ng, gener- a ization nework, letter ng d gita med a employed Prerequ s te GPH 111. *General Studies· CS*

GPH 372 Air Photo Interpretation. (3) S
Subset remote sens ng nc udes photography fi ms, aer al geometry, image components stereoscopy photogrammetry, ground truth'ng nterpret phys ca cu tura econom c, nte l gence nformat'on Prereq uisite: GPH 211 or any Cu tura Geography (GCU) course or nstructor approva

GPH 373 Geographic Information Science I. 3) F
H story and basic aspects of GIS ncluding map and data f e structure convers ons and synthesis w th a computer zed env ronment Prereq- u s te GPH 394 ST Geograph'c Informat on Technolog es. *General Stud es. CS*

GPH 381 Geography of Natural Resources. 3) A
Nature and d stribution of natural resources and the prob ems and princ p es assoc ated with the r use *General Studies· G*

GPH 394 Special Topics. (3) F, S
(a) Geograph c nformation Science
(b) Geograph c nformation Techno og es

GPH 401 Topics in Physical Geography. (1 3) A
Open to students qua f ed to pursue independent stud es F e d trips may be required. Prerequis te nstructor approva

GPH 405 Energy and Environment. (3 S
Sources, regulatory and techn ca contro s, d str but on and consequences of the supp y and human use of energy. Prerequisite· courses n the phys cal r fe sc ences or nstructor approva

GPH 409 Synoptic Meteorology I. 4 F 2001
D agnostic techniques and synopt c forecasting Inc udes techn ques of weather ana ys s, map nterpretat on, and sate te and radar analy s s Prerequ s tes MAT 270, PHY 131 132

GPH 410 Synoptic Meteorology II. 4 S
D agnost c techn ques and synoptic forecast ng nc udes techniques of weather analys s map nterpretat on, and sate te and radar analy s s Prerequis te. GPH 409

GPH 411 Physical Geography. (3) A
Introduct on to phys ography and the phys ca e ements of the env ron ment Open on y to students who have not taken GPH 111 Field tr ps

GPH 412 Physical Climatology. (3) A
Phys cal processes n the earth-atmosphere system on reg onal and g obal sca es, concepts and ana ys s of energy momentum and mass balances. Prerequisites GPH 212 and 213 *or* nstructor approva

GPH 413 Meteorological Instruments and Measurement. 3 A
Des gn and operat on of ground base and aero og cal weather measurement systems Co ection reduct on storage retrieva and analy s s of data. F'eld tr ps are requ red. Prerequ s tes GPH 212 and 213 *or* nstructor approva

GPH 414 Climate Change. 3 S
Survey of three c mate research areas pa eoc matology theor es (e g greenhouse warm ng numer ca mode ng. Prerequ s te GPH 212 or nstructor approva *Genera Stud es· G.*

GPH 418 Landforms of the Western United States. 3 A
Study landforms and geomorph c processes n the western Un ted States nc ud ng ecture topograph ca maps, aer a photographs sat- e l te imagery and field tr ps Lecture, cr t ca inqu ry aboratory, f e d work Prerequ s tes GPH 211 or equ valent comp et on of L c ass *General Stud es L*

GPH 422 Plant Geography. 3 N
P ant communit es of the wor d and the r nterpretat on emphas z ng North Amer can plant assoc at ons. Cross sted as PLB 422 Cred t s a lowed for on y GPH 422 or PLB 422 Prerequ s te B O 182 or GPH 111.

GPH 433 Alpine and Arctic Environments. 3) N
Reg ona study of advantages and im tat ons of the natura env ron ment upon present and future prob ems nvo ving resource d str bu- t on, human activ t es and reg ona and interregiona adjustments F eld tr ps are requ red Prerequ s te GPH 111 or instructor approva . *General Stud es G*

GPH 471 Cartographic Design. 3 F
Advanced des gn us ng desktop mapp ng Cartograph c dec s on mak ing qual tat ve and quant tat ve symbo des gn, pro ect ons co or Pre requisites GPH 371 or instructor approval. *General Stud es CS*

GPH 473 Geographic Information Science II. 3) F
G S as a bas s for m crocomputer spat al analys s and synthes s ncludes d g t z ng, database organ zation spat a retr eva and graph ics Prerequ s te GPH 373 *General Stud es· CS*

GPH 474 Dynamic Meteorology I. 3 F
Large sca e atmospheric mot'on k nemat cs Newton s aws wind equat on baroc n cs vort c ty, and the m d at tude depress on Prereq u's tes. GPH 213 215 MAT 271· PHY 131 132

GPH 475 Dynamic Meteorology II. (3) S
Top cs n c mate dynam cs General c rcu at on, numer cal mode ng te econnect on phenomena and surface atmosphere nteract n Pre requisite: GPH 474 or nstructor approva

GPH 481 Environmental Geography. 3 A
Prob ems of env ronmenta qua ty inclu ng uses of spatial ana ysis research des gn, and f e d work n urban and rura systems. F e d tr ps are requ red Prerequ site: instructor approva

GPH 484 Geography Internship. (3) F S
Ass st n teach ng s xth grade students a s'mpl f ed vers on of GPH 111 us ng hands-on act v ties

GPH 491 Geographic Field Methods. 3 SS
Field techn ques nc uding use of aer a photos arge sca e maps and fract ona code system of mapp ng urban and rura f e d ana ys s to be done off campus. Trave fees requ red Prerequ s tes GCU 102 121, GPH 111.

GPH 511 Fluvial Processes. (3) A
Geograph ca aspects of processes of river eros on, transportat on, sed mentat on: emphas z ng spatial character st cs of f rces, res s- tance andforms sediment nc udes computer app cations Prerequi- sites: GPH 111 (or GLG 101 and 211 (or GLG 362) *or* nstructor approval.

GPH 533 Snow and Ice. 3) S
Processes d strbut on c mat c nteract ons of snow ce emphas z ng mass ba ance snow strat graphy metamorph sm and g ac er snow pack cl matology Lecture f e d work Prerequis te nstructor approva

GPH 573 Computer Mapping and Graphics. (3) A
Ut l zat on of the digita computer n analys s and mapp ng of geo- graph c data Inc udes p ott ng, surf c a d sp ay compos t ng and graph cs F e d tr ps Prerequ sites. GPH 371; instructor approval

GPH 575 Geographic Applications of Remote Sensing. 3 N
Use of mag'ng and non mag ng methods of remote acquisit'on of data nc ud ng sate l te sensors a rborne radar mu t'band scann ng conventional photographic sensors and ground-based equ pment F e d tr ps are requ red Prerequ s tes GCU 585 (or GPH 491) GPH 372

GPH 591 Seminar. 1 3) F, S
Se ected top'cs in phys cal geography F e d tr ps may be required.

GPH 596 Advanced Spatial Statistics. (3 S
Mu tivar ate and advanced stat'st ca techn ques nc ud ng Box Jen kins mode ng and spectra ana ys's Project papers and presentat ons requ red Sem nar Prerequ s te GCU 495 or equ va ent

GPH 599 Thesis. (6 N

Department of Geology

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REGENTS' PROFESSORS
BUSECK, GREELEY MOORE

PROFESSORS
BURT CHRISTENSEN FARMER, FINK, HOLLOWAY, KNAUTH, LARIMER, PEACOCK, REYNOLDS, STUMP TYBURCZY, W LL AMS

ASSISTANT PROFESSORS
ARROWSMITH, GARNERO, LESHIN, O'DAY, SHARP TANG

GEOLOGY—B.S.

The B.S. degree in Geology requires 39 semester hours including the following core courses or their equivalents·

GLG 101	Introduction to Geology I Physical) *SQ, G*	3
GLG 102	Introduction to Geology II (Historical) *SG*[2] *H*	3
GLG 103	Introduction to Geology I Laboratory *SQ*	1
GLG 104	Introduction to Geology II Laboratory *SG*[2]	1
GLG 310	Structural Geology	3
GLG 321	Mineralogy	3
GLG 400	Geology Colloquium	1
GLG 424	Petrology	3
GLG 435	Sedimentology	3
GLG 450	Geology Field Camp *L*	6
Total		27

Both GLG 101 and 103 must be taken to secure SQ credit.
- Both GLG 102 and 104 must be taken to secure SG credit

In addition, two of the following four branch courses must be taken:

GLG 335	Paleontology	3
GLG 418	Geophysics	3
GLG 470	Hydrogeology	3
GLG 481	Geochemistry	3

To complete the total required hours, other upper division courses in geology (excluding GLG 300 and 304) or courses in related fields listed as approved by the department may be taken See "College Degree Requirements," page 332.

Supporting courses required in related fields include:

CHM 113	General Chemistry *SQ*	4
CHM 116	General Chemistry *SQ*	4
MAT 270	Calculus with Analytic Geometry I *MA*	4
MAT 271	Calculus with Analytic Geometry II *MA*	4
MAT 272	Calculus with Analytic Geometry III *MA* or MAT 274 Elementary Differential Equations *MA* (3	4
PHY 121	University Physics I: Mechanics *SQ*	3
PHY 122	University Physics Laboratory I *SQ*	1
PHY 131	University Physics II: Electricity and Magnetism *SQ*[2]	3
PHY 132	University Physics Laboratory II *SQ*-	1
Total		28

Both PHY 121 and 122 must be taken to secure SQ credit
' Both PHY 131 and 132 must be taken to secure SQ credit.

MAT 290 Calculus I and MAT 291 Calculus II may be substituted for MAT 270, 271, and 272.

MINOR IN GEOLOGY

A minor in Geology is awarded to students who complete a minimum of 21 hours of geology courses. Required courses are as follows:

GLG 101	Introduction to Geology I (Physical *SQ, G*	3
GLG 102	Introduction to Geology II (Historical) *SG,*[2] *H*	3
GLG 103	Introduction to Geo ogy I Laboratory *SQ*	1
GLG 104	Introduction to Geology II Laboratory *SG*[2]	1
GLG 310	Structural Geology	3
GLG 321	Mineralogy	3
GLG 400	Geology Colloquium	1
Total		15

Both GLG 101 and 103 must be taken to secure SQ credit
[2] Both GLG 102 and 104 must be taken to secure SG credit.

The remaining six semester hours may be chosen among other upper division geology courses, except GLG 300 and 400, after consultation with a departmental advisor.

NOTE: For the Genera Stud es requ rement, courses and codes (such as L SQ C and H see "General Stud es" page 87 For graduat on requ rements see Un vers ty Graduat on Requirements, page 83 For an exp anat on of add tiona omn bus courses offered but not listed in this cata og, see "C assif cation of Courses," page 60

GRADUATE PROGRAMS

The faculty in the Department of Geology offer programs leading to the degrees of Master of Natural Science, M S , and Ph.D. See the *Graduate Catalog* for requirements.

GEOLOGY (GLG)

GLG 101 Introduction to Geology I (Physical). 3 F, S SS
Bas c pr nc p es of geo ogy, geochemistry, and geophys cs. Rocks, m nera s weather ng earthquakes, mounta n bui d ng, vo canoes water, and g ac ers Poss b e weekend f eld tr ps *General Stud es SQ (if cred t a so earned in GLG 103 G*

GLG 102 Introduction to Geology II (Historical). (3) S
Basic pr nc p es of app ed geo ogy and the use of these princ ples n the nterpretat on f geo og c h story Poss ble weekend f e d trips Prerequ s te GLG 101 *Genera Stud es SG f credit also earned n GLG 104), H.*

GLG 103 Introduction to Geology I—Laboratory. 1) F, S SS
Three hours ab some f e d tr ps Corequis te GLG 101 *General Stud es. SQ if credit also earned in GLG 101)*

GLG 104 Introduction to Geology II—Laboratory. (1) S
Laboratory techn ques nvolving map nterpretat on cross sect ons, and foss s 3 hours lab, possib e f e d tr ps Prerequ s te GLG 103 or equ va ent. Corequ s te GLG 102 *Genera Studies SG (f cred t also earned in GLG 102*

GLG 105 Introduction to Planetary Science. 4 S
So ar system objects and the r geo og c evolut on surfaces nter ors and atmospheres· week y aboratory for data ana ys s and exper ments weekend f e d tr'p. Lecture, lab. *General Studies. SG*

GLG 110 Environmental Geology. (3) F
Geo og cal stud es as they apply to interact ons between humans and earth Inc udes geo og cal processes and hazards, resources, and globa change *General Stud es· SG (if cred t also earned in GLG 111 G*

GLG 111 Environmental Geology Laboratory. (1) F
Bas c geo og cal processes and concepts. Emphas s on geo ogy re ated env ronmenta prob ems concern ng Ar zona Case h stor es and f e d stud es Lab Corequ s te GLG 110. *General Studies. SG (f cred t also earned in GLG 110)*

GLG 294 Special Topics. 1–4) N
a) Geo ogy of the P anets

GLG 300 Geology of Arizona. (3) A
Bas c and h stor ca geo ogy foss ls m n ng energy resources, envi ronmenta prob ems andscape deve opment and meteorites cast n examp es from Arizona Majors who have taken GLG 101 for credit may not enro .

GLG 304 Geology of the Grand Canyon. (2) N
Review of the d scovery, h story or g n and geo ogy of the Grand Can yon of the Co orado R ver n Ar zona 6 day fie d tr p down the r ver (f rst 6 days after commencement n May requ red at student s expense F e d research and term paper on tr p a so requ red

GLG 310 Structural Geology. 3) S
Geolog'c structures and the mechan cal processes nvo ved n the r format on 2 hours ecture 3 hours ab Poss b e f e d trips Prerequ sites· GLG 101· MAT 270 or 290)

GLG 321 Mineralogy. (3) F
Crysta chemistry, crysta ography m nera dentif cation or g n and occurrence of m nera s systemat c mineralogy 2 hours ecture 3 hours ab poss b e f e d tr ps Prerequ s tes CHM 113 MAT 270 (or 290 Pre or corequ s te. CHM 116

GLG 335 Paleontology. (3 F
Introduct on to concepts and analyt cal techniques n b ogeology pale obiology paleoecology and paleoenv ronmental reconstruct'on from the foss l record 2 hours ecture, 3 hours ab Prerequ s tes. GLG 102 and MAT 270 (or 290) *or* 'nstructor approva

GLG 336 Invertebrate Paleontology. (3) N
Biology ske eta morpho ogy, and systemat'cs of foss l nvertebrates One or two projects emphas z ng popu at on ana ys s and techniques n paleontology Lecture 6 hours ab poss b e f e d tr ps Prerequ s te GLG 102 or structor approva Pre or corequ site for Geology majors GLG 335

GLG 362 Geomorphology. 3 N
Land forms and processes wh ch create and mod fy them. Laboratory and f e d study of phys ograph c features 2 hours lecture 3 hours ab poss b e weekend f e d tr ps Prerequ s te GLG 101. Pre- or corequ s te: GLG 310

GLG 400 Geology Colloquium. (1) F S
Presentat n of recent research by facu ty and guests Wr tten assign ments requ red 1 semester hour requ red for Geo ogy majors; may be repeated for a tota of 2 semester hours Prerequisite: 2 courses n the department or nstructor approval

GLG 405 Geology of the Moon. 3) N
Current theor es of the or g n and evo ut on of the moon through pho togeolog ca ana yses and cons derat on of geochem cal and geophys cal constra nts Poss b e weekend f e d trip Prerequ s te GLG 105 or nstructor approva

GLG 406 Geology of Mars. 3 N
Geologica evo ution of Mars through ana yses of spacecraft data the oret ca model ng, and study of terrestrial ana ogs emphas s on cur rent work Poss b e weekend f e d trip to Northern Arizona Prerequ s te GLG 105 or nstructor approva

GLG 410 Computers in Geology. (3) F
Geo og cal computer sk ls nc ud ng data process ng v sua zat on presentat on, numer ca ana ys s software and hardware app cat ons 2 hours ecture 3 hours ab Prerequ s tes GLG 101 and one upper d v s on geology course *or* nstructor approva

GLG 412 Geotecton'cs. 3 F
Earthquakes earth s interior format on of ocean c and cont nental crust and p ate tectonics Emphas s n current work Prerequ s te GLG 310

GLG 416 Field Geophysics. 3 S
Methods of app ed geophys ca explorat on se sm c refract on grav ty, e ectr ca resist v ty geomagnet cs Inc udes survey plann ng data acqu sit on, process ng ana ys s and nterpretat on Lecture fie d exercises Prerequ site one course n geo ogy or nstructor approva

GLG 418 Geophysics. 3 F
So d earth geophys cs geomagnet sm grav ty, se smo gy heat f ow Emphas s on crust and upper mant e Prerequ s tes GLG 310 and MAT 272 and PHY 131 *or* instructor approva

GLG 419 Thermal-Mechanical Processes in the Earth. 3) F
Emphasis on app ed mathemat ca techn ques heat conduct on prob ems n geology therma convect on stresses n the ithosphere, and v scoe astic processes n the Earth. Prerequ s te PHY 131

GLG 420 Volcanology. (3 A
D stribution of past and present volcan sm types of volcan c activity mechanism of erupt on form and structure of vo canoes and geochem stry of volcan c act v ty Poss ble weekend f e d tr ps Prereq u s te· GLG 424

GLG 424 Petrology. (3) F
Or g n of gneous and metamorph c r cks Optical m'nera ogy hand specimen dent f cat on, and thin sect on analys s. 2 hours ecture, 3 hours lab poss b e weekend field tr ps. Prerequisite GLG 321

GLG 435 Sedimentology. (3) S
Or g n transport dep s t on, and d agenes s of sed ments and sed mentary rocks Physica ana ys s hand spec men exam nat on and 'nterpretation of rocks and sed ments 2 hours lecture, 3 hours ab possib e weekend f e d tr ps Prerequ s tes: GLG 102 321

GLG 441 Ore Deposits. (3) N
Or'gin occurrence structure and m nera ogy of ore deposits Possi- b e weekend field tr ps Prerequ s te GLG 424 or instructor approva

GLG 450 Geology Field Camp. (6 SS
Geo og ca mapp ng techn ques on aer a photos and topograph c maps F e d based w th excurs ons Prerequ s tes GLG 310, 321 *General Stud es L*

GLG 455 Advanced Field Geology. (3–4) F S
Geo og c mapp ng n gneous sed mentary and metamorphic terra ns of the Bas n and Range prov nce of Ar zona Weekend f e d trips May be repeated for cred t Prerequ s te: GLG 450 or nstructor approva

GLG 456 Cordilleran Regional Geology. 3 F
Systematic coverage th ough space a d t me of the geo og a deve - opment of western North Amer ca emphas z ng the western United States Prerequ s te sen or major or graduate student n Geology or instructor approval

GLG 470 Hydrogeology. 3 S
Geo ogy of groundwater occurrence, aqu fer and we hydrau cs, water chem stry and qua ty contam nant transport remed ation Emphas s on quant tat ve methods. Prerequ s tes GLG 101 or 103) MAT 270 PHY 121

GLG 481 Geochemistry. 3 F
Or g n and d str but on of the chem ca elements Geochem ca cyc es operat ng n the earth s atmosphere hydrosphere and thosphere. Cross sted as CHM 481 Cred t s a lowed for only CHM 481 or GLG 481 Prerequ s te· CHM 341 (or 346 or GLG 321

GLG 484 Geology Internship. (3) F S
Ass st n teach ng f fth-grade students a s mp fied version of GLG 103 us ng hands on activit es

GLG 485 Meteorites and Cosmochemistry. (3) N
Chem stry of meteor tes and the r re at onsh p to the origin of the earth so ar system and universe. Cross sted as CHM 485 Cred t is a lowed for on y CHM 485 or GLG 485.

GLG 490 Topics in Geology. 1 3 F S SS
Spec a topics n a range of f e ds n geo ogy May be repeated for cred t Prerequ s te nstructor approva

GLG 500 Geology Colloquium. (1 F, S
Presentat on of recent research by facu ty and nv ted guests. 1 semester required for a l geo ogy graduate students May be repeated for total of 2 semesters Research paper requ red Prerequ s te. instructor approva .

GLG 501 Geology of Arizona. (3 A
Bas c and h stor ca geology foss s m n ng energy resources, env ronmenta prob ems, andscape deve opment and meteorites cast in examples from Ar zona. Research paper requ'red.

GLG 504 Geology of the Grand Canyon. 2 S
Rev ew of the d scovery, h story or g n and geology of the Grand Can yon of the Co orado River n Ar zona 6 day f e d tr p down the r ver (f rst 6 days after commencement in May requ red at student s expense. F e d research and term paper on tr p a so required.

GLG 510 Advanced Structural Geology. (3) N
Mechan cs of rock deformation emphasizing re ationsh p between field observat on theory, and exper'ment Stress stra n simp e consti tut ve re ationsh ps fa ure criter a and the basis of cont nuum meth- ods Poss b e f e d tnps Prerequ s tes GLG 310 and 424 *or* nstructor approva

GLG 520 Advanced Physical Volcanology. (2 3) A
Se ected volcano og c topics nc uding exp os ve erupt on processes, lava f ow mechanics and ntrus ve mechanisms F e d tnps poss ble. Prerequ s te GLG 420 or nstructor approval

GLG 524 Advanced Igneous Petrology. 3) N
Theoret cal and pract ca aspects of the genes s of gneous rocks Study of se ected s tes Modern laboratory techn ques 2 hours lec- ture, 3 hours ab poss b e weekend field tr ps. Prerequ s te. GLG 424

GLG 581 Isotope Geochemistry. (3) N
Geochem stry and cosmochemistry of stable and rad oact ve sotopes geochrono ogy sotope equ ibria Prerequisite nstructor approva .

GLG 582 Physical Geochemistry. (3) N
Appl cat on of thermodynamic and kinet c pr nc p es to geochem ca processes Prerequ site CHM 336 (or 341) or GLG 321

GLG 583 Phase Equi ibria and Geochemical Systems. (3) N
Natura react ons at h gh temperatures and pressures, s cate su fide and ox de equ br a Cr ss l sted as CHM 583 Cred t s al owed for on y CHM 583 or GLG 583 Prerequ'sites. GLG 582 nstructor approva

GLG 591 Seminar. 1 3) F, S SS
Top cs in a range of fie ds n geo gy May be repeated for credit. Pre requ s te: nstructor approva

GLG 592 Research. (1 12) N

GLG 598 Special Topics. (1 3) F S SS
Spec a top cs n geo ogy May be repeated for cred t
a Advanced F e d Geo ogy
b Clast c Sed mento ogy and Petrology
c) Cordi eran Reg ona Geology
(d) Geo ogy of Mars
e) Ore Deposits
(f) Petro ogy Petrography
(g) Pr nc p es of Stratigraphy
(h) Sed mentology
(i) Vo canology
Prerequ s te instructor approva .

GLG 599 Thesis. (1 12) N

GLG 792 Research. (1 12) N

GLG 799 Dissertation. (1 15) N

Department of History

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CORE FACULTY

Regents Professor: Iverson;
Professors. Adelson, Batalden Burg, Dav s, De he m, Fuchs, G ff'n, Gratton, K e'nfeld, Lavr n, Luckingham Mack'nnon, Rosa es, Rothsch ld, Ruiz, Simpson Stowe Tambs T man, Trennert, Warnicke,
Associate Professors Barnes Carroll, Gray, Gu ett, Hendricks, Kahn Longley, Rush, Samuelson, L Smith, R Sm th Soerge , Stoner, VanderMeer, Warren F'ndley
Ass stant Professors McKee, Ramey, Thompson, Thornton;
Sen or nstructional Professional: Luey

AFFILIATED FACULTY

Chicana and Chicano Studies
Assoc ate Professor. Escobar

Biology
Professor Pyne

HISTORY—B.A.

The B.A. degree in History consists of 30 semester hours in history and 15 hours in closely related fields, as approved by the undergraduate advisor in consultation with the student. HIS 300 Historical Inquiry and HIS 498 PS· History Pro-Seminar are required for all degree candidates. HIS 300 is a prerequisite for HIS 498. Honors students may substitute HIS 493 Honors Thesis for HIS 498. Courses in related fields may also be used to satisfy university General Studies and college distribution requirements. At least 18 hours in history courses and nine hours in the related fields must be in the upper division. Students are required to take at least six semester hours in each of two different subject areas and at least three hours in a third subject area all within the discipline of history. Subject areas include Asia, Europe, Great

NOTE: For the Genera Stud es requ rement courses, and codes (such as L, SQ C, and H) see "Genera Stud es" page 87 For graduat on requ rements see "Un vers ty Graduat on Requ rements" page 83 For an explanat on of add t ona omn bus courses offered but not sted n th s cata og, see 'C ass fcat on of Courses," page 60

Britain, Latin America, and the United States. A minimum GPA of 2.25 in the 30 hours of history courses is required.

Asian Studies Certificate. Students majoring in History may elect to pursue an Asian Studies certificate combining courses from the major with selected outside courses of wholly Asian content. See "Asian Studies," page 340, for more information.

Jewish Studies Certificate. Students majoring in History may elect to pursue the Jewish Studies Certificate combining courses from the major with selected outside courses of wholly Jewish content. See "Jewish Studies," page 340, for more information

Latin American Studies Certificate. Students majoring in History may elect to pursue a Latin American Studies certificate combining courses from the major with selected outside courses of wholly Latin American content. See "Latin American Studies," page 340, for more information.

Medieval and Renaissance Studies Certificate. Students majoring in History may elect to pursue the Medieval and Renaissance Studies Certificate by successfully completing the requirements. See "Medieval and Renaissance Studies," page 340, for more information.

Russian and East European Studies Certificate. Students majoring in History may elect to pursue the Russian and East European Studies Certificate combining courses from the major with selected outside courses of wholly Russian and East European content See "Russian and East European Studies," page 341, for more information

Southeast Asian Studies Certificate. Students majoring in History may elect to pursue the Southeast Asian Studies Certificate combining courses from the major with selected outside courses of wholly Southeast Asian content See "Southeast Asian Studies," page 341, for more information.

Women's Studies Certificate. Students majoring in History may elect to pursue a Women's Studies certificate by successfully completing the requirements. See "Women's Studies," page 341, for more information.

MINOR IN HISTORY

The History minor consists of 18 semester hours of course work, at least 12 hours of which are in the upper division.

SECONDARY EDUCATION—B.A.E.

History. The major teaching field consists of 42 semester hours, of which at least 30 must be in history courses At least 18 must be in upper division courses At least 15 must be in U.S history. The remaining history and related area courses must be selected in consultation with an advisor from the Department of History. All degree candidates must complete the following four course methods block:

HIS	300	Historical Inquiry *L/SB H*	3
HIS	495	Methods of Teaching History: Classroom Resources	3
HIS	496	Methods of Teaching History: Community Resources	3
HIS	498	PS: History Pro Seminar *L*	3

Students should complete HIS 300 before enrolling in HIS 495, 496, and 498 A minimum GPA of 2.50 in history courses is required for admission to student teaching and for graduation. HIS 495 and 496 may not be counted as part of the 42 hour requirement for the academic specialization.

GRADUATE PROGRAMS

The faculty in the Department of History offer programs leading to the M.A. and Ph.D. degrees. A Certificate in Scholarly Publishing is also available See the *Graduate Catalog* for requirements.

HISTORY (HIS)

HIS 100 Western Civilization. (3) F, S
Traces origin and development of Western societies and institutions from the ancient world through the Middle Ages *General Studies: SB H.*

HIS 101 Western Civilization. (3) F S
Traces origin and development of Western societies and institutions from the Renaissance and Reformation through Age of Enlightenment *General Studies SB H*

HIS 102 Western Civilization. 3) F S
Traces origin and development of Western societies and institutions from the French Revolution to the present *General Studies SB G H*

HIS 103 The United States. (3) F S
Growth of the Republic from colonial times through the Civil War period *General Studies SB H*

HIS 104 The United States. 3) F S
Growth of the Republic from the Civil War period to the present day *General Studies SB, H*

HIS 107 Introduction to Japan. 3) F
Historical survey of the people culture, politics, and economy of Japan supplemented by audiovisual presentations Intended for non majors *General Studies SB, G H*

HIS 111 Global History Since 1500. (3) F S
Survey of Africa, the Americas, and Eurasia; changes in communication, communities demography, economics environment politics, religion technology warfare and women Lecture CD-ROM, electronic forum discussion. *General Studies: G H.*

HIS 201 Introduction to Slavic Civilization. 3 F S, SS
Development of Slavic cultures and societies from medieval Byzantium to the present; introduction to modern Eurasia Lecture discussion electronic forum Pre- or corequisite ENG 101 *General Studies: L/SB, H.*

HIS 230 American Social History. 3) N
American society from the colonial period to the present. Ethnicity, race age and sex as factors in historical experience Lecture discussion *General Studies L H*

HIS 240 Introduction to Southeast Asia. 3 F
An interdisciplinary introduction to the cultures regions political systems geography, and history of Southeast Asia Cross listed as ASB 240 GCU 240 POS 240 REL 240 Credit is allowed for only ASB 240 or GCU 240 or HIS 240 or POS 240 or REL 240 *General Studies G*

HIS 270 Judaism in American History. (3) N
A chronological analysis of Jews and Judaism in American history and letters. *General Studies. SB H.*

HIS 273 American Military History. 3) N
A study of the role of the military in American life during war and peace from colonial times to the present day. 3 hours lecture conference *General Studies SB H*

HIS 294 ST: Selected Topics in History. (3 N
A full description of topics for any semester available in the Department of History office May be repeated for credit

HIS 300 Historical Inquiry. (3) F S
Historical methods and critical inquiry related to particular events and processes Topics vary. Required course for majors. Prerequisite for HIS 498 Discussion, seminar lecture Prerequisites ENG 102 History major. *General Studies L/SB H*

HIS 302 Film as History. (3) A
Survey of moving image media as recorder object and writer of history *General Studies HU*

HIS 303 American Cultural History. (3) F S
Culture n a broad connotation, including deas, deals the arts and soc al and econom'c standards from the nation's colonial background and early national period. *General Studies SB H*

HIS 304 American Cultural History. (3) F, S
Culture in a broad connotation, including deas, deals the arts and social and economic standards from the age of industrialism and modern America *General Studies: SB H*

HIS 305 Asian Civilizations. (3) A
The c vilizations of China, Japan, and India to m d-17th century. *General Studies SB, G, H*

HIS 306 Asian Civilizations. (3) S
The c v izations of Ch na, Japan and India from the mid-17th century to present. May a so inc ude Southeast As a. *General Studies SB, G H.*

HIS 308 Modern Southeast Asia. (3) S
Vietnam, Laos, Cambod a Thai and, Burma Ma ays a S ngapore, Brunei Indonesia, and Phil pp nes s nce 1750 imperia ism, revolut on, and independence Lecture, discussion *General Studies· SB, G H*

HIS 309 History of Chinese Science. (3) N
Explores deve opment of traditiona Chinese sc ence in the context of Chinese thought and soc ety and in comparison with developments elsewhere. Lecture, d scuss on. Cross-l sted as HPS 325. Cred t s al owed for only H S 309 or HPS 325

HIS 312 Interpreting China's Classics. (3) N
Study of selected Confucian and/or Taoist c assics and ways they have been read in both As an and Western scholarship. Cross l sted as HUM 312 Cred t s allowed for only HIS 312 or HUM 312 *General Studies: L/HU H*

HIS 315 Japan in the Age of the Samurai. (3) N
H story of the warrior class of Japan, 700–1868.

HIS 320 Ancient Greece. (3) F
H story and civil zat on of the Greek world from the Bronze Age to the Roman conquest of the Hel en stic kingdoms. *General Stud es SB, H.*

HIS 321 Rome. (3) S
History and civi zation of Rome from the beg nning of the Repub c to the end of the Emp re. *General Studies: SB H*

HIS 322 The Middle Ages. (3) F
Politica socioeconom c, and cu tural developments of Western Europe dur ng the Early M dd e Ages Prerequ s te· HIS 100 or instructor approva *General Studies SB, H.*

HIS 323 The Middle Ages. (3) S
Political, socioeconom c, and cu tural developments of Western Europe during the H gh Middle Ages. Prerequ s te HIS 100 or instruc tor approval *General Studies. SB, H.*

HIS 324 Renaissance. (3) F
Antecedents and development of the Renaissance in Italy and its spread to the rest of Europe. *General Studies· L/SB, H*

HIS 325 Reformation. (3) S
The Protestant and Cathol c Reformat on in the 16th century. *General Studies: L/SB, H*

HIS 326 Early Modern Europe. (3) F
Social, econom c, cu tural, and po it ca changes in 17th-century Europe *General Studies SB, H.*

HIS 327 Early Modern Europe. (3) S
Social, econom c, cu tural, and politica changes in 18th-century Europe *General Studies· SB, H*

HIS 329 19th-Century Europe. (3) F
Po it cal, soc'al, economic and ntellectual currents in Europe from Napoleon to 1866. *General Studies SB, H*

HIS 330 19th-Century Europe. (3) S
Po it ca , social, econom c and ntellectual currents n Europe from 1866–1918 *General Studies SB, H*

HIS 331 20th-Century Europe. (3) F
Europe in its wor d sett ng s nce World War I, emphasizing major polit ica and soc a ssues 1914–1945 *General Studies: SB, G, H*

HIS 332 Europe Since 1945. (3) N
Europe n ts world setting since World War II emphas zing major pol t ical and soc al ssues from 1945 to the present. *General Studies: SB G H*

HIS 340 Witchcraft and Heresy in Europe. (3) N
Background orig ns and deve opment at the Inqu sit on Ana ysis of marginal groups and their suppression Cross isted as REL 374 Credit is al owed for on y H S 340 or REL 374. Prerequisite: upper d v s on stand ng or nstructor approval. *General Studies· L, H*

HIS 341 Sex and Society in Classical and Medieval Europe. (3) F
Fam ly fe, sex ro es and marr age, and the r relat onsh p to pol tical, econom c, and re g'ous change 'n class cal and med eval Europe Lecture, d scuss on Prerequ s te upper-division stand ng or nstructor approval *General Studies. SB, H.*

HIS 342 Sex and Society in Early Modern Europe. (3) S
Fam ly fe, sex ro es and marr'age and their re ationsh p to pol tical, economic, and re gious change in ear y modern Europe Lecture d s cuss on. Prerequ s te upper-d v s on standing or instructor approva . *General Studies· SB, H.*

HIS 343 Sex and Society in Modern Europe. (3) N
Fam ly fe, sex ro es and marr age, and the r relat onship to po it cal, economic, and soc a changes in modern Europe Prerequisite· upper-d'v s'on stand ng or nstructor approva Lecture discussion *General Studies· L/SB, H*

HIS 344 Women and Society in Europe. (3) N
Women's role status and achievements n Europe, 1750–1950 Changes n everyday ife, sex roles, fam ly patterns, work and culture *General Studies. L/HU/SB, H.*

HIS 351 England. (3) F
Polit ca economic, and socia development of the English peop e to the 17th century *General Studies SB H*

HIS 352 England. (3) S
Po itica econom'c, and soc a development of the Eng ish people from 17th century to the present *General Studies. SB, H.*

HIS 356 Immigration and Ethnicity in the United States. (3) F S
Origins, historical deve opment, and future of a mu tiethnic society, 1492 to 2050. Prerequisite: HIS 103 or 104 *General Studies SB, C H*

HIS 357 19th-Century West. (3) F S
Soc a po t cal, and economic deve opment of trans M'ss ssippi West beg nn ng w th Lou s ana Purchase and end ng n 1900. *General Stud ies SB, H*

HIS 358 The West in the 20th Century. 3) F S
Role of the western states n American history since 1890 w th emphas s on po t cs the environment, industry and abor and the chang ng posit on of ethnic m norities. *General Studies SB, H*

HIS 360 American Indian History to 1900. (3) F S
Cultura economic, pol tical, and soc al continuity and change of American Indian communities to 1900 Lecture d scuss on *General Stud es SB C H*

HIS 361 American Indian History Since 1900. (3) F, S
Cultural, econom c pol tica , and soc a continuity and change of American Indian commun ties from 1900 to the present. Lecture, dis cuss on. *General Studies· SB, C, H*

HIS 363 African American History I. (3) F
The Afr can American in American h story thought and culture from s avery to 1865 Cross sted as AFS 363 Credit is al owed for only AFS 363 or HIS 363 *General Studies· SB C, H*

HIS 364 African American History II. (3) S
The Afr can American in American history thought, and culture from 1865 to the present Cross- isted as AFS 364. Credit is al owed for on y AFS 364 or HIS 364. *General Studies: SB C, H.*

HIS 366 The Modern Middle East. (3) N
mpact of the Western wor d upon M dd e Eastern governments re i-g on, and soc ety in the 19th and 20th centuries; prob ems of modern ization and the ro e of the Middle East n wor d affa rs *General Studies· SB G, H*

HIS 369 Exploration and Empire. (3) N
An interd sc p nary survey of explorat on by Western Civi zat on over the past 500 years Lecture d scuss on *General Studies· L, H*

HIS 370 Women in U.S. History, 1600–1880. (3) F
Exam nat on of American women of diverse rac a rel g ous, ethnic groups and classes focus is on changing definitions of women's roles *General Studies. SB C H*

NOTE: For the General Studies requirement courses, and codes (such as L SQ, C, and H), see "General Stud es" page 87. For graduation requirements, see "University Graduat on Requirements," page 83 For an explanation of add tiona omnibus courses offered but not l sted in this catalog see "Class f cat on of Courses," page 60

HIS 371 Women in U.S. History, 1880–1980. (3 F, S
Exam nation of Amer can women of d verse rac a re g ous ethn c groups, and c asses; focus s on chang ng def n t ons of w men s ro es *General Studies· SB C H*

HIS 373 Women in 20th-Century West. (3) A
Exam nes how women of var us cu tures have contended for and shaped the Amer can West nc ud ng the West of the mag nat on Lecture d scuss on *Genera Studies· C H*

HIS 380 History of the Mexican American. (3) N
Ro e of the Mex can Amer can in U S history *General Stud es SB C H*

HIS 381 Quantification in History. 3 N
Quant tat ve techn ques, nc ud ng po t ca ana ys s new ec nom c the ry, dem graphy and soc a h'story Research methods n soc a sc'ence, nc ud ng des gn, data col ect on, and computer sk l s Prereq u s te· MAT 117 or a course for wh ch MAT 117 s a prerequ s te.

HIS 383 Latin America. (3) F S
Anc ent c v l zat on exp orers and conquerors, and co on a nst tu t ons *General Stud es SB H*

HIS 384 Latin America. 3) F S
Nat ona st c deve opment of the ndependent republ cs s'nce 1825 *Genera Stud es SB H*

HIS 385 Women in Colonial Latin America. 3 F
H story of women n co onial Lat n Amer ca cross exam n ng class race, and gender re at ons 'n depth Lecture d scuss on *Genera Stud es H*

HIS 386 Latin American Women: The National Period. 3 S
Surveys the h'story of women, gender re at ons and state po c es in a broad cont nenta sett ng from ndependence to the present Lecture media d scuss on *Genera Stud es: SB G, H.*

HIS 394 ST: Selected Topics in History. 3 F, S
A ful descr ption of top cs for any semester s avai ab e n the Depart ment of H st ry off ce. May be repeated for cred t

HIS 401 American Colonial History. (3) F
Po t cal econom c soc a , and cu tural h story of the colonial era Concentrates on Engl sh co on es, with some ons derat n of Span sh French, and other co on a reg ons in North Amer ca. *Genera Stud es· SB H.*

HIS 403 Revolution and Constitution. (3 N
The causes course and consequences of the Amer can Revo ut n culm nat ng n the rat f cation of the Const tut on. Prerequ s te H S 103 or nstructor approva

HIS 404 The Early Republic, 1789–1850. 3 A
Po it ca , soc a econom c and cu tura deve opment of the Un ted States from the Revolut on to 1850 Prerequ s te· H S 103 or nstructor approval *General Stud es. L/SB H*

HIS 406 Civil War and Reconstruction. 3 A
Exp ores the causes conduct, and consequences of the Amer can Civ War concentrat ng on the years 1848 to 1877 Prerequ s te H S 103 or instructor approva . *Genera Studies· L/SB, H*

HIS 407 The Emergence of the Modern United States, 1877 to 1918. (3 A
The triumph of modern po t ca , soc al and e onom c structures and values 1877 1918 r e of reg n, re g on, race, and ethn c ty *Genera Stud es SB H*

HIS 408 The Modern Un ted States, 1918 to 1945. (3 A
1920's boom and the crash the Depress on and the New Dea response. The Second Wor d War at h me and abr ad Prerequ s te H S 104 r equ va ent. *General Stud es· SB H*

HIS 409 The Postwar United States. 3) A
The Un ted States from 1945 to 1973 *General Stud es SB H*

HIS 410 The Contemporary United States. 3 A
The Un ted States from 1973 to the present *Genera Stud es: SB H*

HIS 414 The Modern American Economy. 3 N
Or g ns of 19th century s avery and 'ndustr a zat on, 20th century cr s s and regulat on: po t ca economy of an advanced cap ta st dem c racy Prerequ s te ECN 111 (or 112 or HIS 103 or 104 *Genera Stud es. SB, H*

HIS 416 American Diplomatic History. 3 S
American re at ons w th fore gn powers from 1898 to the present Pre requ s te HIS 104 or nstructor approva . *General Studies SB, G H*

HIS 417 Constitutional History of the United States. (3) F
Orig n and deve opment of the Amer can constitutiona system from Colon al orig ns through Reconstruct on. Prerequ s te H S 103 or nstructor approva *General Stud es. SB, H.*

HIS 418 Constitutional History of the United States. (3) S
Or g n and deve opment of the Amer can constitutiona system from Reconstruct on to the present Prerequ'site: HIS 104 or nstructor approva *Genera Studies· SB H*

HIS 419 American Urban History. (3) F
The history of the c ty n American l fe from co on a t mes to the ate 19th century *General Stud es· SB H*

HIS 420 American Urban History. (3) S
The history of the city 'n American l fe from the 19th century to the present. *General Studies· SB, H*

HIS 421 History of American Labor. 3 N
Amer can workers, from the colonia per od to the present, includ'ng farmers s aves, housew'ves, the ski ed and unsk l ed, un on zed and nonun onized. Prerequisite: HIS 103 (or 104) or MGT 301. *General Stud es: SB H.*

HIS 422 Rebellious Women. (3) F, S
Examinat on of the ro es of rebe ious women n history through the study of autob ography b ography and theory *General Stud es: L/SB, C H*

HIS 424 The Hispanic Southwest. (3) N
Deve opment f the Southwest n the Spanish and Mex can per ods to 1848 *General Stud'es SB, H.*

HIS 425 The American Southwest. 3) F
Deve opment of the Southwest from 1848 to the present *General Stud es L/SB H*

HIS 426 Indian History of the Southwest. (3) F S
Comprehens ve rev ew of histor'ca events from prehistoric peop es the Span sh and Mexican per ods and the American per od after 1846 to the present Prerequ site. upper-d vision stand ng or nstructor approval. *General Stud es SB C, H*

HIS 428 Arizona. (3) F S
Emergence of the state from early t mes to the present Prerequ s te upper d v s on standing or nstructor approva *General Stud es: SB, H*

HIS 430 20th-Century Chicano History. (3) S
H stor ca development of the Chicano community n the 20th century *General Stud es· SB C, H*

HIS 431 The French Revolution and the Napoleonic Era. (3) N
Condit ons n France before 1789 the Revolut onary decade from 1789 to 1799 the organ zat on of France under Napo eon, and the mpact of changes n France on European soc'ety. Prerequisite upper-d v s on standing or nstructor approval *General Studies SB, H*

HIS 433 Modern France. (3) N
Soc a po tica econom c, and cu tura transformat ons of French soc ety 1815–present mpact of ndustr a ization war and revo ution n peop e's ves Prerequ site: upper division stand ng or nstructor approval *General Stud'es· SB, G H*

HIS 434 Hitler: Man and Legend. 3) F
A biograph cal app oach to the German Th rd Reich emphasizing nature of Naz reg me World War I , and h stor ography *General Stud es SB H*

HIS 435 Modern Germany. 3 S
Germany s nce 1840 *General Stud es: SB G H.*

HIS 437 Eastern Europe and the Balkans. (3) N
Peop es and countr es f eastern and southeastern Europe in the 19th and 20th centur es from 1800 to 1914 emphasiz ng the Hapsburg and Ott man Emp res *General Studies· SB, H*

HIS 438 Eastern Europe and the Balkans. (3) N
Peoples and countr es of eastern and southeastern Europe in the 19th and 20th centuries, emphasizing the successor states from 1914 to the present *Genera Studies SB G, H.*

HIS 441 The Russian Empire. (3) F
Development of modern Eurasia from the late seventeenth century to 1917 nc ud ng analys s of Russ an s c ety, nst tut ons and cu tural tradit ons Lecture d scuss on *General Studies· SB, H*

HIS 442 The Soviet Union. (3) S
An exam'nation of Soviet and post Sov et po tics, econom c deve op ment and fore gn re at ons from the 1917 Revo ution to the present *General Studies· SB, G H*

HIS 443 Russia and the United States. (3) S
Off c a and unoff c a relations between Russia and the Un ted States, from the ate 18th century to the present emphas z ng per od fo ow ng the Bo shev k Revo ution *General Studies SB, G, H.*

HIS 445 Tudor England. (3) A
Po t ca social, econom c, and cu tura developments in 16th century England *General Studies. SB, H.*

HIS 446 Stuart England. (3) A
Po itica , social econom c, and cu tural developments n 17th century Eng and *General Studies: SB H*

HIS 449 Modern Britain. (3) N
Factors contributing to Brita n's position as the world s ead ng power n the 19th century and its dec ne from that pos t on n the 20th cen tury. *General Studies· SB G H*

HIS 450 British Constitutional History. (3) N
H storical development of the const tut onal system of Great Brita n from the M dd e Ages to the present, emphas'z ng the growth of democracy *General Studies SB H*

HIS 451 The British Empire. (3) A
British mper a ism and colonial sm 'n Afr ca, the Americas Asia, and the South Pacific Prerequ site: upper divis on stand ng or instructor approva . *General Studies SB H*

HIS 455 Intellectual History of Modern Europe. (3) A
Major developments n European thought from Karl Marx to the present Prerequisite: upper divis on standing or nstructor approval *General Studies HU H.*

HIS 456 History of Spain. (3) F
Cultura economic po t cal, and soc a deve opment of Spain from ear iest days to 1700 *General Studies. HU SB, H.*

HIS 457 History of Spain. (3) S
Cultural, econom c po t ca , and soc a deve opment of Spain from 1700 to the present *General Studies· HU SB G H.*

HIS 460 Spanish South America. 3) N
Po t cal, econom c, and socia development of the Spanish speaking nat ons of South America since independence 19th-century deve op ments. *General Studies SB H.*

HIS 461 Spanish South America. (3) A
Po it ca economic, and soc a deve opment of the Span sh speaking nations of South America. 20th century deve opments. *General Stud ies· SB, H*

HIS 463 Intellectual and Cultural History of Latin America. (3) A
Main currents of thought the outstanding thinkers and the'r mpact on 19th and 20th-century Latin America Cu tural and nst tut ona bas s of Latin Amencan l fe *General Studies· SB, H*

HIS 464 The United States and Latin America. (3) A
The Latin American struggle for d'p omat c recogn tion attempts at political un on, partic pation in nternationa organizat ons since 1810 and re ations between the United States and Lat n Amer ca *General Studies SB G, H*

HIS 466 Mexico. (3) F
Po itical economic, soc a and cultura deve opments from earl est t mes to 1810 *General Stud es: SB H*

HIS 467 Mexico. (3) S
Political economic social, and cu tura developments from 1810 to the present *General Studies· SB, H*

HIS 468 Brazil. (3) N
D scovery, conquest, and settlement by the Portuguese achievement of independence nse and fa of the empire problems and growth of the republ c to the present *General Studies SB H*

HIS 469 Chinese Thought and Way. (3 F
Ch na's c assics in trans ation stud ed both for the r ntr ns c deas and for the orig'ns of Ch nese thought. *General Studies: SB H*

HIS 470 Chinese Thought and Way. (3) S
Evo ution of Confuc an Tao (Way its synthes s of Tao sm and Bud dh sm, and 20th century react ons to that Tao. *General Stud es SB G H*

HIS 471 The United States and Japan. (3) F
Cu tura poi tical, and economic re ations n the 19th and 20th centu r es. Emphasis on post World War II per od *General Studies SB G H*

HIS 473 China. 3) F
Po t ca econom c soc a and cu tura h story of the Ch nese people from ear y times to the ate 17th entury *Genera Stud es: SB H*

HIS 474 China. (3) S
Po t cal, econom c soc a and cu tura history of the Chinese peop e from m d 17th century to the present *Genera Stud es SB, G, H*

HIS 475 The American Experience in Vietnam, 1945–1975. 3 F
ntersect on of Amer can and As an h stor es n V etnam, v ewed from as many sides as poss b e *Genera Stud es SB G H.*

HIS 477 Japan. 3 F
Po t ca economic soc a and cu tura h story of the Japanese peop e from ear y t mes to the 19th century. *General Stud es L/SB, H*

HIS 478 Japan. (3 S
Po it ca econom c soc a and cu tural h story of the Japanese peop e from 19th century to the present *Genera Stud es SB G H*

HIS 481 The People's Republic of China. (3) N
Ana ys s of major pol tical, soc a econom c, and inte ectua trends n China since the found ng of the Peop e s Repub ic n 1949 *Genera Stud es SB G, H*

HIS 488 History of Fire. (3) F
A g oba survey of the natura and cu tura h story of f re Lecture d s cuss on *Genera Studies L H*

HIS 493 Honors Thesis. 3) N
General Studies L

HIS 495 Methods of Teaching History: Classroom Resources. 3 F
Methods n nstruct on organ zat on and presentat on of the subject matter of h story and c sely a ed f e ds Prerequ s tes H S 300 adm ss on to PTPP

HIS 496 Methods of Teaching History: Community Resources. 3) S
dentify community based resources for teach'ng history work with resources and earn how to ntegrate them nto the secondary class-room Lecture lab Prerequisites H S 300 adm ss on to PTPP.

HIS 498 PS: History Pro-Seminar. 3 F S
Requ red course f r majors on topic se ected by nstructor wr t ng ntens ve course re ated to the deve opment of research sk ls and writ ing too s used by h stor ans Prerequ s tes H S 300 H story major *General Stud es L*

HIS 502 Public History Methodology. (3 F
Introduct on to h stor ca research methodo og es techn ques and strateg es used by pub c h st rians Read ngs short papers and guest speakers Requ red for students n the publ c h story concentra-tion

HIS 512 Historians of Early Europe. 3 N
A study of the h story of European h stor ca wr t ng from the Greeks to the 18th century.

HIS 513 Historians of Modern Europe. 3 N
A study of 19th and 20th century European histor ca wr t ng

HIS 514 Historians of the Un'ted States. 3 N
A study of the h story of Amer can h storica wr ting from the ear y co on a days to the 20th century.

HIS 515 Studies in Historiography. 3 F S
Methods and theor es of wr ters of h story May be repeated f r credit

HIS 525 Historical Resource Management. 3 F
Ident f cat on documentat on, and nterpretat on of h stor c per od bu d ngs s tes, and d stricts Emphas s on nterd sc p nary efforts among h stor ans arch tects and anthropo og sts.

HIS 526 Historians and Preservation. 3 S
Preparat on of h stor ans for pub c and pr vate h stor c preservat on programs Prerequ s te H S 525 or nstructor approva

HIS 527 Historical Administration. 3 F
Preparat on of h stor ans n adm n strat on of arch ves h stor cal s tes h stor cal museums, h storica soc et es and h stor ca off ces n gov ernment agenc es

HIS 532 Community H'story. 3 N
Techn ques and methods of commun ty h story emphas z ng oca resources. Requ red for community h story opt on Sem nar

HIS 551 Comparative Histories of War and Revolut'on. 3 A
A comparative field course of the themes of war and revol t on.

NOTE: For the Genera Stud es requirement courses, and codes such as L SQ, C, and H) see "Genera Stud es ' page 87 For graduat on requ rements, see "Un vers ty Graduat on Requ rements," page 83 For an explanation of add t ona omnibus courses offered but not sted n this catalog, see "Class f cat on of Courses " page 60.

HIS 552 Comparative History of Family and Community. (3) N
A comparat ve course with a focus on fam ly, nc ud ng minority and ethn c groups n soc ety

HIS 553 Comparative History of State and Institutions. (3) N
A comparat've course that exp ores the changing nature of central nstitutions and government

HIS 554 Comparative Historical Population Studies: Ethnicity, Economy, and Migration. (3) N
A comparative course that exp ores the mpact of soc al, cu tural, or econom c changes in the populat on

HIS 555 Comparative Historical Topics. (3) N
Th s course ana yzes a var ety of spec fic social, po t cal, cu tural, and nte lectua top cs

HIS 591 Seminar. (3) N
May be repeated for cred t.

HIS 592 Research. (1 12 N

HIS 598 Special Topics. (3) N
Read ng courses des gned t ncrease students' fami ar ty w th a par ticu ar top c and the important wr t ng concerning t The fol ow ng areas may be nc uded
(a) As an History
(b) Eng sh and British H story
(c European H story
(d) Latin American History
(e U S. H story
May be repeated for credit

HIS 599 Thesis. 1 12) N

SCHOLARLY PUBLISHING (PUB)

See the *Graduate Catalog* for the PUB courses.

Interdisciplinary Humanities Program

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Languages And Literatures

Regents' Professor. Foster

The humanities are those learned bodies of knowledge that are used to express ideas, to understand the meaning of words, and to explore the values and beliefs that underlie our culture and the cultures of others. As defined by the U.S. Congress, the humanities include archaeology, comparative religion, ethics, history, jurisprudence, literature, linguistics, philosophy, the history and criticism of the arts, and those aspects of the social sciences that employ a philosophical or historical rather than quantitative approach to knowledge

HUMANITIES—B.A.

The major in Humanities is interdisciplinary and may be intercollegiate. In consultation with an advisor, the student takes a minimum of 44 semester hours of interdisciplinary humanities courses from two components. (1) an interdisciplinary core of 23 hours and (2) an area of concentration of 21 hours.

Interdisciplinary Core

Issues Methods, and Theory
HUM 200 Encountering the Humanities *HU* 3
HUM 498 Pro Seminar in the Humanities *LHU* 3

Cultures in Context
HUM 301 Humanities in the Western World *LHU, H* 4
HUM 302 Humanities n the Western World *LHU, H* 4
One approved upper division HUM course on the cultures and traditions of Latin America, Asia, or Africa . . . 3

Ethnicity Race and Gender
One approved course 3

Art, Science and Technology
One approved course 3

Total 23

Area of Concentration
Required courses from list obtained from advisor 21

Courses must be selected from an approved list or be approved in advance by the undergraduate advisor. Areas of study include architecture, culture, and society; classical studies; film studies; humanities; humanities and sciences, and liberal arts.

MINOR IN HUMANITIES

The following courses are required for the minor:

HUM 110 Contemporary Issues in the Humanit es *HU* 3
HUM 301 Humanities in the Western World *LHU H* 4
HUM 302 Humanities in the Western World *LHU H* 4
Three approved upper-division HUM courses 9

Total 20

GRADUATE PROGRAM

The faculty in the program also offer the M.A degree in Humanities through the Graduate Committee on Humani ties. See the *Graduate Catalog* for requirements.

HUMANITIES (HUM)

HUM 110 Contemporary Issues in Humanities. (3) F S
Responses of l terature, art h story, h story, phi osophy re igion and other d scipl nes to common problems affect ng modern Amer can l fe *General Stud es HU*

HUM 194 ST: Special Topics in the Humanities. 3 N
Open to a students. Topics include.
(a) American F ne Arts
(b) Comparat ve F ne and Performing Arts
(c) Cu tures of Ethnic M norit es
(d) Non Western Cu tures
(e) Western H stor cal or Contemporary Cu tures

HUM 200 Encountering the Humanities. (3) F S
Introduction to the anguages, methods and object ves of the study of the nterd sc pl nary human t es Intersect ons of ideas, values, and cultura nst tut ons. Lecture, stud'o workshop Prerequ s te Human ties major. *General Studies HU.*

HUM 260 Introduction to Islam. (3 S
Exam nat on of Is am c be efs ceremon es fest vals and nst tutions Course assumes no pr or knowledge about slam Lecture, d scussion Cross sted as REL 260 Cred t is a owed for on y HUM 260 or REL 260

HUM 294 ST: Special Topics in the Humanities. 3) N
Open to a students T p cs nc ude:
(a) American F ne Arts
(b) Comparative F ne and Perform ng Arts
(c) Cu tures of Ethn c Minorities
(d) F lm and Med a Stud es
(e) Non Western Cu tures

HUM 301 Humanities in the Western World. 4) F
Interre ation of arts and deas in Western C v l zat on, He lenic through med eva 3 hours lecture, 1 discussion meet ng per week *General Stud es: L/HU, H*

HUM 302 Humanities in the Western World. (4) S
Interre at on of arts and ideas n Western C v ızat on, Rena ssance to the present 3 hours lecture 1 d scuss'on meet ng per week *General Studies L/HU, H.*

HUM 310 Japanese Cities and Cultures to 1800. (3) S
Re ations among ideas and l terary, visual, and performing arts of the anc ent ar stocracy, medieva samura and ear y modern townspeo p e. Cross isted as REL 355. Cred t is a owed for on y HUM 310 or REL 355 *Genera Studies L/HU H*

HUM 312 Interpreting China's Classics. (3) N
Study of se ect Confuc an and/or Tao st c assics and ways they have been read n both Asian and Western scholarsh p Cross-l sted as HIS 312 Cred t s a lowed for only HIS 312 or HUM 312 *General Studies L/HU H*

HUM 340 Contemporary American Film and Popular Culture. (3) F
Study of American f m, te evis on, and popu ar mus c of past three decades as cultura documents *General Studies. HU.*

HUM 371 Origins, Evolution, and Creation. (3) F
Examines sc entif c, myth c, and rel g ous deas relat ng to orig ns (particularly human P ace of ant evolut on sm and "sc ent f c creat on sm" n American cu ture. Lecture, discussion Cross-l sted as B O 344 HPS 311/REL 383 Cred t s al owed for on y BIO 344 or HPS 311 or HUM 371 or REL 383

HUM 372 The Darwinian Revolution. (3 S
nte ectua and cu tura h story of Darwinism and modern evo utionary theory and their impact on 19th and 20th-century thought Lecture d scuss on Cross-listed as BIO 346 HPS 332. Credit s a owed for on y BIO 346 or HPS 332 or HUM 372

HUM 394 ST: Special Topics in the Humanities. (3) N
Open to a l students Topics include:
(a) Art and Po it cs
b Culture and Soc ety of Contemporary China
(c) mm grat on and Ethn c ty n Amer can Culture
(d) The Holocaust and Soc a Theory

HUM 401 The Culture and Legacy of the European Enlightenment. (3) S
H stor ca survey of e ghteenth century European enl ghtenment and ts status w thin contemporary ntel ectual cu ture Lecture discussion *General Stud es. HU, H*

HUM 420 Interpreting Latin America. (3 S
ntroduct on to protoco s and methodo og es for cultura nterpretat on of Lat n America w th emphas s on four pr nc pa c t es as cu tural space. *General Studies· HU G H*

HUM 440 Los Angeles and Cultural Theory. (3) S
Ana ys s of representations of Los Angeles n l terary fi m and musi ca texts and broader imp 'cations for contemporary Amer'can society. *General Studies· L/HU, C*

HUM 450 Technology and Culture. (3 S
Exp ores soc ocu tural, ideologica , postmodern mpl cat ons of tech nology and the role techno ogy plays n soc a construct ons as wel as the spaces t creates Sem nar discussion *General Stud es. L/HU.*

HUM 451 Virtual Reality: The Culture of Cyberspace. (3) A
Socioeconom c, cu tura aesthet c, postmodern, theoret ca and human mp icat ons of virtua rea ty techno og es Themes cultural deo og cal productions of cyberspace Co laborat ve and research based.

HUM 460 Postmodern Culture and Interpretation. (3) N
Currents and nterpretations of postmodern culture internat onal, comparat ve perspect ve on the cu ture and tradit ons of contemporary Europes" and "Amer cas" Sem nar d scuss on. *General Studies· L.*

HUM 462 Psychoanalysis and Culture. 3) F
ntroduct'on to ntel ectua history of psychoanalyt c movement of twent eth century and its contribut on to human t es d scipl nes *Gen eral Studies: L/HU SB*

HUM 465 Narrative in the Human Sciences. (3) F
Theor es of narrat ve and narrativity n the Human ties, concentrat ng on the prob ems of spec f c d sc p nes and nterd sc p nary so utions *Genera Studies· L/HU*

HUM 494 ST: Special Topics in the Humanities. 3) N
Open to al students Topics nclude
(a) American Jewry through F m and TV
(b) Comedy and Cu ture
(c) G oba Media Stud es
(d) Post Co on a Stud es
(e) Uses and Abuses of C assical Ant qu ty

HUM 498 Pro-Seminar in the Humanities. (3) F S
Methodo og es and c mparat ve theor es for the study of re at onsh ps between var ous aspects of cu ture the h story of deas and the arts For students with a major n human t es with upper-div s on stand ng. May be repeated for a total of 6 semester hours when top cs vary.
a Theory and Culture
General Studies L/HU

HUM 501 Introduction to Cultural Theory. (3) F
Select ve h story of cu tural theory. Major f gures and top cs nc ude Marx, N etzsche, Freud Phenomeno ogy, Western Marxism, Structur al sm and Post Structural sm Seminar.

HUM 503 Research and Writing in the Humanities. (3) F
Systemat c tra n ng in human st c research and wr t ng w th part cu ar attent on to the nterd sc p nary study of cu ture Sem nar

HUM 511 Structures of Knowledge. 3) F
Theories and examples of structures of know edge ncluding such topics as metaphor, sem ot cs and know edge of the "other"

HUM 512 Writing Cultures. (3) S
Theor es and methods of representing Western and non Western cu tures n terature, history, ethnography, and p ctor a media

HUM 513 Interpretation of Cultures. (3) A
Methodologies and comparat ve theor es for the study of relat onships between var ous aspects of cu ture the history of ideas and the arts May be repeated for a tota of 6 semester hours, when topics vary

HUM 549 Contemporary Critical Theory. (3) A
An advanced survey of major schoo s of 20th century literary and crit ca theory Lecture d scuss on Cross- sted as ENG 502 Cred t s a owed for on y ENG 502 or HUM 549

HUM 591 Seminar. 3 A
Topics include.
(a) Cu tural Product ons
b) Theory and Culture
(c) Tragedy Meaning and Form

HUM 598 ST: Special Topics in the Humanities. (3 N
Open to a l students Top cs inc ude:
(a Comparat ve F ne and Perform ng Arts
(b) Cultures of Ethn c M nori t es
(c) Fi m and Med a Stud es
d Non Western Cultures
(e) Western Historical or Contemporary Cultures

NOTE: For the Genera Stud es requ rement courses and codes such as L SQ C and H see "Genera Stud es" page 87 For graduat on requ rements see "Un vers ty Graduat on Requ rements" page 83 For an exp anat on of additiona omn bus courses offered but not sted n th s cata og, see "C ass fica t on of Courses" page 60

Department of Languages and Literatures

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INSTRUCTORS
DEAL, KORET, LE OH, PANG

ASSOCIATE RESEARCH PROFESSIONAL
P. LAFFORD

ASSISTANT RESEARCH PROFESSIONAL
ORL CH

ACADEMIC ASSOCIATE
GLESSNER

BACHELOR OF ARTS DEGREE

The faculty in the Department of Languages and Litera tures offer ma ors in Asian Languages (Chinese/Japanese), French, German, Italian, Russian, and Spanish. Each major consists of 45 semester hours, of which 30 must be in one language and 15 in a second language or in closely related fields to be approved by the advisor in consultation with the student Of the 30 hours required for the major, a minimum of 24 hours n ist be taken at the 300 or 400 level and must include at least nine hours at the 400 level Spec fic required courses for each major area are shown in this section and in a brochure available in the department See "College Degree Requirements," page 332

MAJORS

Asian Languages (Chinese/Japanese)—B.A.

Students majoring in Asian Languages (Chinese Japa nese) may select a course of study that focuses on either lan guage

Chinese. The major requires 45 semester hours At least nine semester hours must be at the 400 level. In addition to the courses shown below, the student must meet with an advisor and choose at least 15 semester hours of courses, including six semester hours of JPN courses such as Japa nese language and calligraphy, Japanese literature in trans lation (FLA 421) or KOR prefix courses such as Korean lan guage and/or Korean culture, and nine semester hours from appropriate courses in art, humanities, social and behavioral sciences, and business

Required

CHI	313	Advanced Chinese *G*	3
CHI	314	Advanced Chinese *G*	3
CHI	32	Chinese Literature *L/HU*	3
CHI	322	Chinese Literature *L/HU G* or FLA 420 Foreign Literature n Translation *HU G* 3	3
CHI	413	Introduction to Classical Chinese *HU*	3
CHI	414	Introduction to Classical Chinese *HU*	3
Total			18

Electives

Choose six semester hours from the courses below 6

- CHI 309 Chinese Conversation (2
- CHI 310 Chinese Conversation 2)
- CHI 311 Chinese Conversation 2
- CHI 312 Chinese Conversation 2
- CHI 494 Special Topics 1–4)
- CHI 499 Individualized Instruction (1 3

Total 6

Recommended

Two 200 level CHI courses (excluding 205). 6

Japanese. The major requires 45 semester hours. At least nine semester hours must be taken from FLA 421, and JPN 321 and 414. No more than eight semester hours may be selected from JPN 309, 310, 311, and 312.

Required

FLA	421	Japanese Literature in Translation *L/HU, G*	3
JPN	313	Advanced Japanese *G*	3
JPN	314	Advanced Japanese *G*	3
JPN	321	Japanese Literature *L/HU G*	3
JPN	414	Introduction to Classical Japanese	3
Total			15

Electives

Choose nine semester hours from the courses below. 9

- JPN 309 Intermediate Japanese Conversation 2
- JPN 310 Intermediate Japanese Conversation 2
- JPN 311 Japanese Conversation and Composition *G* (3)
- JPN 312 Japanese Conversation and Composition *G* 3)
- JPN 321 Japanese L terature 3) *L/HU, G*
- JPN 394 Special Topics 1–4
- JPN 435 Advanced Readings (3
- JPN 485 Problems of Translation 3
- JPN 494 Special Topics 1–4
- JPN 499 Individualized Instruction 1 3

Total 9

Chicana/Chicano Studies students (from left) Laura Muñoz, Eduardo Corral, Raquel Viguerîa, and Perlita Dicochea have recently earned prestigious fellowships to various universities.

Tim Trumble photo

Recommended

Two 200-level JPN courses (excluding 206) 6

In addition to the courses, the student must meet with an advisor and choose at least 15 semester hours of courses including six semester hours of CHI prefix courses such as Chinese language and calligraphy, Chinese literature in translation (CHI 321 and 322 and FLA 420) or KOR prefix courses such as Korean language and/or Korean culture, and appropriate courses in art, humanities, social and behavioral sciences, and business.

French—B.A.

Required

FRE 311 French Conversation *G* 3
FRE 312 French Composition *G* 3
FRE 321 French Literature *L/HU, H* 3
FRE 322 French Literature *L/HU* 3
Two 200-level FRE courses 6

Total 18

Select 12 semester hours from the following list including at least nine semester hours from the 400 level:

FRE 315 French Phonetics 3
FRE 319 Business Correspondence and Communication *G* 3
FRE 411 Advanced Spoken French *G* 3
FRE 412 Advanced Written French *G* 3
FRE 415 French Civilization I *HU* 3
FRE 416 French Civilization II *HU, G* 3
FRE 422 Applied French Linguistics 3
FRE 423 French Syntax 3
FRE 441 French Literature of the 17th Century *HU* 3
FRE 442 French Literature of the 17th Century *HU, H* 3
FRE 445 French Literature of the 18th Century *L/HU* 3

NOTE: For the General Studies requirement, courses, and codes (such as L, SQ, C, and H), see "General Studies," page 87. For graduation requirements, see "University Graduation Requirements," page 83. For an explanation of additional omnibus courses offered but not listed in this catalog, see "Classification of Courses," page 60.

FRE 451 French Poetry of the 19th Century 3
FRE 452 French Novel of the 19th Century *HU*. 3
FRE 453 Theater of the 19th Century *L HU* 3
FRE 461 Preatomic L terature *HU*. 3
FRE 462 Postatomic Literature *HU* 3
FRE 471 The Literature of Francophone Africa and the Car bbean *L HU*. 3
FRE 472 Franco Canadian Civilization 3
FRE 494 Special Topics 1–4
FRE 499 Ind vidual zed Instruct on . 1 3

In addition to the courses, the student must meet with an adv isor and choose at least 15 semester hours of courses from appropriate social and behavioral science, humanities, business courses, and other language courses.

German—B.A.

Required

GER 311 German Conversation *G* 3
or GER 312 German Conversat on *G* (3
GER 315 German Composition *G* . 3
GER 411 Advanced Grammar and Conversation *G* 3
GER 412 Advanced Grammar and Con position *G* 3
GER 421 German Literature *HU* 3
GER 422 German Literature *L/HU* 3
Cl o se s x semester hours from the courses below 6
GER 303 Scientific German (3)
GER 304 Scientific German 3)
GER 314 Introduction to German Literature 3)
GER 319 Business Correspondence and C mmunication *G* 3
GER 394 Special Topics 1–4
GER 415 German Civil zation *HU H* (3
GER 416 German Civi ization *HU H* (3
GER 445 German Literature Enlightenment t) Classicism 3
GER 451 German Literature Biedermeier to Naturalism (3
GER 494 Special Topics 1–4
Tw 200 leve GER courses. 6

Total 30

In addition to the courses, the student must meet with an adv isor and choose at least 15 semester hours of courses from appropriate social and behavioral science, humanities, bus ness courses, and other language courses

Italian—B.A.

Required

ITA 311 Italian C mpo ition and Co versation *G* 3
ITA 312 Italian Co iposition and Conversation *G* 3
ITA 325 Introduction to Italian Literature *HU*. 3
Tw 200 evel ITA courses 6

T tal 15

Fifteen semester hours are required from the following list including at least nine semester hours from the 400 level

ITA 314 Advanced Italian *G* 3
I A 415 Italian C v l zat on *L/HU, G* 3
ITA 420 Ital an C nema 3
ITA 430 Italian Literature of the Middle Ages *HU* 3
ITA 441 Dante. *Di ina Co mmedi a L/HU* 3
ITA 443 Italian Literature of the Renaissance *HU, H* 3
ITA 446 Italian Literature of the 18th and 19th Centuries *HU* 3
ITA 449 20th Century Italian Literature *HU G* . 3
ITA 494 Special Topics 1–4
ITA 499 Individualized Instruct on 1 3

In add t on to the courses shown above, the student must meet with an advisor and choose at least 15 semester hours of courses from appropriate social and behavioral science, humanities, business courses, and other language courses.

Russian—B.A.

Required

RUS 211 Bas c Russian Conversation *G* 3
RUS 212 Basic Russian Conversation *G* 3
RUS 311 Russ an Composition and Conversation *G* . . . 3
RUS 312 Russian Composition and Conversation *G* 3
RUS 411 Advanced Compos tion and Conversation I *G* . 3
or RUS 412 Advanced Composition and Conversation II *G* 3

Total 15

Fifteen semester hours are required from the following list including at least six semester hours from the 400 level:

RUS 303 Scientific Russian 3
RUS 304 Scientific Russ an 3
RUS 32 Survey of Russian Literature *L/HU H* . . 3
RUS 322 Survey of Russian Literature *L/HU* 3
RUS 323 Survey of L terature of the Soviet Era *L/HU G* 3
RUS 411 Advanced Composition and Conversation I *G* 3
RUS 412 Advanced Composition and Conversation II *G* 3
RUS 417 Applied Russian Phonetics 2
RUS 420 Russian Poetry *L/HU* 3
RUS 421 Pushkin *L/HU* 3
RUS 423 Dostoyevsky *L/HU* 3
RUS 424 Tolstoy *L/HU* 3
RUS 425 Chekhov *L/HU* 3
RUS 426 Literatures of the Nationalities of the Former Soviet Union *L/HU, G* 3
RUS 430 Russ an Short Story *L/HU* 3
RUS 440 History of the Russian Language 3
RUS 441 Survey of Russian Culture *L/HU G, H* 3
RUS 494 Special Topics 1–4
RUS 499 Individualized Instruction 1 3

In addition to the courses shown above, the student must meet with an adv isor and choose at least 15 semester hours of courses from appropriate social and behavioral science, humanities, business courses, and other language courses

Spanish—B.A.

Required

SPA 313 Span sh Conversation and Composition *G* . . . 3
or SPA 315 Spanish Conversation and Composition for B linguals 3
SPA 314 Spanish Conversation and Composition *G* 3
or SPA 316 Spanish Conversation and Composition for Bilinguals 3
SPA 325 Introduction to Hispanic Literature *HU* . . . 3
SPA 412 Advanced Conversation and Composition *G* 3
SPA 425 Spanish Literature *HU* 3
Choose two courses below. 6
SPA 426 Spanish Literature *HU* (3)
SPA 427 Spanish Amer can L terature *L* 3)
SPA 428 Spanish American Literature *I G* 3)
Choose one course below 3
SPA 471 Civilization of the Spanish Southwest *HU* (3
SPA 472 Spanish American Civilization *HU G H* (3
SPA 473 Spanish Civilization *HU SB G* (3)

Total 24

Electives
Two upper division (300–400 level) SPA courses 6

Total 30

Related Fields
POR 101 Elementary Portuguese 5
POR 201 Intermediate Portuguese *G* 5

Total 10

In addition to these courses, the student must meet with an advisor and choose at least six semester hours of courses from appropriate social and behavioral science, humanities, business courses, and other romance language courses.

SPA 311 and 312 are not counted toward the major or minor in Spanish.

MINORS

Each minor in Asian Languages (Chinese Japanese), French, German, Italian, and Russian consists of 18 hours, of which 12 hours must be in the upper division. In addition, specific required courses for each area follow and are in a brochure in the department.

Chinese

CHI 313 Advanced Chinese *G*. 3
CHI 314 Advanced Chinese *G* 3

Consult with the departmental advisor for other courses.

French

FRE 311 French Conversation *G* 3
FRE 312 French Composition *G*.....3
FRE 321 French Literature *L/HU, H*.....3
or FRE 322 French Literature *L/HU* (3)

Consult with the departmental advisor for other courses. Twelve hours must be at the 300 level or above.

German

GER 311 German Conversation *G*.....3
or GER 312 German Conversation *G* (3)
GER 313 German Composition *G*..... 3
One 400-level GER course 3
Upper-division GER course..... 3

Consult with the departmental advisor for other courses.

Italian

ITA 311 Italian Composition and Conversation *G*.....3
or ITA 312 Italian Composition and Conversation *G* (3)
ITA 325 Introduction to Italian Literature *HU* 3
One 400 level ITA course..... 3

Consult with the departmental advisor for other courses.

Japanese

JPN 313 Advanced Japanese *G*..... 3
JPN 314 Advanced Japanese *G* 3

Consult with the departmental advisor for other courses.

Russian

RUS 303 Scientific Russian..... 3
RUS 304 Scientific Russian 3
RUS 311 Russian Composition and Conversation *G*..... 3
RUS 312 Russian Composition and Conversation *G*..... 3

RUS 211 and 212 are the only lower division courses that may count toward the Russian minor.

Consult with the departmental advisor for other courses

Spanish

The minor in Spanish requires a minimum of 18 upper division semester hours. The required courses are as fol lows:

SPA 313 Spanish Conversation and Composition *G* 3
or SPA 315 Spanish Conversation and Composition for Bilinguals (3
SPA 314 Spanish Conversation and Composition *G* 3
or SPA 316 Spanish Conversation and Composition for Bilinguals (3)
SPA 325 Introduction to Hispanic Literature *HU* 3
SPA 413 Advanced Spanish Grammar *G*..... 3
SPA 471 Civilization of Spanish Southwest *HU*. 3
or SPA 472 Spanish American Civilization *HU, G, H* 3)
or SPA 473 Spanish Civilization *HU SB G* (3

SPA 311 and 312 are not counted toward the major or minor in Spanish.

CERTIFICATES AND EMPHASES

The following are certificate programs or emphases offered in the Department of Languages and Literatures. For more information, see "Certificate Programs and Areas of Emphasis," page 339.

Asian Studies Certificate. Foreign language students majoring in Asian Languages (Chinese Japanese) may elect to pursue an Asian Studies certificate combining courses from the major with selected outside courses of wholly Asian content.

Latin American Studies Certificate. Foreign language students majoring in Spanish may elect to pursue a Latin American Studies certificate combining courses from the major with selected outside courses of wholly Latin Ameri can content.

Russian and East European Studies. Any undergraduate major can earn a Certificate in Russian and East European Studies by successfully completing one of the options men tioned in the section on "Russian and East European Stud ies," page 341.

Scandinavian Studies. Any undergraduate major can earn a certificate in Scandinavian Studies.

Southeast Asian Studies Certificate. To earn a certificate in Southeast Asian Studies, a student must complete a mini mum of 40 semester hours of course work related to South east Asia, including two years (20 semester hours) of a Southeast Asian language.

NOTE: For the General Studies requirement, courses and codes (such as L SQ C and H), see "General Studies," page 87 For graduat on requirements, see "Un versity Graduation Requirements," page 83 For an exp anation of add t onal omn bus courses offered but not sted in this catalog, see "C assif cation of Courses," page 60.

B.I.S. CONCENTRATION AREAS

Students seek ng to focus on a language as one of their concentration areas for the Bachelor of Interdisciplinary Studies degree may choose from Chinese, French, German, Italian, Japanese, Russian, and Spanish. They may also choose from any of the approved certificate programs The requirements for the Bachelor of Arts in Interdisciplinary Studies (B.I.S. concentrations are the same for the minor in that language See "Minors," page 391, for specific course requirements. For more information, see "Division of Undergraduate Academic Services," page 114.

SECONDARY EDUCATION—B.A.E.

French, German, Japanese, and Spanish. Each of the major teaching fields in French, German, Japanese, and Spanish consists of 45 semester hours, of which 30 must be in one language and 15 in a second language or in closely related fields to be approved by the advisor in consultation with the student Of the 30 hours required for the academic specialization, a minimum of 24 hours must be taken at the 300 or 400 level and must include at least nine hours at the 400 level. Specific required courses for each major area are listed in curriculum check sheets of the individual language areas available in the department

Applications are not being accepted at this time for Chi nese and Russian.

GRADUATE PROGRAMS

The faculty in the Department of Languages and Litera tures offer programs leading to the M.A. degree in French, German, and Spanish and the Ph D degree in Spanish. See the *Graduate Catalog* for requirements.

FOREIGN LANGUAGES FOR INTERNATIONAL PROFESSIONS

The sequence of two semesters, listed under numbers 107 and 207 in two languages (French and Spanish), integrates an accelerated study, a functional approach to course design, and preparation for international professions (e.g., business, diplomacy, international political economy). It is parallel to the traditional sequence of 101 through 202 and also satisfies the college's foreign language requirement. The sequence differs from traditional basic language programs in that all aspects of the language vocabulary, grammar, and skill development are practiced within the context of authentic communication for social and profes siona purposes in the target culture. Classes meet eight hours weekly, for eight semester hours in each of two semesters.

Students who have had success in learning one foreign language are encouraged to join this program in a second language Students should contact the Department of Lan guages and Literatures before registration.

CERTIFICATE PROGRAM IN TRANSLATION

The Certificate Program in Translation is designed to provide the advanced training required for professional translation in both public and private sectors, preparation for the rigorous examinations required by national and international agencies, and training as an ancillary skill for professional fields, such as international business, public health and medicine, and law, in accordance with guidelines recommended by the American Translators' Association The certificate is a nondegree program consisting of 12 semester hours of course work and two hours of in service practicum primarily into the receptor language of English from the source language of Spanish. It may be taken simultaneously with course work leading to an undergraduate or graduate degree, as a related area sequence, or as the sole program of study for members of the community who meet the admission requirements of the certificate program and are enrolled in the university. A complete brochure is available at the Department of Languages and Literatures, LL 440

While the certificate program is not yet available in French, FRE translation courses may be available. See the *Schedule of Classes* for course offerings.

Admission Requirements. Since entrance to professional translation is through work, cultural experience, and exami nation, the two entrance requirements to this certificate pro gram are (1) written proficiency examination in the source and the receptor languages at the level of completion of the fourth year or most advanced composition course in Span ish, which at ASU is SPA 412 and (2) either an academic year at a university in a Spanish speaking country, an extensive work experience using Spanish, or demonstrated bilin gual facility, both written and oral, in English and Spanish

Certificate Requirements. The certificate program consists of the following requirements:

Prerequisites

FLA	400	Linguistics *SB*	3
		or SPA 494 ST: Introduction to Hispanic Linguistics 3	
		or equivalent	
SPA	413	Advanced Spanish Grammar *G*	3
SPA	494	ST: Lexicography	3

Required

FLA	401	Translation Theory and Practice	3

In-Service Practicum

FLA	484	Internship	2

Also required are nine hours of applied translation elec tives in specialized areas chosen from the following courses:

FLA	481	Technical and Scientific Translation	3
FLA	482	Business and Financial Translation	3
FLA	483	Medical and Legal Translation	3
FLA	485	Problems of Literary Translation	3

FOREIGN LANGUAGE REQUIREMENT

The College of Liberal Arts and Sciences requires knowl edge of one foreign language equivalent to the completion of two years' study at the college level. This normally includes a sequence of courses numbered 101 and 102 and 201 and 202 *or* 107 and 207. For mportant exceptions in Greek, Latin, and Portuguese, see the statement at the head of respective course descriptions

FOREIGN LANGUAGE PLACEMENT

Students who transfer from other postsecondary institu tions with foreign language credits below the 202 level are placed in a course at the level directly above the work com pleted.

Students who have completed their secondary education at a school in which the language of instruction was not English are considered to have satisfied the foreign lan guage requirement. Certification of this status is made at the time of admission to ASU. Questions should be addressed to the foreign credentials evaluator at Undergraduate Admis sions.

The foreign language requirement can be met in lan guages not taught at ASU either by transferring credit from another institution or by passing a proficiency examination. When possible, the Department of Languages and Litera tures recommends to the college an appropriate source for such examinations and proctors them. Grading is done by the institution that provides the examination, and the student pays any costs incurred The examination can be used only to demonstrate proficiency, it does not produce semester hours of credit

Students desiring placement above the 101 level course in French, German, or Spanish should take the placement exam for that language in the Computer Language Labora- tory, LL 65.

Ordinarily, no placement or proficiency examination is administered to students who wish to continue studying lan- guages for which high school credits have been earned Stu dents should be guided by the following principles of equiv alency: (1) one unit (one academic year) of high school level study is considered, for placement purposes only, to equal one semester of study of the same language at the uni versity level Thus, students with one year of high school study would enroll in the second semester course 102); stu dents with two years of high school study, in the third semester course (201), and so on. (2) students who feel that their high school language preparation was inadequate may choose to place themselves in a lower level, but not lower than 111 with two or three years of high school study and 201 with four years of high school study.

Students with prior knowledge of a language may meet the college foreign language requirement in any one of the following ways:

1. by satisfactory results in a nonrepeatable college approved proficiency examination;
2. by achieving a grade of at least "C" in the last course of the required sequence; or
3. by achieving a grade of at least "C" in a course at the next higher level.

Students are expected to follow the progressive sequence of 100, 200, and 300. Once a grade of "C" or higher is earned in a 300-level class in a language, students may not earn lower division credit in that language

First year foreign language courses taught by the Depart ment of Languages and Literatures are not open to students who have spent one or more years in a country where that language is the predominant language. Individual language areas may have different policies Students with questions about this policy should check with the appropriate lan guage coordinator in the department.

If transfer students are uncertain about course equivalen cies, they should contact the Department of Languages and Literatures.

LANGUAGE LABORATORY REQUIREMENT

All students enrolled in 101, 102, 201, and 202 language courses are expected to spend a minimum of one hour per week in the language laboratory or in other assigned audio lingual tape exercises in addition to the regular class peri ods.

FOREIGN LANGUAGES (FLA)

FLA 150 Introduction to East Asian Culture. 3 S
An ntroduction to the cultures of Ch na Japan, and Korea *General Stud es HU G.*

FLA 323 Survey of Literature of the Soviet Era in Translation. (3 F, S
Survey ma n terary movements prom nent authors most s'gn f cant works of prose, poetry and drama of the Soviet per od 1917 1991 *Genera Stud es· L/HU G*

FLA 400 Linguistics. 3 S
Introduction t the ana ys s of anguage and ts use in soc a contexts Top cs morph ogy, phonology pragmat cs semant cs syntax, and var at on Open to jun ors w th nstructor approval *General Studies· SB*

FLA 401 Translation Theory and Practice. (3) N
Trans ation theories and profess ona pract ces and ethics b bl ogra phy c mputer techno ogy, and samp e texts for natural and soc al sci ences and human t es Prerequ s te. 4th year composit on or instructor approva n respect ve anguage area

FLA 415 Bilingualism and Languages in Contact. (3) F
Analys s of ngu st c aspects of b ngua sm e g p dg ns and creoles code-sw tch ng, and other contact phenomena, s multaneous sequen t al b ngua anguage acqu s t on. Prerequ's te FLA 400 (or equ'va ent or nstructor approva

FLA 420 Foreign Literature in Translation. 3) F, S
Top cs may be chosen from the fo ow ng
(a) Braz l an
b) Ch nese
c) French
(d German
e Greek
f) ta ian
g) Latin
h Portuguese
(i) Russ an
(j) Soviet
(k) Span sh
(l) Span sh Amer can
Not for anguage majors (except n As an anguages and Russ an open to anguage majors as a re ated-area course Graduate students by perm ss on. *Genera Studies. HU, G*

FLA 421 Japanese Literature in Translation. (3) F S
Read ngs se ected by theme or genre or period from var ous works of Japanese iterature n Eng 'sh trans at on May be repeated as top c changes Graduate students by perm ss on Prerequ s te a course that satisf es the L General Stud es requirement *Genera Stud es L/ HU G*

FLA 480 Methods of Teaching Foreign Languages. (3) F
Teach ng fore gn anguages and teratures at secondary and co ege evels Th s course does not meet the L bera Arts and Sc ences gen- era stud es requirement for human ties and f ne arts Requ red for adm ss on to SED 478 Prerequ s te 12 hours of upper d vis on courses in 1 fore gn language

FLA 481 Technical and Scientific Translation. (3) N
Resources practices, strateg es and exicon for trans at on of profes- s onal texts n subjects such as eng neer ng, arch tecture agr cu ture computer techno ogy e ectron cs and phys ca and b o og ca sc ences Prerequisite· FLA 401

NOTE: For the Genera Stud es requ rement courses, and codes (such as L SQ C and H), see "General Studies" page 87 For graduation requ rements see "Un vers ty Graduat on Requ rements page 83. For an explanation of add t onal omn bus courses offered but not l sted in this cata og see "C assif cat on of Courses, page 60

FLA 482 Business and Financial Trans ation. 3) N
Resources, practices strateg es, and iex con for trans at on of profes- s ona texts n subjects such as econom cs, f nance insurance man agement market ng account ng advert s ng and real estate Prerequisite· FLA 401

FLA 483 Medical and Legal Translation (3 N
Resources and strateg es for trans at on of profess ona texts n sub jects such as med c ne nurs ng pub c hea th cr m na just ce and nternat ona aw May be repeated for a tota of 6 semester hours Pre requ te FLA 401

FLA 484 Internship. 1 12 N

FLA 485 Problems of Literary Translation. (3) N
Theory and practice w th emphas s on app cation through nd v dual trans at on projects. May be repeated for a total of 6 semester hours Prerequ s te FLA 401 or nstructor approva n the respect ve lan guage area

FLA 494 Special Topics. 3 F
Major trends of ta an c'nema from the post war per od to the present

FLA 515 Second Language Acquisition. 3 S
D scuss on and app cat on of theories of second anguage acquis - t on Prerequ s te: FLA 400 or equ valent

FLA 525 Trends and Issues in Foreign Language Teaching. (3 N
Advanced methods sem nar designed for exper enced teachers

ARABIC (ARB)

ARB 101 Elementary Arabic. 4 F
Read ng wr t ng speak ng and understand ng bas c Arab c 4 hours ecture 1 hour ab

ARB 102 Elementary Arabic. (4 S
Read g wr t ng, speak ng and understand ng bas c Arabic 4 hours ecture, 1 hour ab. Prerequ s te ARB 101 or equiva ent

ARB 201 Intermediate Arab c. (4) F
Rev ew of Arab c grammar w th emphasis on the deve opment of the sk s f sten ng comprehens on read ng, speak ng and wr t ng 4 hours ecture 1 hour ab Prerequ s te ARB 102 or equ va ent *Gen eral Stud es: G.*

ARB 202 Intermediate Arab c. (4 S
Rev ew of Arab c grammar w th emphas s on the deve opment of the sk s of l sten ng comprehens on read ng speak ng and wr t ng 4 hours lecture 1 hour lab Prerequ s te ARB 201 or equiva ent *Gen era Stud es. G*

CHINESE (CHI)

CHI 101 Elementary Chinese. 5 F
Pronunc at on grammar e ementary conversat on and deve opment of bas c read ng and wr t ng sk s. Standard dia ect. 5 c ass hours

CHI 102 Elementary Chinese. 5 S
See CH 101 Prerequ s te CH 101 or equ va ent

CHI 107 Chinese for International Professions I. (10 F
Acce erated program a ternative to CHI 101 102 sequence Func t ona approach to needs of nternat ona profess ons 10 c ass hours

CHI 201 Intermediate Chinese. 5 F
Systemat c rev ew of grammar. Deve opment of vocabu ary through read ng and wr t ng Dr n aura ora sk ls 5 c ass hours Prerequ - s te· CH 102 or equ va ent *Genera Stud es G*

CHI 202 Intermediate Ch nese. 5 S
See CH 201 Prerequ s te CH 201 or equ va ent *General Stud es· G*

CHI 205 Chinese Calligraphy. 1 F, S
An ntroduct on to sty es and techn ques of Ch nese wr t ng Know edge of Ch nese or Japanese is not requ red

CHI 207 Ch'nese for International Professions II. 10) S
Cont nuat on of CHI 107, alternat ve to CH 201 202 sequence Expans on of commun cat ve prof c ency n spec f c areas of nterna t ona profess ons 10 c ass hours Prerequ s te CH 107 or nstructor approva *Genera Stud es G*

CHI 309 Chinese Conversation. 2 F
A ra ora dri s us ng contemporary stor es art c es and essays For students w th ower leve prof c ency Prerequ s te CHI 202

CHI 310 Chinese Conversation. 2 S
See CH 309 Prerequ s te CH 202

CHI 311 Chinese Conversation. 2) F
ntens ve aura ora pract ce in Modern Ch nese For students who have ved in Ch na or a Ch nese speak ng env ronment Discuss on dr Prerequ site CH 202

CHI 312 Chinese Conversation. (2 S
See CH 311 D scuss on dr Prerequ s te: CH 202

CHI 313 Advanced Chinese. (3) F
The modern language n genera or spec f c areas depending on the student's needs or nterests 3 hours lecture arranged ab Prerequ s te CH 202 or equ va ent *General Stud es. G.*

CHI 314 Advanced Chinese. 3) S
Cont nuat on f CHI 313 Prerequisite· CHI 313. *Genera Stud es G*

CHI 321 Chinese Literature. 3 F
Masterworks of the trad tion from the 6th century B C E. through the 13th century. Read ngs, ectures and examinat ons are n Eng sh *General Stud es L/HU*

CHI 322 Chinese Literature. 3 S
Masterp eces from the ater trad t on and ts trans t on to modern t mes Read ngs lectures and exam nat ons are n Eng sh *Genera Stud es L/HU G*

CHI 413 Introduction to Classical Chinese. 3 F
Read ng n var ous genres of pre-20th century terature wen yen) with ana ysis of the structure of the c ass ca wr t ngs Prerequ s te CH 314 or nstructor approva *General Stud es· HU*

CHI 414 Introduction to Classical Chinese. 3 S
Continuat on of CHI 413 Prerequ s te CH 413 *General Stud es: HU*

CHI 494 Spec'al Topics. 1–4 N

CHI 499 Individualized Instruction. 1 3 N

CHI 500 Bibliography and Research Methods. 3) N
ntroduct on to research mater als on Ch na n Ch nese Japanese and Western anguages. Overview of research methods Lecture d s- cuss on

CHI 514 Advanced Classical Chinese. (3) N
C ose read ngs n se ected premodern texts w th focus on spec a grammatica features and ncreased vocabu ary Lecture discuss on

CHI 520 Teaching of Chinese as a Second Language. (3 N
Theory and pract ce of teaching Ch nese 'nc ud ng presentat n, nter act on and eva uat on w th cons derat on g ven to cu tura factors Lecture, d scuss on

CHI 535 Advanced Readings. (3) N
Read ngs n pr mary and secondary sources n h story art re g ous stud es economics or other f e ds Lecture, discuss on

CHI 543 Chinese Language and Linguistics. 3 F
Ana ys s and d scussion w th n the framework of ngu st c theory of se ected problems n Ch nese phonet cs morpho ogy and syntax Lecture, discuss on

CHI 585 Problems of Translation. 3 N
Theories and practice of trans at on strateg es for hand ing a var ety of Ch nese texts Lecture d scuss on

CHI 591 Seminar. (3) N
Top cs n terary, ngu st c, or cultura studies.

FRENCH (FRE)

FRE 101 Elementary French. 4) F S SS
ntens ve aural/ora dri n c ass and laboratory basic grammar sup p emented by simp e prose read ngs 4 hours ecture 1 hour lab Not open to students w th cred t n FRE 111.

FRE 102 Elementary French. 4 F S SS
See FRE 101 Prerequ site FRE 101 or equ va ent

FRE 107 French for International Professions I. 8 F
Accelerated a ternat ve to FRE 101 102 F nct ona approach Emphasis on speak ng understanding wr t ng and read ng for com mun cat ve competence for nternationa profess ons

FRE 111 Fundamentals of French. (4) F S
Pr mar ly for students w th two years of high school French who need rev ew to enter second year study Not open to students w th cred t n FRE 101 or 102 4 hours ecture 1 hour lab.

FRE 201 Intermediate French I. (4) F S, SS
Grammar rev ew w th emphas s on development of sk s of speak ng read ng wr t ng and sten ng comprehension Four hours ecture 1 hour ab Prerequ s te FRE 102 or 111 or equ valent. *General Stud es G*

FRE 202 Intermediate French II. (4) F S, SS
Continuation of grammar rev ew w th emphas s on deve opme t of sk ls n speaking, read ng wr ting and sten ng comprehension 4 hours ecture, 1 hour ab Prerequ s te FRE 201 or equiva ent *Gen eral Stud es G*

FRE 205 Readings in French Literature. (3) F, S, SS
Designed to teach read ng with faci ty and comprehens on. Vocabu ary bui d ng and textual ana ysis of l terary genres are major e e ments Prerequ s te· FRE 202 or equ valent *General Studies G.*

FRE 207 French for International Professions II. (8) S
Cont nuat on of FRE 107 alternat ve to FRE 201 202 sequence. Expans on of communicat ve prof c ency n specif c areas of nterna tional professions Prerequ's te. FRE 107 or nstructor approval *Gen eral Stud es· G*

FRE 311 French Conversation. 3) F, S
Further practice n speak ng French emphas z ng current usage and promot ng fac ity in the express on of ideas. Prerequisite 8 hours of 200 leve French or equ valent. *General Studies. G.*

FRE 312 French Composition. (3) F S
Further pract ce n wr't ng French, emphas z ng current usage and promot ng fac t ty in the express on of deas. Prerequis te 8 hours of 200 evel French or equivalent. *General Studies. G.*

FRE 315 French Phonetics. (3) F
Pract ce and theory of French pronunc at on Emphas s is on standard French a though an overv ew of reg onal var eties s offered. Lecture and ab Prerequ s te FRE 311 or equiva ent.

FRE 319 Business Correspondence and Communication. (3) S
Organ zation and presentat on of clear, effect ve bus ness communica tions vocabu ary app cab e to modern bus ness usage Prerequ s te FRE 312 or nstructor approva *General Stud es· G*

FRE 321 French Literature. (3) F S
Representative masterp eces and s gn f'cant movements of French l t erature of the middle ages through the 18th century Prerequ s te FRE 205 or equ va ent *Genera Stud es L/HU H*

FRE 322 French Literature. 3) F S
Literature of the 19th and 20th centuries Prerequ s te FRE 205 or equ va ent *General Stud es. L/HU*

FRE 411 Advanced Spoken French. (3) F S
Improvement of spoken French Prerequis tes: 9 hours of 300 evel French, includ ng FRE 311 *or* equ va ents *General Stud es G*

FRE 412 Advanced Written French. (3 F, S
mprovement of compos tion sk s Prerequisites· 9 hours of 300 evel French, ncluding FRE 312 *or* equ va ents *General Studies. G*

FRE 415 French Civilization I. (3) F
Po it ca ntel ectua soc a econom c, and art st c deve opment of France from its or g ns to the end of the 17th century. Prerequ s te 6 hours of upper d v s on French. *General Stud es HU.*

FRE 416 French Civilization II. (3) S
Po t ca , nte ectua soc al, economic and artist c deve opment of France from the 18th century to present Prerequ'site· 6 hours of upper d v s on French *General Stud es HU G.*

FRE 421 Structure of French. (3) F
Phono ogy, morpho ogy, syntax, semant cs and var et es of French Prerequ s tes FRE 311 and 312 *or* nstructor approva

FRE 422 Applied French Linguistics. 3) S
Appl cat on of ingu stic theory and second anguage acqu s tion the ory to teach ng of French Prerequ site. ASB 480 or ENG 213 or FLA 400

FRE 423 French Syntax. 3) F
The ana ysis of French syntact c structure by contemporary theoretica mode s Prerequisite ASB 480 or ENG 213 or FLA 400.

FRE 424 French Phonology. (3) S
ntroduct on to phono og ca theory and ts appl cation to French Prerequ sites. FRE 311 and 312 *or* nstructor approva .

FRE 441 French Literature of the 17th Century. (3 N
From 1600 to 1660 Prerequ s te 9 hours of 300 level French nc ud ng FRE 321 *or* nstructor approva *General Studies HU*

FRE 442 French Literature of the 17th Century. (3) N
From 1660 to 1700 Prerequ s te 9 hours of 300 evel French nc ud ng FRE 321 *or* nstructor approval *General Stud'es HU, H*

FRE 445 French Literature of the 18th Century. 3 N
Contr but ons of the ph osophers and the deve opment of the nove and drama Prerequ s te 9 hours of 300 evel French inc ud ng FRE 321 *or* nstructor approva . *General Stud es L/HU*

FRE 451 French Poetry of the 19th Century. (3) N
From Romant c sm to Parnassian poetry to Symbo sm Prerequ s te 9 hours of 300 eve French ncluding FRE 322 *or* instructor approva

FRE 452 French Novel of the 19th Century. 3) N
From Constant Hugo, Ba zac Stendhal, and Sand to Flaubert and Zo a w th emphas s on major terary movem nts. Prerequis te· 9 hours of 300 eve French ncluding FRE 322 *or* nstructor approva *General Stud es HU*

FRE 453 Theater of the 19th Century. (3) N
From Romantic drama to the Symbo st Theater Representat ve p ays of Hugo Musset V gny, Dumas, Becque R stand Feydeau, and M'r beau Prerequ s te 9 hours of 300- evel French, includ ng FRE 322 *or* nstructor approva *General Studies L/HU*

FRE 461 Preatomic Literature. (3) F
Representat ve authors from Proust and Ma raux to Sartre from 1900 to 1945. Prerequis te· 9 hours of 300 eve French nc ud ng FRE 322 *or* nstructor approva . *General Stud es. HU*

FRE 462 Postatomic Literature. (3) S
Representat ve authors nc ud ng Camus, Duras and Robbe-Gr let from 1945 to present Prerequ s te 9 hours of 300- evel French, nc ud ng FRE 322 *or* nstructor approva . *Genera Stud es. HU*

FRE 471 The Literature of Francophone Africa and the Caribbean. (3) N
Se ected prose poetry and drama of b ack authors from Africa and the Car bbean Prerequ s te 9 hours of 300 eve French, inc ud ng FRE 322 *or* nstructor approva *Genera Stud es L/HU*

FRE 472 Franco-Canadian Civilization. (3 S
A study of the civ zat on of Quebec in part cu ar through 'ts h story, language terature, mus c, and customs Prerequis te 9 hours of 300 leve French or instructor approval

FRE 494 Special Topics. (1–4) N

FRE 499 Individualized Instruction. 1 3) N

FRE 500 Bibliography and Research Methods. (3 F
Requ red of a graduate students

FRE 510 Explication de Textes. (3) N
Deta ed ana ysis of terary texts

FRE 515 Intellectual Currents in France, from the Middle Ages to the 18th Century. 3) N
S gn f cant soc a , aesthet c ph losoph c and scientific deas as pre sented by major wr ters of f ction and nonfict on.

FRE 516 Intellectual Currents in France, from the 19th Century to the 20th Century. (3) N
See FRE 515.

FRE 521 History of the French Language. 3) N
Pr nc pa phono og ca morpho og ca and semantic deve opments of French from Lat'n to present w th emphas s on o d and m ddle French. Some fami ar ty with Latin s recommended

FRE 531 Medieval French Literature. 3) F
Read ngs n the ep cs, ear y drama roman courto s, and other repre sentat ve terary genres of the M dd e Ages

FRE 535 French Literature of the 16th Century. 3 S
Read ngs n French Rena ssance iterature w th spec a attent on to the human st movement and to Rabe a s Monta gne and the P e ade

FRE 591 Seminar. 3) N
Top cs may be se ected from the fo owing
a) Advanced Prob ems in French L terature
(b) Ba zac
c) Corne e Mo ère and Racine
d) Diderot Vo taire, and Rousseau
(e Flaubert
(f) French Ex stentia st Literature
(g) French Literary Cr tic sm
(h) Proust
(Rea ism and Natura 'sm
(j Romant c sm
k) Stendhal and Zola

NOTE: For the Genera Stud es requirement courses and codes (such as **L**, SQ, C, and H) see General Stud es page 87 For graduat on requ rements, see "Univers ty Graduat on Requirements," page 83 For an explanat on of add t onal omn bus courses offered but not sted n th s cata og, see "Class f cat on of Courses," page 60

GERMAN (GER)

GER 101 Elementary German. 4) F S, SS
Read ng, wr t ng, speak ng and understanding of bas c German, with emphas s on pronunc at on and grammar 4 hours ecture 1 hour lab Not open to students w th credit in GER 111.

GER 102 Elementary German. 4 F, S SS
See GER 101 Prerequ s te GER 101 or equ va ent

GER 111 Fundamentals of German. 4) F, S
Pr mari y for students w th two years of high schoo German who need review to enter second year study. 4 hours lecture, 1 hour ab. Not open to students with cred t n GER 101 or 102

GER 201 Intermediate German. (4) F, S SS
ntens ve rev ew of grammar, with emphasis on the deve opment of the ski ls of speaking, stening comprehens on read ng, and writing 4 hours lecture, 1 hour ab Prerequisite· GER 102 or 111 or equivalent *General Stud es G.*

GER 202 Intermediate German. 4 F, S, SS
See GER 201. Prerequisite GER 201 or equ va ent *General Stud es G*

GER 303 Scientific German. (3) N
Acqu s tion of a spec a zed vocabu ary through the read ng of German scientif c publ cat ons Prerequis te GER 202 or equ valent

GER 304 Scientific German. (3) N
See GER 303 Prerequ s te GER 202 or equiva ent

GER 311 German Conversation. 3) F
Expans on of d om through ora pract ce dea ing w th contemporary art c es essays and stories 3 semester hours l mit for majors. Pre requisite: GER 202 or equ va ent *General Studies G*

GER 312 German Conversation. 3) S
See GER 311 Prerequ s te· GER 202 or equ va ent *General Studies G*

GER 313 German Composition. (3) S
Intens ve pract ce in writ ng emphas z ng sty e, and grammar Prereq uis te GER 202 or equ valent *General Stud es G.*

GER 314 Introduction to German Literature. (3 F
Beg nn ng study of German poetry drama the novel, and the *Novelle* Prerequisite· GER 202 or equ va ent

GER 319 Business Correspondence and Communication. (3) N
Organ zat on and presentation of c ear effect ve bus ness commun ca t ons vocabu ary app cab e to modern bus'ness usage Prerequ s te· GER 313 or nstructor approva *General Stud es G*

GER 394 Special Topics. (1–4) N

GER 411 Advanced Grammar and Conversation. (3) F
Improvement of dict on and diom through ntens ve oral review Pre requ s te: GER 311 or 312 or equ va ent *General Stud'es G*

GER 412 Advanced Grammar and Composition. (3) S
mprovement of wr ting ab ty Prerequisite: GER 313 or equ va ent *Genera Stud es G.*

GER 415 German Civilization. 3 S
Aspects of pol tica , social and cu tura fe of the German-speak ng wor d from the beg nn ng through 1600. Prerequ s te any 300 eve course n German or nstructor approva *General Stud es· HU, H*

GER 416 German Civilization. (3 F
From 1600 through 1945. Prerequ s te any 300 leve course n Ger man or instructor approva *General Stud es HU H*

GER 421 German Literature. (3) F
From the beg nn ng to class c sm Prerequ s te: 6 hours of 300- evel German. *Genera Stud es. HU.*

GER 422 German Literature. 3 S
From Romant c sm to the present Prerequ s te 6 hours of 300 eve German. *General Stud es· L/HU*

GER 445 German Literature: Enlightenment to Classicism. 3) N
Ma or works of the iterary epochs n the century. Prerequ s te GER 421 or nstructor approva

GER 451 German Literature: Biedermeier to Naturalism. (3) N
Representative works of prose and poetry from 1820 to 1890. Prereq u s te GER 422 or nstructor approval

GER 453 German Literary Masterpieces on Film. 3) F S, SS
F m and terature n the r corre at on to each other and to cultura po t cal, and soc a trends n German speak ng countr'es. Spec a arrangements for graduate students and those w thout a know edge of German Lecture, d scussion *Genera Stud es HU, G, H*

GER 461 Contemporary German Literature. 3 S SS
German wr ters s nce 1945 Prerequis te GER 422 or instructor approva

GER 494 Special Topics. 1–4) N

GER 500 Bibliography and Research Methods. 3) N
Requ red of a l graduate students

GER 511 German Stylistics. (3) N
Art of wr t ng iterary German, comparat ve styl st cs

GER 521 History of German Language. (3 N
L ngu st c development of German from the ear est records to the present

GER 523 German Drama. (3) N
Drama of the 19th and 20th centuries

GER 525 German Novel. (3) N
Spec a studies in the German novel

GER 527 The *Novelle.* (3) N
Spec al studies n the German short story

GER 531 Middle High German Language and Literature. (3 N
Reading and d scuss on of spec mens of the M dd e H gh German ep cs romances, and other terary genres

GER 551 Romanticism. 3 N
Treatment of early and ate Romant c sm

GER 555 Modern German Literature. (3 N
Major works from the per'od of Express n sm to 1945

GER 591 Seminar. (3) N
Spec a top cs are concerned w th a figure theme or work n German terature or German c stud es Top cs may be se ected from the fol ow ng
(a) Faust
b) German c Studies
(c Goethe
d Grass and Bo l
e) Hesse
f) Kafka
(g) K e st
(h) Sch er

ANCIENT GREEK (GRK)

To satisfy the foreign language requ rement, students must take GRK 301 and 302

GRK 101 Elementary Ancient Greek. (4) F
Anc ent Greek grammar and vocabulary w th an emphas's on deve op ing reading sk ls For beg nn ng students on y

GRK 201 Intermediate Ancient Greek. 4 S
Continuat'on of GRK 101 ncreased emphas s on read ng texts adapted from Ar stophanes Demosthenes and P ato Prerequisite: GRK 101 or instructor approva

GRK 301 Ancient Greek Literature. (3 F
Readings n the masterpieces of anc ent Greek l terature; advanced grammar Authors read are changed each year n accordance w th needs of the c ass. May be repeated for credit Prerequ s te GRK 201 or nstructor approval *Genera Stud es. HU*

GRK 302 Ancient Greek Literature. (3) S
Continuat on of GRK 301. Prerequ s te GRK 201 or nstructor approva *Genera Stud es HU*

HEBREW (HEB)

HEB 101 Elementary Modern Hebrew. 4) F
Read ng wr t ng, speaking and understanding of basic modern Hebrew w th emphas s on pronunc at on and grammar 4 hours lec ture 1 hour ab

HEB 102 Elementary Modern Hebrew. (4) S
Read ng wr t ng speak ng, and understand ng of bas c modern Hebrew, with emphas s on pronunc at on and grammar 4 hours ec ture, 1 hour ab. Prerequ site. HEB 101 or equ va ent

HEB 201 Intermediate Modern Hebrew. (4 F
Intens ve rev ew of grammar, with emphas's on the deve opment of the sk l s of speaking isten ng comprehens on, reading and writ ng 4 hours ecture, 1 hour ab. Prerequis'te: HEB 102 or equ va ent. *Gen eral Stud es G*

HEB 202 Intermediate Modern Hebrew. 4) S
ntens ve rev ew of grammar, w th emphas s on the development of the sk l s of speak ng sten ng comprehens on, read ng and wr t ng 4 hours ecture, 1 hour ab. Prerequ s te HEB 201 or equ va ent *Gen-era Studies G*

HEB 313 Advanced Modern Hebrew. (4) F
Cont nued deve opment of ab ty to commun cate ora y and in wnt ng. Read ng of se ected terary works Prerequ s te: HEB 202 or equ va ent.

HEB 314 Advanced Modern Hebrew. 4 S
Cont nued deve opment of ab ty to commun cate ora ly and 'n wnt ng. Read ng of se ected terary works Prerequ s te: HEB 313 or equ va ent

HEB 375 Contemporary Culture of Israel. (3 F, S
Intense study of aspects of h stor ca soc al po it ca and cu tura modern fe in Israe Beg nn ng of Z on sm to present day Lecture d s-cuss on *Genera Stud es HU G*

INDONESIAN (IDN)

IDN 101 Elementary Indonesian I. 5) F
Bas c commun cat on read ng and wr t ng sk s ntensive ora aural classroom dr supp emented by prose reading 4 hours ecture 1 hour ab

IDN 102 Elementary Indonesian II. (5) S
Basic commun cat on read ng, and wr t ng sk s. ntensive ora aural c assroom dr supp emented by prose read ng 4 hours ecture 1 hour ab Prerequ s te DN 101 or equ valent

IDN 201 Intermediate Indonesian I. (5) F
Systemat c review of grammar Cont nued deve opment of commun cat on sk s with ncreased emphas s on read ng and wnt ng 4 hours ecture, 1 hour ab Prerequ s te DN 102 or equ valent *General Stud es. G*

IDN 202 Intermediate Indonesian II. (5 S
Systemat c rev ew of grammar Cont nued deve opment of commun cat on sk s w th ncreased emphas s on read ng and wnt ng. 4 hours ecture 1 hour ab Prerequ s te DN 201 or equ valent *General Stud-es G*

ITALIAN (ITA)

ITA 101 Elementary Italian. 4 F, S
Aura ora dr l in c ass and aboratory and bas c grammar supp e mented by s mp e prose read ngs 4 hours ecture 1 hour lab

ITA 102 Elementary Italian. 4 F, S
See ITA 101 P erequ s te TA 101 or equ va ent

ITA 201 Intermediate Italian. (4 F S
ntens ve rev ew of the fundamenta s of ita an grammat ca structure to ncrease the student's ab ty n compos tion trans ation and d om at c express on 4 hours ecture, 1 hour ab Prerequ s te: TA 102 or equiva ent *General Stud es G.*

ITA 202 Intermediate Italian. 4 F S
See TA 201 Prerequ site: ITA 201 or equ valent *General Studies G*

ITA 311 Italian Composition and Conversation. 3) F S
Development of wr t ng ab 'ty and ora express on Prerequ s te ITA 202 or equ valent *Genera Stud es. G.*

ITA 312 Italian Composition and Conversation. (3) F S
See TA 311. Prerequ s te· ITA 202 or equ va ent *General Stud es G*

ITA 314 Advanced Italian. (3) N
An advanced grammar and compos t on course w th read ngs of se ected iterary works Prerequ s te· ITA 202 or instructor approva *General Stud es G*

ITA 325 Introduction to Italian Literature. 3) F
ta an terature through the nterpretat on of representat ve works n drama poetry, and novel Prerequ s te ITA 202 or nstructor approval. *Genera Stud es. HU*

ITA 394 Special Topics. (1–4 N

ITA 415 Italian Civilization. 3 N
A genera survey of h story terature art and mus c emphas z ng ta y s cu tura contr but on to Western c v l zat on. Prerequ'sites: ITA 311 312 (or 314) *Genera Stud es L/HU G*

ITA 420 Italian Cinema. 3) F
Major trends of Ital an c nema from the post war per od to the present

ITA 430 Italian Literature of the Middle Ages. 3) N
Emphas s on "St l Novo, Dante s m nor works, Petrarch, and Boccac c o Prerequ s te ITA 325 or nstructor approva *General Stud es HU*

ITA 441 Dante: *Divina Commedia.* 3) N
Cr tica read ng of the three Cant che (nferno, Purgator o and Parad so) Prerequ s te TA 325. *General Stud es: L/HU.*

ITA 443 Italian Literature of the Renaissance. 3) N
Emphas s on Lorenzo de'Med c , Po z ano Cast g one Mach ave , Ariosto, and Tasso Prerequ s te TA 325 or nstructor approval. *Gen eral Stud es HU H*

ITA 446 Italian Literature of the 18th and 19th Centuries. 3) N
Go don , Par ni, Alfier the poetry of Foscolo and Leopard , and the soc oh stor ca nove s of Fosco o Manzon and Verga. Prerequis te. ITA 325 or nstructor approva . *Genera Stud es. HU.*

ITA 449 20th-Century Italian Literature. 3 N
Major works f gures and movements of contemporary ta ian tera ture. Prerequ s te TA 325. *Genera Studies HU G*

ITA 494 Special Topics. (1–4) N
(a) ta 'an/American Cu ture. (3

ITA 499 Individualized Instruction. (1 3) N

JAPANESE (JPN)

JPN 101 Elementary Japanese. 5 F
Communicat on ski s and bas c sk s in grammar, read ng and wr't ng, includ ng h ragana, katakana and about 75 kanj . 5 hours/week

JPN 102 Elementary Japanese. (5 S
Cont nuat on of JPN 101. Addit ona 99 kanj Cont nued development of commun cat on sk s n speak ng sten ng, reading wr ting and culture Prerequ s te JPN 101 or equ va ent

JPN 107 Japanese for International Professions I. (10 F
Acce erated program a ternat ve to JPN 101, 102 sequence Func t ona approach to needs of nternat ona profess ons 10 c ass hours a week.

JPN 201 Intermediate Japanese. 5) F
Cont nued deve opment of commun cat on ski is. ncreased emphas s on read ng and wr t ng Rev ew of fundamenta s of structure to ncrease student s abi it es n composit on and trans ation 5 c ass hours a week Prerequ s te JPN 102 or equ valent *General Stud es G*

JPN 202 Intermediate Japanese. (5) S
Cont nuat on of JPN 201 Prerequ s te JPN 201 or equ va ent *Gen eral Stud es G*

JPN 206 Calligraphy. (1) N
Introduction to the pract ce of ca l graphy n Japan, with emphas s on the der vation of Japanese kana syl abar es from Ch nese characters Prerequ s te CH 205 or JPN 101

JPN 207 Japanese for International Professions II. (10 S
Cont nuat on of JPN 107 a ternative to JPN 201, 202 sequence Expans on of commun cative prof ciency n specif c areas of nterna tiona profess ons 10 c ass hours a week Prerequisite JPN 107 or nstructor approva *Genera Stud es G*

JPN 309 Intermediate Japanese Conversation. (2) F
Pract ce n current usage n express on of ideas Recommended espe-c a y for those who have not had the opportun ty to pract ce Japanese n Japan Prerequ s te JPN 202

JPN 310 Intermediate Japanese Conversation. (2) S
Cont nuat on of JPN 309 Prerequ s te JPN 309

JPN 311 Japanese Conversation and Composition. 3) F
ntens ve aural/ora pract ce ead ng toward conversat ona f uency Practice in wr ting Japanese emphas z ng current usage Prerequ - s te JPN 202 *Genera Stud es. G.*

JPN 312 Japanese Conversation and Composition. 3 S
See JPN 311 Prerequis te JPN 202 *Genera Studies G*

JPN 313 Advanced Japanese. (3) F
Cont nued development of ab ty to commun cate ora ly and in wr t ng. Exposure to the variety of Japanese wr tten styles Prerequ site JPN 202 or equ valent *General Stud es. G.*

NOTE: For the Genera Stud es requ rement, courses and codes such as L SQ C, and H), see "General Stud es," page 87 For graduat on requ rements see "Un vers ty Graduat on Requ rements" page 83 For an explanation of add t onal omn bus courses offered but not sted in th s cata og, see "C ass f cat on of Courses" page 60.

JPN 314 Advanced Japanese. (3) S
See JPN 313 Prerequ s te JPN 313 or nstr ctor approva *General Studies G*

JPN 321 Japanese Literature. 3 N
Read ngs n representative masterp eces of modern Japanese tera ture Authors read change each year in accordance with the needs of the class May be repeated for cred t Prerequ s te JPN 313 or nstruc tor approva *Gene al Stud es· L/HU G*

JPN 394 Special Topics. 1–4) N

JPN 414 Introduction to Classical Japanese. (3) S
Read ngs from var ous genres of pre-20th-century terature, w th ana ys s of the structure of the c ass cal language Prerequisite: JPN 313 or nstructor approva

JPN 435 Advanced Readings. (3) N
Read ngs in h story, art, re g ous stud es econom cs or other f e ds. Lecture, d scuss on Prerequisite: JPN 314 or equ va ent

JPN 485 Problems of Translation. (3) N
Theories and pract ce of translat on strateg es for hand ng a var ety of apanese texts Lecture d scuss on. Prerequ site JPN 314 or equ va- ent

JPN 494 Special Topics. (1–4 N

JPN 499 Individualized Instruction. 1 3) N

JPN 500 Bibliography and Research Methods. (3) N
Introduct on to research materia s on Japan both n Japanese and in Western anguages. Overv ew of research methods Lecture d scus s on

JPN 514 Advanced Premodern Japanese. (3) N
Close read ngs of se ected premodern texts w th focus on grammati- ca and sty stic features Lecture, d'scuss on Prerequ s te JPN 414 or equ valent

JPN 520 Teaching of Japanese as a Second Language. (3 N
The ry and pract ce of teach ng Japanese, includ ng presentation interact on and eva uat on w th c nsiderat on g ven to cu tura factors. Lecture d scuss on.

JPN 535 Advanced Readings. (3) N
Read ngs n primary and secondary sources n history art, re g ous stud es terature, or other fields. Lecture d scussion Prerequ s te JPN 414 or equ va ent

JPN 543 Japanese Language and Linguistics. 3 N
Ana ys s and discuss on of ngu stic theories app ed to Japanese phonology morpho ogy and syntax ncluding psycho og cal s c o og cal, and h stor cal aspects.

JPN 585 Advanced Problems of Translation. (3) N
Theor es and pract ce of translat on, strateg es for hand ng a var ety of Japanese texts Lecture, d scuss on Prerequ site. JPN 435 or equ va ent.

JPN 591 Seminar. 3 N
Top cs n terary ngu st c, or cu tura studies.

KOREAN (KOR)

KOR 101 Elementary Korean I. (5) F
Pronunc at on grammar e ementary conversat on, and development of bas c read ng and wnt ng sk s nc uding Han'gu Lecture, recita t on

KOR 102 Elementary Korean II. 5) S
Cont nuat on of KOR 101 Lecture rec tat on. Prerequis'te: KOR 101 or equ va ent

KOR 201 Intermediate Korean I. 5) F
Cont nua deve opment of commun cat on sk s Increased emphas s on read ng and wnt ng, vocabulary bu d ng and rev ew of fundamen- ta s. Lecture, rec tat on Prerequ s te KOR 102 or equiva ent. *General Stud es G*

KOR 202 Intermed'ate Korean II. (5) S
Cont nuat on of KOR 201 Lecture rec tat on Prerequ site KOR 201 or equ va ent *General Stud es G*

LATIN (LAT)

Students enter ng LAT 202 d rectly from LAT 102 must complete LAT 201 to satisfy the Col ege of Liberal Arts and Sciences second lan guage requ rement

LAT 101 Elementary Latin. 4) F S
Bas c Lat n grammar w th an emphas s on deve op ng read ng sk l s For beg nn ng students on y

LAT 102 Elementary Latin. (4) F, S
Cont nuation of LAT 101 Prerequ s te LAT 101 or equ va ent

LAT 201 Intermediate Latin. 4) F
Selected Latin iterature both c ass ca and postc ass ca V rg s *Aeneid·* advanced grammar Prerequ s te LAT 102 or nstructor approva *General Stud es· HU*

LAT 202 Intermediate Latin. (4) S
See LAT 201 Prerequisite LAT 102 or nstructor approval. *General Stud es HU*

LAT 421 Roman Literature. 3) F
Readings in the Lat n masterpieces Authors read change each year n accordance with needs of the c ass May be repeated for cred t Prerequ s te: LAT 202 or instructor approva *Genera Studies HU*

LAT 422 Roman Literature. (3) S
See LAT 421 Prerequ s te LAT 202 or nstructor approva *General Studies· HU*

NORWEGIAN (NOR)

NOR 101 Elementary Norwegian. 4 F
Read ng, wnt ng, speaking and understanding of basic Norweg an 4 hours lecture 1 h ur lab

NOR 102 Elementary Norwegian. 4) S
Read ng wnt ng speak ng and understanding of bas c Norweg an 4 hours ecture 1 hour ab. Prerequisite: NOR 101 or equ va ent

NOR 201 Intermediate Norwegian. 4) F
Review of Norweg an grammar w th emphas s on the development of the sk s of speaking, sten ng comprehension read ng and wnt ng 4 hours ecture, 1 hour ab. Prerequ s te NOR 102 or equ valent

NOR 202 Intermediate Norwegian. 4 S
Rev ew of Norweg'an grammar w th emphas s on the development of the sk s of speak ng, l sten ng comprehension read ng and writ ng. 4 hours ecture 1 hour ab Prerequ s te NOR 201 or equ valent.

PORTUGUESE (POR)

To satisfy the foreign language requ rement, students must take POR 314 or a higher numbered POR course

POR 101 Elementary Portuguese. (5 F
Bas c grammar w th ntensive dn s in c ass and laboratory d rected toward conversat ona fluency 5 hours ecture, 1 hour ab Prerequ - s te: 1 year of Span sh or French or ta an or 'nstructor approva

POR 201 Intermediate Portuguese. (5) S
Continuation of POR 101. ntensive dn of fundamenta s n class and laboratory directed toward conversat onal f uency 5 hours lecture 1 hour ab. Prerequ site: POR 101 or instructor approva *General Stud ies. G*

POR 313 Portuguese Composition and Conversation. 3) F
Des gned to develop sk l in written Portuguese and corrected ora express on. Must be taken n sequence Prerequ s te POR 201 or nstructor approval. *General Studies G*

POR 314 Portuguese Composition and Conversation. 3) S
Cont nuat on of POR 313 Prerequ s te POR 313 or nstructor approva *General Studies: G.*

POR 321 Luso-Brazilian Literature. (3) N
Representative masterp eces of Portuguese and Braz an terature from the begnn ng to the present Prerequ s te POR 313 or nstructor approva *General Studies HU*

POR 472 Luso-Brazilian Civilization. (3) N
Lectures read ngs and d scuss on of mp rtant aspects of Luso Bra z ian civi zat on Top cs from mus c art folklore l terature h story and pol tics. Prerequisite: POR 313 or instructor approva *General Stud es. HU, G.*

RUSSIAN (RUS)

RUS 101 Elementary Russian. (4) F, S SS
Structura grammar and bas c vocabu ary Introduct on and reinforce ment of aura oral read ng and wr ting sk s 4 hours ecture 1 hour lab

RUS 102 Elementary Russian. (4) S, SS
See RUS 101 Prerequ s te RUS 101 or equiva ent.

RUS 201 Intermediate Russian. (4) F, SS
Systematic review of grammar Deve opment of vocabu ary through read ng and wr t ng Dri in aural/ora sk s. 4 hours ecture 1 hour ab Prerequisite RUS 102 or equ valent *General Stud es· G.*

RUS 202 Intermediate Russian. 4) S, SS
See RUS 201 Prerequ s te RUS 201 or equ va ent *Genera Stud es G*

RUS 211 Basic Russian Conversation. 3 F
ntens ve aural ora dri to supp ement read ng and grammatica sk s acqu red n RUS 101 102 201 and 202 Requ red of Russ an ma ors Prerequ s te. RUS 102. *Genera Stud es G*

RUS 212 Basic Russian Conversation. (3) S
See RUS 211 Pre equ s te RUS 102 *Genera Stud es G*

RUS 303 Scientific Russian. (3) F
Acqu s t on of sc ent f c vocabu ary through read ng from current Rus s an sc ent f c pub cat ons Does not sat sfy the L bera Arts and Sc ences language requ reme t for B.A degree Prerequ s te RUS 102

RUS 304 Scientific Russian. 3 S
See RUS 303 Prerequ s te: RUS 102

RUS 311 Russian Composition and Conversation. 3 F
Deve pment of wr t ng ab ty and ora express on Prerequis te. RUS 202 *Genera Stud es G*

RUS 312 Russian Composition and Conversation. 3) S
See RUS 311 Prerequ ite RUS 202. *General Stud es G*

RUS 321 Survey of Russian Literature. (3 A
Main terary movements authors, and s gnif cant works of prose poetry and drama from the beg nn ng to the m d 19th century in trans at on Prerequ s te RUS 202 or equ va ent *General Stud es L/HU, H.*

RUS 322 Survey of Russian Literature. 3) A
An ns ght nto the 19th and early 20th century Russ an thought ife, and cu ture by read ng trans at ons of works of major wr ters Prerequ s te RUS 202 or equ va ent *Genera Stud es· L/HU*

RUS 323 Survey of Literature of the Soviet Era. (3) A
Main iterary movements, p om nent authors and the most s gn f cant works of prose poetry and drama of the Sov et per od from 1917 1991 Prerequ s te RUS 2 2 or equ va ent *Genera Stud es L/HU, G.*

RUS 411 Advanced Composition and Conversation I. 3 F
Des gned to mprove aura d scr'm nat on and se f-express on n ora and wr tten sk ls emphas z ng vocabulary bu ld ng Subject mater als drawn from current post Sov et Russian pub cat ons Prerequ s te. RUS 312 *Genera Stud es. G.*

RUS 412 Advanced Composition and Conversation II. (3 S
See RUS 411 Prerequ s te RUS 312 *General Stud es G*

RUS 417 Applied Russian Phonetics. (2) N
General mprovement the student s language sk s through aural ora tra n ng n Russ an phono ogy and an ana ys s of Russ an orthog raphy Prerequ s te RUS 102

RUS 420 Russian Poetry. (3) N
Deve opment of Russ an poetry from its beg nn ngs to the present nc ud ng both native and em gre poets. Top cs n cr t c sm and the study of poetics Prerequ s te RUS 312 or instructor approval *Gen era Stud es L/HU*

RUS 421 Pushkin. (3) N
Pushk n s poetry p ays, and prose f ct on nc ud ng *Eugene Oneg n The Litt e Traged es Ta es of Be k n Queen of Spades* and *The Cap ta n s Daughter* Taught n Engl sh Does not sat sfy the L beral Arts and Sc ences language requ rement for B A degree. *Genera Stud es L/HU*

RUS 423 Dostoyevsky. (3 N
Dostoyevsky s major works of f ction includ ng *Cr me and Pun shment* and *Brothers Karamazov* Taught n Engl sh Does not satisfy the L b era Arts and Sc ences anguage requirement for B A. degree *General Stud es· L/HU*

RUS 424 Tolstoy. 3) N
To stoy s major works nc ud ng *War and Peace* and *Anna Karen na* Taught n Eng sh Does not sat sfy the L bera Arts and Sc ences lan guage requ rement for B A degree *General Stud es L/HU.*

RUS 425 Chekhov. (3 N
Chekhov s major works representat ve short stor es and major p ays, nc ud ng *The Cherry Orchard* and *Three S sters* Taught n Eng sh Does not sat sfy the L bera Arts and Sc ences language requ rement for B A degree. *Genera Stud es L/HU*

RUS 426 Literatures of the Nationalities of the Former Soviet Union. 3 N
nc ud ng such authors as Belsev ca Kross Ve c ova Kupa a Khvy ovy Sevak Nasri A tmatov Charents Cho pan Prerequ s te RUS 312 or nstructor approval. *Genera Stud es. L/HU, G*

RUS 430 Russian Short Story. 3) N
Deta ed study of representat ve works of the Russ an short story genre. A thors c uded are from both mper al and Sov et Russ a. Prerequ s te. RUS 312 o nstructor approva *Genera Stud es L/HU*

RUS 440 H'story of the Russian Language. 3 N
Pr nc p es of h stor cal ingu st cs presented through the evo ut on of *the Russ an anguage from Proto Indo European to the present* Read ngs of h storica documents O d Russ an and Old Church S av c Prerequ s te RUS 312 or nstructor approva .

RUS 441 Survey of Russian Culture. 3 N
Interp ay of art st c soc a and po t ca forces n the deve opment of Russ an cu ture from the K evan period to the present Exc us ve use of Russ an anguage source mater a s Prerequ s te RUS 312 or nstructor approva . *Genera Stud es. L/HU, G, H*

RUS 494 Special Topics. 1–4 N

RUS 499 Individualized Instruction. (1 3 N

RUS 591 Seminar. 3 N
Top cs may be se ected from the fo ow ng
a Ba t c L teratures
(b Literature from 1956 to August 1991
c L terary Zhdanov sm
d) 19th Century Russ an
e) Post Sov et L te ature
(f) Pre 19th Ce tury Russ an L terature
(g) Russ an L terary Cr t c sm
(h) Russ an Poetry to 1890
(Russ an Poetry 1890 to Present

SCANDINAVIAN (SCA)

SCA 250 Introduction to Scandinavian Culture. (3 S
Scandinav an dent ty from an nterd sc p nary perspect ve with an h s tor c overv ew Lecture d scuss on

SCA 314 Medieval Scandinavia. 3 F S
Study in Eng sh trans at on of the Sagas Edda and Ska d c poetry, h story and mytho ogy of the V k ngs

SCA 315 Old Norse. 3 F S
Read ngs and st dy of grammat ca structures of Med eva Scand na v an w th emphas s on the Sagas and Edda poetry and histor ca wr t ings

SCA 316 Scandinavian Cinema. 3) F S
Presentat on of Dan sh Norweg an ce and c and Swed sh f m with Eng sh subtit es, as representat ves of contemporary h stor cal cu - ture

SCA 450 Masterpieces of Scandinavian Literature. 3 S
Scand nav an l terature n trans at on n ts cu tura and h stor ca con- texts

SPANISH (SPA)

Students who have comp eted the r secondary educat on n a schoo where Span sh was the offic a anguage of nstruct on shou d beg n the r stud es at the 325 leve or above F r the courses SPA 313 and 314 certa n restr ct ons app y. no student who has comp eted more than two years of h gh schoo n a Span sh speak ng country where Spanish is the med um of nstruct on n the sch o , s a owed to reg s ter in a Span sh c ass below the 400 leve

SPA 101 Elementary Spanish. 4 F, S SS
Fundamenta s of the anguage Emphas on sten ng, speak ng read ng and wr t ng. 4 hours ecture, 1 hour ab Not open to students w th cred t n SPA 111

SPA 102 Elementary Span sh. 4 F S SS
See SPA 101 Not open to students w th cred t n SPA 111 Prerequ s te SPA 101 or equ va ent.

NOTE: For the Genera Stud es requ rement, courses and codes (such as L, SQ, C, and H see "Genera Studies page 87 For graduat o requ rements, see "Un vers ty Graduat on Requirements' page 83 For an exp anat on of add t ona omn bus courses offered but not l sted n th s cata og see C ass f cation of Courses,' page 60

SPA 107 Spanish for International Professions I. 8 F
Accelerated program alternat ve to SPA 101 102 sequence Func t onal approach to needs of nternat ona professions

SPA 111 Fundamentals of Spanish. 4) F S
Pr mar y for students w th two years of h gh schoo Spanish who need rev ew to enter second year study 4 hours ecture 1 hour ab Not open to students w th cred t n SPA 101 or 102

SPA 201 Intermediate Spanish. 4 F, S SS
Continuat on of fundamenta s Emphasis on the deve opment of the sk l s of read ng sten ng comprehens on speak ng writ ng and cu ture 4 hours ecture 1 hour ab Prerequ s te SPA 102 or 111. *Gen eral Stud es· G.*

SPA 202 Intermediate Spanish. (4) F S SS
See SPA 201. Prerequ s te SPA 201 r equ va ent *Genera Stud es· G*

SPA 203 Intermediate Spanish for Bilinguals. (4 F
For Span sh-speak ng students n l eu of SPA 201 Composit on ter- ature conversat on, grammar fundamenta s. 4 hours ecture, 1 hour lab Prerequ s te SPA 102 or 111 or placement. *Genera Studies G*

SPA 204 Intermediate Spanish for Bilinguals. 4 S
For Spanish speak ng students n eu of SPA 202 Compos t on ter ature conversat on, grammar fundamenta s 4 hours ecture, 1 hour ab Prerequ s te SPA 203 or equ va ent *Genera Studies G*

SPA 207 Spanish for International Profess'ons II. 8 S
Continuat on of SPA 107 a ternat ve to SPA 201 202 sequen e. Expans on of commun cat ve prof c ency n specif c areas of nterna t ona profess ons Prerequ s te SPA 107 or nstructor approval *Gen eral Stud es G*

SPA 311 Spanish Conversation. (3 F S
Designed primari y for nonmaj rs to promote vocabu ary bui d ng and commun cat ve express on n Span sh through d scuss ons based on cultura read ngs Prerequ s te SPA 202 or equ va ent

SPA 312 Spanish Conversation. (3) F S
See SPA 311 Prerequ site SPA 311 or equ va ent

SPA 313 Spanish Conversation and Composition. (3) F S SS
Des gned to deve op sk and accuracy in spoken and written Span sh Requ red of majors, SPA 313 and 314 must be taken in sequence. Prerequis te: SPA 202 or equ valent *General Stud es G*

SPA 314 Spanish Conversation and Composition. (3) F S, SS
See SPA 313. Prerequ s te SPA 313 or equ va ent *Genera Studies· G*

SPA 315 Spanish Conversation and Composition for Bilinguals. (3) F
Emphas s on compar ng standard Span sh with regiona Southwest Spanish May be taken n eu of SPA 313 and 314 Prerequ s te SPA 202 or 204 or nstructor approva

SPA 316 Spanish Conversation and Composition for Bil'nguals. 3) S
See SPA 315 Prerequ s te· SPA 315 or equ va ent

SPA 319 Business Correspondence and Communication. 3 N
Organ zation and presentat on of clear, effect ve bus nes communi a t ons vocabu ary app icable to modern bus ness usage Prerequ s te SPA 314 or 316 r nstructor approval. *General Stud es G*

SPA 325 Introduction to Hispanic Literature. 3 F, S
A cr t cal approach to and ana ys s of terary types, nc ud ng poetry drama short story, and nove Requ red of a majors. Prerequ s te SPA 313 *Genera Stud es HU*

SPA 412 Advanced Conversation and Composition. (3 F S
Ora and wr tten Span sh commun cat on ski s, with part cular atten t on g ven to deve op ng f uency and fac ty Requ red of ma ors Pre requ s te SPA 314 or 316 or instructor approva *Genera Stud es G*

SPA 413 Advanced Spanish Grammar. 3 F
Intens ve ana ys s of the Span sh anguage Required of teaching majors Prerequ s te SPA 314 or 316 or nstructor approva *Genera Studies G*

SPA 417 Span sh Phonet cs and Phonology. 3) F
Introduct on to the theory and pract ce of Span sh phonet cs and pho no ogy Prerequ s te· SPA 412

SPA 420 Applied Spanish Linguistics. 3 S
App cat on of l ngu st c pr nc p es to the teach ng of Span sh. Prereq uisites: FLA 400 (or equ va ent), SPA 412 *General Stud es L*

SPA 421 Spanish in the Southwest. 3 F
D scuss on and ngu st c ana ys s of Southwest Span sh Prerequ s te: SPA 412 *Genera Studies L SB, C.*

SPA 425 Spanish Literature. 3 F, S
Survey of Span sh terature from ts beg nn ng to 1700 Prerequ s te: SPA 325. *General Studies. HU*

SPA 426 Spanish Literature. (3) F S
Survey of Span sh terature from 1700 to the present Prerequ s te SPA 325. *Genera Stud es HU.*

SPA 427 Spanish American Literature. (3 F S
Survey of major works f gures and movements from Colonial period to 1880 Prerequis te SPA 325 *General Stud es. L*

SPA 428 Spanish American Literature. (3) F S
Survey of major works, f gures and movements from 1880 to the present Prerequ s te SPA 325 *General Studies L G*

SPA 429 Mexican Literature. 3) N
Se ected read ngs from pre-Co umb an wr ters poets (e g Macui xó ch t through the nove of the Revolut on to the present Prerequ s te SPA 325.

SPA 434 Drama of the Golden Age. 3 S
Dramat c works of Lope de Vega, Ca derón de a Barca, and the r con temporar es Prerequ s te SPA 325

SPA 435 Cervantes—*Don Quijote.* 3 F
Don Qu ote and the deve opment of the novel. Prerequ s te SPA 325

SPA 454 19th-Century Spanish American Narrative. (3) F
Pr nc pa works n the nove short story, narrative f ction and narrat ve Gauchesque) poetry Prerequ s te SPA 325

SPA 456 20th-Century Spanish American Fiction. (3) S
Major works and movements Prerequ s te: SPA 325.

SPA 464 Mexican American Literature. 3) F
Representative terature n Span sh and Eng sh by Mex can Amer cans emphas z ng soc ocu tura as we as terary va ues Prerequ s te: SPA 325 *Genera Stud es. HU.*

SPA 471 Civilization of the Spanish Southwest. (3) S
The po t ca nte ectua soc a econom c and art stic deve opment of the Span sh speak ng peop e of the Southwest Prerequisite: SPA 314 or 316 or nstructor approva *General Studies: HU*

SPA 472 Spanish American Civilization. 3 F
Growth of the nst tut ons and cu tures of Span sh Amer can peop e. Prerequ s te: SPA 314 or 316 or instructor approval *General Studies HU G H*

SPA 473 Spanish Civilization. 3 S
Po it ca nte lectua soc a econom c, and art stic development of the Span sh nat on from its or g n to the present. Prerequisite. SPA 314 or 316 or nstructor approva *Genera Stud es· HU SB, G*

SPA 485 Mexican American Short Story. 3) N
Cri ca study of contemporary short stories by Mexican Amer can authors w th emphas s on their Span sh- anguage wr t ngs Prerequ s te SPA 325 or nstructor approva

SPA 486 Mexican American Novel. 3) N
Social and terary contexts of representat ve nove sts emphas z ng the r Span sh anguage wr tings Prerequis te. SPA 325 or instructor approval

SPA 487 Mexican American Drama. (3 N
Representat ve dramat c works w th emphas s on the h story and development of th s genre from ts reg ona or g ns to the present Prerequ s te: SPA 325 or nstructor approva

SPA 494 Special Topics. 3 N
a) ntroduct on to H span c L'ngu stics
(b) Lex cography

SPA 500 Bibliography and Research Methods. (3) F
Requ red of a graduate students

SPA 536 Generation of 1898. 3 N
Works of Unamuno Baroja, Azorin and the r contemporar es stud ed against the ideo og ca background of the turn of century in Spa n Prerequ s te SPA 325

SPA 540 History of the Spanish Language. 3) S
Ana ys s and d scussio of the deve opment of Span sh from Vu gar Lat n to the present day Prerequisite FLA 400 or equ va ent

SPA 541 Spanish Language in America. 3) F
D scuss on and ana ys s of various reg ona and soc a var et es of Span sh n the Americas. Prerequ s te FLA 400 or equ valent.

SPA 542 Studies in the Spanish of the Southwest. (3) S
Exam nation of b l ngual sm and the soc a and regiona d a ects of Span sh n the Southwest. Prerequisite: FLA 400 or equ va ent