ITC Program Courses*

Semester I: Spring

EDP	303	Human Development *L*	3
EDT	300	Computers in Education	1
EED	433	Language Arts Methods, Management, and Assessment in the Elementary School	3
EED	496	Field Experience	2
RDG	414	Teaching Reading/Decoding	3
RDG	415	Teaching Phonics	3
SPF	301	Culture and Schooling *L*	3
SPF	401	Theory and Practice in Education	1
Total			19

Semester II: Summer

EED	420	Science Methods, Management, and Assessment in the Elementary School	3
EED	444	Organizing the Classroom Culture	1
EED	455	Social Studies Methods, Management, and Assessment in the Elementary School	3
EED	480	Mathematics Methods, Management, and Assessment in the Elementary School	3
EED	496	Field Experience	3
SPE	416	Quality Practices in the Collaborative Classroom	3
Total			16

Semester III: Fall

BLE	408	SEI for Linguistically Diverse Learners	3
EED	478	Student Teaching in the Elementary School	12
ITC program course total			50

* A minimum grade of "C" (2.00) is required in all courses.

Elementary Education (Multilingual/Multicultural Education Concentration)—BAE

Language Proficiency. Language proficiency requirements must be met for each endorsement before completing the Initial Teacher Certification (ITC) professional program.

Bilingual endorsement for Spanish. Students are required to pass the Arizona Classroom Teacher Spanish Proficiency Exam administered through ASU's Department of Languages and Literatures. For more information, call 480/965-6281. The exam is administered at several colleges in Arizona.

Bilingual endorsement for an American Indian language. Proficiency for this endorsement must be verified in writing by an official of the appropriate tribe.

English as a Second Language. Students admitted into the Multilingual/Multicultural Program who are pursuing the English as a Second Language Endorsement must fulfill a second language proficiency requirement. Students are required to submit proof of one of the following to the Office of Student Services before an Institutional Recommendation will be provided to the student:

1. completion of six semester hours of college credits in a single second language (which may include sign language) or the equivalent, from an accredited institution. Credit must be from two different courses, and not a repeat of the same course;
2. documentation of placement by the language department of an accredited institution in a third-semester level second language;
3. documentation of a passing score on the Arizona Classroom Spanish Proficiency Examination; or
4. documentation of proficiency in an American Indian language, verified by an official designated by the appropriate tribe.

Course Requirements. Many courses are held at local elementary schools during the regular school day. Field Experience requires a minimum commitment of six hours a week during the regular school day. Field-based courses are taken in semester blocks in sequential order. Program courses and requirements are subject to change depending on the ITC admission date.

Required

First-Year Composition	6
General Studies	35–37
Total	41–43
Electives	0–5

College of Education Requirements[1]

EDP	310	Educational Psychology *SB*	3
EED	334	Children's Literature and Elementary School Curriculum	3
		or RDG 334 Children's Literature and Elementary School Curriculum (3)	
MCE	446	Understanding the Culturally Diverse Child *C*	3
MTE	180	Theory of Elementary Mathematics	3
MTE	181	Theory of Elementary Mathematics	3
SPE	311	Orientation to Education of Exceptional Children *SB, C*	3
Fine arts requirements			6
Language proficiency[2]			0–6
Total			24–30

[1] A minimum grade of "C" (2.00) is required in all courses.

[2] For information on language proficiency see, "Language Proficiency," on this page.

ITC Program Courses*

Any Semester in Program

BLE	335	Language Diversity in Classrooms	3
		or ENG 213 Introduction to the Study of Language (3)	

Semester I

BLE	400	Principles of Language Minority Education	3
BLE	455	Social Studies Methods, Management, and Assessment in Elementary BLE/ESL Settings	3
BLE	496	Field Experience	1
EDT	300	Computers in Education	1
SPF	301	Culture and Schooling *L*	3
SPF	401	Theory and Practice in Education	1
Total			12

Semester II

BLE	408	SEI for Linguistically Diverse Learners	3
BLE	420	Science Methods, Management, and Assessment in BLE/ESL Settings	3

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

BLE 480 Mathematics Methods, Management, and Assessment in Elementary BLE/ESL Settings 3
BLE 496 Field Experience 1
MCE 447 Diversity in Families and Communities in Multicultural Settings 3

Total 13

Semester III

BLE 414 Reading Methods, Management, and Assessment in BLE/ESL Settings 3
BLE 433 Language Arts Methods, Management, and Assessment in Elementary BLE/ESL Settings 3
BLE 481 Reading Practicum 3
BLE 496 Field Experience 1
SPE 416 Quality Practices in the Collaborative Classroom 3

Total 13

Semester IV

BLE 478 Student Teaching in the Elementary School 12

ITC program course total 50

* A minimum grade of "C" (2.00) is required in all courses.

Elementary Education (Indigenous Education)—BAE

Course Requirements. Many courses are held at local elementary schools during the regular day. Field Experience requires a minimum commitment of six hours a week during the regular school day. Field-based courses are taken in semester blocks in sequential order. Program courses and requirements are subject to change depending on the ITC admission date.

Required

First-Year Composition 6
General Studies 35–37

Total 41–43

Electives 3–8

College of Education Requirements*

EED 334 Children's Literature and Elementary School Curriculum 3
or RDG 334 Children's Literature and Elementary School Curriculum (3)
MCE 446 Understanding the Culturally Diverse Child *C* 3
MTE 180 Theory of Elementary Mathematics 3
MTE 181 Theory of Elementary Mathematics 3
SPE 311 Orientation to Education of Exceptional Children *SB, C* 3
Fine arts requirements 6

Total 21

* A minimum grade of "C" (2.00) is required in all courses.

ITC Program Courses*

Semester I

EDP 310 Educational Psychology *SB* 3
EDT 300 Computers in Education 1
IED 410 History of American Indian Education *SB, C, H* 3
IED 455 Social Studies Methods, Management, and Assessment for Indigenous Classrooms *C* 3
IED 496 Field Experience: Classroom Management and Organization 1
SPF 301 Culture and Schooling *L* 3
SPF 402 Teachers and the Law in Indigenous Communities 1

Total 15

Semester II

IED 414 Reading Methods, Management, and Assessment for Indigenous Classrooms 3
IED 422 Methods of Teaching Indian Students *C* 3
IED 433 Counseling the Indian Student 3
IED 496 Field Experience: Classroom Management and Organization 1
SPE 418 Quality Practices in the Collaborative Indigenous Classroom 3

Total 13

Semester III

BLE 408 SEI for Linguistically Diverse Learners 3
IED 420 Science Methods, Management, and Assessment for Indigenous Classrooms 3
IED 430 Issues in Language and Literacy of Indigenous Peoples *HU/SB, C* 3
IED 480 Mathematics Methods, Management, and Assessment for Indigenous Classrooms 3
IED 496 Field Experience: Classroom Management and Organization 1

Total 13

Semester IV

BLE 478 Student Teaching in the Elementary School 12

ITC program course total 53

* A minimum grade of "C" (2.00) is required in all courses.

Secondary Education—BAE

The Secondary Education major includes two areas of study: academic specialization and Initial Teacher Certification (ITC) professional education course work and experiences.

The academic specialization or teaching major requires 30 to 60 semester hours in a discipline. The ITC program in Secondary Education is a 36 to 38 semester hour sequential program that consists of pedagogical and theoretical training. Refer to the pages shown in the "Academic Specializations" table, page 199.

Course Requirements. All methods courses (including SED 403) must be taken with a field experience. It is recommended that SED 403 be taken during the first semester of ITC admission. Field Experience requires a minimum commitment of six hours a week during the regular school day. Fine Arts areas may follow a different sequence of ITC courses. Program courses and requirements are subject to change depending on the ITC admission date.

Required

First-Year Composition 6
General Studies 35–37

Total 41–43

Electives 0–13

College of Education Requirements[1]

SPE 311 Orientation to Education of Exceptional Children *SB, C* 3

Academic Specialization[1]

Academic specialization[2] 30–60

ITC Program Courses[1]

BLE 407 SEI for Secondary Students 3
EDP 303 Human Development *L* 3
or EDP 313 Childhood and Adolescence[3] (3)
EDP 310 Educational Psychology *SB* 3
EDT 300 Computers in Education 1
RDG 301 Literacy and Instruction in the Content Areas 3
SED 403 Middle and Secondary School Principles, Curricula, and Methods[4] 3
SED 478 Student Teaching in Secondary Schools 12
SED 496 Field Experience 1
SED 496 Field Experience 1
SED 496 Field Experience 1
SPE 417 Inclusion Practices at the Secondary Level 3
SPF 301 Culture and Schooling *L* 3
SPF 401 Theory and Practice in Education 1
Methods in Academic Specialization I[4] 3
Methods in Academic Specialization II[4] 3

ITC program course total 44

[1] A minimum grade of "C" (2.00) is required in all courses.
[2] Refer to a separate "Academic Specialization" sheet for specific information about each concentration area.
[3] Students who take EDP 313 instead of EDP 303 and student teach in grades 7 to 9 qualify for a recommended middle grade endorsement.
[4] This course must be taken with field experience.

Special Education—BAE

Course Requirements. Many courses are held at local elementary schools during the regular school day. Field Experience requires a minimum commitment of six hours a week during the regular school day. Field-based courses are taken in semester blocks in sequential order. Program courses and requirements are subject to change depending on the ITC admission date.

Required

ENG 101 First-Year Composition 3
ENG 102 First-Year Composition 3
General Studies 35–37

Total 41–43

Electives 9–14

College of Education Requirements[1]

MTE 180 Theory of Elementary Mathematics 3
MTE 181 Theory of Elementary Mathematics 3
Fine Arts requirement 9

Total 15

ITC Program Courses[1]

Semester I

SPE 309 Basic Special Education Curriculum[2] 3
SPE 311 Orientation to Education of Exceptional Children[2] *SB, C* 3
SPE 315 Introduction to Bilingual/Multicultural Special Education and SEI 3
SPE 361 Introduction to Learning Disabilities 3
SPE 496 Field Experience 1
SPF 301 Culture and Schooling *L* 3

Total 16

Semester II

EDT 300 Computers in Education 1
SPE 312 Mental Retardation 3
SPE 336 Behavioral and Emotional Problems in Children 3
SPE 412 Evaluating Exceptional Children 3
SPE 413 Methods in Language, Reading, and Arithmetic for Exceptional Children 3
SPE 496 Field Experience 1

Total 14

Semester III

SPE 411 Parent Involvement and Regulatory Issues 3
SPE 414 Methods and Strategies in Behavior Management 3
SPE 415 Social Behavior Problems of Exceptional Children 3
SPE 494 ST: Instruction in Content Areas: Science/Social Studies 3
SPE 496 Field Experience (7.5 hours/week) 1

Total 13

Semester IV

SPE 478 Student Teaching in Special Education 12

ITC program course total 55

[1] A minimum grade of "C" (2.00) is required in all courses.
[2] This course may be taken before being admitted to the ITC.

Selected Studies in Education—BAE

Applications are not being accepted for the major in Selected Studies in Education at this time.

COLLEGE OF EXTENDED EDUCATION

The university-wide College of Extended Education provides an interactive link between ASU and the diverse communities it serves. The college assesses lifelong learning requirements and works in partnership with campuses, other colleges, and the community to serve learners, using a network of locations, programs, schedules, and technologies.

For more information, see "College of Extended Education," page 703, or access the Web site at www.asu.edu/xed.

ACADEMIC STANDARDS

Professional Program Status

Students admitted to the ITC program must maintain high academic standards and demonstrate the requisite qualifications for successful teaching, including sound physical and mental health, good interpersonal skills, basic communication skills, a positive attitude, appropriate professional conduct, and satisfactory performance in field experiences. Because ITC standards are higher than those for the university, a student who is suspended from the ITC program may still be eligible to enroll in other non-ITC courses.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

College of Education Graduate Degrees and Majors

Major	Degree	Concentration[1]	Administered By
Counseling	MC	—	Division of Psychology in Education
Counseling Psychology	PhD	—	Division of Psychology in Education
Counselor Education	MEd	—	Division of Psychology in Education
Curriculum and Instruction	MA	Bilingual education, early childhood education, elementary education, English as a second language, Indian education, language and literacy, mathematics education, science education, secondary education, or social studies education	Division of Curriculum and Instruction
	MEd	Bilingual education, early childhood education, elementary education, English as a second language, Indian education, language and literacy, mathematics education, professional studies, science education, secondary education, or social studies education	Division of Curriculum and Instruction
	EdD	Bilingual education, curriculum studies, early childhood education, elementary education, English as a second language, Indian education, language and literacy, mathematics education, science education, secondary education, or social studies education	Division of Curriculum and Instruction
	PhD	Art education,[2] curriculum studies, early childhood education, elementary education, English education, exercise and wellness education,[3] language and literacy, mathematics education, physical education, science education, or special education	Division of Curriculum and Instruction
Educational Administration and Supervision	MEd, EdD	—	Division of Educational Leadership and Policy Studies
Educational Leadership and Policy Studies	PhD	—	Division of Educational Leadership and Policy Studies
Educational Psychology	MA, MEd	—	Division of Psychology in Education
	PhD	Learning; lifespan developmental psychology; measurement, statistics, and methodological studies; or school psychology	Division of Psychology in Education
Educational Technology	MEd, PhD	—	Division of Psychology in Education
Higher and Postsecondary Education	MEd, EdD	Optional: higher education[1]	Division of Educational Leadership and Policy Studies
Social and Philosophical Foundations of Education	MA	—	Division of Educational Leadership and Policy Studies
Special Education	MA	—	Division of Curriculum and Instruction
	MEd	Gifted, mildly disabled, multicultural exceptional, or severely/multiply disabled	Division of Curriculum and Instruction

[1] If a major offers concentrations, one must be selected unless noted as *optional*.

[2] This concentration is administered in collaboration with the Katherine K. Herberger College of Fine Arts.

[3] Doctoral courses for this interdisciplinary program administered by the Tempe campus are offered at the East campus.

A copy of the Retention and Continuation Policy, which is part of the ITC handbook, may be obtained from the Office of Student Services, EDB L1-13.

College of Education faculty and placement teachers routinely review preservice teachers' professional attributes and characteristics to determine if the student is making satisfactory progress at both midterm and final examinations. To maintain good standing, students need to demonstrate appropriate professional demeanor in field placements and college classes.

Students demonstrating behaviors or characteristics that make it questionable as to whether they can succeed in the teaching profession are reviewed by the director of the Office of Professional Field Experiences and the assistant dean of the Office of Student Services. If necessary, a review panel composed of faculty members who have had direct involvement with the student is convened. Following this review, the student may be referred to the Division of Curriculum and Instruction Standards and Appeals Committee. The committee's review may result in a decision to disqualify the student or the specification of conditions under which continued participation is permitted, i.e., probation.

Students who wish to appeal decisions of the Division of Curriculum and Instruction Standards and Appeals Committee may do so in writing to the dean of the college. Any exceptions to the retention and disqualification policies and procedures must be approved by the committee and the dean.

Certification for Teaching

The curricula for both the undergraduate and postbaccalaureate Initial Teacher Certification programs meet the requirements for teacher certification in the state of Arizona.

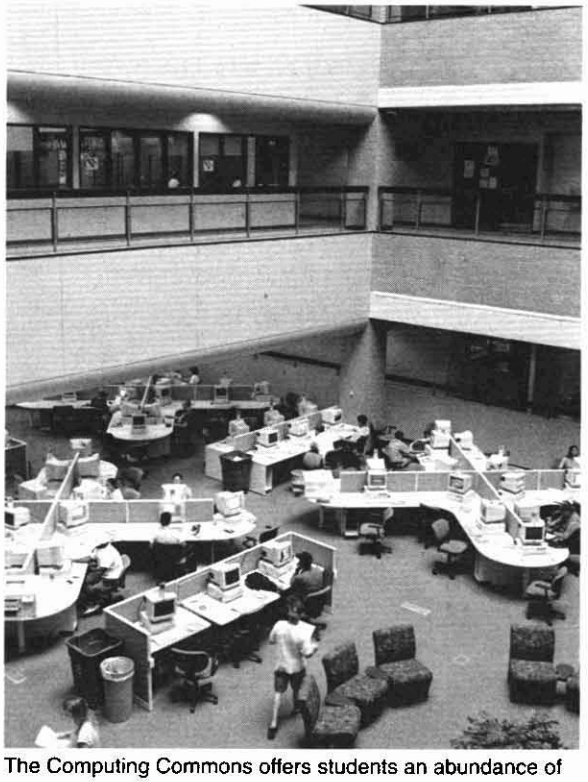
In addition to the course requirements specified in this catalog, there are other requirements for teacher certification mandated by the state of Arizona including the U.S. Constitution and Arizona Constitution requirement. Each student must pass the Arizona Educator Proficiency Assessment, which consists of professional knowledge and subject knowledge tests.

Because these requirements vary over program areas and may be changed at any time, students are encouraged to maintain close contact with the Office of Student Services regarding the most current state certification requirements.

The College of Education is approved by the Arizona Department of Education for the preparation of elementary, secondary, and special education teachers. The Office of Student Services maintains information about current certification requirements in Arizona and other states.

Independent Learning Course Work for Credit

It is the general policy of the College of Education not to accept course credit for *courses in education* taken through Independent Learning. Exceptions to this policy may be approved if the Independent Learning course work has been approved in advance of enrollment in the course by the student's advisor, respective program coordinator, and division director. In all such cases, an appropriate rationale must be submitted with the request to enroll.



The Computing Commons offers students an abundance of resources. Tim Trumble photo

BIS CONCENTRATION

A concentration in education is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

GRADUATE DEGREES

The College of Education offers numerous graduate degree programs. For more information, see the "College of Education Graduate Degrees and Majors" table, page 204, and the *Graduate Catalog*.

COLLEGE OF EDUCATION (COE)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Division of Curriculum and Instruction

coe.asu.edu/programs
480/965-1644
ED 426

James Middleton, Director

Professors: Appleton, Artiles, Baker, Barone, Bitter, Cannella, Christie, Edelsky, Faltis, Flores, E. Garcia, Gryder, Guzzetti, Hudelson, Ovando, Rutherford, Stahl, Surbeck, Swadener, Tobin, Zucker

Associate Professors: Anijar, Arias, Blumenfeld-Jones, Cohn, Di Gangi, Gomez, MacSwan, McCoy, Middleton, Rader, Smith, Vallejo, Young

Assistant Professors: Baek, Clark, Fischman, Manuelito, Martinez-Roldan, Rolstad, Romero

Clinical Associate Professors: P. Garcia, Lamorey, Mathur

Clinical Assistant Professor: Christine

Lecturers: Atkinson, Cocchiarella, Esch, Fain, Harrison, Kastre, Maderazo, McDaniel-Doran, Roanhorse-Dineyazhe, Rutowski, Soroka, Spanias, Stahlman, Thompson, Wellner

Administrative Professional: Enz

Assistant Administrative Professional: Kortman

Initial Teacher Certification Programs

Apprentice Teacher Program (ATP)
Diné Teacher Education Program (DTEP)
Early Childhood Interprofessional Program (ECD)
Elementary Education Partnership Program (EED)
Integrated Certification in Teacher Education (INCITE) (for postbaccalaureate students only)
Multilingual/Multicultural Program (MLMC)
Secondary Education (SED) (7–12)
Special Education (SPE)
Teacher Education and Certification Highway + Masters in Education option (TEACH+ME)
Teacher Education for Arizona Mathematics and Science (TEAMS) (for postbaccalaureate students only)

Degrees: BAE, MA, MEd, EdD, PhD

Bachelor of Arts in Education—BAE

The faculty in the Division of Curriculum and Instruction offer several undergraduate academic programs designed to prepare persons to teach effectively in bilingual education, early childhood, elementary, English as a second language, secondary, and special education settings. Programs in special education lead to Arizona teacher certification working with mentally disabled, emotionally disabled, and learning disabled individuals. Programs of study leading to special endorsements by the Arizona Department of Education are bilingual education, ESL, middle school education, reading, and school library science.

Graduate Programs

The faculty in the division offer graduate degrees in a number of majors. See the "College of Education Graduate Degrees and Majors" table, page 204, and the *Graduate Catalog*.

BILINGUAL EDUCATION (BLE)

BLE 335 Language Diversity in Classrooms. (3)
fall and spring
Issues in sociolinguistics and language variation in schools with a focus on classroom interaction, instruction, curriculum, assessment, and language policy. Lecture, discussion, lab. Prerequisite: ITC admission.

BLE 400 Principles of Language Minority Education. (3)
fall and spring
Overview of philosophical and theoretical foundations of bilingual education and ESL models of instruction. Other topics include significant legislative and judicial measures. Lecture, small group discussion. Prerequisite: ITC admission or BIS student.

BLE 407 SEI for Secondary Students. (3)
fall and spring
Examines foundations, assessment, English language learner proficiency standards, and strategies (including SEI) for the 7–12 classroom. Prerequisite: ITC admission.

BLE 408 SEI for Linguistically Diverse Learners.þ(3)
fall and spring
Examines foundations, assessment, English language learner proficiency standards, and strategies (including SEI) for the K–8 classroom. Prerequisite: ITC admission.

BLE 409 Methods in Language-Sensitive Content Teaching. (3)
fall and spring
Methods course for bilingual and ESL preservice students. Examines the rule of language and culture in teaching, program types, and general strategies. Lecture, discussion. Prerequisite: ITC admission.

BLE 410 Language Arts, Emergent Literacy, and Language Acquisition in Navajo/English Settings. (4)
fall
Provides foundational concepts for language and literacy development in bilingual (Navajo/English) K–8 settings. Lecture, collaborative activities. Prerequisite: Diné Teacher Education ITC admission.

BLE 414 Reading Methods, Management, and Assessment in BLE/ESL Settings. (3)
fall and spring
Teaching and assessing reading with emphasis on integrated curriculum and literature-based instruction for BLE/ESL learners. Strategies for decoding (phonics), vocabulary, comprehension, and content area reading. Lecture, lab, discussion. Prerequisite: ITC admission.

BLE 420 Science Methods, Management, and Assessment in BLE/ESL Settings. (3)
fall and spring
Methods, management strategies, and assessment procedures for teaching science to BLE/ESL students in elementary schools. Lecture, lab, discussion. Prerequisite: ITC admission.

BLE 433 Language Arts Methods, Management, and Assessment in Elementary BLE/ESL Settings. (3)
fall and spring
Social nature of oral and written, first- and second-language acquisition and congruent teaching, management, assessment practices in BLE/ESL settings. Lecture, lab, discussion. Prerequisite: ITC admission.

BLE 455 Social Studies Methods, Management, and Assessment in Elementary BLE/ESL Settings. (3)
fall and spring
Examines methods, classroom management strategies, and assessment techniques for social studies instruction in elementary BLE/ESL classes. Lecture, lab, discussion. Prerequisite: ITC admission.

BLE 478 Student Teaching in the Elementary School. (3–15)
fall and spring
Supervised teaching in the area of specialization. Synthesized experience in curriculum instruction and classroom management in a BLE/ESL setting. Fee. Prerequisite: ITC admission.

BLE 480 Mathematics Methods, Management, and Assessment in Elementary BLE/ESL Settings. (3)
fall and spring
Teaching, management, and assessment of mathematics in K–8 BLE/ESL settings. Lecture, lab, discussion. Prerequisite: ITC admission.

BLE 481 Reading Practicum. (3)
fall and spring
Applies concepts from BLE 414. Supervised school-based experiences in teaching reading to BLE/ESL students. Prerequisite: ITC admission.

BLE 496 Field Experience. (0–3)
fall and spring
Applies course content in a bilingual/ESL school setting. Emphasizes observation, pupil management, planning and delivering instruction, and assessment. Fee. Prerequisite: ITC admission.

BLE 498 Pro-Seminar. (1–7)
fall and spring
Small-group study and research for advanced students within their majors. Prerequisites: ITC admission; major status in the department (or instructor approval).

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

BUSINESS EDUCATION (BUE)

BUE 480 Teaching Business Subjects. (3)
fall and spring
Organization and presentation of appropriate content for business subjects in the secondary school.

BUE 481 Technology in Business and Vocational Education. (3)
fall and spring
Emerging curricula and instructional technology in business and vocational education. Lecture, hands-on computer instruction.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

CURRICULUM AND INSTRUCTION (DCI)

DCI 396 Field Experience I. (0)
fall and spring
First-semester ITC. Observation and limited participation in a school setting. Focus on observation of development, learning, management, instruction, assessment, and motivation. Requires 4 hours per week. Fee. Corequisite: semester I of the ITC.

DCI 397 Field Experience II. (0)
fall
Second-semester ITC. Observation and limited participation in a school setting. Focus on observation of development, learning, management, instruction, assessment, and motivation. Requires 6 hours per week. Fee. Corequisite: semester II of the ITC.

DCI 484 Service Learning Internship. (1–12)
fall, spring, summer
Fee.

DCI 498 Pro-Seminar. (1–7)
selected semesters
Topics may include the following:
- Field Experience. (2)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

EARLY CHILDHOOD EDUCATION (ECD)

ECD 220 Nutrition, Health, and Safety for Young Children. (2)
selected semesters
Emphasizes providing proper nutrition, promoting a safe but challenging learning environment, and becoming knowledgeable of a child's health status.

ECD 300 Principles of Interprofessional Collaboration. (3)
fall and spring
Focuses on the dispositions, experiences, knowledge, and skills necessary for interprofessional collaboration designed for young children and their families. Prerequisite: ITC admission.

ECD 310 Educational Environments: Infants/Toddlers. (3)
fall, spring, summer
Organizing, planning, and implementing developmentally appropriate educational practices to provide optimal learning environments for infants and toddlers in group settings.

ECD 314 The Developing Child. (3)
fall, spring, summer
Examines all aspects of development of children, birth through age 8, with implications for teachers and parents. Requires classroom observation and participation.

ECD 315 Classroom Organization and Guidance in the Early Years. (2)
fall and spring
Develops understanding and application of classroom organization and management principles, strategies, and procedures. Prerequisite: ITC admission.

ECD 378 Practicum in Early Childhood Development. (3)
fall and spring
Provides a field-based experience in selected early childhood settings (outside the public schools before student teaching). Prerequisite: ECD 314.

ECD 400 Inquiry into Teaching and Learning. (3)
fall and spring
Foundational basis of the early childhood field, including historical roots, current practices, ethics, models of teaching, and application in early childhood settings. Prerequisite: ITC admission.

ECD 401 Integrated Curriculum and Assessment: Social Studies and Creative Arts. (3)
fall and spring
Presents materials, techniques, and resources for a balanced program of social studies and aesthetic expression appropriate for children in preschool through 3rd grade, with emphasis on the integrated curriculum. Prerequisite: ITC admission.

ECD 402 Integrated Curriculum and Assessment: Math and Science. (3)
fall and spring
Emphasizes developmentally appropriate educational strategies and instructional techniques in teaching mathematics and science to children in preschool through 3rd grade, within an integrated curriculum approach. Prerequisite: ITC admission.

ECD 403 Educational Environments: Preschool/Kindergarten/Primary Grades. (3)
fall and spring
Focuses on interactions between young learners and the physical and social environments encountered in preschool, kindergarten, and primary settings. Prerequisite: ITC admission.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

ECD 404 Teaching Reading and Language Arts in Early Childhood. (3)
fall and spring
Development of oral and written language from birth to age 8. Describes developmentally appropriate educational strategies for promoting growth in speaking, listening, reading, and writing. Prerequisite: ITC admission.

ECD 405 Practicum in Teaching Reading and Language Arts in Early Childhood. (2)
fall and spring
Supervised experience teaching reading and language arts at the preschool, kindergarten, and primary-grade (1–3) levels. Developmentally appropriate strategies to promote young children's speaking, listening, reading, and writing abilities. Prerequisite: ITC admission.

ECD 414 Interprofessional Practicum. (3)
fall and spring
Investigates services and agencies available in the local community to parents of children with special needs. Practical experiences with an intermittent seminar format. Dispositions, knowledge, experiences, and skills necessary for interprofessional collaboration across multiple agencies and programs. Prerequisite: ITC admission.

ECD 420 Integrated Curriculum and Assessment: Mathematics. (3)
fall and spring
Developmentally appropriate educational strategies and instructional techniques in teaching mathematics to children birth–3rd grade. Prerequisite: ITC admission.

ECD 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Integrated Curriculum Assessment: Math. (3)
- Integrated Curriculum Assessment: Science. (3)

ECD 496 Field Experience. (0–3)
fall and spring
Applies course content in a preschool through 3rd grade setting. Emphasizes observation, focus on child-centered curriculum, planning and delivering instruction, and assessment. Fee. Corequisite: ECD 404.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog,* or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

ELEMENTARY EDUCATION (EED)

EED 334 Children's Literature and Elementary School Curriculum. (3)
fall and spring
Selecting and using children's literature in various curriculum areas in elementary school classrooms with diverse student populations. Lecture, discussion, lab. Cross-listed as RDG 334. Credit is allowed for only EED 334 or RDG 334. Prerequisite: education major.

EED 420 Science Methods, Management, and Assessment in the Elementary School. (3)
fall and spring
Examines philosophies of science and how these relate to the implementation, management, and assessment of science teaching. Lecture, discussion, lab. Fee. Prerequisite: ITC admission.

EED 433 Language Arts Methods, Management, and Assessment in the Elementary School. (3)
fall and spring
Theory on the social nature of oral and written language and congruent teaching, management, and assessment practices. Lecture, discussion, lab. Corequisite: EED 455.

EED 444 Organizing the Classroom Culture. (1)
fall and spring
Examines how teachers can create and maintain a classroom learning community within the context of an elementary school program. Discussion, workshop, lab. Prerequisite: ITC admission.

EED 455 Social Studies Methods, Management, and Assessment in the Elementary School. (3)
fall and spring
Teaching methods, classroom management strategies, and assessment techniques for social studies instruction in the elementary grades. Lecture, discussion, lab. Prerequisite: ITC admission.

EED 478 Student Teaching in the Elementary School. (3–15)
fall and spring
Supervised teaching in the area of specialization. Synthesized experience in curriculum, instruction, and classroom management. Fee. Prerequisite: ITC admission.

EED 480 Mathematics Methods, Management, and Assessment in the Elementary School. (3)
fall and spring
Beginning course in the teaching, management, and assessment of mathematics in grades K–8. Lecture, discussion, lab. Prerequisite: ITC admission.

EED 496 Field Experience. (0–3)
fall and spring
Applies course content in a K–8 school classroom. Emphasizes observation, pupil management, planning and delivery of instruction, and assessment. Fee.

EED 498 Pro-Seminar. (1–7)
selected semesters
Topics may include the following:
- Field Experience. (3)
- Integrated Children's Literature. (1)
- Language and Learning. (3)
  General Studies: L

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog,* or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

INDIAN EDUCATION (IED)

IED 401 Navajo Language and Culture I. (3)
fall
History and culture are added components to the introduction of language reading, writing, and speaking. Emphasizes basic communication and appreciation of history and culture. Lecture, discussion.

IED 403 Navajo Language and Culture II. (3)
spring
Emphasizes communication, grammar, and sentence structures. Translations, reading, writing, and discussions of proper and slang language. Includes cultural activities. Lecture, discussion. Prerequisite: IED 401.

IED 407 Diné Education Philosophy. (4)
fall
Assists preservice teachers in integrating Navajo educational philosophy Sá'ah Naagháí Bik'eh Hózhóon into educational instruction. Lecture, collaborative activities. Prerequisite: Diné Teacher Education ITC admission.
General Studies: HU, C

IED 410 History of American Indian Education. (3)
fall and spring
Philosophical and historical review of the development of American Indian education policies in both traditional and contemporary society. Credit is allowed for only IED 410 or 510.
General Studies: SB, C, H

IED 413 Language Arts Methods, Management, and Assessment for Indigenous Classrooms. (3)
fall and spring
Theory and practice on the social nature of oral and written language and the development of appropriate classroom practices for indigenous students. Prerequisite: ITC admission.

IED 414 Reading Methods, Management, and Assessment for Indigenous Classrooms. (3)
fall and spring
Development of reading and phonics instruction, management, and assessment methods necessary for successful literacy development for indigenous students. Prerequisite: ITC admission.

IED 420 Science Methods, Management, and Assessment for Indigenous Classrooms. (3)
fall and spring
Develops and applies elementary science lessons accommodating multiple world views, including those of Native societies, while conforming to Arizona standards. Fee. Prerequisite: ITC admission.

IED 422 Methods of Teaching Indian Students. (3)
spring
Philosophies, methodologies, and materials used in Indian education. Examines local and tribal classroom materials. Experimentation with new teaching concepts. Prerequisite: IED 410.
General Studies: C

IED 425 Methods of Teaching Navajo to Nonnative Speakers. (4)
fall
Methods for teaching Navajo language immersion instruction in K–8 settings. Lecture, collaborative activities. Prerequisite: Diné Teacher Education ITC admission.

IED 427 Methods of Teaching Navajo to Native Speakers. (4)
fall
Methods for teaching Navajo language immersion instruction in K–8 settings. Lecture, collaborative activities. Prerequisite: Diné Teacher Education ITC admission.

IED 430 Issues in Language and Literacy of Indigenous Peoples. (3)
spring
Examines issues, policies, theoretical foundations, and practices of indigenous peoples and other language minority communities from a sociolinguistics and language reclamation perspective. Credit is allowed for only IED 430 or 530.
General Studies: HU/SB, C

IED 433 Counseling the Indian Student. (3)
fall
Techniques and methods used in counseling, with emphasis on understanding Indian cultures and values. Experimentation with new counseling concepts. Prerequisite: IED 410.

IED 444 The Role of Governments in Native Education Policy and Administration. (3)
fall
Examines the interrelationship of federal Indian policy, federal/state/tribal law, and tribal sovereignty as they have shaped American Indian education. Analyzes administrative practices and personnel, program and fiscal management, and resources as they reflect the historic and present influence of this triad of factors. Credit is allowed for only IED 444 or 544. Lecture, seminar.
General Studies: SB

IED 455 Social Studies Methods, Management, and Assessment for Indigenous Classrooms. (3)
fall and spring
Examines methods, classroom management, and assessment for elementary social studies instruction for indigenous learners, while incorporating language and culture. Prerequisite: ITC admission.
General Studies: C

IED 460 Yaqui History and Culture. (3)
fall
Yaqui history and culture ranging from precontact to the present. Larger themes of Yaqui identity, belief systems, family, traditions, community, resistance, dispersion, and survival. Credit is allowed for only IED 460 or 560.
General Studies: HU/SB, C, H

IED 480 Mathematics Methods, Management, and Assessment for Indigenous Classrooms. (3)
fall and spring
Develops and applies elementary mathematics lessons incorporating learning styles and cultural perspectives, while conforming to state standards. Prerequisite: ITC admission.

IED 496 Field Experience: Classroom Management and Organization. (0–3)
fall, spring, summer
Applies course content in indigenous classrooms. Emphasizes observation, management, and planning and delivering instruction. May be repeated for credit. Lecture, lab. Fee. Prerequisite: ITC admission.

IED 498 Pro-Seminar. (1–7)
fall and spring
Topics may include the following:
- Navajo Language. (3)
  Designed for Navajo and non-Navajo-speaking students who have little or no knowledge of the Navajo language in its written form. Emphasizes development of reading, writing, and speaking skills.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

LIBRARY SCIENCE (LIS)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

MULTICULTURAL EDUCATION (MCE)

MCE 446 Understanding the Culturally Diverse Child. (3)
fall and spring
Survey of cultural and linguistic diversity in American education, including education equity, pluralism, learning styles, and roles of schools in a multiethnic society.
General Studies: C

MCE 447 Diversity in Families and Communities in Multicultural Settings. (3)
fall and spring
Diversity and the changing role of schools in a multiethnic society. Lecture, simulation activities, discussion. Prerequisite: ITC admission.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

READING EDUCATION (RDG)

RDG 301 Literacy and Instruction in the Content Areas. (3)
fall, spring, summer
Required course for all Secondary Education candidates. Introduces theory and instructional strategies for learning written and oral texts across academic disciplines. Prerequisite: ITC admission.

RDG 334 Children's Literature and Elementary School Curriculum. (3)
fall and spring
Selecting and using children's literature in various curriculum areas in elementary school classrooms with diverse student populations. Lecture, discussion, lab. Cross-listed as EED 334. Credit is allowed for only EED 334 or RDG 334. Prerequisite: education major.

RDG 414 Teaching Reading/Decoding. (3)
fall and spring
Emphasizes teaching reading as part of an integrated classroom curriculum. Includes strategies and skills for teaching decoding (phonics), vocabulary, comprehension, study skills, and content area reading. Prerequisite: ITC admission.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Laura Hanish, associate professor of Family and Human Development, was recently recognized for her excellent rapport with students.

Tim Trumble photo

RDG 415 Teaching Phonics. (1–3)
fall and spring or summer
Provides training in phonics instruction with the study of related research and classroom experiences as appropriate. Lecture, discussion.

RDG 481 Reading Practicum. (3)
fall and spring
Applies concepts from RDG 414 in classroom settings. Students demonstrate teaching strategies under supervision. Required for Elementary Education candidates. Prerequisite: ITC admission.

RDG 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Reading/Decoding. (3)
- Teaching Reading/Practicum Grades K–3. (3)
- Teaching Reading/Practicum Grades 4–8. (3)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

SECONDARY EDUCATION (SED)

SED 400 Principles of Effective Instruction in Secondary Education. (3)
fall, spring, summer
Examines different models of education. Develops and applies appropriate teaching practices for each model to secondary school classrooms. Lecture, discussion. Prerequisite: ITC admission.

SED 403 Middle and Secondary School Principles, Curricula, and Methods. (3)
fall, spring, summer
Advanced level of development of knowledge and skills of instructional planning and methods of teaching and evaluating in the middle and secondary schools. Requires observation/participation. Prerequisite: ITC admission.

SED 478 Student Teaching in Secondary Schools. (3–15)
fall and spring
Practice of teaching. Relationship of theory and practice in teaching. Fee. Prerequisite: ITC admission.

SED 480 Special Methods of Teaching Social Studies. (3)
fall and spring
Interdisciplinary approaches; production and collection of materials. Prerequisite: ITC admission.

SED 496 Field Experience. (0–3)
fall and spring
Applies course content in a secondary school setting. Emphasizes observation, pupil management, planning and delivering instruction, and assessment. Fee. Corequisite: SED 403.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

SPECIAL EDUCATION (SPE)

SPE 294 Special Topics. (1–4)
selected semesters

SPE 309 Basic Special Education Curriculum. (3)
fall, spring, summer
Introduces curricular practices used in inclusion classrooms.

SPE 311 Orientation to Education of Exceptional Children. (3)
fall, spring, summer
Includes gifted, mildly handicapped, severely handicapped, and the bilingual/multicultural exceptional child.
General Studies: SB, C

SPE 312 Mental Retardation. (3)
fall, spring, summer
Characteristics and assessment specific to mental retardation. Emphasizes terminology, development, educational programming, and therapeutic procedures. Prerequisite: ITC admission.

SPE 314 Introduction to Bilingual/Multicultural Special Education. (3)
fall, spring, summer
Theoretical background and practical application of general issues regarding the education of bilingual/multicultural handicapped children. Prerequisite: ITC admission.

SPE 336 Behavioral and Emotional Problems in Children. (3)
fall, spring, summer
Characteristics and assessment specific to emotionally and behaviorally disturbed children. Emphasizes terminology, development, and educational programming. Prerequisite: ITC admission.

SPE 361 Introduction to Learning Disabilities. (3)
fall, spring, summer
Characteristics and assessment specific to learning disabilities. Emphasizes terminology, development, and educational programming. Prerequisite: ITC admission.

SPE 394 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Basic Special Education Curriculum
- Inclusion Practices at the Secondary Level
- Quality Practices in the Collaborative Classroom

Prerequisite: ITC admission.

SPE 411 Parent Involvement and Regulatory Issues. (3)
fall and spring
Emphasizes parent and school relations through effective communication and state and federal regulations impacting services for the handicapped. Prerequisite: ITC admission.

SPE 412 Evaluating Exceptional Children. (3)
fall and spring
Normative and criterion-referenced diagnostic techniques, including formative evaluation. Emphasizes application. Requires daily practicum. Prerequisite: ITC admission.

SPE 413 Methods in Language, Reading, and Arithmetic for Exceptional Children. (3)
fall and spring
Methods, techniques, and materials for use in prescriptive teaching. Requires daily practicum. Prerequisite: ITC admission.

SPE 414 Methods and Strategies in Behavior Management. (3)
fall and spring
Organization and delivery of instruction, including formative evaluation techniques. Techniques of behavior management. Requires daily practicum. Prerequisite: ITC admission.

SPE 415 Social Behavior Problems of Exceptional Children. (3)
fall and spring
Analysis and intervention into social behavior problems of exceptional populations. Requires daily practicum. Prerequisite: ITC admission.

SPE 416 Quality Practices in the Collaborative Classroom. (1–3)
fall and spring
Develops skills, strategies, and a knowledge base for preservice teachers in building collaborative partnerships with special educators. May be repeated for credit. Instructor presentation, group activities, field experience. Prerequisites: SPE 311; ITC admission.

SPE 417 Inclusion Practices at the Secondary Level. (3)
fall and spring
Applies curricular practice and how preservice teachers work with special needs students in middle and secondary levels. Lecture, group activities, field experience. Prerequisites: SPE 311; ITC admission.

SPE 418 Quality Practices in the Collaborative Indigenous Classroom. (3)
fall and spring
Develops skills, strategies, and knowledge for preservice teachers, focusing on indigenous children, while building collaborative partnerships with special education. Prerequisite: ITC admission.

SPE 455 Early Childhood and the Handicapped. (3)
fall
Early childhood education as it applies to the handicapped child.

SPE 478 Student Teaching in Special Education. (3–15)
fall and spring
"Y" grade only. Fee. Prerequisite: ITC admission.

SPE 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Instruction in Content Areas: Science/Social Studies. (3)

Prerequisite: ITC admission.

SPE 496 Field Experience. (0–3)
selected semesters
Applies course content in a special education setting. Emphasizes observation, pupil management, planning and delivering instruction, and assessment. Fee. Prerequisite: ITC admission.

SPE 498 Pro-Seminar. (1–7)
fall and spring
Small-group study and research for advanced students in their majors. Fee.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Division of Educational Leadership and Policy Studies

coe.asu.edu/programs
480/965-6357
ED 120

Terrence G. Wiley, Director

Regents' Professors: Berliner, Glass, Smith

Professors: Appleton, Barone, Beaulieu, Fenske, González, McCarty, Molnar, Tobin, Turner, Valverde, Webb, Wiley

Associate Professors: Danzig, Hunnicutt, Margolis, Rund, Wilkinson

Assistant Professors: Begaye, D. Garcia, Moses, Powers, Read

Clinical Associate Professors: Jurs, Macey

Research Professor: de los Santos

Program Areas

Educational Administration and Supervision
Educational Policy Studies
Higher and Postsecondary Education
Social and Philosophical Foundations

Degrees: MA, MEd, EdD, PhD

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Graduate Programs

The faculty in the division offer several graduate degrees in a number of majors. For more information, see the "College of Education Graduate Degrees and Majors" table, page 204, and the *Graduate Catalog*.

EDUCATIONAL ADMINISTRATION AND SUPERVISION (EDA)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

EDUCATION POLICY ANALYSIS (EPA)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

HIGHER AND POSTSECONDARY EDUCATION (HED)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

SOCIAL AND PHILOSOPHICAL FOUNDATIONS (SPF)

SPF 301 Culture and Schooling. (3)
fall and spring
For the professional teacher preparation program. Overview of the cultural, social, and political milieus in which formal schooling takes place in the United States. Lecture, recitation. Prerequisite: education major.
General Studies: L

SPF 401 Theory and Practice in Education. (1–2)
fall and spring
For the professional teacher preparation program. Analysis and interpretation of classroom behavior from perspectives derived from philosophy, social science, and law. Prerequisite: education major.

SPF 402 Teachers and the Law in Indigenous Communities. (1)
fall
Examines the legal rights of students, teachers, and the district while preventing injury to students in indigenous communities. Lecture, discussion.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Division of Psychology in Education

coe.asu.edu/psyched
480/965-3384
EDB 302

Elsie G. J. Moore, Director

Regents' Professors: Berliner, Glass, Smith

Professors: Arredondo, Bernstein, Bitter, Blanchard, Claiborn, Green, Hackett, Hood, Horan, Kerr, Kinnier, Klein, Krus, Moore, Robinson Kurpius, Santos de Barona, Strom, Sullivan, Tracey

Associate Professors: Arciniega, Brown, Ladd, Nakagawa, Savenye, Stafford, Wodrich

Assistant Professors: Arzubiaga, Atkinson, Brem, Gorin, Husman, Rayle, Thompson

Clinical Associate Professors: Glidden-Tracey, Homer, Stamm

Program Areas

- Counseling
- Counseling Psychology
- Counselor Education
- Educational Psychology
  - Learning
  - Lifespan Developmental Psychology
  - Measurement, Statistics, and Methodological Studies
  - School Psychology
- Educational Technology

Degrees: MA, MC, MEd, PhD

Graduate Programs

The faculty in the Division of Psychology in Education offer graduate degrees in a number of majors. For more information, see the "College of Education Graduate Degrees and Majors" table, page 204, and the *Graduate Catalog*.

COUNSELOR EDUCATION (CED)

CED 111 Exploration of Education. (3)
fall and spring
Education as an instrument in the development of the individual and society, and its significance as an American institution.
General Studies: SB

CED 250 Career Development. (3)
fall, spring, summer
Covers models of the individual, the world of work, and decision making with emphasis on individual application. Lecture, discussion.
General Studies: L

CED 294 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Career Development. (1–3)
- Foundations of Leadership. (1–3)

- Leadership Colloquium. (1–3)
- Trio. (1–3)

CED 394 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Special Topics in Leadership. (1)
  Courses bring together a faculty member with no more than 12 students to discuss and learn about specific interest or topic. Topics designed to engage students in intellectual dialogue on one of the themes of leadership, diversity, and service/civic responsibility. Pass/fail elective; taught in classroom of McClintock Residence Hall. Open to freshmen through senior undergraduates; all majors.

CED 484 Internship. (1–12)
fall and spring
Topics may include the following:
- Leadership Internship
- Leadership Internship and Capstone

CED 493 Honors Thesis. (1–6)
fall and spring

CED 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Paraprofessional Training. (3)

CED 498 Pro-Seminar. (1–7)
fall and spring
Topics may include the following:
- Resident Assistant Experience. (2)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

COUNSELING PSYCHOLOGY (CPY)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

EDUCATIONAL PSYCHOLOGY (EDP)

EDP 302 Assessment and Evaluation in Education. (1)
fall and spring
Applies assessment and evaluation principles to education contexts, using a case format. Prerequisite: education major.

EDP 303 Human Development. (3)
fall and spring
Selected aspects of child and adolescent development. Emphasizes possibilities for influence by teachers and parents. Prerequisite: education major.
General Studies: L

EDP 310 Educational Psychology. (1–6)
fall and spring
Presents human behavior in educational situations through instructional modules. May be repeated for credit for total of 6 hours.
General Studies: SB (Three hours must be taken to secure SB credit.)

EDP 313 Childhood and Adolescence. (3)
fall, spring, summer
Principles underlying total development of pre- and early-adolescents. Emphasizes physical, intellectual, social, and emotional development, with practical implications for teachers grades 5–9. Prerequisite: admission to College of Education postbaccalaureate program.

EDP 454 Statistical Data Analysis in Education. (3)
fall, spring, summer
Role of data analysis in research and decision making. Elements of exploratory data analysis, descriptive indexes, and statistical inference. Lecture, lab. Prerequisite: MAT 117.
General Studies: CS

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

EDUCATIONAL TECHNOLOGY (EDT)

EDT 300 Computers in Education. (1)
fall, spring, summer
Introduces general computer applications, teacher utility programs, World Wide Web, and evaluation of educational software. Required for majors in the College of Education.

EDT 321 Computer Literacy. (3)
fall, spring, summer
Survey of the role of computers in business and education. Laboratory experience in using word processing, database, and spreadsheet software. 2 hours lecture, 2 hours lab.
General Studies: CS

EDT 323 Computer Applications. (3)
fall, spring, summer
Introduces computer applications such as HyperCard, telecommunications, authoring languages, and expert systems. Lecture, lab.
General Studies: CS

EDT 405 Presentation Technology for Multimedia. (3)
fall
Explores multimedia hardware and software used in creating presentations for educational, corporate, and commercial applications.

EDT 406 Computer Graphics and Animation. (3)
spring
Studies and applies design and animation techniques for use in video or computer-based presentations.

EDT 455 Authoring Tools. (3)
fall, spring, summer
Use of current authoring tools to design and deliver computer-based instructional materials.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Ira A. Fulton School of Engineering

www.fulton.asu.edu **Peter E. Crouch, PhD, Dean**

PURPOSE

The Ira A. Fulton School of Engineering educates undergraduate and graduate engineering students, giving them the knowledge, skills, and attitudes they need for success in technically oriented careers. The school provides students with a range of educational opportunities by which they may achieve excellence in the major branches of engineering, in computer science, and in construction management.

The Fulton School takes pride in its diversity, its economic and cultural heritage, and in the quality of its graduates. It strives to be an integral part of the community it serves and a lifelong presence in the lives of those within its compass. The school's educational and research programs are built around the following principles: entrepreneurship; use-inspired research and scholarship; a focus on the individual; intellectual fusion of unique and distinct disciplines; social embeddedness in the local, national, and international community; and global engagement.

For more information, access the school's Web site at www.fulton.asu.edu.

THE FULTON ASPIRATIONS

Graduates from any of the school's programs will be technically sound. In addition to technical competency, the Fulton School aspires to develop leaders who are aware of biological issues, well read and well spoken, and knowledgeable about current business practices. To this end the school offers enhanced curricula, special courses, and extracurricular activities to enrich the student's stay and to offer every student opportunities to achieve the school's aspirations.

All the programs within the school are professional programs, and hence professionalism is an important component of all the curricula. The school strives to help students understand and value the various aspects of professionalism including ethical behavior; a desire for life long learning; the ability to communicate with others, and an awareness of how the profession fits into and impacts society. As a first step in ethics, all students are expected to follow rules of academic integrity defined by the university.

For more information, access the Web site at www.asu.edu/studentlife/judicial/integrity.html.

ORGANIZATION

The Fulton School of Engineering includes three primary educational components: eight academic units, several research centers, and the Center for Professional Development.

Departments. The school houses eight academic units.

Del E. Webb School of Construction
Department of Chemical and Materials Engineering
Department of Civil and Environmental Engineering
Department of Computer Science and Engineering
Department of Electrical Engineering
Department of Industrial Engineering
Department of Mechanical and Aerospace Engineering
Harrington Department of Bioengineering

Research Centers. The school is committed to the development of research programs of national prominence and to the concept that research is an important part of its educational role. The school encourages the participation of qualified undergraduate and graduate students in various research activities. Most faculty are involved in government- or industry-sponsored research programs in a wide variety of fields. This research is carried out in the academic units and in a number of interdisciplinary research institutes, centers, and programs. A list of centers is available on the Web at www.fulton.asu.edu/fulton/research/centers.php.

Center for Professional Development. The Center for Professional Development (CPD) provides engineers and technical professionals the skills and knowledge necessary to master new methods, to lead projects and teams, and to advance professionally. Programs are offered in traditional classroom environments and through distance learning. CPD works with the nationally renowned faculty of the Fulton School of Engineering and affiliate experts to administer short courses and conferences, professional certifica-

Professional Status Requirements

Student	Program	High School Rank	ABOR GPA	Minimum Scores ACT	Minimum Scores SAT	Transfer GPA* Resident	Transfer GPA* Nonresident
Resident	Construction	Upper 25%	3.00	23	1140	—	—
	Engineering	Upper 25%	3.00	23	1140	—	—
Nonresident	Construction	Upper 25%	3.00	24	1140	—	—
	Engineering	Upper 25%	3.00	24	1140	—	—
Transfer	Construction	—	—	—	—	2.25	2.50
	Engineering	—	—	—	—	2.50	2.50

* The cumulative GPA is calculated using all credits from ASU as well as all transfer credits from other colleges and universities.

tion programs, and graduate degree programs. These online programs allow students with complex schedules to complete advanced work from remote locations. CPD also administers customized programs at company sites. For more information, call 480/965-1740, or access the center's Web site at www.asuengineeringonline.com.

ADMISSION

The technical programs housed in the school are demanding, and success requires good preparation. High school students are expected to have completed a college preparation curriculum including math through precalculus; transfer students are expected to have performed well in their postsecondary work. Students who are not well prepared may be required to enroll in university courses that are not applicable for degree credit. High school students interested in degrees within the school are encouraged to consult an advisor to help ensure that a proper set of high school and/or postsecondary courses are being taken.

Students eligible for admission to one of the school programs are admitted to either preprofessional or professional status in the program of interest. The processes and standards used to admit students depend on whether the students are first-time freshmen, transfer students from outside of ASU, transfer students from within ASU, or readmission students.

Preprofessional and Professional Status. Students who have a high likelihood of success are admitted with professional status; other students are admitted with preprofessional status. The difference is that preprofessional students are permitted to register for only lower-division (100- and 200-level) classes within the school.

Promotion to professional status is done in one of two ways. Students in the Computer Science or Computer Systems Engineering programs use one method; for more information, see "Department of Computer Science and Engineering," page 249, or access the Web site at www.eas.asu.edu/~csedept/AcademicPrograms/Undergraduate/UGPrograms.htm. Promotion for all other students is a two-step process:

1. In consultation with an academic advisor, lower division courses are selected.
2. After completing a minimum of 30 semester hours of required or approved elective course work with a cumulative GPA equivalent to that required of transfer students and corresponding to the chosen major, students may apply for promotion to professional status (see the "Professional Status Requirements" table, on this page). Note: For transfer students, the cumulative GPA includes the transfer GPA.

Admission as First-Time Freshmen. Students other than those interested in Computer Science or Computer Systems Engineering who meet one of the requirements listed in the "Professional Status Requirements" table are admitted to programs within the school with professional status. Students who are not admissible to professional status within the school but are otherwise regularly admissible to ASU are admitted to one of the school's programs with preprofessional status.

All students interested in Computer Science or Computer Systems Engineering, who meet the university admission requirements as stated in "Office of Undergraduate Admissions," page 65, are admitted with preprofessional status.

In addition, students who are required to take the Test of English as a Foreign Language (TOEFL) must earn a score of at least 550 on the paper version (230 on the computerized version).

Students admitted to the university after successful completion of the General Education Development examination are admitted as preprofessional students within their major. Professional status is attained by meeting the minimum ACT or SAT score required for admission as listed in the "Professional Status Requirements" table, on this page.

Admission of Transfer Students. As with freshmen, admission of Computer Science and Computer Systems Engineering (CS and CSE) transfer students is different.

1. All non-CS and CSE transfer students who meet the requirements shown in the "Professional Status Requirements" table are admitted with professional status.
2. All non-CS and CSE transfer students who are not admissible to professional status within the school but are otherwise regularly admissible to ASU are

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

admitted to one of the school's programs with preprofessional status.

3. All CS and CSE transfer students who meet the university admission standards, as stated in "Office of Undergraduate Admissions," page 65, are admitted with preprofessional status.

The academic units may impose additional admission and graduation requirements beyond the minimum specified by the school.

Change of Major Within ASU. Students moving between academic programs within the school or from other colleges or schools within the university are admitted under the same conditions as transfer students.

Readmission. Students reapplying to the school after a one semester absence must meet the following requirements to be considered for readmission: Engineering students are required to have 2.50 or higher cumulative GPA for all courses completed; in-state Construction students must have a 2.25 cumulative GPA for all courses completed. Students with lower GPAs may be denied readmission. Preprofessional students with less than the 2.50 GPA for all courses will be denied readmission.

Computer Science and Computer Systems Engineering students will be readmitted as preprofessionals provided they meet the readmission requirements for engineering students. Students should consult the Computer Science advising office at 965-3199 for readmission information to their professional status.

Students seeking readmission should contact the Office of the Associate Dean of Academic Affairs.

Evaluation of Previous Course Work. Transferring from one institution to another or between programs can result in a net loss in units that count toward the degree. Thus it is important for students who contemplate transferring into this school from another institution, whether a community college or four-year institution, to carefully study the catalog material pertaining to the particular program to get a sense of what courses may transfer.

Credit is granted for transferred courses deemed equivalent to corresponding courses in the selected program of study, subject to grade and ASU resident credit requirements. No grades lower than "C" (2.00) are accepted as transfer credit to meet the graduation requirements of this school. Credits transferred from a community college or two-year institution are applied only as lower-division credits. For a listing of the acceptable courses transferable to the various degree programs, prospective Arizona transfer students should consult their advisors and refer to the ASU transfer tools available on the Web at www.asu.edu/provost/articulation.

It should be noted that some courses taken in other ASU colleges or other universities may be acceptable for general university credit but may not be applicable toward the degree requirements of this school. Determination of those particular courses applicable to a specific degree program is made within the appropriate academic unit with the approval of the dean.

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

ADVISING

Each department in the Fulton School employs one or more professional academic advisors to work with students in setting academic and career goals; understanding school and university policies and procedures; meeting degree requirements; and becoming familiar with the university's and school's sources of academic support and success. Students may also work with a faculty advisor familiar with the chosen field of specialization. While final responsibility for becoming familiar with and understanding academic degree requirements lies with the student, professional and faculty advisors are available to assist. Students should consult with an advisor before registering each semester.

Many students find it necessary to work while attending ASU. The working student should endeavor to create a careful balance of work and class responsibilities to avoid academic problems. Students should inform faculty and professional advisors of any outside work or activity so that course loads may be adjusted accordingly.

The Office of the Associate Dean for Academic Affairs in the school is available to assist individual students with many different types of advising issues. Advisors and staff work with students to answer general questions regarding policy and procedure; help with registration transactions; administer the probation, disqualification, and readmission processes; oversee disciplinary actions; and hear grade grievances and assist with other administrative matters. More information is available from the school Web site.

REGISTRATION

Students are required to register for courses using one of the university-provided processes. As part of the registration process, the school enforces the following registration restrictions.

Mandatory Advising. All first-year students, all student athletes, and students who are found to be having academic difficulty are required to be advised before they can register for classes, including summer sessions. Some programs relax the advising requirement after the first year, so students should consult their department to determine if advising is required

Maximum Hours. Students enrolled in an undergraduate degree program in this school may register for a maximum of 19 semester hours each semester. Any student wanting to register for more than the maximum must submit a petition and have an approval on file before registering for the overload.

Probationary Status. Students who have been placed on academic probation must be advised by a faculty or professional advisor from within the academic unit of their major and then advised by an advisor within the Office of the Associate Dean of Academic Affairs, who will issue a

special permit allowing them to register. Students on probation are limited to 13 semester hours. The special permits are not issued until after grades have been posted.

Undergraduate Nondegree Status. Students who are enrolled in an undergraduate nondegree status in this school must obtain advising and approval to register before registering each semester from the Office of the Associate Dean of Academic Affairs. For more information, see "Admission of Undergraduate Nondegree Applicants," page 72.

Course Prerequisites. Students should consult the *Schedule of Classes* and the catalog for course prerequisites. Students who register for courses without the designated prerequisites may be withdrawn without the student's consent at any time before the final examination. Such withdrawal may be initiated by the instructor, the chair of the department offering the course, or the dean of the college. In such cases, students will not receive monetary reimbursement.

Pass/Fail Grades. Students enrolled in the school do not receive degree credit for pass/fail courses taken at this institution. In addition, no course in this school is offered for pass/fail credit. Students requesting credit for pass/fail courses taken at another institution must file a Petition for Adjustment to Curriculum Requirements to the department of their major. Each request is judged on its particular merits.

Entry into Upper-Division Courses. Before enrolling in courses at the 300 level and above, students must be in good academic standing in professional program status in this school and have the approval of their advisors. A student who is not in good academic standing must secure approval from his or her advisor and the office of the associate dean for academic affairs. Students whose grades in 300-level courses are unsatisfactory may be required to retake one or more courses for which credit has previously been granted.

The academic units have certain additional requirements that must be met in addition to the above school requirements, and students should make sure they are fulfilling all requirements.

Non-Fulton School of Engineering Students. Students who are not admissible to programs in this school and who enroll in another school at ASU may not register for any 300- or 400-level courses in this school unless they are required in their degree programs and the students have the proper course prerequisites.

UNDERGRADUATE DEGREES

The faculty in the Fulton School of Engineering offer programs leading to the BS and BSE degrees with majors in the subjects shown in the "Ira A. Fulton School of Engineering Baccalaureate Degrees and Majors" table, page 218. Each major is administered by the academic unit indicated.

For detailed information on the degree requirements of a major in the Ira A. Fulton School of Engineering, refer to that academic unit's individual description on the following pages.

GRADUATE DEGREES

The faculty in the Fulton School of Engineering offer master's and doctoral degrees as shown in the "Ira A. Fulton School of Engineering Graduate Degrees and Majors" table, page 219. Engineering faculty participate in offering the Master of Engineering (MEng) as a collaborative degree program offered by Arizona's three state universities. For more information, see the *Graduate Catalog*.

COLLEGE OF EXTENDED EDUCATION

The university-wide College of Extended Education provides an interactive link between ASU and the diverse communities it serves. The college assesses lifelong learning requirements and works in partnership with campuses, other colleges, and the community to serve learners, using a network of locations, programs, schedules, and technologies.

For more information, see "College of Extended Education," page 703, or access the Web site at www.asu.edu/xed.

UNIVERSITY GRADUATION REQUIREMENTS

In addition to department and school requirements, students must meet all university graduation requirements (see "University Graduation Requirements," page 88). A well-planned program of study enables students to meet all requirements in a timely fashion. Students are encouraged to consult with an academic advisor in planning a program to ensure that they comply with all necessary requirements.

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. General Studies courses are listed in the "General Studies Courses" table, page 94, in the course descriptions in this catalog or on the Web, in the *Schedule of Classes*, and in the *Summer Sessions Bulletin*. Consult with an advisor for an approved list of courses.

First-Year Composition Requirement

As a minimum, completion of ENG 101 and 102, or ENG 107 and 108, or ENG 105 with grades of "C" (2.00) or higher is required for graduation from ASU in any baccalaureate program as described in "First-Year Composition Requirement," page 88. Any student whose written or spoken English in any course is unsatisfactory may be required by the appropriate director or department chair to take additional course work.

STUDENT RESPONSIBILITIES

Students have to make many decisions as they complete their degrees. While the school and the university make a number of resources available (e.g., faculty, courses, advisors, and tutors) to help in making the decisions, students are expected to take responsibility for making them.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Ira A. Fulton School of Engineering Baccalaureate Degrees and Majors

Major	Degree	Concentration[1]	Administered By
Aerospace Engineering[2]	BSE	—	Department of Mechanical and Aerospace Engineering
Bioengineering[2]	BSE	—	Harrington Department of Bioengineering
Chemical Engineering[2]	BSE	—	Department of Chemical and Materials Engineering
Civil Engineering[2]	BSE	Optional: construction engineering or environmental engineering[1]	Department of Civil and Environmental Engineering
Computer Science[2]	BS	Optional: software engineering[1]	Department of Computer Science and Engineering
Computer Systems Engineering[2]	BSE	—	Department of Computer Science and Engineering
Construction[2]	BS	General building construction, heavy construction, residential construction, or specialty construction	Del E. Webb School of Construction
Electrical Engineering[2]	BSE	—	Department of Electrical Engineering
Engineering Interdisciplinary Studies[3]	BS	—	Ira A. Fulton School of Engineering
Engineering Special Studies[2]	BSE	Premedical engineering	Ira A. Fulton School of Engineering and the Harrington Department of Bioengineering
Industrial Engineering[2]	BSE	—	Department of Industrial Engineering
Materials Science and Engineering[2]	BSE	—	Department of Chemical and Materials Engineering
Mechanical Engineering[2]	BSE	—	Department of Mechanical and Aerospace Engineering

[1] If a major offers concentrations, one must be selected unless noted as *optional*.

[2] This major requires a minimum of 128 semester hours to complete.

[3] Applications for this program are not being accepted at this time.

Satisfactory Progress

Students are expected to select and successfully complete courses that lead to the timely completion of their degree. Students are said to be making satisfactory progress if they (1) maintain an acceptable GPA and (2) complete courses each semester that are applicable to their degree. Students who are making satisfactory progress are said to be in good standing.

PROBATION

Some students do not make satisfactory progress, and these students generally need extra attention and resources to help them get back on track. Such students are placed on probation to help track them and ensure they get the necessary help. Students on probation have their course load constrained. These students may also be required to take specific courses to help them gain the skills needed to be successful.

Various conditions can place a student on probation. Some conditions trigger an automatic placement of the student on probation whereas others trigger a review of the student's case to determine if probation is warranted. When a probation review is triggered, the final decision and conditions of probation are made by the student's department.

Automatic Probation. These conditions trigger automatic probation:

1. a semester or summer session with a GPA less than or equal to 1.50;
2. two successive semesters with GPAs less than 2.00; or
3. an ASU Cumulative GPA below 2.00 (for more than 55 semester hours).

Automatic Review. These conditions trigger probation review:

1. an ASU cumulative GPA less than 2.00 (0 to 55 semester hours);
2. a cumulative GPA in the major of less than 2.00; or

Ira A. Fulton School of Engineering Graduate Degrees and Majors

Major	Degree	Concentration[1]	Administered By
Aerospace Engineering	MS, MSE, PhD	—	Department of Mechanical and Aerospace Engineering
Bioengineering	MS, PhD	—	Harrington Department of Bioengineering
Chemical Engineering	MS, MSE, PhD	—	Department of Chemical and Materials Engineering
Civil and Environmental Engineering	MS, MSE, PhD	—	Department of Civil and Environmental Engineering
Computer Science	MCS	—	Department of Computer Science and Engineering
	MS, PhD	Optional: arts, media, and engineering[1]	Department of Computer Science and Engineering
Construction	MS	Optional: construction science, facilities, or management[1]	Del E. Webb School of Construction
Electrical Engineering	MS, PhD	Optional: arts, media, and engineering[1]	Department of Electrical Engineering
	MSE	—	Department of Electrical Engineering
Engineering	MEng	—	Ira A. Fulton School of Engineering
Engineering Science	MS	—	Ira A. Fulton School of Engineering
	MSE	Optional: executive embedded systems[1]	Ira A. Fulton School of Engineering
	PhD	Optional: materials science and engineering[1]	Ira A. Fulton School of Engineering
Industrial Engineering	MS, MSE, PhD	—	Department of Industrial Engineering
Materials Engineering	MS, MSE	—	Department of Chemical and Materials Engineering
Materials Science	MS[2]	—	Committee on the Science and Engineering of Materials
Mechanical Engineering	MS, MSE, PhD	—	Department of Mechanical and Aerospace Engineering
Science and Engineering of Materials	PhD[2]	High-resolution nanostructure analysis or solid-state device materials design	Committee on the Science and Engineering of Materials

[1] If a major offers concentrations, one must be selected unless noted as *optional*.

[2] This program is administered by the Division of Graduate Studies.

3. failure to complete any courses appropriate for the degree during each semester.

Disqualification. Students on probation are subject to disqualification if

1. they do not attain a semester GPA of 2.25;
2. their cumulative GPA is below 2.00 at the end of the probationary semester; or
3. they are placed on probation for two consecutive semesters.

Courses completed during the summer sessions may not be used to reevaluate a student's fall semester probationary status.

Students on academic probation are not allowed to register for more than 13 semester hours of course work. Probationary students may not register for the next semester without a special permit from an advisor in the Office of the Associate Dean for Academic Affairs. Special permits are not given until grades are recorded by the registrar for the current semester.

Disqualification

Students who are on academic probation and fail to meet the retention standards become ineligible to continue working toward a degree within the school. These limitations apply:

1. Students who change colleges may not register for courses in engineering unless the courses are required by their new major.
2. Students who register for courses in the school may be withdrawn from these courses any time during the semester they are registered.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

3. Students may be eligible to change their major to another college if they have a cumulative GPA of 2.00 or higher.
4. Students may take nonengineering courses during summer and winter sessions.
5. Students who have completed fewer than 25 semester hours with a cumulative GPA of 1.75 or higher may be eligible for study with the University College
6. Students may request a review of their status by contacting the Office of the Associate Dean for Academic Affairs.

Reinstatement

The school does not accept an application for reinstatement until the disqualified student has remained out of this school for at least a 12-month period. Merely having remained in a disqualified status for this period of time does not, in itself, constitute a basis for reinstatement. Proof of ability to do satisfactory college work in the chosen discipline is required, for example, completing at least 15 semester hours of pertinent courses in the discipline at a community college with a GPA of 2.50 or higher, and a cumulative GPA of 2.50 or higher for all courses completed.

SPECIAL PROGRAMS

Fulton Scholars. The Fulton Scholars are a group of highly motivated, talented students who have the opportunity to participate in enriched intellectual, cultural, and social programs during their college years. Membership is competitive and admission is determined at the time of admission to the program. For more information, access the Web site at www.fulton.asu.edu/fulton/students/index.php.

Fulton Ambassadors. The Fulton Ambassadors is composed of undergraduate students representing all disciplines within the school. Originally called "Student Ambassadors," the name was changed in fall 2003 to "Fulton Ambassadors" in recognition of Ira A. Fulton's contribution to the school of engineering. Fulton Ambassadors promote and advance the school at ASU and serve as student liaisons between current students, administrators, alumni, and industry. For more information, access the Web site at www.fulton.asu.edu/fulton/students/index.php.

SORP. The Student Outreach and Retention Program (SORP) houses student diversity programs in the Ira A. Fulton School of Engineering. SORP offers programs and services to improve the climate for, and to attract, support, and retain minority and women students in engineering. Programs included in SORP are the Women in Science and Engineering Program, the Minority Engineering Program, and the Coalition of Engineering Minority Societies and the Society of Women Engineers (CEMSWE). CEMSWE encourages the minority engineering organizations: American Indian Science and Engineering Society, National Society of Black Engineers, Society of Hispanic Professional Engineers, and the Society of Women Engineers to work together to maximize their effectiveness in many areas.

In addition, SORP houses the Center for Outreach and Recruitment (COR) for the Fulton School. This unit supports the recruitment programs for the Fulton School of Engineering, including the Central Arizona Math, Engineering, Science Achievement program. COR coordinates the Engineering Summer Institute, providing hands-on engineering camps, both commuter and residential, to middle school, high school, and incoming freshmen students. For more information, contact the Office of the Associate Dean of Academic Affairs.

Joint Bachelor's and Master's Degree. Several programs within the school offer an opportunity to their highly motivated and high-performing students to start a master's program while still completing the last year of the BSE degree. Interested students should contact their major department for details.

Cooperative Education. The co-op program is a work-study plan of education that alternates periods of academic study with periods of employment in business, industry, or government. Students who choose this program ideally complete 12 months of employment and graduate with both the academic background and practical experience gained from working with professionals in a chosen field.

A student in the school is eligible to apply to the co-op program upon completion of 45 or more hours of classes required for the selected major. Transfer students are required to complete at least one semester at ASU before beginning work. All student applicants must have a GPA of at least 2.50 and the approval of an advisor and the dean of the school.

To maintain continuous student status in the university, each co-op student must be enrolled in ASE 399 Cooperative Work Experience for one semester hour during each work session. Such credit cannot be applied toward degree requirements. For more information, visit the Office of the Associate Dean for Academic Affairs, or call 480/965-1750, and visit the Career Services office in SSV 329, or call 480/965-2350.

Honor Societies. Students are encouraged to seek information concerning entry into those honor societies for which they may qualify. Membership in such organizations enhances the student's professional stature. The following honor societies are active within the school:

Alpha Eta Mu Beta—Bioengineering Honor Society
Alpha Pi Mu—Industrial Engineering Honor Society
Chi Epsilon—Civil Engineering Honor Society
Eta Kappa Nu—Electrical Engineering Honor Society
Omega Rho—Industrial Engineering Society
Pi Tau Sigma—Mechanical Engineering Honor Society
Sigma Gamma Tau—Aerospace Engineering Honor Society
Sigma Lambda Chi—Construction Honor Society
Tau Beta Pi—National Engineering Honor Society
Upsilon Pi Epsilon—National Computer Science Honor Society

Information on any of these organizations may be obtained from the respective department or school offices.

Honors Students. The Fulton School of Engineering participates in the programs of the Barrett Honors College, which provides enhanced educational experiences to academically superior undergraduate students. Participating students can major in any academic program. A description of the requirements and the opportunities offered can be found in "The Barrett Honors College," page 129.

Internships. A variety of internship programs exist within the college. Information on these programs can be obtained from the Engineering Internship Program coordinator in the office of the associate dean for academic affairs.

Scholarships. Information and applications for academic scholarships for continuing students may be obtained by contacting the Office of the Associate Dean for Academic Affairs or the various department or school offices. Other scholarships may be available through the university Student Financial Assistance Office. For an application and more information, access the Web site at www.fulton.asu.edu/fulton/students/index.php.

ROTC. Students pursuing a commission through either the Air Force or Army ROTC programs are required to take courses in the Department of Aerospace Studies or Department of Military Science. To preclude excessive overloads, these students should plan on at least one additional semester to complete degree requirements. Because of accreditation requirements, aerospace studies (AES) or military science (MIS) courses are not acceptable for degree credit in engineering as social and behavioral science or humanities and fine arts under General Studies. ROTC students must also meet all other degree requirements of this school.

GENERAL INFORMATION

Definition of Terms. The terms used 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 several 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 made with the advice and counsel of an advisor. Example: major—Mechanical Engineering; area of study—thermosciences.

Del E. Webb School of Construction

construction.asu.edu
480/965-3615
USE 138

William W. Badger, Director

Professor: Badger

Associate Professors: Ariaratnam, Bashford, Chasey, Ernzen, Kashiwagi, Sawhney, Wiezel

Assistant Professors: Fiori, Knutson, Mitropoulos, Sullivan

Visiting Eminent Scholars: Mathews, Schleifer

PURPOSE

Construction careers are so broadly diversified that no single curriculum prepares the student for universal entry into all fields. As an example, heavy construction contractors usually place more emphasis on technical and engineering science skills than do residential contractors/developers, who usually prefer a greater depth of knowledge in the business management of 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 industry.

DEGREES

Construction—BS

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

Each concentration is arranged to accent requisite technical skills and to develop management, leadership, and competitive qualities in the student. Prescribed are a combination of General Studies courses, technical courses basic to engineering and construction, and courses on a broad range of applied management subjects fundamental to the business of construction contracting.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Construction—MS

The faculty in the school also offer the MS degree in Construction. Details for this degree are found in the *Graduate Catalog.*

Professional Accreditation and Affiliations. The Del E. Webb School of Construction is a member of the Associated Schools 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.

SPECIAL PROGRAMS

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

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

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 construction program.

Business Minor. The school, in conjunction with the W. P. Carey School of Business, offers a business minor for students who have an interest in additional business courses while pursuing a degree in construction. The courses available for the minor are designed to appeal to and inform the nonbusiness student. Courses cover a broad range of topics important to modern managers. See a construction undergraduate advisor for minor requirements.

ADMISSION

For information regarding requirements for admission, transfer, retention, qualification, and reinstatement, see "Undergraduate Admission," page 66; "Admission," page 215; and "Degree Requirements," on this page. A preprofessional category is available for applicants deficient in regular admission requirements. Vocational and craft-oriented courses taught at the community colleges are not accepted for credit toward a bachelor's degree in Construction.

BASIC REQUIREMENTS

Students complete the following basic requirements before registering for advanced courses: (1) All first-semester, first-year courses and the university First-Year Composition requirement (see "University Graduation Requirements," page 88) must be completed by the time the student has accumulated 48 semester hours of program requirements, 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. Participation in a summer field internship activity is required for all students between the second and third years of the program.

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 general building construction, heavy construction, residential construction, and specialty construction. Students in all concentrations 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" (2.00) 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 "General Studies," page 92, and all university graduation requirements as noted in "University Graduation Requirements," page 88. Note that all three General Studies awareness areas are required. Consult an 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 course as needed 3		
HU/SB (upper division) and awareness area course as needed 3		
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*[1] 3
PHY	112	General Physics *SQ*[2] 3
PHY	113	General Physics Laboratory *SQ*[1] 1
PHY	114	General Physics Laboratory *SQ*[2] 1
Total 8		

Mathematical Studies

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

[1] 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 340 Hydraulics and Hydrology 3
CON 221 Applied Engineering Mechanics: Statics 3
CON 223 Strength of Materials 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 296 Field Internship 1
CON 310 Testing of Materials for Construction 3
CON 341 Surveying 3
CON 345 Mechanical Systems 3
CON 371 Construction Management and Safety 3
CON 383 Construction Estimating 4
CON 389 Construction Cost Accounting and Control *CS* 3
CON 424 Structural Design 3
CON 450 Geotechnical Applications for Construction 3
CON 453 Construction Labor Management 3
CON 455 Construction Project Management 3
CON 484 Managerial Internship 1
CON 494 Special Topics 1
CON 495 Construction Planning and Scheduling *CS* 3
ECE 100 Introduction to Engineering Design *CS* 3
LES 305 Legal, Ethical, and Regulatory Issues in Business 3
or W LES 306 Business Law (3)
or LES 380 Consumer Perspective of Business Law (3)
Physical 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 all 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] 1

Total 17

Second Semester

ECE 100 Introduction to Engineering Design *CS* 3
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 area as needed 3

Total 16

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] (3)
COM 225 Public Speaking *L* 3
CON 223 Strength of Materials 3
CON 252 Building Construction Methods, Materials, and Equipment 3
Physical science elective with lab 4

Total 16

[1] 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 industrial, 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 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,

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

bridges, canals, sewerage and water works, and mass earthwork.

Requirements

CON 486 Heavy Construction Estimating	3
CON 494 ST: Heavy Construction Project Management	3
Upper-division electives	9
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
MKT 382 Advertising and Marketing Communication	3
PUP 432 Planning and Development Control Law or PUP 433 Zoning Ordinances, Subdivision Regulations, and Building Codes (3)	3
Upper-division elective	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 trade contractor level.

Requirements

CON 468 Mechanical and Electrical Estimating	3
CON 471 Mechanical and Electrical Project Management	3
CON 494 ST: Cleanroom Construction	3
Upper-division electives	6
Total	15

CONSTRUCTION (CON)

CON 101 Construction and Culture: A Built Environment. (3)
fall and spring
Analyzes the cultural context of construction, emphasizing its centrality in the evolution and expansion of built environments as expressions of ethical and historical value systems. Lecture, speakers.
General Studies: HU, G, H

CON 221 Applied Engineering Mechanics: Statics. (3)
fall and spring
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 223 Strength of Materials. (3)
fall and spring
Analyzes strength and rigidity of structural members in resisting applied forces. Stress, strain, shear, moment, deflections, combined stresses, and connections. Both U.S. and SI units of measurement. Prerequisite: CON 221.

CON 243 Heavy Construction Equipment, Methods, and Materials. (3)
fall and spring
Emphasizes "Horizontal" construction. Fleet operations, maintenance programs, methods, and procedures to construct tunnels, roads, dams, and the excavation of buildings. Lab, field trips. Fee.

CON 251 Microcomputer Applications for Construction. (3)
fall and spring
Applies the microcomputer as a problem-solving tool for the constructor. Uses spreadsheets, information management, and multimedia software. Prerequisite: ECE 100.

CON 252 Building Construction Methods, Materials, and Equipment. (3)
fall and spring
Emphasizes "Vertical" construction. Methods, materials, codes, and equipment used in building construction corresponding to the 16 division "Master Format."

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

CON 296 Field Internship. (1)
summer
Participation as interns on construction projects to observe and experience the daily activities. Internship. Fee.

CON 310 Testing of Materials for Construction. (3)
fall and spring
Structural and behavioral characteristics, engineering properties, measurements, and application of construction materials. Not open to engineering students. Lecture, lab. Fee. Prerequisite: CON 223.

CON 341 Surveying. (3)
fall, spring, summer
Theory and field work in construction and land surveys. Lecture, lab. Cross-listed as CEE 381. Credit is allowed for only CEE 381 or CON 341. Fee. Prerequisite: MAT 270.

CON 345 Mechanical Systems. (3)
fall and spring
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)
fall and spring
Organization and management theory applied to the construction process. Leadership functions. Safety procedures and equipment. OSHA requirements for construction. Prerequisite: CON 252.

CON 377 Residential Construction Production Procedures. (3)
spring
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. (4)
fall and spring
Analyzes construction drawings and specifications. Methods used in estimating process. Quantity surveying techniques for CSI divisions. Lecture, project workshops. Prerequisites: CON 243, 252.

CON 389 Construction Cost Accounting and Control. (3)
fall and spring
Nature of construction cost. Depreciation and tax theory and variable equipment costs. Cash flow theory, investment models, profitability, and analysis. Computer applications. Funding sources and arrangements. Builder's insurance. Prerequisites: ACC 230 (or 394 ST: Financial Analysis and Accounting for Small Businesses); CON 251.
General Studies: CS

CON 424 Structural Design. (3)
fall
Economic use of concrete, steel, and wood in building and engineered structures. Design of beams, columns, concrete formwork, and connections. Lecture, field trips. Prerequisite: CON 310.

CON 450 Geotechnical Applications for Construction. (3)
fall and spring
Soil formation, engineering properties and use as building materials. Soil's influence on construction of built environment, including specifications. Lecture, lab, site visits. Fee. Prerequisite: CON 310.

CON 453 Construction Labor Management. (3)
fall and spring
Labor and management history, union, and open shop organization of building and construction workers; applicable laws and government regulations; goals, economic power, jurisdictional disputes, and grievance procedures. Prerequisites: CON 371; ECN 112.

CON 455 Construction Project Management. (3)
fall and spring
Study of methods for coordinating people, equipment, materials, money, and schedule to complete a project on time and within approved cost. Lecture, class projects, CPC exam. Fee. Prerequisite: CON 371. Pre- or corequisite: CON 495.

CON 468 Mechanical and Electrical Estimating. (3)
fall
Analysis and organization of performing a cost estimate for both mechanical and electrical construction projects. Computer usage. Prerequisites: a combination of CON 273 and 345 and 383 or only instructor approval.

CON 471 Mechanical and Electrical Project Management. (3)
spring
Specialty contracts and agreements, scheduling, material handling, labor unit analysis, and job costing for mechanical and electrical construction. Prerequisite: CON 371.

CON 472 Development Feasibility Reports. (3)
fall and spring
Integrates economic location theory, development cost data, market research data, and financial analysis into a feasibility report. Computer orientation. Prerequisite: REA 380.
General Studies: L

CON 477 Residential Construction Business Practices. (3)
fall
Topics addressed include development, marketing, financing, legal issues, and sales.

CON 483 Advanced Building Estimating. (3)
fall and spring
Concepts of pricing and markup, development of historic costs, life cycle costing, change order and conceptual estimating, and emphasizing microcomputer methods. Prerequisite: CON 383.

CON 484 Internship. (1–12)
fall, spring, summer
Structured practical experience following a contract or plan, supervised by faculty and practitioners. May serve with industry participant or government agency. May be repeated for credit. Topics may include the following:
- Managerial Internship. (1)
  Fee. Prerequisites: CON 296; school approval.

CON 486 Heavy Construction Estimating. (3)
fall
Methods analysis and cost estimation for construction of highways, bridges, tunnels, dams, and other engineering works. May be repeated for credit. Lecture, field trips. Prerequisites: CON 341, 383.

CON 492 Honors Directed Study. (1–6)
selected semesters

CON 493 Honors Thesis. (1–6)
selected semesters

CON 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Cleanroom Construction. (3)
  fall
- Heavy Construction Project Management. (3)

CON 495 Construction Planning and Scheduling. (3)
fall and spring
Various network methods of project scheduling, such as AOA, AON Pert, bar-charting, line-of-balance, and VPM techniques. Microcomputers used for scheduling, resource allocation, and time/cost analysis. Lecture, lab. Fee. Prerequisites: CON 383; STP 226. Pre- or corequisite: CON 389.
General Studies: CS

CON 496 Construction Contract Administration. (3)
fall and spring
Surveys administrative procedures of general and subcontractors. Studies documentation, claims, arbitration, litigation, bonding, insurance, and indemnification. Discusses ethical practices. Lecture, field trips. Prerequisites: COM 225 or ECE 300; senior standing.
General Studies: L

CON 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Engineering Programs

480/965-1726

PURPOSE

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 programs are designed to develop a balance between science and engineering and an understanding of the economic and social consequences of engineering activity. The goals of the programs include the promotion of the general welfare of the engineering profession.

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

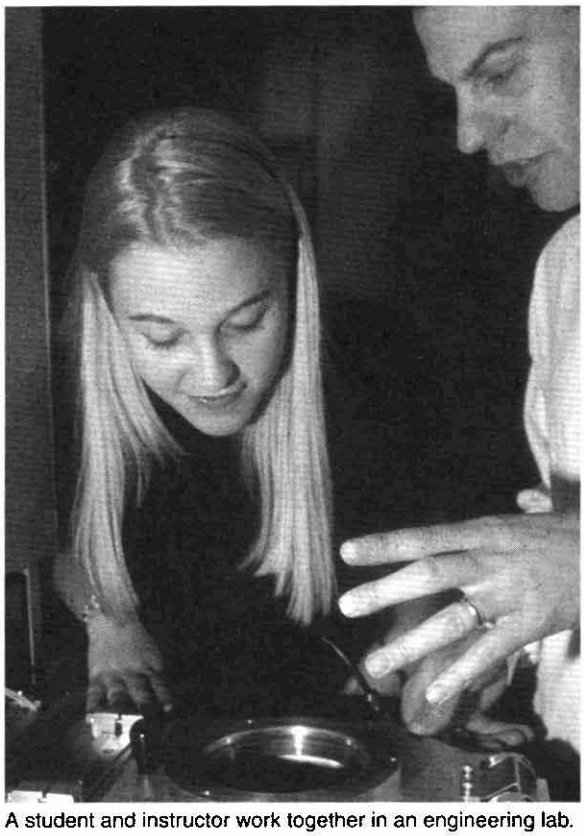
1. those who wish to pursue a career in engineering;
2. those who wish to do graduate work in engineering;
3. those who plan to pursue a nonengineering career but want the technical background associated with a BSE; and
4. those who wish to take certain electives in engineering while pursuing another program in the university.

ADMISSION

For information regarding requirements for admission, transfer, retention, disqualification, and reinstatement, see "Undergraduate Admission," page 66; "Admission," page 215; and "Student Responsibilities," page 217.

Individuals who are beginning their initial college work in engineering should have completed certain secondary school units in addition to the minimum university admission requirements. Four units are required in mathematics; a course with trigonometry should be included. The laboratory sciences chosen must include at least one unit in physics and one unit in chemistry. Calculus, biology, and computer programming are also recommended. Students who do not meet 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 180 Computer Literacy, CSE 181 Applied Problem Solving with Visual

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.



A student and instructor work together in an engineering lab.

Tim Trumble photo

BASIC, MAT 170 Precalculus, and PHY 105 Basic Physics—may be required to satisfy omissions or deficiencies upon admission.

DEGREES

The Bachelor of Science in Engineering (BSE) degree consists of three parts:

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

The BS 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, Accreditation Board for Engineering and Technology, Inc. (ABET), for programs in engineering and computing science, respectively.

In addition to First-Year Composition, the university requires, through the General Studies requirement, courses in literacy and critical inquiry, humanities and fine arts, social and behavioral sciences, mathematical studies, and natural sciences (see "General Studies," page 92). There are also requirements for historical awareness, global awareness, and cultural diversity in the United States. ABET imposes additional requirements, particularly in mathematics, 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 to 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 subsequent work in the same and related subject areas; and (2) for those students who may not desire to pursue additional studies in a particular subject area. Thus, subjects within the engineering core are taught with an integrity and quality appropriately relevant to the particular discipline but always with an attitude and concern for both engineering in general and for the particular major(s).

The majors available are of two program types: (1) those associated with a particular program (for example, Electrical Engineering and Civil Engineering) and (2) those offered as concentrations in Engineering Special Studies (for example, premedical engineering). With the exception of the Computer Science major, all major courses in the 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 traditionally referred to as *technical electives*.

Majors and areas of study are offered by the seven engineering departments within the Fulton School of Engineering:

Department of Chemical and Materials Engineering
Department of Civil and Environmental Engineering
Department of Computer Science and Engineering
Department of Electrical Engineering
Department of Industrial Engineering
Department of Mechanical and Aerospace Engineering
Harrington Department of Bioengineering

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

The semester-by-semester selection of courses varies from one field to another, particularly at the upper-division level, and is determined by the student in consultation with a faculty or professional advisor. See the "Typical Freshman Year" table, page 227, an example for a full-time student; depending on a particular student's circumstances, many other examples are possible.

Typical Freshman Year

CHM	114 General Chemistry for Engineers *SQ*	4 or 8
	or CHM 113 General Chemistry *SQ* (4) and CHM 116 General Chemistry *SQ* (4)	
ECE	100 Introduction to Engineering Design *CS*	3
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 and awareness area course		3
Total		31 or 35

* 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 courses 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 88), and the literacy and critical inquiry component (see "Five Core Areas," page 92) of the university 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 university 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	56
Engineering core*	14–18
Major (including area of study or concentration)*	48–52
Minimum total	128

* The requirements for each of the majors offered are described in the department sections.

Specific course requirements for the BS and BSE 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—

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

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[1]
ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* (3)
HU and awareness area courses ..... 6 or 9
SB and awareness area course(s) ..... 3 or 6

Total 15

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

Total 6

Mathematical, Computation, and Quantitative Studies
ECE 100 Introduction to Engineering Design *CS* 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
Department mathematics elective 2

Total 20

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] 3
PHY 132 University Physics Laboratory II *SQ*[3] 1
Department basic science elective 3

Total 15
General Studies/school requirements total 56

[1] Engineering students may not use aerospace studies (AES) or military science (MIS) courses to obtain HU or SB requirements. Courses in the awareness areas of global, historical, and cultural diversity in the United States must also be represented in the program of study. One course must be upper-division.

[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.

Engineering Core Requirement

In addition to ECE 100 and 300, which also fulfill a portion of the university General Studies requirement, a minimum of five of the following eight courses are required. Courses selected are subject to departmental approval. See department requirements.

ECE 201 Electrical Networks I 4
ECE 210 Engineering Mechanics I: Statics 3
ECE 212 Engineering Mechanics II: Dynamics 3
ECE 214 Engineering Mechanics 4
ECE 313 Introduction to Deformable Solids 3
ECE 334 Electronic Circuits 4
Choose one thermodynamics course below ..... 3 or 4
ECE 340 Thermodynamics (3)
CHE 342 Introduction to Applied Chemical Thermodynamics (4)
MSE 430 Thermodynamics of Materials (3)
Choose one materials course below ..... 3 or 4
ECE 350 Structure and Properties of Materials (3)
ECE 351 Civil Engineering Materials (3)
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)

GRADUATION REQUIREMENTS

To qualify for graduation, a student must have a minimum cumulative ASU 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 ABET, Baltimore, Maryland, 410/347-7700. The BS program in Computer Science is accredited by the Computer Science Accreditation Commission of ABET.

ANALYSIS AND SYSTEMS (ASE)

ASE 100 College Adjustment and Survival. (2)
fall and spring
Explores career goals and majors. Emphasizes organization and development of study skills, including time management, stress management, and use of the library.

ASE 194 Special Topics. (1–4)
fall
Topics may include the following:
- MEP Academic Success. (2)
- MEP Computer Basics. (1)

ASE 399 Cooperative Work Experience. (1)
fall, spring, summer
Work periods with industrial firms or government agencies alternated with full-time course work. Not open to students from other colleges. May be repeated for credit. Prerequisites: 45 hours completed in major with 2.50 GPA; dean approval.

ASE 490 Project in Design and Development. (2–3)
fall, spring, summer
Individual project in creative design and synthesis. May be repeated for credit. Prerequisite: senior standing.

ASE 496 Professional Seminar. (0)
fall and spring
Topics of interest to students in the engineering special and interdisciplinary studies.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

ENGINEERING CORE (ECE)

ECE 100 Introduction to Engineering Design. (3)
fall and spring
Introduces engineering design; teaming; the profession of engineering; computer models in engineering; communication skills; quality and customer satisfaction. Credit is allowed for only ECE 100 or 200. Fee. Prerequisites: high school computing and physics and algebra courses (or their equivalents).
General Studies: CS

ECE 200 Elements of Engineering Design. (3)
fall and spring
Advanced version of ECE 100 for students who transfer to ASU after completion of the stated prerequisites. Credit is allowed for only ECE 200 or 100. Lecture, lab. Prerequisites for engineering majors: ENG 101 (or 105); MAT 270; PHY 121, 122. Prerequisites for Construction majors: ENG 101 (or 105); MAT 270; PHY 111, 113. Pre- or corequisite for engineering majors: CHM 113 or 114 or 116.
General Studies: CS

ECE 201 Electrical Networks I. (4)
fall and spring
Fundamental network theorems for dc and ac analysis. Utilization of SPICE. Design and measurement of linear analog electrical systems. Lecture, lab. Fee. Prerequisites: ECE 100 (or 200); MAT 274 (or 275); PHY 131, 132.

ECE 210 Engineering Mechanics I: Statics. (3)
fall, spring, summer
Force systems, resultants, equilibrium, distributed forces, area moments, fluid statics, internal stresses, friction, energy criterion for equilibrium, and stability. Lecture, recitation. Prerequisites: ECE 100 (or 200); MAT 271 (or 291); PHY 121, 122.

ECE 212 Engineering Mechanics II: Dynamics. (3)
fall, spring, summer
Kinematics and kinetics of particles, translating and rotating coordinate systems, rigid body kinematics, dynamics of systems of particles and rigid bodies, and energy and momentum principles. Lecture, recitation. Prerequisites: ECE 210; MAT 274.

ECE 214 Engineering Mechanics. (4)
fall, spring, summer
Force systems, resultants, moments and equilibrium. Kinematics and kinetics of particles, systems of particles and rigid bodies. Energy and momentum principles. Lecture, recitation. Prerequisites: ECE 100 (or 200); MAT 274; PHY 121, 122.

ECE 300 Intermediate Engineering Design. (3)
fall, spring, summer
Engineering design process concentrating on increasing the ability to prepare well-written technical communication and to define problems and generate and evaluate ideas. Teaming skills enhanced. Fee. Prerequisites: ECE 100 (or 200); ENG 102 (or 105 or 108); at least two other engineering core courses.
General Studies: L

ECE 313 Introduction to Deformable Solids. (3)
fall, spring, summer
Equilibrium, strain-displacement relations, and stress-strain-temperature relations. Applications to force transmission and deformations in axial, torsional, and bending of bars. Combined loadings. Lecture, recitation. Prerequisites: ECE 210 (or 214); MAT 274.

ECE 334 Electronic Circuits. (4)
fall, spring, summer
Applies electric network theory to semiconductor circuits. Diodes/transistors/amplifiers/opamps/digital logic gates, and electronic instruments. Lecture, lab. Fee. Prerequisite: ECE 201.

ECE 340 Thermodynamics. (3)
fall, spring, summer
Work, heat, and energy transformations and relationships between properties; laws, concepts, and modes of analysis common to all applications of thermodynamics in engineering. Lecture, recitation. Prerequisites: CHM 114 (or 116); ECE 210 (or 214); PHY 131, 132. Pre- or corequisite: MAT 274.

ECE 350 Structure and Properties of Materials. (3)
fall, spring, summer
Basic concepts of material structure and its relation to properties. Application to engineering problems. Prerequisites: CHM 114 (or 116); PHY 121, 122.

ECE 351 Civil Engineering Materials. (3)
fall and spring
Structure and behavior of civil engineering materials. Laboratory investigations and test criteria. Lecture, lab. Fee. Prerequisite: ECE 313.

ECE 352 Properties of Electronic Materials. (4)
fall and spring
Schrodinger's wave equation, potential barrier problems, bonds of crystals, the band theory of solids, semiconductors, superconductor dielectric, and magnetic properties. Prerequisites: CHM 114 (or 116); MAT 362; PHY 241.

ECE 380 Probability and Statistics for Engineering Problem Solving. (3)
fall and spring
Applications-oriented course with computer-based experience using statistical software for formulating and solving engineering problems. 2 hours lecture, 2 hours lab. Fee. Prerequisite: MAT 271.
General Studies: CS

ECE 384 Numerical Methods for Engineers. (4)
fall and spring
Numerical methods and computational tools for selected problems in engineering. Prerequisites: ECE 100 (or 200); MAT 274; at least two other engineering core courses. Pre- or corequisite: MAT 272.

ECE 400 Engineering Communications. (3)
fall, spring, summer
Planning and preparing engineering publications and oral presentations, based on directed library research related to current engineering topics. Prerequisites: ENG 102 (or 105 or 108); completion of General Studies L requirement (or ECE 300); senior standing in an engineering major.
General Studies: L

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

SOCIETY, VALUES, AND TECHNOLOGY (STE)

STE 208 Patterns in Nature. (4)
fall and spring
Project-oriented science course with computer training to develop critical thinking and technical skills for student-oriented K–12 science lessons. Lecture, lab. Cross-listed as PHS 208. Credit is allowed for only PHS 208 or STE 208. Prerequisite: a college-level course in science or instructor approval.
General Studies: SQ

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Harrington Department of Bioengineering

www.fulton.asu.edu/~bme
480/965-3028
ECG 334

Eric J. Guilbeau, Chair

CORE FACULTY

Olin Endowed Professor: Guilbeau
Professors: Garcia, He, Towe
Associate Professors: Abbas, Iasemidis, Joshi, Jung, Massia, Pizziconi, Sweeney
Assistant Professors: Caplan, Muthuswamy, Panitch, Vernon
Research Professors: Brophy, Herman
Associate Research Professor: Singh
Assistant Research Professors: Helms Tillery, Shimansky
Senior Research Professional: Brandon
Research Scientists: Ehteshami, Pauken
Senior Lecturer: Coursen

AFFILIATED FACULTY

Electrical Engineering
Professor: Kozicki
Associate Professor: Kim

Electronics and Computer Engineering Technology (East campus)
Associate Professor: Macia

Kinesiology
Associate Professor: Santello

The faculty in the Harrington Department of Bioengineering offer the BSE degree in Bioengineering. The major builds on a broad base of knowledge within the basic and mathematical sciences and the engineering core. The major offers graduates excellent career opportunities.

Faculty within the department also participate in the Engineering Special Studies program in premedical engineering, which is described separately in "Programs in Engineering Special Studies," page 271.

BIOENGINEERING—BSE

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 in students 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 students an understanding of and positive approach toward continued lifelong learning of new technologies and relevant issues in the discipline of bioengineering.

Graduate degree programs in Bioengineering are offered at ASU at 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 BSE degree in Bioengineering. A minimum of 50 upper-division semester hours is required. Students must attain a GPA of at least 2.00 for the courses in the major field.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, students must satisfy all university graduation requirements. See "University Graduation Requirements," page 88.

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 12

Total 15

Literacy and Critical Inquiry
BME 413 Biomedical Instrumentation *L*[1] 3
BME 423 Biomedical Instrumentation Laboratory *L*[1] 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*[2] 3
PHY 122 University Physics Laboratory I *SQ*[2] 1
PHY 131 University Physics II: Electricity and Magnetism *SQ*[3] 3
PHY 132 University Physics Laboratory II *SQ*[3] 1

Total 16

Mathematical Studies
ECE 100 Introduction to Engineering Design *CS* 3
ECE 384 Numerical Methods for Engineers 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* 4
MAT 274 Elementary Differential Equations *MA* 3

Total 22
General Studies/school requirements total 60

Engineering Core
ECE 201 Electrical Networks I 4
ECE 214 Engineering Mechanics 4
ECE 334 Electronic Circuits 4
ECE 340 Thermodynamics 3
ECE 350 Structure and Properties of Materials 3

Total 18

Major
BIO 188 General Biology II *SQ*[4] 4
or MBB 245 Cellular and Molecular Biology *SQ*[5] (3) and MBB 246 Cellular and Molecular Biology Laboratory *SQ*[5] (1)
BME 101 Introduction to Bioengineering 3
BME 235 Physiology for Engineers 4
BME 318 Biomaterials 3
BME 331 Biomedical Transport Phenomena 3
BME 350 Signals and Systems for Bioengineers 3
BME 417 Biomedical Engineering Capstone Design I 3
BME 470 Microcomputer Applications in Bioengineering 4
BME 490 Biomedical Engineering Capstone Design II 3
CSE 100 Principles of Programming with C++ *CS*[6] 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
Technical electives 8

Total 44

[1] Both BME 413 and 423 must be taken to secure L credit.
[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] To fulfill medical school admission requirements, premedical students generally should choose BIO 188. Note that BIO 187 General Biology I is required by many medical schools in addition to BIO 188 and the other degree requirements and cannot generally be used as a technical elective.
[5] Both MBB 245 and 246 must be taken to secure SQ credit. Students who pursue this major fulfill this GS requirement through other courses.
[6] CSE 110 Principles of Programming with Java can be substituted for CSE 100 with departmental approval.

The major BME courses require a grade of "C" (2.00) or higher to advance in the program and to receive a baccalaureate degree.

Bioengineering Areas of Study

Technical electives should in general be selected from one of the emphasis areas. Students can elect to emphasize biochemical engineering, bioelectrical engineering, biomaterials engineering, biomechanical engineering, biomedical imaging engineering, biosystems engineering, molecular and cellular bioengineering, or premedical engineering in their studies. A student may also, with prior approval of the department, select a general area of study or combination of courses that support a career in bioengineering not covered by one of these areas.

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. Students must take the following course:

BME 434 Applications of Bioengineering Transport Phenomena 3

Students should choose additional technical electives from the following:

BCH 361 Principles of Biochemistry 3
or BCH 461 General Biochemistry (3)
BCH 462 General Biochemistry 3
CHE 475 Biochemical Engineering 3
CHE 476 Bioreaction Engineering 3
CHE 477 Bioseparation Processes 3
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
MIC 420 Immunology: Molecular and Cellular Foundations 3

Bioelectrical Engineering. This area is designed to strengthen the student's knowledge of electrical systems, electronics, and signal processing. Students considering a career in bioelectric phenomena, biocontrol systems,

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SQ** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

medical instrumentation, neural engineering, or electrophysiology should consider this area of study. Students should choose technical electives from the following:

BME 419 Biocontrol Systems 3
EEE 302 Electrical Networks II 3
EEE 425 Digital Systems and Circuits 4
EEE 433 Analog Integrated Circuits 4

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. Students must take the following two courses:

MSE 353 Introduction to Materials Processing and Synthesis 3
MSE 355 Introduction to Materials Science and Engineering 3

Students should choose additional technical electives from the following:

BME 494 ST: Biopolymeric Drug Delivery 3
MSE 431 Corrosion and Corrosion Control 3
MSE 441 Analysis of Material Failures 3
MSE 470 Polymers and Composites 3
MSE 471 Introduction to Ceramics 3

Biomechanical Engineering. This area is designed to strengthen the student's knowledge of mechanics and control theory. Students interested in careers related to biomechanical analyses, the design of orthotic/prosthetic devices and orthopaedic implants, forensic biomechanics, and rehabilitation engineering should consider this area of study. While students may choose any combination of the following technical electives, it is recommended that courses be selected from one of three subareas: movement biomechanics, rehabilitation engineering, or orthopaedic biomechanics. The movement biomechanics area is designed to strengthen the student's knowledge of dynamics and control theory. Students interested in analyzing pathological movement disorders, sports techniques, and neuromuscular control should select courses from this area. Rehabilitation engineering emphasizes the design of highly functional products for people with disabilities. Biomechanical, electrical, and mechanical design procedures are used to develop new assistive devices, orthoses, and prostheses. The student primarily interested in the material properties of bones, cartilage, soft tissues, and the design of implants for tissue repair and replacement should select courses from the orthopaedic biomechanics area. Students must take the following course:

BME 416 Biomechanics 3

Recommended subarea selections are as follows:

Movement Biomechanics
BME 419 Biocontrol Systems 3
KIN 334 Functional Anatomy and Kinesiology 3
KIN 414 Electromyographic Kinesiology *L* 3

Rehabilitation Engineering
IEE 437 Human Factors Engineering 3
or DSC 344 Human Factors in Design (3)
IND 354 Principles of Product Design 3
KIN 334 Functional Anatomy and Kinesiology 3
MAE 341 Mechanism Analysis and Design 3

Orthopaedic Biomechanics
ECE 313 Introduction to Deformable Solids 3
KIN 412 Biomechanics of the Skeletal System 3
MAE 404 Finite Elements in Engineering 3

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. Students should choose technical electives from the following or other departmental approved electives:

BME 494 ST: Scanning Probe Microscopy 3
EEE 460 Nuclear Concepts for the 21st Century 3
PHY 361 Introductory Modern Physics 3

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 require 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.

Students should choose technical electives from the following (or other departmental approved electives):

BME 411 Biomedical Engineering I 3
BME 412 Biomedical Engineering II 3
BME 415 Biomedical Transport Processes 3
BME 419 Biocontrol Systems 3
CHE 476 Bioreaction Engineering 3

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 biotechnologies.

Students are strongly encouraged to choose from the following courses:

BIO 353 Cell Biology 3
CHM 331 General Organic Chemistry 3

Students should choose additional or alternative technical electives from the following;
BCH 361 Principles of Biochemistry 3
or BCH 461 General Biochemistry (3)
BIO 340 General Genetics 4
or MBB 350 Applied Genetics (4)
or PLB 350 Applied Genetics (4)

BIO 343 Genetic Engineering and Society *L* 4
or MBB 343 Genetic Engineering and Society *L* (4)
BME 494 ST: Cell Biotechnology Lab 3
BME 494 ST: Introduction to Molecular, Cellular, and Tissue Engineering 3
CHE 475 Biochemical Engineering 3
or CHE 476 Bioreaction Engineering (3)
or CHE 477 Bioseparation Processes (3)
CHM 335 General Organic Chemistry Laboratory 1

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

Additional technical electives should be chosen from any of the course offerings listed for the other bioengineering areas of study listed. Note that, to fulfill medical school admission requirements, BIO 187 General Biology I is required in addition to BIO 188 General Biology II as well as the other degree requirements and cannot generally be used as a technical elective.

Bioengineering Program of Study
Typical Four-Year Sequence

First Year

First Semester
CSE 100 Principles of Programming with C++ *CS*[1] 3
ECE 100 Introduction to Engineering Design *CS* 3
ENG 101 First-Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
Total 13

Second Semester
BME 101 Introduction to Bioengineering 3
CHM 113 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*[2] 3
PHY 122 University Physics Laboratory I *SQ*[2] 1
Total 18

Second Year

First Semester
BIO 188 General Biology II *SQ*[3] 4
or MBB 245 Cellular and Molecular Biology *SQ*[4] (3)
and MBB 246 Cellular and Molecular Biology Laboratory *SQ*[4] (1)
CHM 116 General Chemistry *SQ* 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
PHY 131 University Physics II: Electricity and Magnetism *SQ*[5] 3
PHY 132 University Physics Laboratory II *SQ*[5] 1
Total 16

Second Semester
BME 235 Physiology for Engineers 4
ECE 201 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 318 Biomaterials 3
ECE 214 Engineering Mechanics 4
ECE 300 Intermediate Engineering Design *L* 3
ECE 384 Numerical Methods for Engineers 4
HU/SB and awareness area course[6] 3
Total 17

Second Semester
BME 331 Biomedical Transport Phenomena 3
BME 350 Signals and Systems for Bioengineers 3
ECE 334 Electronic Circuits 4
ECE 340 Thermodynamics 3
HU/SB and awareness area course[6] 3
Total 16

Fourth Year

First Semester
BME 413 Biomedical Instrumentation *L*[7] 3
BME 417 Biomedical Engineering Capstone Design I 3
BME 423 Biomedical Instrumentation Laboratory *L*[7] 1
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
HU/SB and awareness area course[6] 3
Technical elective(s) 3
Total 16

Second Semester
BME 470 Microcomputer Applications in Bioengineering 4
BME 490 Biomedical Engineering Capstone Design II 3
HU/SB and awareness area course[6] 3
Technical electives 5
Total 15
Total degree requirements 128

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1 CSE 110 Principles of Programming with Java can be substituted for CSE 100 with departmental approval.

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

3 To fulfill medical school admission requirements, premedical students generally should choose BIO 188. Note that BIO 187 General Biology I is required by many medical schools in addition to BIO 188 and the other degree requirements and cannot generally be used as a technical elective.

4 Both MBB 245 and 246 must be taken to secure SQ credit. Students who pursue this major fulfill this GS requirement through other courses.

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

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

7 Both BME 413 and 423 must be taken to secure L credit.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

BIOENGINEERING (BME)

BME 101 Introduction to Bioengineering. (3)
fall and spring
Impact of bioengineering on society. Develops an awareness of the contributions of bioengineering to solve medical and biological problems. Fee. Pre- or corequisites: ENG 102 (or 105 or 108); BME major (or department approval).

BME 202 Global Awareness Within Biomedical Engineering Design. (3)
selected semesters
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 (or 105).
General Studies: L/HU

BME 235 Physiology for Engineers. (4)
fall and spring
Physiology of the nervous, muscular, cardiovascular, endocrine, renal, and respiratory systems. Emphasizes use of quantitative methods in understanding physiological systems. Lecture, lab. Fee. Prerequisites: BIO 188; CHM 115 (or 116). Pre- or corequisite: PHY 131.

BME 318 Biomaterials. (3)
fall and spring
Material properties of natural and artificial biomaterials. Tissue and blood biocompatibility. Uses of materials to replace body parts. Prerequisites: BIO 188; ECE 350.

BME 331 Bioengineering Transport Phenomena. (3)
fall
Transport phenomena with emphasis on momentum, energy, and mass transport in living systems, medical devices, and other therapeutic/diagnostic applications. Prerequisites: ECE 210 (or 214); MAT 274; PHY 131, 132. Pre- or corequisite: ECE 340 recommended.

BME 350 Signals and Systems for Bioengineers. (3)
spring
Applies principles of calculus and ordinary differential equations to analysis and computer processing of biosignals and linear modeling of biosystems. Prerequisites: ECE 201; MAT 272, 274.

BME 411 Biomedical Engineering I. (3)
once a year
Reviews diagnostic and prosthetic methods using engineering methodology. Introduces transport, metabolic, and autoregulatory processes in the human body. Prerequisite with a grade of "C" (2.00) or higher: BME 434.

BME 412 Biomedical Engineering II. (3)
once a year
Reviews electrophysiology and nerve pacing applications. Introduces biomechanics and joint/limb replacement technology, cardiovascular and pulmonary fluid mechanics, and the application of mathematical modeling. Prerequisite: instructor approval.

BME 413 Biomedical Instrumentation. (3)
fall
Principles of medical instrumentation. Studies of medical diagnostic instruments and techniques for the measurement of physiologic variables in living systems. Prerequisites: ECE 300, 334. Prerequisite with a grade of "C" (2.00) or higher: BME 235. Corequisite: BME 423.
General Studies: L (if credit also earned in BME 423)

BME 415 Biomedical Transport Processes. (3)
once a year
Principles of momentum, heat, and mass transport with applications to medical and biological systems and medical device design. Prerequisites: MAT 274; PHY 131.

BME 416 Biomechanics. (3)
fall
Mechanical properties of bone, muscle, and soft tissue. Static and dynamic analysis of human movement tasks such as locomotion. Prerequisite: ECE 210 or 214. Prerequisite with a grade of "C" (2.00) or higher: BME 318.

BME 417 Biomedical Engineering Capstone Design I. (3)
fall
Technical, regulatory, economic, legal, social, and ethical aspects of medical device systems engineering design. Lecture, field trips. Prerequisites: BME 101; ECE 300. Pre- or corequisites with a grade of "C" (2.00) or higher: at least 5 of the 7 following courses: BME 318, 331, 350, 413, 470; ECE 340, 380.

BME 419 Biocontrol Systems. (3)
fall
Applies linear and nonlinear control systems techniques to analysis of neuromusculoskeletal, cardiovascular, thermal, and mass transfer systems of the body. Prerequisites: ECE 201; MAT 274.

BME 423 Biomedical Instrumentation Laboratory. (1)
fall
Laboratory experience with problems, concepts, and techniques of biomedical instrumentation in static and dynamic environments. Lab. Fee. Prerequisites: ECE 300, 334. Prerequisite with a grade of "C" (2.00) or higher: BME 235. Corequisite: BME 413.
General Studies: L (if credit also earned in BME 413)

BME 434 Applications of Bioengineering Transport Phenomena. (3)
spring
Develops mathematical models of transport phenomena in physiological systems, medical devices, and pharmacokinetic analysis. Prerequisite: ECE 380. Prerequisite with a grade of "C" (2.00) or higher: BME 331.

BME 451 Cell Biotechnology Laboratory. (3)
fall
Mammalian cell culture techniques, including mouse embryonic stem cells, the use of bioreactors, cell fractionation, and digital video imaging. Lecture, lab. Cross-listed as BIO 451. Credit is allowed for only BME 451 or BIO 451. Prerequisites: BIO 353; instructor approval.

BME 470 Microcomputer Applications in Bioengineering. (4)
spring
Uses microcomputers for real-time data collection, analysis, and control of experiments involving actual and simulated physiological systems. Lecture, lab. Fee. Prerequisite: ECE 334. Prerequisite with a grade of "C" (2.00) or higher: BME 235. BME 413 and 423 recommended.

BME 490 Biomedical Engineering Capstone Design II. (3–4)
spring
Individual projects in medical systems or medical device design and development. Lecture, lab. Fee. Prerequisite with a grade of "C" (2.00) or higher: BME 417.

BME 492 Honors Directed Study. (1–6)
selected semesters

BME 493 Honors Thesis. (1–6)
selected semesters

BME 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Biopolymeric Drug Delivery. (3)
- Biotechnology Laboratory Techniques. (3)
- Cell Biotechnology Lab. (3)
  Fee.
- Introduction to Molecular, Cellular, and Tissue Engineering. (3)
- Scanning Probe Microscopy. (3)

BME 496 Professional Seminar. (1–3)
fall and spring
Professional and ethical aspects with a discussion of responsibilities. Lecture, field trips. Prerequisite: instructor approval.

BME 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Department of Chemical and Materials Engineering

www.fulton.asu.edu/~cme
480/965-3313
ECG 202

The faculty in the Department of Chemical and Materials Engineering offer the BSE 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 design and operate processes that may include chemical change. They combine the science of chemistry with the discipline of engineering in order to solve complex problems in a wide variety of industries. Challenging job opportunities exist not only in the chemical and petroleum industries, but also in the plastics, electronics, 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 transformation, biomedical applications, fermentation, protein recovery, extractive metallurgy, and separations. In the environmental 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 relationships between the structure and processing of materials and their properties. Students educated in this discipline decide how to optimize existing materials or how to develop 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, semiconductors, and transportation.

CHEMICAL ENGINEERING—BSE

Chemical engineers are generally concerned with transfer within and between liquid, gas, and solid phases and the chemical changes that may also occur. Engineers 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 analyzed. The new challenge in chemical engineering is to apply the principles of fluid dynamics, mass transfer, solution thermodynamics, reaction kinetics, and separation techniques to technological endeavors such as pollution control within manufacturing and the environment, integrated circuit design, solid-state surface treatments, and materials processing.

Consequently, in addition to the chemical and petroleum industries, chemical engineers find challenging opportunities in the plastics, solid-state, electronics, computer, metals, space, food, drug, and health care industries, where they practice in a wide variety of occupations, such as environmental control, surface treatments, energy and materials transformations, biomedical applications, fermentation, protein 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 engineering is accomplished by a blend of classroom instruction and laboratory experience.

The chemical engineering faculty are committed to fully developing the potential of students by providing a unique learning environment that encourages them to take responsibility for their education; exposes students to a diversity of viewpoints and teaching/learning styles; prepares students to work in teams to solve real-world, multidisciplinary problems; and sets them on a path of lifelong learning. The faculty demand high quality work. They are fair, honest, courteous, and professional. They are sensitive to students' needs and dedicated to student success. They are interested in capitalizing on the nontraditional student demographics, including cultural background, age group, and the full- and part-time employed, to develop a vibrant and flexible education and research environment.

To achieve this commitment, the following program educational objectives were established by the chemical engineering faculty:

1. Graduates will have a strong foundation in mathematics, science, and engineering with a balance of theoretical understanding and ability to apply modern techniques, skills, and tools to solve real-world chemical engineering problems.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

2. Graduates will have the skills and experience necessary to design component systems and processes for the manufacturing of chemical engineering products.
3. Graduates will have the skills and experience necessary to communicate effectively in oral, written, and graphical forms to various types of audiences.
4. Graduates will have the skills necessary to perform as engineers in a professional and ethical manner.
5. Graduates will have the skills and attitudes for continued life-long learning of new technologies and concepts.
6. Graduates will have opportunities to interact with local industries, educational institutions, and constituent populations.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the BSE degree in Chemical Engineering. A minimum of 50 upper-division semester hours is required. Students must attain a GPA of at least 2.00 for the courses in the major field.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, majors must satisfy all university graduation requirements. See "University Graduation Requirements," page 88.

COURSE REQUIREMENTS

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[1] 12

Total 15

Literacy and Critical Inquiry

CHE 462 Process Design *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
PHY 131 University Physics II: Electricity and Magnetism *SQ*[3] 3

Total 19

Mathematical Studies

ECE 100 Introduction to Engineering Design *CS* 3
ECE 384 Numerical Methods for Engineers 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* 4
MAT 274 Elementary Differential Equations *MA* 3

Total 22

General Studies/school requirements total 62

Engineering Core

CHE 311 Introduction to Chemical Processing 3
CHE 342 Introduction to Applied Chemical Thermodynamics 4
CHE 461 Process Control *CS* 4
ECE 350 Structure and Properties of Materials 3
ECE Core elective 3

Total 17

Major

CHE 331 Introduction to Transport Phenomena I: Fluids 3
CHE 334 Introduction to Transport Phenomena II: Heat and Mass Transfer 4
CHE 352 Transport Laboratories 2
CHE 432 Principles of Chemical Engineering Design 2
CHE 433 Modern Separations 3
CHE 442 Introduction to Chemical Reactor Design 3
CHE 451 Chemical Engineering Laboratory 2
CHM 332 General Organic Chemistry 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
Technical electives 18

Total 43

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

Students should consult with their department academic advisors to ensure that all requirements are met.

The technical elective courses must be selected from upper-division courses with 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 fulfill accreditation requirements and to prepare adequately for the advanced chemistry courses, Chemical Engineering 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.

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

following are possible elective areas with 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 processing, pharmaceuticals, and other areas within biochemical engineering should select from the following:

Chemistry Electives
BCH 361 Principles of Biochemistry 3
or 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

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
or BCH 461 General Biochemistry (3)
BCH 462 General Biochemistry 3

Technical Electives
BME 318 Biomaterials 3

Environmental. Students interested in environmental engineering are encouraged to pursue a BSE 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
BCH 361 Principles of Biochemistry 3
or BCH 461 General Biochemistry (3)
CHM 302 Environmental Chemistry 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

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 2
MSE 431 Corrosion and Corrosion Control 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 187, 188, 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 494 ST: Advanced Process Control 3
MAE 436 Combustion 3

Semiconductor Processing. Students 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 2

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* 3
ENG 101 First-Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
Total 14

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] 1
Total 15

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Second Year

First Semester

CHE	311	Introduction to Chemical Processing 3
ECE	380	Probability and Statistics for Engineering Problem Solving *CS* 3
ECE core elective 3		
ECN	111	Macroeconomic Principles *SB* 3
		or ECN 112 Microeconomic Principles *SB* (3)
MAT	274	Elementary Differential Equations *MA* 3
PHY	131	University Physics II: Electricity and Magnetism *SQ*[2] 3
Total 18		

Second Semester

CHE	331	Introduction to Transport Phenomena I: Fluids 3
ECE	350	Structure and Properties of Materials 3
ECE	384	Numerical Methods for Engineers 4
MAT	272	Calculus with Analytic Geometry III *MA* 4
HU/SB and awareness area course 3		
Total 17		

Third Year

First Semester

CHE	334	Introduction to Transport Phenomena II: Heat and Mass Transfer 4
CHE	342	Introduction to Applied Chemical Thermodynamics 4
CHM	331	General Organic Chemistry 3
CHM	335	General Organic Chemistry Laboratory 1
ECE	300	Intermediate Engineering Design *L* 3
Total 15		

Second Semester

CHE	352	Transport Laboratories 2
CHE	433	Modern Separations 3
CHE	442	Introduction to Chemical Reactor Design 3
CHM	332	General Organic Chemistry 3
HU/SB and awareness area course 3		
Technical elective 3		
Total 17		

Fourth Year

First Semester

CHE	432	Principles of Chemical Engineering Design 2
CHE	451	Chemical Engineering Laboratory 2
CHE	461	Process Control *CS* 4
HU/SB and awareness area course 3		
Technical electives 6		
Total 17		

Second Semester

CHE	462	Process Design *L* 3
HU/SB and awareness area course 3		
Technical electives 9		
Total 15		
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.

MATERIALS SCIENCE AND ENGINEERING—BSE

Materials engineers create innovations that result in new and improved materials that help drive the cutting edge of new technologies in many industries. These include the auto, aerospace, electronics, semiconductor, materials production, and health professions. The space shuttle, lightweight cars, and today's fastest computers have all been developed using the latest materials technologies. In advancing today's technologies, materials engineers fulfill a wide range of job responsibilities that significantly impact other engineering disciplines and include

1. selecting the best material for a given application or developing innovative materials and processing techniques for new applications;
2. characterizing and analyzing failed products in order to redesign more reliable and robust engineering components; and
3. impacting technological advances in larger-scale projects through working in a team environment with other engineers from the chemical, electrical, mechanical, aerospace and other engineering disciplines.

The Materials Science and Engineering degree program at ASU has outstanding faculty who have national reputations in the areas of both structural and electronic materials. The faculty bring significant professional expertise to classroom teaching, which is complemented by enlightening experimental work in the program's contemporary, well-equipped laboratory facilities. This atmosphere promotes quality undergraduate research projects and senior design projects that frequently result in patents and technical publications. Examples of recent patent applications include an improved method for producing artificial Teflon arteries and an improved technique for testing steel in air bag containers. Such preparation and experiences give the program's graduates an edge in seeking employment at the best companies or admission to the nation's leading graduate schools. The program's educational experience is also enhanced by numerous scholarships available to students ranging from entering freshmen to final-year seniors.

The Materials Science and Engineering degree program is accredited by the Accreditation Board for Engineering and Technology, Inc. As such, it has an identifiable program mission, objectives, and outcomes, which reflect, encompass, and embody the unique educational development that a student experiences as he or she progresses through the program to graduation. The mission and objectives are described below.

The mission of the Materials Science and Engineering degree program is to provide a solid educational foundation in the application of the principles of science and engineering toward the design, utilization, and improvement of materials in engineering components and systems for the betterment of society. This mission, with the associated objectives and outcomes, also supports the mission and goals of ASU and the Ira A. Fulton School of Engineering. To accomplish this mission, the program's graduates fulfill the following objectives: (1) graduates will have the strong educational foundation in materials science and engineering that promotes success in the broad range of career opportunities available in graduate school, industry, and government; and (2) graduates will have the personal skills and values that promote their success in the rapidly changing,

culturally diverse workplace that reflects the needs of contemporary society.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the BSE degree in Materials Science and Engineering. A minimum of 50 upper-division semester hours is required. Students must attain a GPA of at least 2.00 for the courses in the major field.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, majors must satisfy all university graduation requirements. See "University Graduation Requirements," page 88.

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)

—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 12

Total 15

Literacy and Critical Inquiry

ECE 300 Intermediate Engineering Design *L* 3
MSE 482 Materials Engineering Design *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 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 16

Mathematical Studies

ECE 100 Introduction to Engineering Design *CS* 3
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 20

General Studies/school requirements total 57

Engineering Core

ECE 201 Electrical Networks I 4
ECE 210 Engineering Mechanics I: Statics 3
ECE 313 Introduction to Deformable Solids 3
ECE 350 Structure and Properties of Materials 3
MSE 430 Thermodynamics of Materials 3

Total 16

Major

Select two of the following five courses[3] 6
- CHM 302 Environmental Chemistry (3)
- 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 12
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
MSE 111 Challenges in Materials Engineering 1
MSE 353 Introduction to Materials Processing and Synthesis 3
MSE 354 Experiments in Materials Synthesis and Processing 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 490 Capstone Design Project 3

Total 49

[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.

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

[*] Both BME 413 and 423 must be taken to secure L credit.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SQ** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

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

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 4
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

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
IEE 300 Economic Analysis for Engineers 3
IEE 360 Manufacturing Processes 3
or MAE 351 Manufacturing Processes (3)
IEE 361 Manufacturing Processes Lab 1
IEE 368 Facilities Analysis and Design 3
IEE 369 Work Analysis and Design 3
IEE 431 Engineering Administration 3
IEE 437 Human Factors Engineering 3
IEE 461 Production Control 3
IEE 463 Computer-Aided Manufacturing Control *CS* 3
MAE 422 Mechanics of Materials 4
MAE 441 Principles of Design 3
MAE 442 Mechanical Systems Design 4
MSE 431 Corrosion and Corrosion Control 3
MSE 441 Analysis of Material Failures 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 4
MSE 431 Corrosion and Corrosion Control 3
MSE 441 Analysis of Material 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

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

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* 3
ENG 101 First-Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
MSE 111 Challenges in Materials Engineering 1
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] 1
Total 15

Second Year

First Semester
ECE 210 Engineering Mechanics I: Statics 3
ECE 350 Structure and Properties of Materials 3
MAT 242 Elementary Linear Algebra 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 201 Electrical Networks I 4
ECE 313 Introduction to Deformable Solids 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
MAT 274 Elementary Differential Equations *MA* 3
Technical elective 3
Total 16

Third Year

First Semester
ECE 300 Intermediate Engineering Design *L* 3
ECN 111 Macroeconomic Principles *SB* 3
MSE 353 Introduction to Materials Processing and Synthesis 3
MSE 355 Introduction to Materials Science and Engineering 3

Advanced science course[3]	3
Total	15

Second Semester

MSE 354 Experiments in Materials Synthesis and Processing	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]	3
Advanced science course[3]	3
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 *L*	3
Technical electives	3
HU/SB and awareness area course[4]	3
Total	18

Second Semester

MSE 490 Capstone Design Project	3
HU/SB and awareness area course[4]	6
Technical elective	6
Total	15
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.

[3] To take CHM 341 Elementary Physical Chemistry, CHM 331 General 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.

GRADUATE STUDY

The faculty in the Department of Chemical and Materials Engineering also offer graduate programs leading to the MS, MSE, and PhD degrees. These programs provide a blend of classroom instruction and research. Many diverse 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 (CHE)

CHE 311 Introduction to Chemical Processing. (3)
fall
Applies chemical engineering analysis and problem solving to chemical processes material and energy balance methods and skills. Prerequisites: CHM 116; MAT 271.

CHE 331 Introduction to Transport Phenomena I: Fluids. (3)
spring
Transport phenomena, with emphasis on fluid systems. Credit is allowed for only CHE 331 or 501. Prerequisites: CHE 311; MAT 274.

CHE 334 Introduction to Transport Phenomena II: Heat and Mass Transfer. (4)
fall
Applies heat and mass transport principles. Design of heat exchangers and continuous contactors. Credit is allowed for only CHE 334 or 502. Prerequisite: CHE 331.

CHE 342 Introduction to Applied Chemical Thermodynamics. (4)
fall
Applies conservation and accounting principles with nonideal property estimation techniques. Lecture, recitation. Credit is allowed for only CHE 342 or 504. Prerequisite: CHE 311; ECE 350. Corequisite: MAT 272.

CHE 352 Transport Laboratories. (2)
spring
Demonstrates transport phenomena principles with experiments in fluid flow, heat, and mass transfer. Fee. Prerequisites: CHE 334; ECE 300.

CHE 432 Principles of Chemical Engineering Design. (2)
fall
Multicomponent distillation, engineering economics, equipment sizing and costs, plant operation economics, and simulation and optimization techniques. Prerequisites: CHE 334, 342.

CHE 433 Modern Separations. (3)
spring
Design of modern separation equipment in chemical engineering other than fractionation. Prerequisites: CHE 334, 342.

CHE 442 Introduction to Chemical Reactor Design. (3)
spring
Applies kinetics to chemical reactor design. Lecture, recitation. Credit is allowed for only CHE 442 or 505. Prerequisites: CHE 334, 342.

CHE 451 Chemical Engineering Laboratory. (2)
fall
Operation, control, and design of experimental and industrial process equipment; independent research projects. 6 hours lab. Fee. Prerequisites: CHE 334, 352; ECE 384.

CHE 458 Semiconductor Material Processing. (3)
selected semesters
Introduces the processing and characterization of electronic materials for semiconductor applications. Prerequisites: CHE 334, 342.

CHE 461 Process Control. (4)
fall
Process dynamics, instrumentation, and feedback applied to automatic process control. Lecture, lab. Fee. Prerequisites: ECE 384; MAT 274.
General Studies: CS

CHE 462 Process Design. (3)
spring
Applies economic principles to optimize equipment selection and design; development and design of process systems. Prerequisites: CHE 432, 433, 442.
General Studies: L

CHE 474 Chemical Engineering Design for the Environment. (3)
fall
Conflict of processing materials and preserving the natural resources. Teaches students to understand and value the environment and attempt to control our impact. Prerequisites: CHE 334, 342.

CHE 475 Biochemical Engineering. (3)
selected semesters
Applies chemical engineering methods, mass transfer, thermodynamics, and transport phenomena to industrial biotechnology. Prerequisite: instructor approval.

CHE 476 Bioreaction Engineering. (3)
selected semesters
Principles of analysis and design of reactors for processing with cells and other biologically active materials; applications of reaction engineering in biotechnology. Prerequisite: instructor approval.

CHE 477 Bioseparation Processes. (3)
selected semesters
Principles of separation of biologically active chemicals; the application, scale-up, and design of separation processes in biotechnology. Prerequisite: instructor approval.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

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

CHE 490 Chemical Engineering Projects. (1–5)
fall, spring, summer
Individual projects in chemical engineering operations and design. Prerequisite: instructor approval.

CHE 492 Honors Directed Study. (1–6)
selected semesters

CHE 493 Honors Thesis. (1–6)
selected semesters

CHE 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Advanced Process Control. (3)
- Biotechnology Techniques. (3)

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

CHE 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

MATERIALS SCIENCE AND ENGINEERING (MSE)

MSE 111 Challenges in Materials Engineering. (1)
fall
Introduces current issues and concepts of materials engineering, relationship between materials properties, application to engineering problems.

MSE 353 Introduction to Materials Processing and Synthesis. (3)
fall
Principles of materials structure and properties with emphasis on applications in bulk and thin film materials processing and synthesis. Prerequisites: CHM 116 and ECE 350 and PHY 131 (or their equivalents).

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

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

MSE 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Computer and Experimental Methods in Materials. (3)
- Computer Modeling
  Fee.

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

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

MSE 430 Thermodynamics of Materials. (3)
spring
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)
spring in odd years
Introduces corrosion mechanisms and methods of preventing corrosion. Topics include: electrochemistry, polarization, corrosion rates, oxidation, coatings, and cathodic protection. Prerequisite: ECE 350.

MSE 440 Mechanical Properties of Solids. (3)
fall
Effects of environmental and microstructural variables of mechanical properties, including plastic deformation, fatigue, creep, brittle fracture, and internal friction. Prerequisite: ECE 350.

MSE 441 Analysis of Material Failures. (3)
spring in even years
Identifies types of failures. Analytical techniques. Fractography, SEM, nondestructive inspection, and metallography. Mechanical and electronic components. Prerequisite: ECE 350.

MSE 450 X-Ray and Electron Diffraction. (3)
spring
Fundamentals of x-ray diffraction, transmission electron microscopy, and scanning electron microscopy. Techniques for studying surfaces, internal microstructures, and fluorescence. Lecture, demonstrations. Fee. Prerequisite: ECE 350.

MSE 470 Polymers and Composites. (3)
fall
Relationship between chemistry, structure, and properties of engineering polymers. Design, properties, and behavior of fiber composite systems. Cross-listed as MAE 455. Credit is allowed for only MAE 455 or MSE 470. Prerequisites: ECE 313, 350.

MSE 471 Introduction to Ceramics. (3)
fall
Principles of structure and property relations in ceramic materials. Processing techniques. Applications in mechanical, electronic, and superconducting systems. Prerequisite: ECE 350.

MSE 482 Materials Engineering Design. (3)
fall
Principles of the design process. Feasibility and optimization. Manufacturing processes, materials selection, failure analysis, and economics. Prerequisites: ECE 300; ENG 101 (or 105 or 107); MSE 354, 355.
General Studies: L

MSE 490 Capstone Design Project. (1–3)
fall and spring
For small groups in fundamental or applied aspects of engineering materials; emphasizes experimental problems and design. Fee. Prerequisites: MSE 430, 440, 450.

MSE 492 Honors Directed Study. (1–6)
selected semesters

MSE 493 Honors Thesis. (1–6)
selected semesters

MSE 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Composite Materials. (3)
- Electronic, Optical, and Magnetic Properties of Materials. (3)
- Engineering Disasters: Heavy Metal Toxicity
- Growth and Processing of Semiconductors. (3)
- Growth and Processing of Semiconductors Laboratory. (1)
- Nanomaterials: Synthesis and Evaluation. (3)
- Scanning Probe Microscopy. (3)
- Vacuum Systems Science and Engineering. (3)

MSE 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Department of Civil and Environmental Engineering

www.fulton.asu.edu/~civil
480/965-3589
ECG 252

Sandra L. Houston, Chair

Richard Snell Presidential Chair Professor: Crittenden

Professors: Allenby, Fox, Houston, Johnson, Mamlouk, Mays, Mobasher, Rajan, Rittmann, Singhal, Witczak

Associate Professors: Abbaszadegan, Fafitis, Kavazanjian, Muccino, Westerhoff

Assistant Professors: Allen, Kaloush, Peccia

Associate Research Professor: Chen

Assistant Research Professor: El-Basyouny

Faculty Research Associates: Alum, Kabiri-Badr, Zapata

The civil engineering profession includes analysis, planning, design, construction, and maintenance of many types of facilities for government, commerce, industry, and the public domain. These facilities include high-rise office towers, factories, schools, airports, tunnels and subway systems, dams, canals, and water purification and environmental 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 BSE degree in Civil Engineering readily find employment. Civil engineers work in many different types of companies, from large corporations to small, private consulting firms, or in governmental agencies. A civil engineering background is an excellent foundation for jobs in management and public service. Civil engineering is one of the best engineering professions from the viewpoint of international travel opportunities or for eventually establishing one's own consulting business.

Uniqueness of the Program at ASU. The Department of Civil and Environmental Engineering offers a challenging program of study designed to provide the student with the resources and background to pursue a career in a wide range of specialty areas. Some of these areas are structural, construction, geotechnical, environmental and water resources, and transportation and materials engineering. The Civil Engineering program is fully accredited by ABET. With the program, students will be prepared for the Fundamentals of Engineering examination and professional registration.

The Department of Civil and Environmental Engineering at ASU strongly believes in the development of programmatic objectives and outcomes, and in a continuous quality improvement program. The four preeminent learning objectives for the program deal with the ability of graduates to

1. be technically competent,
2. be effective members of society,
3. communicate effectively, and
4. analyze and design civil engineering systems with due consideration to cost and environmental and construction factors.

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 systems, seepage control, earthdams and water resource structures, earthwork operations, fluid flow-through porous media, response of foundations and embankments to earthquakes, and solutions to environmental problems.

Structures/Materials Engineering. This area of study considers the planning, analysis, and design of steel and concrete 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 design and operation and (2) pavements and materials. Transportation design and operation cover geometric design of highways, traffic operations, and highway capacity and safety. Pavements and materials focus on pavement analysis and design, pavement maintenance and rehabilitation, pavement evaluation and management, characterization of highway materials, and durability of highway structures.

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

The undergraduate program provides an excellent background 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;

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

2. the major with a concentration in construction engineering; and
3. the major with a concentration in environmental engineering.

Civil Engineering. The BSE degree in Civil Engineering offers students a wide background in various areas of study within civil engineering. The degree provides basic principles of construction, 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 senior year.

Civil Engineering with Construction Engineering Concentration. The BSE 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 traditional engineering principles, construction materials and practice, quality control, and civil engineering project management.

Civil Engineering with Environmental Engineering Concentration. The BSE 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—BSE

The BSE 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, and computer programming along with precalculus, algebra, and trigonometry.

The BSE degree program consists of the following categories:

First-Year Composition	6
General Studies/school requirements	55
Engineering core	18–19
Civil Engineering major	27
Design courses	6
Technical courses	15–16
Minimum requirement	128

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 course(s)	6–9
SB courses	3–6
Minimum total	15
Literacy and Critical Inquiry	
ECE 300 Intermediate Engineering Design *L*	3
CEE 486 Integrated Civil 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*[1]	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
Basic science elective	3
Total	15
Mathematical Studies	
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
ECE 384 Numerical Methods for Engineers	4
Total	19
General Studies/school requirements total	55

Engineering Core

ECE 100 Introduction to Engineering Design *CS*	3
ECE 201 Electrical Networks I	4
or ECE 340 Thermodynamics (3)	
ECE 210 Engineering Mechanics I: Statics	3
ECE 212 Engineering Mechanics II: Dynamics	3
ECE 313 Introduction to Deformable Solids	3
ECE 351 Civil Engineering Materials	3
Total	18–19

[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.

Civil Engineering Major

CEE 296 Civil Engineering Systems	4
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

Design Courses for the Degree Without a Concentration

Six semester hours from the following list are required.

CEE 412 Pavement Analysis and Design	3
or CEE 475 Highway Geometric Design (3)	
CEE 420 Steel Structures	3
or CEE 421 Concrete Structures (3)	
CEE 441 Water Resources Engineering	3

CEE 452 Foundations 3
CEE 466 Sanitary Systems Design 3

Technical Courses for the Degree Without a Concentration

From 15 to 16 semester hours are required. The design elective courses that have not been selected to satisfy the design electives requirement may be used as technical electives.

A maximum of four hours may be selected from outside civil engineering, with an advisor's approval. Construction courses taken as technical electives may be selected from the following list: CON 383, 495, and 496. Students must select technical and design electives from at least three different CEE areas of study.

Environmental Engineering
CEE 362 Unit Operations in Environmental Engineering 3
CEE 466 Sanitary Systems Design 3
CEE 467 Environmental Microbiology 4
CHM 231 Elementary Organic Chemistry *SQ** 3

* Both CHM 231 and 235 must be taken to secure SQ credit. Students who pursue this major fulfill this GS requirement through other courses.

Geotechnical/Geoenvironmental Engineering
CEE 452 Foundations 3

Structures/Materials Engineering
CEE 420 Steel Structures 3
CEE 421 Concrete Structures 3
CEE 423 Structural Design 3
CEE 432 Developing Software for Engineering Applications 3

Transportation/Materials Engineering
CEE 381 Surveying 3
CEE 412 Pavement Analysis and Design 3
CEE 474 Transportation Systems Engineering 3
CEE 475 Highway Geometric Design 3
CEE 481 Civil Engineering Project Management 3
CEE 483 Highway Materials, Construction, and Quality 3

Water Resources Engineering
CEE 440 Engineering Hydrology 3
CEE 441 Water Resources Engineering 3

Design Courses for the Degree with the Construction Engineering Concentration

CEE 420 Steel Structures 3
CEE 452 Foundations 3
Total 6

Technical Courses for the Degree with the Construction Engineering Concentration

CEE 381 Surveying 3
CEE 421 Concrete Structures 3
CEE 481 Civil Engineering Project Management 3
CEE 483 Highway Materials, Construction, and Quality 3
CON 496 Construction Contract Administration *L* 3
Total 15

Design Courses for the Degree with the Environmental Engineering Concentration

CEE 441 Water Resources Engineering 3
CEE 466 Sanitary Systems Design 3
Total 6

Technical Courses for the Degree with the Environmental Engineering Concentration

BIO 320 Fundamentals of Ecology 3
or BCH 361 Principles of Biochemistry (3)
or CHM 302 Environmental Chemistry (3)
or CHM 341 Elementary Physical 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
CEE 467 Environmental Microbiology 4
Technical elective* 3
Total 16

* This course is selected from the list of technical courses for the degree without a concentration.

Civil Engineering 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* 3
ENG 101 First-Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
Total 14

Second Semester
CEE 296 Civil Engineering Systems 4
ECN 111 Macroeconomic Principles *SB* 3
or 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*[1] 3
PHY 122 University Physics Laboratory I *SQ*[1] 1
Total 18

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 and awareness area course[3] 3
Total 17

Second Semester
ECE 201 Electrical Networks I 4
or ECE 340 Thermodynamics (3)

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

ECE 212 Engineering Mechanics II: Dynamics 3
ECE 313 Introduction to Deformable Solids 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
Basic science elective 3
Total 15–16

Third Year

First Semester
CEE 321 Structural Analysis and Design 4
CEE 372 Transportation Engineering 4
ECE 300 Intermediate Engineering Design *L* 3
ECE 351 Civil Engineering Materials 3
ECE 384 Numerical Methods for Engineers 4
Total 18

Second Semester
CEE 341 Fluid Mechanics for Civil Engineers 4
CEE 351 Geotechnical Engineering 4
CEE 361 Introduction to Environmental Engineering 4
HU/SB and awareness area course[3] 3
Total 15

Fourth Year

First Semester
Design elective 3
HU/SB and awareness area course[3] 3
Technical electives 9
Total 15

Second Semester
CEE 486 Integrated Civil Engineering Design *L* 3
Design elective 3
HU/SB and awareness area course[3] 3
Technical electives 6–7
Total 15–16
Minimum 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, 320; CON 101; PUP 100, 200.

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* 3
ENG 101 First-Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
Total 14

Second Semester
CEE 296 Civil Engineering Systems 4
ECN 111 Macroeconomic Principles *SB* 3
or 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*[1] 3
PHY 122 University Physics Laboratory I *SQ*[1] 1
Total 18

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 and awareness area course[3] 3
Total 17

Second Semester
ECE 201 Electrical Networks I 4
ECE 212 Engineering Mechanics II: Dynamics 3
ECE 313 Introduction to Deformable Solids 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
Basic science elective 3
Total 16

Third Year

First Semester
CEE 321 Structural Analysis and Design 4
CEE 372 Transportation Engineering 4
ECE 300 Intermediate Engineering Design *L* 3
ECE 351 Civil Engineering Materials 3
ECE 384 Numerical Methods for Engineers 4
Total 18

Second Semester
CEE 341 Fluid Mechanics for Civil Engineers 4
CEE 351 Geotechnical Engineering 4
CEE 361 Introduction to Environmental Engineering 4
HU/SB and awareness area course[3] 3
Total 15

Fourth Year

First Semester
CEE 381 Surveying 3
CEE 420 Steel Structures 3
CEE 452 Foundations 3
CEE 481 Civil Engineering Project Management 3
HU/SB and awareness area course[3] 3
Total 15

Second Semester
CEE 421 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 and awareness area course[3] 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, 320; CON 101; PUP 100, 200.

Environmental 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* 3
ENG	101	First-Year Composition 3
MAT	270	Calculus with Analytic Geometry I *MA* 4
Total		 14

Second Semester

CEE	296	Civil Engineering Systems 4
ECN	111	Macroeconomic Principles *SB* 3
		or 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*[1] 3
PHY	122	University Physics Laboratory I *SQ*[1] 1
Total		 18

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 and awareness area course[3] 3		
Total		 17

Second Semester

CHM	231	Elementary Organic Chemistry *SQ*[4] 3
ECE	212	Engineering Mechanics II: Dynamics 3
ECE	313	Introduction to Deformable Solids 3
ECE	340	Thermodynamics 3
ECE	380	Probability and Statistics for Engineering Problem Solving *CS* 3
Total		 15

Third Year

First Semester

CEE	321	Structural Analysis and Design 4
CEE	372	Transportation Engineering 4
ECE	300	Intermediate Engineering Design *L* 3
ECE	351	Civil Engineering Materials 3
ECE	384	Numerical Methods for Engineers 4
Total		 18

Second Semester

CEE	341	Fluid Mechanics for Civil Engineers 4
CEE	351	Geotechnical Engineering 4
CEE	361	Introduction to Environmental Engineering 4
HU/SB and awareness area course[3] 3		
Total		 15

Fourth Year

First Semester

CEE	362	Unit Operations in Environmental Engineering 3
CEE	440	Engineering Hydrology 3
CEE	466	Sanitary Systems Design 3
CEE	467	Environmental Microbiology 4
HU/SB and awareness area course[3] 3		
Total		 16

Second Semester

BIO	320	Fundamentals of Ecology 3
		or BCH 361 Principles of Biochemistry (3)
		or CHM 302 Environmental Chemistry (3)
		or CHM 341 Elementary Physical 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 and awareness area course[3] 3		
Technical elective[5] 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, 320; CON 101; PUP 100, 200.

[4] Both CHM 231 and 235 must be taken to secure SQ credit. Students who pursue this major fulfill this GS requirement through other courses.

[5] This course is selected from the list of technical courses for the degree without a concentration.

GRADUATION REQUIREMENTS

Each sequence of mathematics, engineering core, civil engineering major, and the combined design and technical courses must be completed with an average grade of "C" (2.00) or higher. CEE courses, except CEE 296, may not be taken before the engineering core courses are completed. Design and technical courses may not be taken before the civil engineering major courses are completed. CEE 486 is taken in the last semester of course work.

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

In addition to fulfilling school and major requirements, students must satisfy all university graduation requirements. See "University Graduation Requirements," page 88.

Concurrent Studies in Architecture and Civil Engineering

Qualified lower-division students interested in combining undergraduate studies in architecture and civil engineering may prepare for upper-division and graduate courses in both programs by taking courses to meet requirements for option B under the Architectural Studies major. See "Architectural Studies—BSD[1] Lower-Division Requirements," page 141.

GRADUATE STUDY

The Department of Civil and Environmental Engineering also offers graduate programs leading to the MS, MSE, and PhD degrees. These programs provide a blend of classroom instruction and research. Many topics and relevant research

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

projects are available for thesis programs. Students interested in these programs should review the *Graduate Catalog* for up-to-date literature.

CIVIL AND ENVIRONMENTAL ENGINEERING (CEE)

CEE 296 Civil Engineering Systems. (4)
fall and spring
Introduces civil engineering. Problem solving, economics, description of civil engineering systems, design concepts, ethics, professional responsibilities, and computer graphics. Lecture, computer labs, field trips. Fee. Pre- or corequisite: ECE 100.

CEE 321 Structural Analysis and Design. (4)
fall and spring
Statically determinate and indeterminate structures (trusses, beams, and frames) by classical and matrix methods. Introduces structural design. Lecture, recitation. Prerequisites: ECE 212, 313. Pre- or corequisites: ECE 380, 384.

CEE 340 Hydraulics and Hydrology. (3)
fall and spring
Applies hydraulic engineering principles to flow of liquids in pipe systems and open channels; hydrostatics; characteristics of pumps and turbines. Introduces hydrology. Not open to engineering students. Lecture, lab. Fee. Prerequisite: CON 221.

CEE 341 Fluid Mechanics for Civil Engineers. (4)
fall and spring
Fundamental principles and methods of fluid mechanics forming the analytical basis for water resources engineering. Conduit and open channel flow. 3 hours lecture, 1 hour lab. Fee. Prerequisites: ECE 212, 313. Pre- or corequisites: ECE 380, 384.

CEE 351 Geotechnical Engineering. (4)
fall and spring
Index properties and engineering characteristics of soils. Compaction, permeability and seepage, compressibility and settlement, and shear strength. Lecture, lab. Fee. Prerequisites: ECE 212, 313. Pre- or corequisites: ECE 380, 384.

CEE 361 Introduction to Environmental Engineering. (4)
fall and spring
Concepts of air and water pollution; environmental regulation, risk assessment, chemistry, water quality modeling, water and wastewater treatment systems designs. Lecture, lab. Fee. Prerequisites: ECE 212, 313. Pre- or corequisites: ECE 380, 384.

CEE 362 Unit Operations in Environmental Engineering. (3)
spring
Design and operation of unit processes for water and wastewater treatment. Prerequisite: CEE 361.

CEE 372 Transportation Engineering. (4)
fall and spring
Highway, rail, water, and air transportation. Operational characteristics and traffic control devices of each transport mode. Impact on urban form. Prerequisites: ECE 212, 313. Pre- or corequisites: ECE 380, 384.

CEE 381 Surveying. (3)
fall, spring, summer
Theory and field work in construction and land surveys. Lecture, lab. Cross-listed as CON 341. Credit is allowed for only CEE 381 or CON 341. Fee. Prerequisite: MAT 270.

CEE 412 Pavement Analysis and Design. (3)
fall
Design of flexible and rigid pavements for highways and airports. Surface, base, and subgrade courses. Cost analysis and pavement selection. Credit is allowed for only CEE 412 or 511. Prerequisites: CEE 351; ECE 351.

CEE 420 Steel Structures. (3)
fall
Behavior of structural components and systems. Design of steel members and connections. Load and resistance factor design methods. Lecture, recitation. Prerequisite: CEE 321.

CEE 421 Concrete Structures. (3)
spring
Behavior of concrete structures and the design of reinforced and prestressed concrete members, including footings. Partial design of concrete building system. Lecture, recitation. Prerequisite: CEE 321.

CEE 423 Structural Design. (3)
fall
Analysis and design of reinforced concrete steel, masonry, and timber structures. Fee. Prerequisite: CEE 421. Pre- or corequisite: CEE 420.

CEE 432 Developing Software for Engineering Applications. (3)
spring
Matrix and computer applications to structural engineering and structural mechanics. Stiffness and flexibility methods, finite elements, and differences. Credit is allowed for only CEE 432 or 532. Prerequisite: CEE 321.

CEE 440 Engineering Hydrology. (3)
fall
Descriptive hydrology; hydrologic cycle, models, and systems. Rainrunoff models. Hydrologic design. Concepts, properties, and basic equations of groundwater flow. Prerequisite: CEE 341.

CEE 441 Water Resources Engineering. (3)
spring
Applies the principles of hydraulics and hydrology to the engineering of water resources projects; design and operation of water resources systems; water quality. Prerequisite: CEE 341.

CEE 452 Foundations. (3)
fall
Applies soil mechanics to foundation systems, bearing capacity, lateral earth pressure, and slope stability. Prerequisite: CEE 351.

CEE 466 Sanitary Systems Design. (3)
fall
Capacity, planning and design of water supply, domestic and storm drainage, and solid waste systems. Prerequisite: CEE 361.

CEE 467 Environmental Microbiology. (4)
fall
Overview of the microbiology of natural and human-impacted environment, microbial detection methodologies, waterborne disease outbreaks, risk assessment, and regulations. Credit is allowed for only CEE 467 or 567. Lecture, lab. Fee. Prerequisite: CEE 361 or MIC 220.

CEE 474 Transportation Systems Engineering. (3)
fall
Introduces transportation systems and modeling, traffic characteristic analysis, traffic predictions, highway capacity, signal timing, transportation systems management, and transit. Prerequisites: CEE 372; ECE 384.

CEE 475 Highway Geometric Design. (3)
spring
Design of the visible elements of the roadway. Fundamental design controls with application to rural roads, at-grade intersections, freeways, and interchanges. Lecture, computer lab. Fee. Credit is allowed for only CEE 475 or 576. Prerequisite: CEE 372.

CEE 481 Civil Engineering Project Management. (3)
once a year
Civil engineering project management and administration, planning and scheduling, cost estimating and bidding strategies, financial management, quality control and safety, and computer applications. Lecture, field trips. Prerequisites: CEE 321, 351, 372.

CEE 483 Highway Materials, Construction, and Quality. (3)
fall
Properties of highway materials, including aggregates, asphalt concrete, and portland cement concrete; construction practice; material delivery, placement, and compaction; quality control. Lecture, field trips. Credit is allowed for only CEE 483 or 583. Prerequisites: CEE 351, 372; ECE 351.

CEE 486 Integrated Civil Engineering Design. (3)
fall and spring
Requires completion of a civil engineering design in a simulated practicing engineering environment. Limited to undergraduates in their final semester. Lecture, team learning. Prerequisites: CEE 321, 341, 351, 361, 372.
General Studies: L

CEE 492 Honors Directed Study. (1–6)
selected semesters

CEE 493 Honors Thesis. (1–6)
selected semesters

CEE 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Department of Computer Science and Engineering

cse.asu.edu
480/965-3190
BYENG

Sethuraman Panchanathan, Chair

Professors: Baral, Colbourn, Collofello, Farin, Kambhampati, Lee, Lewis, Nielson, Panchanathan, Tsai, J. Urban, S. Urban, Vrudhula, Yau

Associate Professors: Bazzi, Candan, Dasgupta, Dietrich, Faltz, Gupta, Huey, Liu, Miller, Richa, Sen, Xue

Assistant Professors: Cam, Chatha, Davulcu, Kim, Konjevod, Li, Ryu, Sarjoughian, Sundaram, Syrotiuk, Wonka

Senior Lecturer: DeLibero

Lecturers: Boyd, Calliss, Nakamura, Navabi, Turban

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 computation; for the recognition, storage, retrieval, and processing of data of all kinds; for the automatic control and simulation of processes; and for information assurance.

The curricula offered by the Department of Computer Science and Engineering prepare the student to be a participant 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 BS degree in Computer Science and a BSE degree in Computer Systems Engineering. The following are shared objectives of the degree programs:

1. Graduates will understand current trends in information technology and be able to apply their understanding in the distributed management of information.
2. Graduates can apply the underlying principles of computer science, including mathematical and physical sciences and engineering principles.
3. Graduates will know and be able to apply system development processes, using modern tools, from the component level to the system level.
4. Graduates also will have the skills required to communicate effectively in both technical and nontechnical settings, to work effectively in teams and in a multicultural environment, to work ethically and professionally, and continue to learn independently and grow intellectually.

The Computer Systems Engineering program has the specific objective that its graduates will have the technical expertise necessary to analyze requirements and to design and implement effective solutions to problems that require the integration of hardware and software. The Computer Science program has the specific objective that its graduates will have the technical expertise necessary to analyze requirements and to design and implement effective solutions using computer science for a broad range of problems. The department strives to maintain a modern learning environment that fosters excellence, cooperation, and scholarship for faculty, students, and staff.

ADMISSION REQUIREMENTS

The Preprofessional Program. Each student admitted to the Department of Computer Science and Engineering is designated a preprofessional student in either Computer Science or Computer Systems Engineering. The student follows the first- and second-year sequence of courses listed in the curriculum outline for his or her particular major. Included in the first- and second-year schedules are all emphasis courses:

CSE 120 Digital Design Fundamentals 3
CSE 200 Concepts of Computer Science *CS* 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 (Intel) (4)
CSE 240 Introduction to Programming Languages 3
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)
HU/SB elective chosen with an advisor (3)
—or—
ENG 107 English for Foreign Students (3)
ENG 108 English for Foreign Students (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
PHY 121 University Physics I: Mechanics *SQ*[1] 3
PHY 122 University Physics Laboratory I *SQ*[1] 1

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

PHY 131 University Physics II: Electricity and Magnetism *SQ*[2] ..3
PHY 132 University Physics Laboratory II *SQ*[2] ..1

[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 Professional Program. Admission to the professional program is competitive and granted to those applicants demonstrating the highest promise for professional success in Computer Science and Engineering. The admissions committee considers overall transfer and ASU GPA numbers as well as the transfer and ASU GPA numbers in Computer Science and Engineering emphasis courses. All students seeking professional status must have completed or be in the process of completing all the emphasis courses and then follow the application procedure as described on the Computer Science and Engineering Web site. Completion of the specified courses does not guarantee admission to professional status. Only students who have been admitted to ASU are eligible to apply for the professional programs. Candidates are strongly encouraged to visit the Computer Science and Engineering Advising Center in BYENG before beginning the application process. All application materials can be found on the Web at cse.asu.edu.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is required for the BS degree in Computer Science and the BSE degree in Computer Systems Engineering. A minimum of 50 upper-division semester hours is required. In addition to the requirement for a cumulative GPA and a major GPA of 2.00 or higher, all computer science and computer systems engineering students must obtain a minimum grade of "C" (2.00) in all CSE courses used for degree credit. Students cannot take CSE courses for which they failed to earn a grade of "C" (2.00) or better in the prerequisite course.

The department calculates the major GPA in both Computer Science and Computer Systems Engineering based on an average of all CSE courses and technical electives that count toward the degree.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, majors must satisfy all university graduation requirements. See "University Graduation Requirements," page 88.

DEGREES

Computer Science—BS

The faculty in the Department of Computer Science and Engineering offer a BS degree that prepares the student for a career in computer science. A student pursuing a BS 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, visit the department, call 480/965-3190, or access the department's Web site at cse.asu.edu.

Software Engineering Concentration. Students pursuing the BS degree in Computer Science may choose to concentrate their studies on software engineering. The BS Degree in Computer Science with a concentration in software engineering provides recognition that the student has acquired in-depth knowledge and hands-on experience in software development and related subjects. This concentration requires the student to complete CSE 445, 460, 461, and 462 with a grade of "C" (2.00) or higher in each.

The following table specifies departmental requirements for the BS 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)
HU/SB 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 Behavioral Sciences
HU/SB electives ..18

Literacy and Critical Inquiry
L elective ..3
ECE 400 Engineering Communications ..3
or approved CSE L course (3)
Total ..6

Natural Sciences/Basic Sciences
PHY 121 University Physics I: Mechanics *SQ*[1] ..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
Science elective[3] ..4
Total ..12

Mathematical Studies
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
or MAT 343 Applied 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 *CS* ..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 (Intel) (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[4] 18
Technical electives[5] 6
Unrestricted electives 7

Total 31
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.
[3] Each student must complete a four-credit laboratory science course that meets major requirements in the discipline of the course selected and satisfies the SQ portion of the General Studies requirement. See an advisor for the approved listing.
[4] Students cannot count toward graduation more than six semester hours of independent study courses, including, but not limited to, CSE 484, 492, 493, and 499. Computer Science honors students are allowed to use an extra three semester hours for the L elective. The only course that meets the L elective requirement in this group is CSE 493.
[5] Each student must complete six hours of courses chosen from the computer science technical elective list and approved by the student's advisor. See an advisor for the approved listing.

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 and awareness area course[1] 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 3

Total 16

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*[2] 3
PHY 122 University Physics Laboratory I *SQ*[2] 1
HU/SB and awareness area course[1] 3

Total 17

Second Semester
CSE 225 Assembly Language Programming and Microprocessors (Motorola) 4
or CSE 226 Assembly Language Programing and Microprocessors (Intel) (4)
MAT 342 Linear Algebra 3
or MAT 343 Applied Linear Algebra (3)
PHY 131 University Physics II: Electricity and Magnetism *SQ*[3] 3
PHY 132 University Physics Laboratory II *SQ*[3] 1
HU/SB and awareness area course[1] 3
L elective 3

Total 17

Third Year

First Semester
CSE 310 Data Structures and Algorithms 3
CSE 330 Computer Organization and Architecture 3
CSE 360 Introduction to Software Engineering 3
HU/SB and awareness area course[1] 3
Laboratory Science *SQ*[4] 4

Total 16

Second Semester
CSE 340 Principles of Programming Languages 3
CSE 355 Introduction to Theoretical Computer Science 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
HU/SB and awareness area course[1] 3
Technical elective 3

Total 15

Fourth Year

First Semester
CSE 430 Operating Systems 3
ECE 400 Engineering Communications 3
or approved CSE L course (3)
400-level CSE computer science breadth electives 9
Unrestricted elective 1

Total 16

Second Semester
400-level CSE computer science breadth electives 9
HU/SB and awareness area course[1] 3
Technical elective 3

Total 15

[1] Engineering students may not use aerospace studies (AES) or military science (MIS) courses to fulfill HU and SB requirements.
[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] Each student must complete a four-credit laboratory science course that meets major requirements in the discipline of the course selected and satisfies the SQ portion of the General Studies requirement. See an advisor for the approved listing.

COMPUTER SYSTEMS ENGINEERING—BSE

The Department of Computer Science and Engineering offers a BSE degree that prepares the student for a career in computer systems engineering. This degree program provides training in both engineering and computer science. Qualified students in this program may apply to participate in an industrial internship program offered through the Embedded Systems and Internetworking Consortium. Students who participate in this internship program receive academic credit (CSE 484) that applies to the technical elective

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

requirement of the BSE degree in Computer Systems Engineering. The following table specifies departmental requirements for the BSE 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)
- HU/SB 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 Behavioral Sciences

ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* (3)
HU and SB electives 12

Total 15

Literacy and Critical Inquiry

CSE 423 Capstone Project *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*[1] 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
PHY 361 Introductory Modern Physics 3

Total 15

Mathematical Studies

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 274 Elementary Differential Equations *MA* 3
or MAT 275 Modern Differential Equations *MA* (3)
MAT 342 Linear Algebra 3
or MAT 343 Applied Linear Algebra (3)

Total 21

General Studies/department requirement total 57

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* 3
ECE 201 Electrical Networks I 4
ECE 210 Engineering Mechanics I: Statics 3
ECE 334 Electronic Circuits 4

Total 21

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 electives[3] 6

Total 44

Degree requirement total 128

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

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* 3
or CSE 120 Digital Design Fundamentals (3)
ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* (3)
ENG 101 First-Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4

Total 16

Second Semester

CHM 114 General Chemistry for Engineers *SQ* 4
CSE 120 Digital Design Fundamentals 3
or ECE 100 Introduction to Engineering Design *CS* (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

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*[1] 3
PHY 122 University Physics Laboratory I *SQ*[1] 1

Total 15

Second Semester

CSE 240 Introduction to Programming Languages 3
ECE 210 Engineering Mechanics I: Statics 3
MAT 274 Elementary Differential Equations *MA* 3
or MAT 275 Modern 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 and awareness area course[3] 3

Total 16

Third Year

First Semester

CSE	310	Data Structures and Algorithms 3
CSE	330	Computer Organization and Architecture 3
CSE	360	Introduction to Software Engineering 3
ECE	300	Intermediate Engineering Design *L* 3
MAT	342	Linear Algebra 3
		or MAT 343 Applied Linear Algebra (3)
Total		 15

Second Semester

CSE	340	Principles of Programming Languages 3
CSE	355	Introduction to Theoretical Computer Science 3
CSE	421	Microprocessor System Design I 4
ECE	380	Probability and Statistics for Engineering Problem Solving *CS* 3
HU/SB and awareness area course[3]		 3
Total		 16

Fourth Year

First Semester

CSE	422	Microprocessor System Design II 4
CSE	430	Operating Systems 3
ECE	201	Electrical Networks I 4
PHY	361	Introductory Modern Physics 3
HU/SB and awareness area course[3]		 3
Total		 17

Second Semester

CSE	423	Capstone Project *L* 3
		or CSE 438 Systems Programming *L* (3)
ECE	334	Electronic Circuits 4
HU/SB and awareness area course[3]		 3
Technical electives		 6
Total		 16

[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)
fall and spring
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)
fall and spring
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.
General Studies: CS

CSE 120 Digital Design Fundamentals. (3)
fall and spring
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. Fee. Prerequisite: computer literacy.

CSE 180 Computer Literacy. (3)
fall and spring
Introduces 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)
fall and spring
Introduces systematic definition of problems, solution formulation, and method validation. Requires computer solution using Visual BASIC for projects. Lecture, lab. Prerequisites: MAT 117; nonmajor.
General Studies: CS

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

CSE 200 Concepts of Computer Science. (3)
fall and spring
Overview of algorithms, languages, computing systems, theory. Problem solving by programming with a high-level language (Java or other). Lecture, lab. Fee. Prerequisite: CSE 100 or 110 or 1 year of high school programming with Java or C++ or PASCAL.
General Studies: CS

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

CSE 225 Assembly Language Programming and Microprocessors (Motorola). (4)
fall and spring
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. Fee. Prerequisites: CSE 100 (or 110 or 200); CSE 120 or EEE 120.

CSE 226 Assembly Language Programming and Microprocessors (Intel). (4)
fall and spring
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. Fee. Prerequisites: CSE 100 (or 110 or 200); CSE 120 or EEE 120.

CSE 240 Introduction to Programming Languages. (3)
fall and spring
Introduces the procedural (C/C++), applicative (LISP/Scheme), and declarative (Prolog) languages. Lecture, lab. Prerequisite: CSE 210.

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

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

CSE 340 Principles of Programming Languages. (3)
fall and spring
Formal syntactic and semantic descriptions, compilation and implementation issues, and theoretical foundations for several

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

programming paradigms. Prerequisites: either CSE 225 (or 226) or EEE 225 (or 226) and both CSE 240 and 310.

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

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

CSE 408 Multimedia Information Systems. (3)
fall
Design, use, and applications of multimedia systems. Introduces 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)
fall and spring
Introduces DBMS concepts. Data models and languages. Relational database theory. Database security/integrity and concurrency. Fee. Prerequisite: CSE 310.

CSE 420 Computer Architecture I. (3)
once a year
Computer architecture. Performance versus cost tradeoffs. Instruction set design. Basic processor implementation and pipelining. Prerequisite: CSE 330.

CSE 421 Microprocessor System Design I. (4)
fall and spring
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. Fee. Prerequisite: CSE 225 or EEE 225.

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

CSE 423 Capstone Project. (3)
fall and spring
Development process: specification, design, implementation, evaluation, and testing with economic, social, and safety considerations. Written or oral communication skills enrichment. Fee. Prerequisite: CSE 422.
General Studies: L

CSE 428 Computer-Aided Processes. (3)
selected semesters
Hardware and software considerations for computerized manufacturing systems. Specific concentration on automatic inspection, numerical control, robotics, and integrated manufacturing systems. Prerequisite: CSE 330.

CSE 430 Operating Systems. (3)
fall and spring
Operating system structure and services, processor scheduling, concurrent processes, synchronization techniques, memory management, virtual memory, input/output, storage management, and file systems. Fee. Prerequisites: CSE 330, 340.

CSE 432 Operating System Internals. (3)
fall
IPC, exception and interrupt processing, memory and thread management, user-level device drivers, and OS servers in a modern microkernel-based OS. Prerequisite: CSE 430.

CSE 434 Computer Networks. (3)
fall and spring
Cryptography fundamentals; data compression; error handling; flow control; multihop routing; network protocol algorithms; network reliability, timing, security; physical layer basics. Prerequisite: CSE 330.

CSE 438 Systems Programming. (3)
selected semesters
Design and implementation of systems programs, including text editors, file utilities, monitors, assemblers, relocating linking loaders, I/O handlers, and schedulers. Prerequisite: CSE 421 or instructor approval.
General Studies: L

CSE 440 Compiler Construction I. (3)
once a year
Introduces programming language implementation. Implementation strategies such as compilation, interpretation, and translation. Major compilation phases such as lexical analysis, semantic analysis, optimization, and code generation. Prerequisites: CSE 340, 355.

CSE 445 Distributed Computing with Java and CORBA. (3)
fall and spring
Frameworks for distributed software components. Foundations of client-server computing and architectures for distributed object systems. Dynamic discovery and invocation. Lecture, projects. Fee. Prerequisite: CSE 360 or instructor approval.

CSE 446 Client-Server User Interfaces. (3)
selected semesters
Client-server model and its use in creating and managing window interfaces. Toolkits and libraries, including X11, Microsoft Foundation Classes, and Java Abstract Window Toolkit. Lecture, projects. Fee. Prerequisite: CSE 310 or instructor approval.

CSE 450 Design and Analysis of Algorithms. (3)
fall and spring
Design and analysis of computer algorithms using analytical and empirical methods; complexity measures, design methodologies, and survey of important algorithms. Prerequisite: CSE 310.

CSE 457 Theory of Formal Languages. (3)
once a year
Theory of grammar, methods of syntactic analysis and specification, types of artificial languages, relationship between formal languages, and automata. Prerequisite: CSE 355.

CSE 459 Logic for Computing Scientists. (3)
selected semesters
Propositional logic, syntax and semantics, proof theory versus model theory, soundness, consistency and completeness, first order logic, logical theories, automated theorem proving, ground resolution, pattern matching unification and resolution, Dijkstras logic, proof obligations, and program proving. Prerequisite: CSE 355.

CSE 460 Software Analysis and Design. (3)
fall and spring
Object-oriented and structured analysis and design; software architecture and design patterns; component-based development; software safety and reliability. Fee. Prerequisite: CSE 360.

CSE 461 Software Engineering Project I. (3)
fall and spring
First of two-course software team-development sequence. Planning, management, design, and implementation using object-oriented technology, CASE tools, CMM-level-5 guidelines. Lecture, lab, oral and written communications. Fee. Prerequisite: CSE 360.

CSE 462 Software Engineering Project II. (3)
fall and spring
Second of two-course software team-development sequence. Software evolution, maintenance, reengineering, reverse engineering, component-based development, and outsourcing. Lecture, lab, oral and written communications. Fee. Prerequisite: CSE 461.

CSE 463 Introduction to Human Computer Interaction. (3)
spring
Design, evaluate, and implement interactive software intended for human use. Prerequisite: CSE 310.

CSE 470 Computer Graphics. (3)
fall and spring
Display devices, data structures, transformations, interactive graphics, 3-D graphics, and hidden line problem. Fee. Prerequisites: CSE 310; MAT 342.

CSE 471 Introduction to Artificial Intelligence. (3)
fall and spring
State space search, heuristic search, games, knowledge representation techniques, expert systems, and automated reasoning. Fee. Prerequisites: CSE 240, 310.

CSE 476 Introduction to Natural Language Processing. (3)
selected semesters
Principles of computational linguistics, formal syntax, and semantics, as applied to the design of software with natural (human) language I/O. Prerequisite: CSE 310 or instructor approval.

CSE 477 Introduction to Computer-Aided Geometric Design. (3)
once a year
Introduces parametric curves and surfaces, Bezier and B-spline interpolation, and approximation techniques. Prerequisites: CSE 210, 470; MAT 342.

CSE 484 Internship. (1–12)
selected semesters

CSE 492 Honors Directed Study. (1–6)
selected semesters

CSE 493 Honors Thesis. (1–6)
selected semesters

CSE 494 Special Topics. (1–4)
selected semesters
Topics may include the following:

- Computational Models for the Arts. (3)
  fall
  Covers computability and intractability; kolmogorov complexity in the context of randomness and determinism.
- Signal Processing and Programming for the Arts. (3)
  spring
  Introduces basic concepts behind the functioning of existing, widely used digital arts and media tools.

CSE 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Department of Electrical Engineering

www.fulton.asu.edu/ee
480/965-3424
ENGRC 552

Stephen M. Goodnick, Chair

Regents' Professors: Balanis, Ferry, Heydt

Professors: Chakrabarti, Crouch, Goodnick, Gorur, Hui, Karady, Kiaei, Kozicki, Lai, Palais, Pan, Phillips, Rodriguez, Roedel, Schroder, Shen, Si, Spanias, Tao, Thornton, Tsakalis, Vittal, Y. Zhang

Associate Professors: Aberle, Allee, Bakkaloglu, Clark, Cochran, Diaz, Duman, El-Sharawy, Holbert, Karam, Kim, Papandreou-Suppappola, Skromme, Tylavsky

Assistant Professors: Abbaspour-Tamijani, Ayyanar, Barnaby, Cao, Joo, Qian, Reisslein, Tepedelenlioglu, Vasileska, J. Zhang

The professional activities of electrical engineers directly affect the everyday lives of most of the world's population. They are responsible for the design and development of radio and television transmitters and receivers, telephone networks and switching systems, computer systems, and electric power generation and distribution. Within the broad scope of these systems, the electrical engineer is concerned with a challenging and diverse array of design and development problems.

Electrical engineers design minuscule semiconductor integrated circuits that contain many thousands of elementary devices. These engineers design systems for automatically controlling mechanical devices and a variety of processes. These engineers are responsible for the design of satellite communication links as well as patient monitoring systems for hospitals. The development of the microprocessor has expanded the opportunities for electrical engineers to improve the design of familiar products since these devices are now incorporated in automobiles, consumer and office products, entertainment systems, and a vast variety of test and measurement instruments and machine tools.

Students who earn a BSE degree in Electrical Engineering will be involved in a variety of electrical and electronic problems in the course of their careers. To ensure the necessary breadth of knowledge, the Electrical Engineering curriculum includes basic (core) engineering courses and courses in networks and electronic circuits, electromagnetic fields and waves, microprocessors, communication and control systems, solid-state electronics, electrical power systems, and other specialty courses.

ELECTRICAL ENGINEERING—BSE

The goal of the Electrical Engineering undergraduate program is to prepare graduates for entry-level positions as electrical engineers for the broad range of opportunities available in industrial, commercial, and governmental organizations, and to prepare graduates for continued learning experiences either in a formal graduate program or in continuing education applications.

This goal is achieved through a curriculum designed to accomplish five objectives:

1. We will maintain a modern curriculum, which adapts to changes in technology and society.
2. Our program will foster a diverse student population entering and successfully graduating, and our graduates will function well in a diverse work force.
3. Our graduates will be self-motivated, creative people who can succeed in environments where technical innovation is important.
4. Our graduates will be sought after by our constituent industries and respected graduate programs.
5. Our graduates will be technically competent.

The curriculum in Electrical Engineering builds upon the base provided by the engineering core. Beyond the engineering core, the curriculum includes a number of required electrical engineering and technical elective courses. Approved technical elective courses provide students with

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

an opportunity either to broaden their background in electrical engineering or to study, in greater depth, technical subjects in which they have special interests. Successful completion of the curriculum leaves the student prepared to embark on a career in electrical engineering or to pursue advanced education in graduate school.

The engineering design experience is structured around four backbone courses employing engineering teams: ECE 100 Introduction to Engineering Design (freshman year), ECE 300 Intermediate Engineering Design (junior year), EEE 488 Senior Design Laboratory I, and EEE 489 Senior Design Laboratory II. The integrated experience is strengthened with required courses: EEE 120 Digital Design Fundamentals, EEE 225 Assembly Language Programming and Microprocessors (Motorola), EEE 226 Assembly Language Programming and Microprocessors (Intel), EEE 303 Signals and Systems, and EEE 360 Energy Conversion and Transport. Students focus on design pertaining to specific electrical engineering areas in their senior technical electives before the culminating, capstone design experience in EEE 488 and EEE 489.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the BSE degree in Electrical Engineering. A minimum of 50 upper-division semester hours is required.

GRADUATION REQUIREMENTS

A student must earn a grade of "C" (2.00) or higher in the mathematics and physics courses listed in the program of study. Each mathematics and physics course in the program of study must be completed with a "C" (2.00) or higher before enrolling in any course that requires that mathematics or physics course as a prerequisite. The student must also have an overall GPA of at least 2.00 for the following group of courses: CSE 100; ECE 201, 300, 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 88.

COURSE REQUIREMENTS

The specific course requirements for the BSE degree in Electrical Engineering follow.

First-Year Composition[1]

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 (requires departmental approval) (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 6–9
SB course(s) 3–6

Minimum total 15

Literacy and Critical Inquiry

ECE 300 Intermediate Engineering Design *L* 3
EEE 488 Senior Design Laboratory I L^2 2
EEE 489 Senior Design Laboratory II L^2 2

Total 7

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 $SQ^{1,3}$ 3
PHY 122 University Physics Laboratory I $SQ^{1,3}$ 1
PHY 131 University Physics II: Electricity and Magnetism $SQ^{1,4}$ 3
PHY 132 University Physics Laboratory II $SQ^{1,4}$ 1
PHY 241 University Physics III[1] 3

Total 15

Mathematical Studies

ECE 100 Introduction to Engineering Design *CS* 3
MAT 270 Calculus with Analytic Geometry I MA^1 4
MAT 271 Calculus with Analytic Geometry II MA^1 4
MAT 272 Calculus with Analytic Geometry III MA^1 4
MAT 274 Elementary Differential Equations MA^1 3
or MAT 275 Modern Differential Equations MA^1 (3)
MAT 342 Linear Algebra[1] 3
or MAT 343 Applied Linear Algebra[1] (3)
MAT 362 Advanced Mathematics for Engineers and Scientists[1] 3

Total 24
General Studies/school requirements total 61

Engineering Core

ECE 201 Electrical Networks I 4
ECE 214 Engineering Mechanics 4
ECE 334 Electronic Circuits 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

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1 A minimum grade of "C" (2.00) is required.
2 Both EEE 488 and 489 must be taken to secure L credit.
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.

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

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* CSE 110 Principles of Programming with Java (3) can be substituted for CSE 100 with Department of Electrical Engineering approval.

The program in Electrical Engineering requires a total of 18 semester 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 seven 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

Computer Engineering
CSE 330 Computer Organization and Architecture 3
CSE 420 Computer Architecture I 3
CSE 421 Microprocessor System Design I 4
CSE 422 Microprocessor System Design II 4

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

Electromagnetics
EEE 440 Electromagnetic Engineering II 4
EEE 443 Antennas for Wireless Communications 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 4

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

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 *CS*[1] 3
or EEE 120 Digital Design Fundamentals (3)
ENG 101 First-Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
Total 14

Second Semester
EEE 120 Digital Design Fundamentals[1] 3
or ECE 100 Introduction to Engineering Design *CS* (3)
ENG 102 First-Year Composition 3
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*[2] 1
Total 14

Second Year

First Semester
CSE 100 Principles of Programming with C++ *CS*[3] 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
or MAT 275 Modern Differential Equations *MA* (3)
PHY 131 University Physics II: Electricity and Magnetism *SQ*[4] 3
PHY 132 University Physics Laboratory II *SQ*[4] 1
Total 17

Second Semester
ECE 201 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 3
PHY 241 University Physics III 3
HU/SB and awareness area course[5] 3
Total 17

Third Year

First Semester
ECE 334 Electronic Circuits 4
EEE 302 Electrical Networks II 3
EEE 340 Electromagnetic Engineering I 4
MAT 342 Linear Algebra 3
or MAT 343 Applied Linear Algebra (3)
HU/SB and awareness area course[5] 3
Total 17

Second Semester
ECE 300 Intermediate Engineering Design *L* 3
ECE 352 Properties of Electronic Materials 4
EEE 303 Signals and Systems 3
EEE 360 Energy Conversion and Transport 4
HU/SB and awareness area course[5] 3
Total 17

Fourth Year

First Semester
ECE 214 Engineering Mechanics 4
EEE 350 Random Signal Analysis 3
EEE 488 Senior Design Laboratory I *L*[6] 2
Technical electives 7
Total 16

Second Semester
EEE 489 Senior Design Laboratory II *L*[6] 2

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

HU/SB and awareness area course[5]	3
Technical electives	11
Total	16

[1] Both ECE 100 and EEE 120 are required.
[2] Both PHY 121 and 122 must be taken to secure SQ credit.
[3] CSE 110 Principles of Programming with Java (3) can be substituted for CSE 100 with Department of Electrical Engineering approval.
[4] Both PHY 131 and 132 must be taken to secure SQ credit.
[5] Engineering students may not use aerospace studies (AES) or military science (MIS) courses to obtain HU or SB requirements.
[6] Both EEE 488 and 489 must be taken to secure L credit.

ELECTRICAL ENGINEERING (EEE)

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

EEE 225 Assembly Language Programming and Microprocessors (Motorola). (4)
fall and spring
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 CSE 225. Credit is allowed for only CSE 225 or EEE 225. Fee. Prerequisites: CSE 100 (or 110 or 200); CSE 120 or EEE 120.

EEE 226 Assembly Language Programming and Microprocessors (Intel). (4)
fall and spring
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 CSE 226. Credit is allowed for only CSE 226 or EEE 226. Fee. Prerequisites: CSE 100 (or 110 or 200); CSE 120 or EEE 120.

EEE 302 Electrical Networks II. (3)
fall and spring
Analyzes linear and nonlinear networks. Analytical and numerical methods. Prerequisite: ECE 201. Pre- or corequisite: MAT 362.

EEE 303 Signals and Systems. (3)
fall and spring
Introduces continuous and discrete time signal and system analysis, linear systems, Fourier, and z-transforms. Prerequisite: EEE 302. Pre- or corequisite: MAT 342 or 343.

EEE 340 Electromagnetic Engineering I. (4)
fall and spring
Static and time varying vector fields; boundary value problems; dielectric and magnetic materials; Maxwell's equations; boundary conditions. Prerequisites: ECE 201; MAT 362; PHY 131, 132.

EEE 350 Random Signal Analysis. (3)
fall and spring
Probabilistic and statistical analysis as applied to electrical signals and systems. Pre- or corequisite: EEE 303.

EEE 360 Energy Conversion and Transport. (4)
fall and spring
Three-phase circuits. Energy supply systems. Magnetic circuit analysis, synchronous generators, transformers, induction and DC machines. Transmission line modeling and design. Lecture, lab. Fee. Prerequisite: EEE 302.

EEE 405 Filter Design. (3)
fall
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)
fall and spring
Time and frequency domain analysis, difference equations, z-transform, FIR and IIR digital filter design, discrete Fourier transform, FFT, and random sequences. Lecture, lab. Fee. Prerequisites: EEE 303; MAT 342 (or 343).

EEE 425 Digital Systems and Circuits. (4)
fall and spring
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. Fee. Prerequisite: ECE 334.

EEE 433 Analog Integrated Circuits. (4)
fall and spring
Analysis, design, and applications of modern analog circuits using integrated bipolar and field effect transistor technologies. Lecture, lab. Fee. Prerequisite: ECE 334.

EEE 434 Quantum Mechanics for Engineers. (3)
fall
Angular momentum, wave packets, Schroedinger wave equation, probability, problems in one dimension, 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)
spring
Introduces basic CMOS processing and fabrication tools. Covers the fundamentals of thermal oxidation, CVD, implantation, diffusion, and process integration. Internet lecture, Internet or on-campus lab. Fee. Pre- or corequisite: EEE 436.

EEE 436 Fundamentals of Solid-State Devices. (3)
fall and spring
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)
selected semesters
Basic operating principles of various types of optoelectronic devices that play important roles in commercial and communication electronics; light-emitting diodes, injection lasers, and photodetectors. Prerequisite: EEE 436.

EEE 439 Semiconductor Facilities and Cleanroom Practices. (3)
fall
Microcontamination, controlled environments, cleanroom layout and systems, modeling, codes and legislation, ultrapure water, production materials, personnel and operations, hazard management, advanced concepts. Prerequisite: EEE 435 or instructor approval.

EEE 440 Electromagnetic Engineering II. (4)
spring
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. Fee. Prerequisite: EEE 340.

EEE 443 Antennas for Wireless Communications. (3)
spring
Fundamental parameters; radiation integrals; wireless systems; wire, loop, and microstrip antennas; antenna arrays; smart antennas; ground effects; multipath. Prerequisite: EEE 340.

EEE 445 Microwaves. (4)
fall
Waveguides; circuit theory for waveguiding systems; microwave devices, systems, and energy sources; striplines and microstrips; impedance matching transformers; measurements. Lecture, lab. Fee. Prerequisite: EEE 340.

EEE 448 Fiber Optics. (4)
fall
Principles of fiber-optic communications. Lecture, lab. Fee. Prerequisites: EEE 303, 340.

EEE 455 Communication Systems. (4)
fall and spring
Signal analysis techniques applied to the operation of electrical communication systems. Introduction to and overview of modern digital and analog communications. Lecture, lab. Fee. Prerequisite: EEE 350.

EEE 459 Communication Networks. (3)
spring
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)
spring
Radiation interactions, damage, dose, and instrumentation. Cosmic rays, satellite effects; soft errors; transmutation doping. Fission reactors, nuclear power. TMI, Chernobyl. Radioactive waste. Prerequisite: PHY 241 or 361.

EEE 463 Electrical Power Plant. (3)
fall
Nuclear, fossil, and solar energy sources. Analysis and design of steam supply systems, electrical generating systems, and auxiliary systems. Power plant efficiency and operation. Prerequisites: ECE 201, 340 (or PHY 241).

EEE 470 Electric Power Devices. (3)
fall
Analyzes devices used for short circuit protection, including circuit breakers, relays, and current and voltage transducers. Protection against switching and lightning over voltages. Insulation coordination. Prerequisite: EEE 360.

EEE 471 Power System Analysis. (3)
spring
Review of transmission line parameter calculation. Zero sequence impedance, symmetrical components for fault analysis, short circuit calculation, review of power flow analysis, power system stability, and power system control concepts. Prerequisite: EEE 360.

EEE 473 Electrical Machinery. (3)
fall
Operating principles, constructional details, and design aspects of conventional DC and AC machines, transformers and machines used in computer disc drives, printers, wrist watches, and automobiles. Prerequisite: EEE 360.

EEE 480 Feedback Systems. (4)
fall and spring
Analysis and design of linear feedback systems. Frequency response and root locus techniques, series compensation, and state variable feedback. Lecture, lab. Fee. Prerequisite: EEE 303.

EEE 482 Introduction to State Space Methods. (3)
fall
Discrete and continuous systems in state space form controllability, stability, and pole placement. Observability and observers. Pre- or corequisite: EEE 480.

EEE 488 Senior Design Laboratory I. (2)
fall and spring
Capstone senior project. Design process: research, concept, feasibility, simulation, specifications, benchmarking, and proposal generation. Technical communications and team skills enrichment. Lecture, lab. Fee. Prerequisites: ECE 300, 334; EEE 303, 340; senior standing. Pre- or corequisite: ECE 352; EEE 360.
General Studies: L (if credit also earned in EEE 489)

EEE 489 Senior Design Laboratory II. (2)
fall and spring
Capstone senior project. Implement, evaluate, and document EEE 488 design. Social, economic, and safety considerations. Technical communications and team skills enrichment. Lecture, lab. Fee. Prerequisite: EEE 488 in the immediately preceding semester.
General Studies: L (if credit also earned in EEE 488)

EEE 492 Honors Directed Study. (1–6)
selected semesters

EEE 493 Honors Thesis. (1–6)
selected semesters

EEE 498 Pro-Seminar. (1–7)
selected semesters
Topics may include the following:

- Real-Time DSP

Fee. Credit is allowed for only EEE 498 or 591.

EEE 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Department of Industrial Engineering

www.eas.asu.edu/~ie
480/965-3185
GWC 502

Gary L. Hogg, Chair

Professors: Cochran, Fowler, Henderson, Hogg, Hubele, Montgomery, Runger, Shunk, Wolfe, Ye

Associate Professors: Anderson-Rowland, Mackulak, Moor, Villalobos

Assistant Professors: Gel, Keha, Kulahci, Wu

Senior Lecturers: Pfund, Thompson

The industrial engineer (IE) provides leadership for American organizations in establishing and maintaining competitiveness in the global marketplace through system integration and productivity 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 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 productivity looking at the "big picture" of what makes society perform best—the right combination of human resources, natural resources, synthetic structures, and equipment. An IE bridges the gap between management and operations, dealing with and motivating people as well as determining what tools should be used and how they should be used.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

An IE deals with people as well as things. In fact, industrial engineering is often called the "people-oriented profession." 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 discipline offering course work in designing and implementing quality assurance systems.

The IE's skills are applicable to every kind of organization. IEs learn how to approach, think about, and solve productivity and integration problems regardless of their settings. IEs work in manufacturing facilities, banks, hospitals, government, transportation, construction, and social services. Within this wide variety of organizations, IEs get involved in projects such as designing and implementing quality control systems, independent work groups, the work flows in all forms of work systems, 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 necessary to direct these teams, including team building, brainstorming, group dynamics, and interpersonal relationships.

IEs have a sound background in technology integration, management theory and application, engineering economics, and cost analysis. IEs are well equipped to deal with organizational problems 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—BSE

The curriculum in Industrial Engineering builds upon mathematics, computer utilization, and the engineering core. Beyond this foundation, the curriculum includes a number of required IE core courses, IE electives, and focused study area electives, enabling each student 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 suggested career-focused study areas are as follows:

1. *Industrial and Management Systems.* For a broad traditional IE career in the design and analysis of manufacturing 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 organizations.
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, banking/financial, and government/public-administration systems.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the BSE degree in Industrial Engineering. A minimum of 50 upper-division hours is required. Students must attain a GPA of at least 2.00 for the courses in the major field.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, majors must satisfy all university graduation requirements. See "University Graduation Requirements," page 88. For information concerning admission, degree, course, and graduation requirements for the School of Engineering, see "Admission," page 225, and subsequent sections.

COURSE REQUIREMENTS

Students take 59 semester hours of university English proficiency and general studies course work, 19 hours of engineering core, 35 hours of industrial engineering courses, three hours of industrial engineering electives, and 12 hours of career-focused study area electives. Each career-focused study area has an associated list of recommended 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
or ECN 111 Macroeconomic Principles *SB* (3)
HU courses 6–9
SB course(s) 3–6

Minimum total 15

Literacy and Critical Inquiry

ECE 300 Intermediate Engineering Design *L* 3

IEE 490 Project in Design and Development *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*[1] 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
Basic science elective 3

Total 15

Mathematical Studies

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 53

Engineering Core

ECE 100 Introduction to Engineering Design *CS* 3
ECE 201 Electrical Networks I 4
ECE 210 Engineering Mechanics I: Statics 3
ECE 212 Engineering Mechanics II: Dynamics 3
ECE 350 Structure and Properties of Materials 3
IEE 463 Computer-Aided Manufacturing and Control *CS* 3

Total 19

[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.

Industrial Engineering Major

The following courses are required:

CSE 100 Principles of Programming with C++ *CS* 3
or CSE 110 Principles of Programming with Java (3)
CSE 200 Concepts of Computer Science *CS* 3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS* 3
IEE 210 Applications to Industrial Engineering 3
IEE 300 Economic Analysis for Engineers 3
IEE 360 Manufacturing Processes 3
IEE 368 Facilities Analysis and Design 3
or IEE 369 Work Analysis and Design (3)
IEE 376 Operations Research Deterministic Techniques/Applications *CS* 3
IEE 385 Introduction to Engineering Probability Models *CS* 3
IEE 461 Production Control 3
IEE 474 Quality Control *CS* 3
IEE 475 Simulating Stochastic Systems *CS* 3

Total 36

Industrial Engineering Electives Area. Students select two 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 one of the following five career-focused study areas:

Industrial and Management Systems

IEE 305 Information Systems Engineering *CS* 3
IEE 431 Engineering Administration 3
Any approved engineering or business elective 3
Any approved engineering elective 3

Information and Telecommunication Systems

CSE 210 Object-Oriented Design and Data Structures *CS* 3
CSE 240 Introduction to Programming Languages 3
IEE 305 Information Systems Engineering *CS* 3
IEE 494 ST: Information Systems Development Tools 3

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 electives 3

High-Tech Manufacturing[1]

ECE 352 Properties of Electronic Materials 4
EEE 435 Microelectronics 3
EEE 436 Fundamentals of Solid-State Devices 3
MSE 355 Introduction to Materials Science and Engineering 3
MSE 441 Analysis of Materials Failures 3
MSE 470 Polymers and Composites 3

Preprofessional and Service Systems[1, 2]

Focus area courses 12

[1] Certain focus areas may require more than 12 semester hours due to course prerequisites.

[2] A student desiring a focus area other than those listed is invited to create his or her own that concentrates on a professional service area. The student is expected to formulate a set of four courses (12 semester hours) that supports his or her career option. The student needs to submit a petition to the department that explains and supports the focus and the courses selected. The associate chair for undergraduate studies must approve the petition before the student begins study in the focus area. For more information, see the IE academic advisor.

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*[1]
ECE 100 Introduction to Engineering Design *CS* 3
ENG 101 First-Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4

Total 14

Second Semester

ECN 112 Microeconomic Principles *SB* 3
or ECN 111 Macroeconomic 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*[2] 3
PHY 122 University Physics Laboratory I *SQ*[2] 1
HU/SB elective[3] 3

Total 17

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Second Year

First Semester

CSE 100 Principles of Programming with C++ *CS* 3
or CSE 110 Principles of Programming with Java *CS* (3)
IEE 300 Economic Analysis for Engineers....3
MAT 242 Elementary Linear Algebra....2
MAT 272 Calculus with Analytic Geometry III *MA*....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

CSE 200 Concepts of Computer Science *CS*....3
ECE 350 Structure and Properties of Materials....3
ECE 380 Probability and Statistics for Engineering Problem Solving *CS*....3
IEE 210 Industrial Engineering Applications....3
MAT 274 Elementary Differential Equations *MA*....3
Basic science elective[5]....3
Total....18

Third Year

First Semester

ECE 201 Electrical Networks I....4
ECE 210 Engineering Mechanics I: Statics....3
IEE 360 Manufacturing Processes....3
IEE 385 Introduction to Engineering Probability Models *CS*....3
IEE 474 Quality Control *CS*....3
Total....16

Second Semester

ECE 212 Engineering Mechanics II: Dynamics....3
ECE 300 Intermediate Engineering Design *L*....3
IEE 376 Operations Research Deterministic Techniques/Applications *CS*....3
IEE 463 Computer-Aided Manufacturing and Control *CS*....3
Study area elective....3
Total....15

Fourth Year

First Semester

IEE 368 Facilities Analysis and Design....3
or IEE 369 Work Analysis and Design (3)
IEE 461 Production Control....3
IEE 475 Simulating Stochastic Systems *CS*....3
HU/SB elective[3]....3
Study area elective....3
Industrial engineering elective....2
Total....17

Second Semester

IEE 490 Project in Design and Development *L*....3
HU/SB elective[3]....6
Study area electives....6
Total....15

[1] Students who have taken no high school chemistry should take CHM 113 and 116.

[2] Both PHY 121 and 122 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.

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

[5] This elective 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.

INDUSTRIAL ENGINEERING (IEE)

IEE 210 Introduction to Industrial Engineering. (3)
fall and spring
History of IE: IE career paths; ethical, social, and contemporary issues; introduction to IE techniques, methods, and their application; case studies. Prerequisite: ECE 100; sophomore standing.

IEE 294 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Industrial Engineering Applications Seminar. (2)

IEE 300 Economic Analysis for Engineers. (3)
fall, spring, summer
Economic evaluation of alternatives for engineering decisions, emphasizing the time value of money. Prerequisites: ECE 100; MAT 270.

IEE 305 Information Systems Engineering. (3)
fall
Overview of computer and information systems applications. Topics include client/server; distributed computing; networks; process modeling; e-commerce; enterprise applications; Internet. Fee. Prerequisite: CSE 200.
General Studies: CS

IEE 360 Manufacturing Processes. (3)
fall and spring
Production technique and equipment. Casting and molding, forming, machining, joining and assembly, computer-integrated manufacturing, rapid prototyping, and electronics manufacturing. Cross-listed as MAE 351. Credit is allowed for only IEE 360 or MAE 351. Fee. Prerequisite: ECE 350.

IEE 361 Manufacturing Processes Lab. (1)
fall and spring
Series of labs designed to illustrate concepts presented in IEE 360 on production technique and equipment. Fee. Corequisite: IEE 360 or MAE 351.

IEE 368 Facilities Analysis and Design. (3)
fall
Planning, analysis, and design of the tangible physical assets of the firm. Emphasizes facilities location, materials handling, automation, computer integration, and utilization of financial resources. Applications in diverse fields. Lecture, lab. Fee. Prerequisite: IEE 300.

IEE 369 Work Analysis and Design. (3)
spring
Planning, analysis, and design of methods of accomplishing work. Emphasizes human factors, work planning, methods analysis and design, and work measurement. Applications in diverse fields. Lecture, lab. Fee. Prerequisite: IEE 300.

IEE 376 Operations Research Deterministic Techniques/Applications. (3)
fall and spring
Industrial systems applications with deterministic operations research techniques. Resource allocation, product mix, production, transportation, task assignment, networks. Prerequisites: CSE 200; MAT 242.
General Studies: CS

IEE 385 Introduction to Engineering Probability Models. (3)
fall, spring, summer
Elements of probability modelling with engineering applications. Topics include probability distributions, properties of distributions, Markov chains, queuing, and reliability. Prerequisite: ECE 380.
General Studies: CS

IEE 394 Special Topics. (1–4)
fall and spring
Covers topics of immediate or special interest to a faculty member and students.

IEE 431 Engineering Administration. (3)
fall and summer
Introduces quantitative and qualitative approaches to management functions, engineering administration, organizational analysis, decision making, and communication. Credit is allowed for only IEE 431 or 541. Prerequisite: senior standing.

IEE 437 Human Factors Engineering. (3)
fall
Study of the human psychological and physiological factors that underlie the design of equipment and the interaction between people and machines. Credit is allowed for only IEE 437 or 547.

IEE 461 Production Control. (3)
fall
Techniques for the planning, control, and evaluation of production systems. Project management, forecasting, inventory control, scheduling, enterprise requirements planning. Prerequisites: CSE 100 (or 110); IEE 376, 385.

IEE 463 Computer-Aided Manufacturing and Control. (3)
spring
Computer control in manufacturing, CIM, NC, logic controllers, group technology, process planning, and robotics. Cross-listed as MAE 453. Credit is allowed for only IEE 463 or MAE 453. Credit is allowed for only IEE 463 or 543. Fee. Prerequisite: IEE 360 or MAE 351.
General Studies: CS

IEE 474 Quality Control. (3)
fall
Basic statistical process control techniques, capability analysis, design of experiments, and acceptance sampling plans. Prerequisite: IEE 385.
General Studies: CS

IEE 475 Simulating Stochastic Systems. (3)
fall and spring
Analyzes stochastic systems using basic queuing networks and discrete event simulation. Basic network modeling, shared resources, routing, assembly logic. Prerequisites: CSE 200; IEE 385.
General Studies: CS

IEE 490 Project in Design and Development. (3)
fall and spring
Individual or team capstone project in creative design and synthesis. Fee. Prerequisites: IEE 376, 475.
General Studies: L

IEE 492 Honors Directed Study. (1–6)
selected semesters

IEE 493 Honors Thesis. (1–6)
selected semesters

IEE 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Information Systems Development Tools. (3)

IEE 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog,* or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Department of Mechanical and Aerospace Engineering

www.fulton.asu.edu/~mae
480/965-3291
ECG 346

Robert E. Peck, Chair

Aerospace Engineering

Professors: Chattopadhyay, Mignolet, Wie

Associate Professors: Lee, Wells

Assistant Professor: Mikellides

Mechanical Engineering

Professors: Boyer, Davidson, Fernando, Peck, Roy, Shah, Sieradzki, Squires, Tseng, Van Schilfgaarde, Yao

Associate Professors: Chen, McNeill, Peralta, Phelan,

Assistant Professors: Calhoun, Friesen, Sugar

The Department of Mechanical and Aerospace Engineering is the administrative home for two undergraduate majors: Aerospace Engineering and Mechanical Engineering. Consistent with the department's mission to provide the best possible education to its students, a department goal is to attract and retain—from the metropolitan community, the state, and the country—outstanding and diverse students and to give each the opportunity to become competent in contemporary subjects that bear on an engineering career.

The Aerospace Engineering major provides students an education in technological areas critical to the design and development of aerospace vehicles and systems. Aerospace Engineering graduates are typically employed in aerospace industries or at government laboratories (e.g., NASA). The Mechanical Engineering major is one of the most broadly applicable programs in engineering, providing education for a wide variety of employment opportunities.

The two majors 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 a rapidly changing technical society.

AEROSPACE ENGINEERING—BSE

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

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

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. Astronautics topics such as orbital mechanics, attitude dynamics, spacecraft control, and rocket propulsion are also covered in required courses.

The aerospace engineering curriculum is designed to accomplish four objectives:

1. *Our graduates will be technically competent engineers.* Graduates will show basic understanding of the fundamental principles of mathematics, physics, and chemistry and will use them to model and predict the behavior of aerospace engineering systems.
2. *Our graduates will have the ability to design a system appropriate to the field of aerospace engineering.* Graduates will perform conceptual and preliminary design of aircraft and/or spacecraft systems or subsystems, and will include life-cycle cost and environmental impact in the design process.
3. *Our graduates will communicate effectively.* Graduates will make effective oral and written technical presentations and will document analysis and design processes.
4. *Our graduates will have the professional attributes necessary for success in the current work environment.* Graduates will be prepared for modern engineering practice by effectively working in teams, recognizing the need for maintaining technical currency, and having an understanding of related global, ethical, environmental, and societal issues.

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 one-half year 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 three wind tunnels, a mechanical-testing laboratory, a measurements and controls laboratory, and a vibrations laboratory.

DEGREE REQUIREMENTS

A minimum of 128 semester hours of course work is necessary for the BSE degree in Aerospace Engineering, including a minimum of 50 upper-division semester hours. All students must satisfy the university First-Year Composition requirement and General Studies requirement. The Fulton School of Engineering does not permit the use of pass/fail classes as part of a degree program, and credit hours earned more than five years before admission to the program are normally not accepted for transfer credit.

GRADUATION REQUIREMENTS

A student must earn a grade of "C" (2.00) or higher in all lower-division mathematics, physics, and chemistry courses and in the engineering core. A student must attain a minimum GPA of 2.00, in the major and overall. The department may require additional or remedial course work for students experiencing academic difficulties.

COURSE REQUIREMENTS

The specific course requirements for the BSE degree in Aerospace Engineering are as follows:

First-Year Composition[1]

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)
- Approved elective (3)

—or—

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

Total 6

General Studies/School Requirements[2]

Humanities and Fine Arts/Social and Behavioral Sciences

ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* (3)
HU courses 6–9
SB course(s) 3–6
Minimum total 15

Literacy and Critical Inquiry

ECE 300 Intermediate Engineering Design *L* 3
MAE 468 Aerospace Systems Design *L* 3
Total 6

Mathematical Studies[1]

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 275 Modern Differential Equations *MA* 3
MAT 343 Applied Linear Algebra 3
Total 18

Natural Sciences/Basic Sciences

CHM 114 General Chemistry for Engineers *SQ*[1] 4
or CHM 116 General Chemistry *SQ*[1] (4)
PHY 121 University Physics I: Mechanics *SQ*[1, 3] 3
PHY 122 University Physics Laboratory I *SQ*[1, 3] 1
PHY 131 University Physics II: Electricity and Magnetism *SQ*[1, 4] 3
PHY 132 University Physics Laboratory II *SQ*[1, 4] 1
PHY 361 Introductory Modern Physics 3
or AST 321 Introduction to Planetary and Stellar Astrophysics *SQ*[5] (3)
Total 15

General Studies school requirements total 54

Engineering Core[6]

ECE 100 Introduction to Engineering Design *CS* 3
ECE 201 Electrical Networks I 4
ECE 214 Engineering Mechanics 4
ECE 313 Introduction to Deformable Solids 3
ECE 340 Thermodynamics 3

ECE 350 Structure and Properties of Materials 3

Total 20

Aerospace Engineering Major[7]

ECE 384 Numerical Methods for Engineers 4
MAE 101 Introduction to Aerospace Engineering[8] 2
MAE 317 Dynamic Systems and Control 3
MAE 319 Measurements and Data Analysis 3
MAE 361 Aerodynamics I 3
MAE 413 Aircraft Dynamics 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 462 Space Vehicle Dynamics and Control 3
MAE 463 Propulsion 3
MAE 464 Aerospace Laboratory 3
Design technical elective (Select at least one) 3
MAE 426 Design of Aerospace Structures (3)
MAE 465 Rocket Propulsion (3)
MAE 466 Rotary Wing Aerodynamics and Performance (3)
MAE 469 Projects in Astronautics or Aeronautics (3)
Technical elective(s) 4

Total 48

Total for the program 128

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1 A minimum grade of "C" (2.00) is required.

2 The General Studies requirement is divided into five core and three awareness areas. A student must include within his or her program at least two courses that cover the three awareness areas. It is recommended that students consult an academic advisor to ensure the completion of the Humanities and Fine Arts (HU), Social and Behavior Sciences (SB), and awareness areas (C, G, H).

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 Both AST 113 and 321 must be taken to secure SQ credit.

6 A student must attain a minimum grade of "C" to receive prerequisite credit for engineering core courses that are prerequisite to any course in the Aerospace Engineering major.

7 A "C" (2.00) average or higher is required for all classes listed under the major plus MAE 468.

8 This course is required for incoming first-year students. Transfer students with sophomore status should not register for MAE 101 but must take an additional two semester hours of approved technical electives.

Aerospace Engineering Areas of Study

The technical elective(s) may be selected from among any of the courses on the following list. A student may, with prior approval of the advisor and department chair, select a course not listed that would support a specific career objective. Graduate-level courses are permitted provided the student has at least a 3.00 GPA and approval of the instructor, advisor, and the school dean.

IEE 300 Economic Analysis for Engineers 3
IEE 385 Introduction to Engineering Probability Models *CS* 3
IEE 463 Computer-Aided Manufacturing and Control *CS* 3
MAE 341 Mechanism Analysis and Design 3
MAE 351 Manufacturing Processes 3
MAE 372 Fluid Mechanics 3
MAE 388 Heat Transfer 3
MAE 404 Finite Elements in Engineering 3
MAE 406 CAD/CAM Applications in MAE 4
MAE 417 Control System Design 3
MAE 434 Internal Combustion Engines 3
MAE 435 Turbomachinery 3
MAE 447 Robotics and Its Influence on Design 3
MAE 455 Polymers and Composites 3
MAE 461 Aerodynamics II 3
MAE 471 Computational Fluid Dynamics 3
MAT 421 Applied Computational Methods *CS* 3
MAT 423 Numerical Analysis I *CS* 3
MAT 425 Numerical Analysis II *CS* 3
MSE 440 Mechanical Properties of Solids 3
MSE 441 Analysis of Material Failures 3

TYPICAL FOUR-YEAR SEQUENCE

The first two years are usually devoted to the General Studies and engineering core requirements. 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* 3
ENG 101 First-Year Composition 3
MAE 101 Introduction to Aerospace Engineering 2
MAT 270 Calculus I *MA* 4

Total 16

Second Semester

ENG 102 First-Year Composition 3
MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 275 Modern Differential Equations *MA* 3
PHY 121 University Physics I: Mechanics *SQ*[1] 3
PHY 122 University Physics Laboratory I *SQ*[1] 1
HU/SB electives[2] 3

Total 17

Second Year

First Semester

ECE 214 Engineering Mechanics 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 343 Applied Linear Algebra 3
PHY 131 University Physics II: Electricity and Magnetism *SQ*[3] 3
PHY 132 University Physics Laboratory II *SQ*[3] 1

Total 15

Second Semester

ECE 201 Electrical Networks I 4
ECE 313 Introduction to Deformable Solids 3
ECE 340 Thermodynamics 3
ECE 350 Structure and Properties of Materials 3
ECE 384 Numerical Methods for Engineers 4

Total 17

Third Year

First Semester

ECE 300 Intermediate Engineering Design *L* 3

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

MAE 317 Dynamic Systems and Control	3
MAE 319 Measurements and Data Analysis	3
MAE 361 Aerodynamics I	3
MAE 425 Aerospace Structures	4
Total	16

Second Semester

MAE 413 Aircraft Dynamics and Control	3
MAE 444 Fundamentals of Aerospace Design	3
MAE 460 Gas Dynamics	3
PHY 361 Introductory Modern Physics or AST 321 Introduction to Planetary and Stellar Astrophysics *SQ*[4] (3)	3
HU/SB elective[2]	3
Total	15

Fourth Year

First Semester

MAE 415 Vibration Analysis	4
MAE 462 Space Vehicle Dynamics and Control	3
MAE 463 Propulsion	3
MAE 464 Aerospace Laboratory	3
HU/SB elective[2]	3
Total	16

Second Semester

MAE 468 Aerospace Systems Design *L*	3
HU/SB elective[2]	6
Required design elective	3
Technical electives	4
Total	16

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

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

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

[4] Both AST 113 and 321 must be taken to secure SQ credit.

MECHANICAL ENGINEERING —BSE

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 such as heat exchangers, pipelines, gears, and linkages; and the use of energy to perform a variety of tasks for the benefit of society, such as in transportation vehicles of all types, manufacturing tools and equipment, and household appliances. Furthermore, since all 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 in seeking new knowledge through research, in generating creative design and development, and in 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.

The curriculum is designed to accomplish the following four objectives:

1. *Technical Competency.* Graduates are able to model and predict the behavior of engineering systems by applying the fundamental principles from mathematics, physics, and chemistry and by using modern computational and experimental tools.
2. *Product Realization Ability.* Graduates are able to design components or systems at the conceptual and embodiment design level, including the issues of production, manufacturability, and cost.
3. *Communication Skills.* Graduates can present and document effectively, using both oral and written communication, their work and ideas to a diverse audience.
4. *Professionalism.* Graduates are prepared for modern engineering practice by working in teams, keeping technologically abreast, and having an understanding of related ethical, environmental, and societal issues.

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, a mechanical-testing laboratory, a measurements and controls laboratory, and a manufacturing laboratory.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the BSE degree in Mechanical Engineering, including a minimum of 50 upper-division semester hours. All students must satisfy the university First-Year Composition requirement and General Studies requirement. The Fulton School of Engineering does not permit the use of pass/fail classes as part of a degree program, and credit hours earned more than five years before admission to the programs are normally not accepted for transfer credit.

GRADUATION REQUIREMENTS

A student must earn a grade of "C" (2.00) or higher in all lower-division mathematics, physics, and chemistry courses, and in the engineering core. A student must attain a

minimum GPA of 2.00 in the major and overall. The department may require additional or remedial course work for students experiencing academic difficulties.

COURSE REQUIREMENTS

The specific course requirements for the BSE degree in Mechanical Engineering are as follows:

First-Year Composition[1]

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)
- Approved elective (3)

—or—

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

Total 6

General Studies/School Requirements[2]

Humanities and Fine Arts/Social and Behavioral Sciences

ECN 111 Macroeconomic Principles *SB* 3
or ECN 112 Microeconomic Principles *SB* (3)
HU courses 6–9
SB course(s) 3–6
Minimum total 15

Literacy and Critical Inquiry

ECE 300 Intermediate Engineering Design *L* 3
MAE 491 Experimental Mechanical Engineering *L* 3
Total 6

Mathematical Studies[1]

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 275 Modern Differential Equations *MA* 3
MAT 343 Applied Linear Algebra 3
Total 18

Natural Sciences/Basic Sciences

CHM 114 General Chemistry for Engineers *SQ*[1] 4
or CHM 116 General Chemistry *SQ*[1] (4)
PHY 121 University Physics I: Mechanics *SQ*[1, 3] 3
PHY 122 University Physics Laboratory I *SQ*[1, 3] 1
PHY 131 University Physics II: Electricity and Magnetism *SQ*[1, 4] 3
PHY 132 University Physics Laboratory II *SQ*[1, 4] 1
PHY 361 Introductory Modern Physics 3
Total 15
General Studies school requirements total 54

Engineering Core[5]

ECE 100 Introduction to Engineering Design *CS* 3
ECE 201 Electrical Networks I 4
ECE 214 Engineering Mechanics 4
ECE 313 Introduction to Deformable Solids 3
ECE 340 Thermodynamics 3
ECE 350 Structure and Properties of Materials 3
Total 20

Mechanical Engineering Major[6]

ECE 384 Numerical Methods for Engineers 4
MAE 317 Dynamic Systems and Control 3
MAE 319 Measurements and Data Analysis 3
MAE 371 Fluid Mechanics 3
MAE 388 Heat Transfer 3
MAE 422 Mechanics of Materials 4
MAE 441 Principles of Design 3
MAE 488 Mechanical Engineering Design I 3
MAE 489 Mechanical Engineering Design II 3
Computer-aided engineering (three modules) 1
Mechanical systems design (select one) 3–4
- MAE 341 Mechanism Analysis and Design (3)
- MAE 442 Mechanical Systems Design (4)
- MAE 447 Robotics and Its Influence on Design (3)

Thermal systems design (select one) 3
- MAE 382 Thermodynamics (3)
- MAE 433 Air Conditioning and Refrigeration (3)
- MAE 434 Internal Combustion Engines (3)
- MAE 435 Turbomachinery (3)
- MAE 446 Thermal Systems Design (3)

Technical electives 11–12
Total 48
Total for the program 128

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1 A minimum grade of "C" (2.00) or higher is required.

2 The General Studies requirement is divided into five core and three awareness areas. A student must include within his or her program at least two courses that cover the three awareness areas. It is recommended that students consult an academic advisor to ensure completion of the Humanities and Fine Arts (HU), Social and Behavioral Sciences (SB), and awareness areas (C, G, H).

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 A minimum grade of "C" (2.00) or higher is required for engineering core courses that are prerequisite to any course in the Mechanical Engineering major. A student must attain a minimum grade of "C" in order to receive prerequisite credit.

6 A GPA of 2.00 or higher is required for all classes listed under the major plus MAE 488 and 489.

Mechanical Engineering Areas of Study. Technical electives may be selected from among any of the following courses. 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 area are allowed. Furthermore, only one project course may be used for a technical elective. Graduate-level classes may be used provided the student's GPA is at least 3.00 and the student has permission from the course instructor, department advisor, and the Fulton School of Engineering dean. Credit for courses not on the list requires prior approval of the student's advisor and department.

Aerospace

MAE 413 Aircraft Dynamics and Control 3
MAE 415 Vibration Analysis 4
MAE 426 Design of Aerospace Structures 3
MAE 455 Polymers and Composites 3
MAE 460 Gas Dynamics 3
MAE 461 Aerodynamics II 3
MAE 463 Propulsion 3

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

MAE 465 Rocket Propulsion 3
MAE 466 Rotary Wing Aerodynamics and Performance 3
MAE 469 Projects in Astronautics or Aeronautics 3

Biomechanical
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
CSE 310 Data Structures and Algorithms 3
CSE 422 Microprocessor System Design II 4
CSE 428 Computer-Aided Processes 3
IEE 385 Introduction to Engineering Probability Models *CS* 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
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
CSE 428 Computer-Aided Processes 3
EEE 360 Energy Conversion and Transport 4
EEE 480 Feedback Systems 4
EEE 482 Introduction to State Space Methods 3
IEE 463 Computer-Aided Manufacturing and Control *CS* 3
MAE 413 Aircraft Dynamics and Control 3
MAE 417 Control System Design 3
MAE 462 Space Vehicle Dynamics and Control 3

Design
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 Dynamics and Control 3
MAE 417 Control System Design 3
MAE 434 Internal Combustion Engines 3
MAE 435 Turbomachinery 3
MAE 442 Mechanical Systems Design 4
MAE 446 Thermal Systems Design 3
MAE 447 Robotics and Its Influence on Design 3
MAE 462 Space Vehicle Dynamics and Control 3

Energy Systems
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
MAE 341 Mechanism Analysis and Design 3
MAE 404 Finite Elements in Engineering 3
MAE 413 Aircraft Dynamics and Control 3
MAE 415 Vibration Analysis 4
MAE 426 Design of Aerospace Structures 3
MAE 442 Mechanical Systems Design 4
MAE 460 Gas Dynamics 3
MAE 461 Aerodynamics II 3
MAE 471 Computational 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
CSE 428 Computer-Aided Processes 3
IEE 300 Economic Analysis for Engineers 3
IEE 461 Production Control 3
IEE 463 Computer-Aided Manufacturing and Control *CS* 3
IEE 474 Quality 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 4
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
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
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

TYPICAL FOUR-YEAR SEQUENCE

The first two years are usually devoted to the General Studies and engineering core requirements. A typical schedule is given below.

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* 3
ENG 101 First-Year Composition 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
HU/SB elective[1] 3
Total 17

Second Semester
ENG 102 First-Year Composition 3
MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 275 Modern Differential Equations *MA* 3
PHY 121 University Physics I: Mechanics *SQ*[2] 3
PHY 122 University Physics Laboratory I *SQ*[2] 1
HU/SB elective[1] 3
Total 17

Second Year

First Semester

ECE	214	Engineering Mechanics 4
MAT	272	Calculus with Analytic Geometry III *MA* 4
MAT	343	Applied Linear Algebra 3
PHY	131	University Physics II: Electricity and Magnetism *SQ*[3] 3
PHY	132	University Physics Laboratory II *SQ*[3] 1
Total		 15

Second Semester

ECE	201	Electrical Networks I 4
ECE	313	Introduction to Deformable Solids 3
ECE	340	Thermodynamics 3
ECE	350	Structure and Properties of Materials 3
ECE	384	Numerical Methods for Engineers 4
Total		 17

Third Year

First Semester

ECE	300	Intermediate Engineering Design *L* 3
MAE	317	Dynamic Systems and Control 3
MAE	319	Measurements and Data Analysis 3
MAE	371	Fluid Mechanics 3
MAE	394	ST: Computer-Aided Engineering 1
MAE	422	Mechanics of Materials 4
Total		 17

Second Semester

MAE	388	Heat Transfer 3
MAE	441	Principles of Design 3
HU/SB elective[1]		 3
Technical electives		 6
Total		 15

Fourth Year

First Semester

MAE	488	Mechanical Engineering Design I 3
MAE	491	Experimental Mechanical Engineering *L* 3
HU/SB elective[1]		 6
Technical electives		 3
Total		 15

Second Semester

MAE	489	Mechanical Engineering Design II 3
PHY	361	Introductory Modern Physics 3
HU/SB elective[3]		 3
Technical electives		 6
Total		 15

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

[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.

MECHANICAL AND AEROSPACE ENGINEERING (MAE)

MAE 101 Introduction to Aerospace Engineering. (2)
fall
Careers in aerospace engineering, problem solving, computer usage in aerospace engineering, contemporary issues of the aerospace industry, the aerospace engineering curriculum. Prerequisites: high school physics and algebra. Pre- or corequisite: ECE 100.

MAE 317 Dynamic Systems and Control. (3)
fall and spring
Modeling and representations of dynamic physical systems, including transfer functions, block diagrams, and state equations. Transient response. Principles of feedback control and linear system analysis, including root locus and frequency response. Prerequisite: ECE 212. Pre- or corequisite: ECE 384.

MAE 319 Measurements and Data Analysis. (3)
fall and spring
Theory of measurement systems, sensors, digital data acquisition, signal processing and statistical analysis. Computer simulations and real-time experiments designed to illustrate these topics. Lecture, lab. Fee. Prerequisite: ECE 201. Pre- or corequisite: MAE 317.

MAE 341 Mechanism Analysis and Design. (3)
once a year
Positions, velocities, and accelerations of machine parts; cams, gears, flexible connectors, and rolling contact; introduces synthesis. Prerequisite: ECE 212.

MAE 351 Manufacturing Processes. (3)
fall and spring
Production technique and equipment. Casting and molding, forming, machining, joining and assembly, computer-integrated manufacturing, rapid prototyping, and electronics manufacturing. Cross-listed as IEE 360. Credit is allowed for only IEE 360 or MAE 351. Fee. Prerequisite: ECE 350.

MAE 361 Aerodynamics I. (3)
fall
Fluid statics, conservation principles, stream function, velocity potential, vorticity, inviscid flow, Kutta-Joukowski, thin-airfoil theory, and panel methods. Prerequisites: ECE 212, 340.

MAE 371 Fluid Mechanics. (3)
fall and spring
Introductory concepts of fluid motions; fluid statics; control volume forms of basic principles; viscous internal flows. Prerequisites: ECE 212, 340.

MAE 372 Fluid Mechanics. (3)
once a year
Applies basic principles of fluid mechanics to problems in viscous and compressible flow. Prerequisites: ECE 384; MAE 361 (or 371).

MAE 382 Thermodynamics. (3)
once a year
Applied thermodynamics; gas mixtures, psychrometrics, property relationships, power and refrigeration cycles, and reactive systems. Prerequisite: ECE 340.

MAE 388 Heat Transfer. (3)
fall and spring
Steady and unsteady heat conduction, including numerical solutions; thermal boundary layer concepts and applications to free and forced convection. Thermal radiation concepts. Prerequisites: ECE 384; MAE 361 (or 371).

MAE 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Computer-Aided Engineering. (1)

MAE 404 Finite Elements in Engineering. (3)
once a year
Introduces ideas and methodology of finite element analysis. Applications to solid mechanics, heat transfer, fluid mechanics, and vibrations. Prerequisites: ECE 313; MAT 242 (or 342).

MAE 406 CAD/CAM Applications in MAE. (4)
once a year
Solution of engineering problems with the aid of state-of-the-art software tools in solid modeling, engineering analysis, and manufacturing; selection of modeling parameters; reliability tests on software. 3 hours lecture, 3 hours lab. Fee. Prerequisites: ECE 384; MAE 422, 441 (or 444).

MAE 413 Aircraft Dynamics and Control. (3)
spring
Aircraft static stability; equations of motion; dynamic modes and stability; stability derivatives; response to controls; introduction to automatic control of aircraft. Prerequisites: MAE 317, 361.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

MAE 415 Vibration Analysis. (4)
fall
Free and forced response of single and multiple degree of freedom systems, continuous systems; applications in mechanical and aerospace systems numerical methods. Lecture, lab. Fee. Prerequisites: ECE 212; MAE 319, 422 (or 425); MAT 242 (or 342).

MAE 417 Control System Design. (3)
once a year
Tools and methods of control system design and compensation, including simulation, response optimization, frequency domain techniques, state variable feedback, and sensitivity analysis. Introduces nonlinear and discrete time systems. Prerequisite: MAE 317.

MAE 422 Mechanics of Materials. (4)
fall and spring
Theory of stress and strain, generalized Hooke's Law, plasticity, energy methods, finite elements, stress concentrations, fracture and fatigue. Lecture, lab. Fee. Prerequisites: ECE 313; MAT 242 (or 342). Pre- or corequisite: ECE 384.

MAE 425 Aerospace Structures. (4)
fall
Stability, energy methods, finite element methods, torsion, unsymmetrical bending and torsion of multicelled structures, design of aerospace structures. Lecture, lab. Fee. Prerequisites: ECE 313; MAT 242 (or 342).

MAE 426 Design of Aerospace Structures. (3)
once a year
Flight vehicle loads, design of semimonocoque structures, local buckling and crippling, fatigue, aerospace materials, composites, joints, and finite element applications. Prerequisite: MAE 422 or 425.

MAE 433 Air Conditioning and Refrigeration. (3)
once a year
Air conditioning processes; environmental control; heating and cooling loads; psychrometry; refrigeration cycles. Prerequisite: MAE 388 or MET 432 or instructor approval.

MAE 434 Internal Combustion Engines. (3)
once a year
Performance characteristics, combustion, carburetion and fuel-injection, and the cooling and control of internal combustion engines. Computer modeling. Lab. Fee. Prerequisite: MAE 388.

MAE 435 Turbomachinery. (3)
once a year
Design and performance of turbomachines, including steam, gas and hydraulic turbines, centrifugal pumps, compressors, fans, and blowers. Pre- or corequisite: MAE 361 or 371.

MAE 436 Combustion. (3)
once a year
Thermochemical and reaction rate processes; combustion of gaseous and condensed-phase fuels. Applications to propulsion and heating systems. Pollutant formation. Prerequisite: MAE 388.

MAE 441 Principles of Design. (3)
fall and spring
Conceptual and embodiment design of mechanical elements; form synthesis; material selection, failure modes, manufacturability tolerances, common mechanisms, and machine elements. Lecture, lab (project). Fee. Prerequisites: ECE 300, 350. Pre- or corequisites: MAE 319, 422 (or 425).

MAE 442 Mechanical Systems Design. (4)
spring
Applies design principles and techniques to the synthesis, modeling, and optimization of mechanical, electromechanical, and hydraulic systems. Lecture, lab. Fee. Prerequisites: MAE 317, 441 (or 444).

MAE 444 Fundamentals of Aerospace Design. (3)
spring
Design theory and design tools applied to aerospace engineering. Engineering drawings, solid modeling, RFP's, Federal Aviation Regulations and military specifications, aircraft sizing, rapid prototyping. Lab, projects. Fee. Prerequisites: ECE 300, 350; MAE 361, 425. Pre- or corequisite: MAE 413.

MAE 446 Thermal Systems Design. (3)
once a year
Applies engineering principles and techniques to the modeling and analysis of thermal systems and components. Presents and demonstrates optimization techniques and their use. Prerequisite: ECE 300; MAE 388.

MAE 447 Robotics and Its Influence on Design. (3)
once a year
Robot applications, configurations, singular positions, and work space; modes of control; vision; programming exercises; design of parts for assembly. Prerequisite: MAE 317.

MAE 453 Computer-Aided Manufacturing and Control. (3)
spring
Computer control in manufacturing, CIM, NC, logic controllers, group technology, process planning, and robotics. Cross-listed as IEE 463. Credit is allowed for only IEE 463 or MAE 453. Credit is allowed for only IEE 463 or 543. Fee. Prerequisite: IEE 360 or MAE 351.
General Studies: CS

MAE 455 Polymers and Composites. (3)
fall
Relationship between chemistry, structure, and properties of engineering polymers. Design, properties, and behavior of fiber composite systems. Cross-listed as MSE 470. Credit is allowed for only MAE 455 or MSE 470. Prerequisites: ECE 313, 350.

MAE 460 Gas Dynamics. (3)
spring
Compressible flow at subsonic and supersonic speeds; duct flow; normal and oblique shocks, perturbation theory, and wind tunnel design. Prerequisites: ECE 384; MAE 361 (or 371).

MAE 461 Aerodynamics II. (3)
once a year
Transonic/hypersonic flows, wing theory, Navier-Stokes, laminar/turbulent shear flows, pressure drop in tubes, separation, drag, viscous/inviscid interaction, and wing design. Prerequisite: MAE 460.

MAE 462 Space Vehicle Dynamics and Control. (3)
fall
Attitude dynamics and control, launch vehicles, orbital mechanics, orbital transfer/rendezvous, space mission design, space structures, spacecraft control systems design. Prerequisite: MAE 317.

MAE 463 Propulsion. (3)
fall
Fundamentals of gas-turbine engines and design of components. Principles and design of rocket propulsion and alternative devices. Lecture, design projects. Prerequisites: ECE 384; MAE 382 (or 460).

MAE 464 Aerospace Laboratory. (3)
fall
Aerodynamic flow parameters; flow over airfoils and bodies of revolution; flow visualization; computer-aided data acquisition and processing; boundary layer theory. 1 hour lecture, 4 hours lab. Fee. Prerequisites: ECE 384; MAE 319, 460.

MAE 465 Rocket Propulsion. (3)
once a year
Rocket flight performance; nozzle design; combustion of liquid and solid propellants; component design; advanced propulsion systems; interplanetary missions; testing. Prerequisite: MAE 382 or 460.

MAE 466 Rotary Wing Aerodynamics and Performance. (3)
once a year
Introduces helicopter and propeller analysis techniques. Momentum, blade-element, and vortex methods. Hover and forward flight. Ground effect, autorotation, and compressibility effects. Prerequisites: both ECE 384 and MAE 361 or only instructor approval.

MAE 468 Aerospace Systems Design. (3)
fall and spring
Group projects related to aerospace vehicle design, working from mission definition and continuing through preliminary design. Fee. Prerequisites: MAE 413, 444. Pre- or corequisite: MAE 463.
General Studies: L

MAE 469 Projects in Astronautics or Aeronautics. (3)
fall and spring
Various multidisciplinary team projects available each semester. Projects include design of high-speed rotocraft autonomous vehicles, liquid-fueled rockets, microaerial vehicles, satellites. Fee. Prerequisite: instructor approval.

MAE 471 Computational Fluid Dynamics. (3)
once a year
Numerical solutions for selected problems in fluid mechanics. Fee. Prerequisites: ECE 384; MAE 361 (or 371).

MAE 488 Mechanical Engineering Design I. (3)
fall and spring
Conceptual and embodiment design; modeling; rapid prototyping. Team project. MAE 488 and 489 must be taken in consecutive semesters. Lecture, discussion. Prerequisites: MAE 319, 371, 441.

MAE 489 Mechanical Engineering Design II. (3)
fall and spring
Detail design; fabrication and testing. Team project. MAE 488 and 489 must be taken in consecutive semesters. Lecture, discussion. Prerequisite: MAE 488.

MAE 491 Experimental Mechanical Engineering. (3)
fall and spring
Experimental and analytical studies of phenomena and performance of fluid flow, heat transfer, thermodynamics, refrigeration, and mechanical power systems. 6 hours lab. Fee. Prerequisites: MAE 319, 388.
General Studies: L

MAE 492 Honors Directed Study. (1–6)
selected semesters

MAE 493 Honors Thesis. (1–6)
selected semesters

MAE 498 Pro-Seminar. (1–3)
selected semesters
Special topics for advanced students. Applies the engineering disciplines to design and analysis of modern technical devices and systems. Prerequisite: instructor approval.

MAE 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Programs in Engineering Special Studies

480/965-1726

Ronald J. Roedel, 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 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 BSE 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—BSE

Premedical Engineering. In recent decades, the interrelation between engineering and medicine has become vigorous and exciting. 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 who desire entry into a medical college and who have medical interests 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. This program is administered by the faculty of the Harrington Department of Bioengineering.

DEGREE REQUIREMENTS

A minimum of 128 semester hours is necessary for the BSE degree in Engineering Special Studies with a concentration in Premedical Engineering. A minimum of 50 upper-division hours is required. Students must attain a GPA of at least 2.00 for the courses in the major field.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, majors must satisfy all university graduation requirements. See "University Graduation Requirements," page 88.

Note: To fulfill medical school admission requirements, BIO 187 General Biology is required in addition to the degree requirements and is best taken in summer session before the Medical College Admission Test.

COURSE REQUIREMENTS

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)

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

ENG 108 English for Foreign Students (3)

Total 6

* A minimum grade of "C" (2.00) is required.

General Studies/School Requirements

Humanities and Fine Arts/Social and Behavioral Sciences

ECN 111 Macroeconomic Principles *SB*[1] 3
or ECN 112 Microeconomic Principles *SB*[1] (3)
HU/SB and awareness area courses[2] 12

Total 15

Literacy and Critical Inquiry

BME 413 Biomedical Instrumentation *L*[3] 3
BME 423 Biomedical Instrumentation Laboratory *L*[3] 1
ECE 300 Intermediate Engineering Design *L* 3

Total 7

Natural Sciences

PHY 121 University Physics I: Mechanics *SQ*[4] 3
PHY 122 University Physics Laboratory I *SQ*[4] 1
PHY 131 University Physics II: Electricity and Magnetism *SQ*[5] 3
PHY 132 University Physics Laboratory II *SQ*[5] 1

Total 8

Mathematical Studies

ECE 100 Introduction to Engineering Design *CS* 3
ECE 384 Numerical Methods for Engineers 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* 4
MAT 274 Elementary Differential Equations *MA* 3

Total 22

General Studies/school requirements total 52

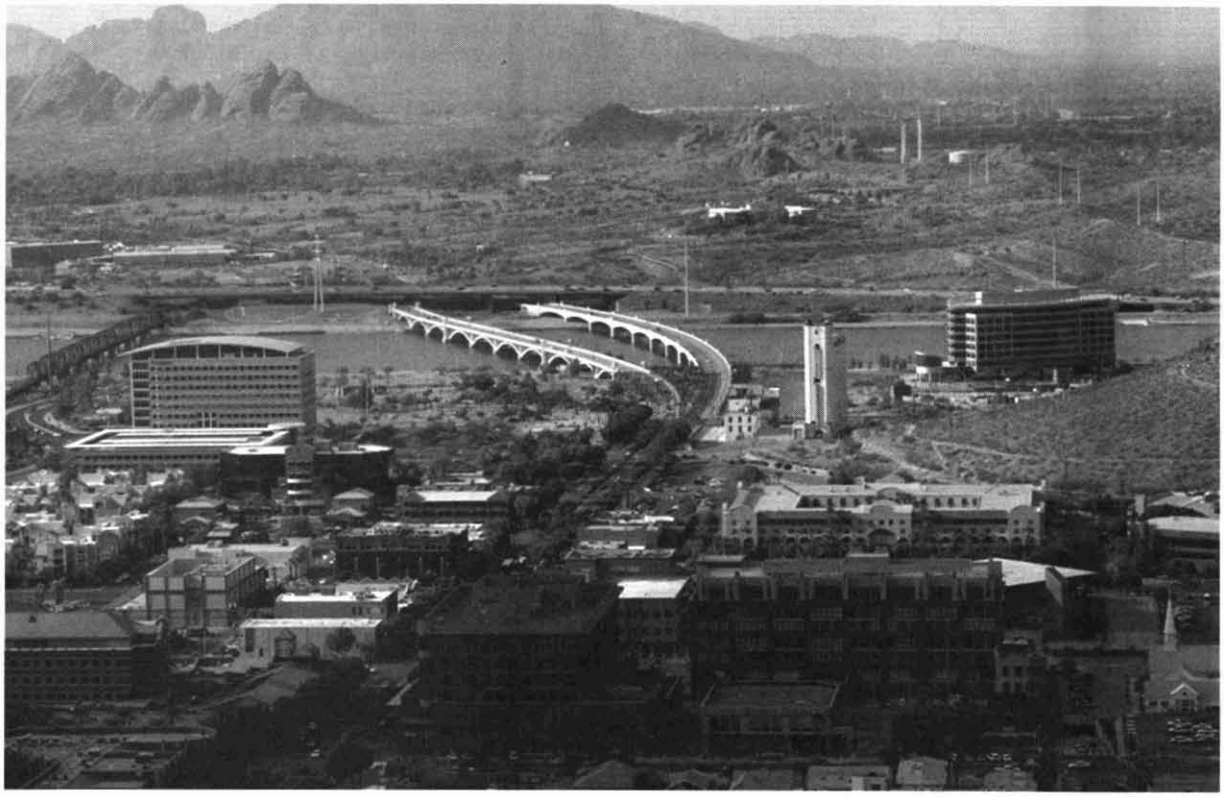
Engineering Core

ECE 201 Electrical Networks I 4
ECE 214 Engineering Mechanics 4
ECE 334 Electronic Circuits 4
ECE 340 Thermodynamics 3
ECE 350 Structure and Properties of Materials 3

Total 18

Engineering Special Studies Program Major—Premedical Engineering Concentration[6]

BIO 188 General Biology II *SQ* 4
BME 101 Introduction to Bioengineering 3
BME 235 Physiology for Engineers 4
BME 318 Biomaterials 3
BME 331 Biomedical Transport Phenomena 3
BME 350 Signals and Systems for Bioengineers 3
BME 417 Biomedical Engineering Capstone Design I 3
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 1
CHM 336 General Organic Chemistry Laboratory 1



A view of downtown Tempe toward the north features the Brickyard (lower center), home of the Ira A. Fulton School of Engineering; Mill Avenue bridges; and Camelback Mountain in the distance.

Tim Trumble photo

CSE	100	Principles of Programming with C++ *CS*[7] 3
ECE	380	Probability and Statistics for Engineering Problem Solving *CS* 3
Total		 52

[1] ECN 111 or 112 must be included to obtain HU and SB requirements.

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

[3] Both BME 413 and 423 must be taken to secure L credit.

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

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

[6] To fulfill medical school admission requirements, premedical students generally should choose BIO 188. Note that BIO 187 General Biology I is required by many medical schools in addition to BIO 188 and the other degree requirements and cannot generally be used as a technical elective.

[7] CSE 110 Principles of Programming with Java can be substituted for CSE 100 with departmental approval.

Premedical Engineering
Program of Study
Typical Four-Year Sequence

First Year

First Semester

CSE	100	Principles of Programming with C++ *CS*[1] 3
ECE	100	Introduction to Engineering Design *CS* 3
ENG	101	First-Year Composition 3
MAT	270	Calculus with Analytic Geometry I *MA* 4
Total		 13

Second Semester

BME	101	Introduction to Bioengineering 3
CHM	113	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*[2] 3
PHY	122	University Physics Laboratory I *SQ*[2] 1
Total		 18

Second Year

First Semester

BIO	188	General Biology II *SQ* 4
CHM	116	General Chemistry *SQ* 4
MAT	272	Calculus with Analytic Geometry III *MA* 4
PHY	131	University Physics II: Electricity and Magnetism *SQ*[3] 3
PHY	132	University Physics Laboratory II *SQ*[3] 1
Total		 16

Second Semester

BME	235	Physiology for Engineers 4
ECE	201	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	318	Biomaterials 3
CHM	331	General Organic Chemistry 3
CHM	335	General Organic Chemistry Laboratory 1
ECE	214	Engineering Mechanics 4
ECE	300	Intermediate Engineering Design *L* 3
ECE	384	Numerical Methods for Engineers 4
Total		 18

Second Semester

BME	331	Biomedical Transport Phenomena 3
BME	350	Signals and Systems for Bioengineers 3
CHM	332	General Organic Chemistry 3
CHM	336	General Organic Chemistry Laboratory 1
ECE	334	Electronic Circuits 4
ECE	340	Thermodynamics 3
Total		 17

Fourth Year

First Semester

BME	413	Biomedical Instrumentation *L*[4] 3
BME	417	Biomedical Engineering Capstone Design I 3
BME	423	Biomedical Instrumentation Laboratory *L*[4] 1
ECE	380	Probability and Statistics for Engineering Problem Solving *CS* 3
HU/SB and awareness area courses[5] 6		
Total		 16

Second Semester

BME	470	Microcomputer Applications in Bioengineering 4
BME	490	Biomedical Engineering Capstone Design II 3
HU/SB and awareness area course[5] 6		
Total		 13
Total degree requirements 128		

[1] CSE 110 Principles of Programming with Java can be substituted for CSE 100 with departmental approval.

[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] Both BME 413 and 423 must be taken to secure L credit.

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

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

The Katherine K. Herberger College of Fine Arts

herbergercollege.asu.edu **J. Robert Wills, PhD, Dean**

PURPOSE

The Katherine K. Herberger College of Fine Arts at ASU provides both preprofessional and professional education in the arts disciplines and an opportunity for nonmajors to become culturally literate through participation 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 Katherine K. Herberger College of Fine Arts also offers community audiences many hours of cultural enjoyment through a myriad of 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 2,600 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 Katherine K. Herberger 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 69. Transfer students are encouraged to contact their department or school or the Katherine K. Herberger College of Fine Arts Undergraduate Student Academic Services (GHALL 116) to ensure a smooth transition to the Katherine K. Herberger 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 *Course Applicability System* for transferability of specific courses from Arizona community colleges. For more information, access the Web site at ag.transfer.org/cag.

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 Katherine K. Herberger 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 must complete a minimum of 15 semester hours of resident credit in the major as approved by the faculty.

ADVISING

Undergraduate academic advising is handled as a centralized 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 Herberger Student Academic Services central office. For more information, call 480/965-4495.

Katherine K. Herberger College of Fine Arts Baccalaureate Degrees and Majors

Major	Degree	Concentration[1]	Administered By
Art	BA	Art history, digital art, museum studies, or studio art	School of Art
	BFA	Art education, ceramics, drawing, fibers, intermedia, metals, painting, photography, printmaking, or sculpture	School of Art
Dance	BFA	Choreography, dance education, dance studies, or performance	Department of Dance
Music	BA	—	School of Music
Music Education[2]	BM	Choral-general, instrumental, or string	School of Music
Music Therapy[2]	BM	—	School of Music
Performance	BM	Guitar, jazz, keyboard, music theatre, orchestral instrument, piano accompanying, or voice	School of Music
Theatre	BA	Optional: acting or scenography[1]	Department of Theatre
Theory and Composition	BM	Composition or theory	School of Music

[1] If a major offers concentrations, one must be selected unless noted as *optional.*

[2] This major requires more than 120 semester hours to complete.

Baccalaureate Degrees

The three baccalaureate degrees differ in curricula with respect to the amount of specialization permitted in the major field. The BA degree provides a broad, scholarly, humanistic program, while the other two programs place greater emphasis upon the major field. See the "Katherine K. Herberger College of Fine Arts Baccalaureate Degrees and Majors" table, on this page, 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 Katherine K. Herberger College of Fine Arts. See "General Studies," page 92, 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, and music 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 Initial Teacher Certification (ITC) program in the College of Education (leading to teaching certification) must consult with an advisor from the Office of Student Services in the College of Education before applying for the ITC. Students must have completed 56 semester hours with a minimum GPA of 2.50. Further details on admission requirements and procedures for the ITC can be found under "Teacher Education," page 193.

Minors

The Katherine K. Herberger 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 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 25. 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 "Katherine K. Herberger College of Fine Arts Graduate Degrees and Majors" table, page 276, 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 88.

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 92. All three General Studies awareness areas are required. Consult with an advisor for an approved list of courses. General Studies courses are listed in "General Studies," page 94, 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

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Katherine K. Herberger College of Fine Arts Graduate Degrees and Majors

Major	Degree	Concentration[1]	Administered By
Art	MA	Art education or art history	School of Art
	MFA	Ceramics, digital technology, drawing, fibers, intermedia, metals, painting, photography, printmaking, sculpture, or wood	School of Art
Composition	MM	Optional: interdisciplinary digital media and performance[1]	School of Music
Creative Writing	MFA[2]	—	Creative Writing Committee
Curriculum and Instruction	PhD[3]	Art education	School of Art
Dance	MFA	Optional: interdisciplinary digital media and performance[1]	Department of Dance
History and Theory of Art[4]	PhD	—	School of Art
Music	MA	Ethnomusicology, music history and literature, or music theory	School of Music
	DMA	Conducting, interdisciplinary digital media and performance, music composition, music education, or performance	School of Music
Music Education	MM	Choral music, general music, instrumental music, or jazz studies	School of Music
Performance	MM	Music theatre/opera musical direction, music theatre/opera performance, performance, performance pedagogy, or piano accompanying	School of Music
Theatre	MA	—	Department of Theatre
	MFA	Directing, interdisciplinary digital media, performance design, or theatre for youth	Department of Theatre
	PhD	Optional: theatre and performance of the Americas or theatre for youth[1]	Department of Theatre

[1] If a major offers concentrations, one must be selected unless noted as *optional*.

[2] This program is administered by the Division of Graduate Studies.

[3] This program is administered in collaboration with the College of Education.

[4] This major is jointly offered with the University of Arizona.

to consult with an academic advisor to ensure that they comply with all necessary requirements.

COLLEGE DEGREE REQUIREMENTS

The Katherine K. Herberger 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* Katherine K. Herberger College of Fine Arts course outside of the student's major.

All BA degrees require the equivalent of 16 semester hours in one foreign language except for the BA degrees in Theatre and Art with concentrations in digital art and 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 BM degree in Performance with a concentration in voice have specific foreign language requirements, which are stated in the degree requirements. There is no foreign language requirement for other concentrations of the BFA or BM degrees.

ACADEMIC STANDARDS AND RETENTION

Good Standing. Students in the Katherine K. Herberger College of Fine Arts are considered in good standing for the purpose of retention if they maintain a cumulative GPA of 2.00 or higher in all courses taken at ASU. However, to gain admission into certain undergraduate degree programs in the college, students must maintain a minimum GPA within their major and/or a minimum cumulative GPA. These minimum GPAs vary according to the given program.

Probation. Any student who does not maintain good standing is placed on academic probation. A student on academic

probation is required to observe any limitations or rules the college may impose as a condition for retention.

Disqualification. A student who is on probation becomes disqualified if the student (1) has not returned to good standing or (2) has not met the required semester GPA.

Disqualification is exercised at the discretion of the college and becomes effective on the first day of the fall or spring semester following college action. A disqualified student is notified by the Office of the Registrar and/or the dean of the college and is not allowed to register for a fall or spring semester at the university until reinstated. A student who is disqualified may not attend as a nondegree student.

Reinstatement. Students seeking reinstatement after disqualification should contact the Katherine K. Herberger College of Fine Arts Student Services Office regarding procedures and guidance for returning to good standing. When reinstatement includes readmission, application must be made to the Readmissions Section of the Office of the Registrar.

All academic disciplinary action is a function of the Katherine K. Herberger College of Fine Arts Student Services Office, GHALL 116, under the direction of the assistant dean of the college. Students having academic problems should call this office for advising at 480/965-4495.

MAJOR REQUIREMENTS

The minimum requirement for a baccalaureate degree is the completion of 120 semester hours with a minimum 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 require additional semester hours for graduation and a higher cumulative GPA of their students. 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 (BA) Degree. The BA degree requires from 45 to 69 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. The exact content of the major is selected by a student in consultation with an advisor under the rules and regulations of the department or school concerned. A successful entrance audition is also required for admission to the BA degree in Music program.

Bachelor of Fine Arts (BFA) Degree. The BFA 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. Auditions are required for entrance into Dance major classes, and auditions and/or interviews are required for admission into the BFA program in Dance. Specific information can be obtained through the department's Advisement Office.

Bachelor of Music (BM) Degree. The BM 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 is designed to provide a broad yet concentrated preparation with a choice of specialization among various areas. See the "Katherine K. Herberger College of Fine Arts Baccalaureate Degrees and Majors" table, page 275, for available majors and concentrations. An entering undergraduate music student, regardless of the area of specialization, must pass 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 84. 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 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 among the highest ranked programs in the country. The faculty are nationally recognized and the programs offer students diverse educational opportunities in studio art (ceramics, drawing, fibers, intermedia, metals, painting, photography, printmaking, and sculpture), art history and museum studies, and art education. Some of the unique offerings include bookmaking and papermaking, digital art, film, neon, video, computer 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, Harry Wood, Gallery 100, and Step galleries host 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. The department's strengths include choreography and performance, dance science and somatics, educational outreach and methodology, media and technology, as well as contemporary directions. Prominent and renowned faculty and guest artists create repertory for dance majors and for the Dance Arizona Repertory Theatre (DART), the repertory and community partnership company. Through instructional curriculum, workshop intensives, guest residencies, strong performance programs, professional internships and apprenticeships, students are exposed to and trained to meet the demands of professional preparations. An environment that encourages creative

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

collaboration, interdisciplinary views, and community awareness is central to the mission of the department.

School of Music. Ranked among the top programs in the United States, the School of Music offers a broad scope of degree options for the study of performance, music education, music therapy, composition, theory, history and literature, jazz, music theatre, ethnomusicology, pedagogy, interdisciplinary digital media, accompanying, and conducting. This wide spectrum of areas is supported by special programs and facilities that enrich the opportunities for professional training and musical growth. Music education and pedagogy are supplemented by the Piano and Guitar Preparatory Programs, the Music for Tots series, and special classes for certification in Orff and Kodály methods. Performance opportunities are enhanced by a wide variety of ensembles, including such groups as marimba, African drumming, and mariachi. Voice students may pursue training in opera or in Broadway musicals. Composition students work in the Electronic Music Studio, and all benefit from the Electronic Classroom, a state-of-the-art computer facility. A variety of community partnerships, including a gang intervention program, stem from the music therapy area. The scope and variety of the School of Music's programs are made possible by the wide range of expertise of the faculty, who are performers, teachers, conductors, composers, and scholars recognized nationally and internationally.

Department of Theatre. The Department of Theatre's BA degree features a broad liberal arts education. The program's mission is to educate imaginative, knowledgeable, skilled, and responsible artists, teachers, scholars, audience members, and advocates for the theatre of the future. Special strengths of the department include internationally acclaimed programs in theatre for youth; an outstanding playwriting area that infuses each specialization with new script work; multicultural courses; an acting concentration that allows work with nationally acclaimed directors and acting coaches; and a design and production area that provides for further specialization in costume, lighting, scene design, and 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. Four to six subscription series plays are produced annually in the 496-seat Galvin Playhouse and the smaller Lyceum Theatre. Additional student-directed shows are presented in the Prism Theatre and studios.

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, participate in theatre tours to area schools, and 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.

Institute for Studies in the Arts. The Institute for Studies in the Arts (ISA) is an interdisciplinary research and education center in the Katherine K. Herberger College of Fine Arts. The ISA has established the Arts, Media, and Engineering Graduate Research and Education (AME) program. The program is cosponsored by the Ira A. Fulton School of Engineering and the Katherine K. Herberger College of Fine Arts. Graduate degrees with concentrations in media and arts are offered collaboratively through AME by the Departments of Electrical Engineering, Computer Science and Engineering, Dance, and the Schools of Theatre, Art, and Music. The concentrations aim to train hybrid arts-engineering graduate students who draw their creativity from the arts and their methodology from the sciences. The concentrations focus on in-depth studies that fully integrate discipline-specific studies with development of arts and media technologies and research-oriented practices.

COLLEGE OF EXTENDED EDUCATION

The university-wide College of Extended Education provides an interactive link between ASU and the diverse communities it serves. The college assesses lifelong learning requirements and works in partnership with campuses, other colleges, and the community to serve learners, using a network of locations, programs, schedules, and technologies.

For more information, see "College of Extended Education," page 703, or access the Web site at www.asu.edu/xed.

GENERAL INFORMATION

Undergraduate Credit for Graduate Courses. To enable interested students to benefit as much as possible from their undergraduate studies, the Division of Graduate Studies and the Katherine K. Herberger 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.

Preprofessional Programs. Students preparing for admission to professional graduate schools should obtain information regarding admission requirements by writing directly to the schools in which they are interested.

Courses. The academic units within the Katherine K. Herberger College of Fine Arts may use the CFA prefix for course offerings that cross disciplinary boundaries.

COLLEGE OF FINE ARTS (CFA)

CFA 194 Special Topics. (1–4)
fall
Topics may include the following:
- Academic Balance for the Fine Arts Major. (1)

CFA 484 Internship. (1–12)
fall and spring

CFA 494 Special Topics. (3)
fall and spring

CFA 498 Pro-Seminar. (1–7)
fall and spring

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

ARTS, MEDIA, AND ENGINEERING (AME)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

School of Art

herbergercollege.asu.edu/art
480/965-3468
ART 102

Jon W. Sharer, Director

Regents' Professors: Klett, Weiser

Professors: Alquist, Bates, Britton, Codell, Duncan, Eckert, Erickson, Fahlman, Fronske, Gillingwater, Hajicek, Magenta, Marc, Maxwell, Meissinger, Pile, Pittsley, Risseeuw, Schmidt, Schoebel, Sharer, Stokrocki, Sweeney, Verstegen, White, Young

Associate Professors: Brown, Collins, Gully, Jenkins, McIver, Newport, Pessler, Schleif, Schutte, Segura, Serwint, Umberger, Wolfthal

Assistant Professors: Hood, Mesch, Schneider

All students registering in a School of Art degree program enroll through the Katherine K. Herberger College of Fine Arts. Each degree program and area of specialization has its own check sheet, which describes the particulars of course sequence and special requirements. Check sheets are available in the School of Art Undergraduate Advising Center.

Art majors seeking a second BA or BFA degree in art must petition the Katherine K. Herberger College of Fine Arts after completing 12 semester hours in the specialization of the second degree. The second degree in art requires at least 30 semester hours of courses that meet art requirements in the major. These 30 semester hours should not duplicate any of the courses taken for the first degree.

Portfolio Reviews

Students in the following concentrations must be accepted through portfolio review into upper-division classes in these programs (300 and 400 levels): BA in Art with a concentration in digital art; BFA in art with a concentration in drawing, intermedia, painting, or photography. The minimum GPA required is 2.70 overall and 3.00 for art classes. Portfolio deadlines are March 15 for admission to fall semester upper-division classes and October 15 for spring classes. Transfer students are encouraged to apply a semester before attending ASU.

Senior Exhibition

All majors in studio BFA programs and the BA in Art with a concentration in digital art program must successfully complete ART 494 ST: Senior Exhibition and Portfolio for graduation. Graduating students in these areas must submit work for a group exhibition, a portfolio of 10 to 15 slides, and an artist's statement that are acceptable to the faculty sponsor in their area of concentration.

ART—BA

The faculty in the School of Art offer four concentrations for students in the BA degree in Art program: art history, digital art, museum studies, and studio art. These concentrations are intended to give the student a broadly based general education in the field with specialized work at the upper-division level.

The major in Art consists of 45 to 79 semester hours, depending on the concentration, and includes the requirements listed on this page for each concentration. BA degree programs are especially suited for individuals pursuing interdisciplinary studies or a minor in another discipline. All courses in the major must be completed with a grade of "C" (2.00) or higher.

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 88, and "College Degree Requirements," page 276.

Art History

This concentration consists of a minimum of 45 to 61 semester hours. It requires 33 semester hours of art history, 12 semester hours of related study, and 16 semester hours of foreign language (101, 102, 201, and 202) or a demonstrated proficiency in one foreign language which is equivalent to the completion of two years of language at the college level. At least 27 of the 45 semester hours must be upper-division credit. Satisfactory completion of ARS 480 Research Methods is required before the senior year.

Art History Requirements

ARS	101 Art from Prehistory Through Middle Ages *HU, H*	3
ARS	102 Art from Renaissance to Present *HU, H*	3
ARS	480 Research Methods *L*	3
ARS	498 PS: Art History	3
Total		12

Also required is at least one 300- or 400-level art history (ARS) course from each of the following areas:

Ancient	3
Medieval	3
Modern/Contemporary	3
Non-Western	3
Renaissance/Baroque	3
Any ARS courses	6

BIS CONCENTRATION

A concentration in art history is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

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 2-D Design 3
ART 113 Color 3
ART 115 3-D Design 3
ART 201 Photography I 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.

Foreign Language. Sixteen semester hours of 101, 102, 201, and 202 language courses; or a demonstrated proficiency in at least one foreign language equivalent to the level attained through the completion of two years of study at the college level is required. For specific courses, see the "Department of Languages and Literatures," page 404. (SHS courses are not acceptable.)

Digital Art

Sixty-nine semester hours are required for the concentration in digital art. It requires 18 semester hours of core curriculum, 18 semester hours of course work with a digital art emphasis, nine semester hours of art history, and 24 semester hours of related study. The faculty in the student's declared emphasis must approve course work in the digital art concentration and the related subject field. A senior exhibition is also required. Guidelines for the portfolio and exhibition are available in the Art Building (room 151) or by accessing the Web site at art.asu.edu/ug_advising/UG_index.

Portfolio Review. Admission to digital art upper-division courses require both a portfolio review and a minimum cumulative GPA of 2.70 and a School of Art GPA of 3.00. Students must also declare an emphasis in three-dimensional imaging and animation, digital photography, or video. The portfolio deadlines are October 15 for spring classes and March 15 for fall classes.

Core Curriculum. See "Studio Art," page 280, for courses that make up the core curriculum.

Specialization. Select 18 semester hours (including 12 semester hours of upper-division study) from the following:

ART 294 ST: Digital Art 3
or ART 394 ST: Digital Art (3)
ART 308 Digital Photographic Images I 3
ART 345 Visualization and Prototyping I 3
ART 346 3-D Computer Imaging and Animation *CS* 3
ART 348 Animation Motion Studies 3
ART 440 New Media Concepts 3
ART 441 Video Art 1
ART 449 Computer Animation and Video 3
ART 450 Computer Animation and Audio 3
ART 470 Computer Animation Portfolio *CS* 3
ART 494 ST: Digital Photographic Images II 3
or ART 494 ST: Visualization and Prototyping II (3)
or any ART 494 digital art course (3)

For descriptions of these digital art classes, see the Intermedia course listings on page 290.

Related Subject Area. Select 23 semester hours of course work outside of the specialization. This may include courses in the School of Art, the Katherine K. Herberger College of Fine Arts, and throughout the university that further students' fine arts goals in digital media and aid them in preparation for the senior exhibition. One semester hour of ART 494 ST: Senior Exhibition and Portfolio is also required.

Museum Studies

A minimum of 67 hours is required for the museum studies concentration. This concentration is an interdisciplinary program, which involves courses in the School of Art, Department of Anthropology, W. P. Carey School of Business, American Humanics/Department of Recreation Management, and the Department of Languages and Literatures.

Specialization

ARS 101 Art from Prehistory Through Middle Ages *HU, H* 3
ARS 102 Art from Renaissance to Present *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
ARS 480 Research Methods *L* 3
ARS 484 Internship: Museum 3

Also required is at least one 300- or 400-level art history (ARS) course from each of the following areas:

ART 409 Photographic Exhibition 3
or ARA 460 Gallery Exhibitions (3)
ASB 471 Introduction to Museums *L* 3
or ARS 494 ST: Introduction to Museums (3)
Ancient 3
Any ARS courses 6
Medieval 3
Modern/contemporary 3
Non-Western 3
Renaissance/Baroque 3

Related Study

ACC 394 ST: Accounting and Financial Analysis 3
MGT 380 Management and Strategy for Nonmajors 3
MKT 382 Advertising and Marketing Communication 3
REC 300 Fund Raising 3
REC 310 Volunteerism 3
REC 430 Managing Nonprofit Organizations 3

Free Electives. Students must select a minimum of 12 semester hours of free electives. Recommended courses include REC 300 or 310; art history, anthropology, history, and/or business courses.

Foreign Language. Sixteen semester hours of 101, 102, 201, and 202 language courses are required or a demonstrated proficiency in at least one foreign language equivalent to the level attained through the completion of two years of study at the college level. For specific courses, see the "Department of Languages and Literatures," page 404. (SHS courses are not acceptable.)

Studio Art

Core Curriculum. The following courses make up the core curriculum:

ARS	101	Art from Prehistory Through Middle Ages *HU, H*	3
ARS	102	Art from Renaissance to Present *HU, H*	3
ART	111	Drawing I	3
ART	112	2-D Design	3
ART	113	Color	3
ART	115	3-D Design	3
Total			18

Specialization. Eighteen semester hours are required, including nine semester hours of 2-D classes from drawing, painting, photography, and printmaking; and nine hours of 3-D classes from ceramics, fibers, intermedia, metals, printmaking, and sculpture. Nine hours must be in the upper division.

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.

Related Subject Area. The related subject area includes courses outside the area of specialization in the School of Art, the Katherine K. Herberger College of Fine Arts, and the university. Course selection must be related to the student's professional goals in art and approved by area of specialization faculty and an academic advisor. A minimum of 24 hours is required, of which 18 hours must be of upper-division study.

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 minimum grade of "C" (2.00) is required in all classes in the minor. 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 the Tempe campus is required.

ARS 100 or 300 may be used toward a minor. ARS 100 and 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 from Prehistory Through Middle Ages *HU, H*	3
ARS	102	Art from Renaissance to Present *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. Interested students should contact the School of Art for specific requirements and admission procedures.

ART—BFA

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: art education, ceramics, drawing, fibers, intermedia, metals, painting, photography, printmaking, and sculpture. A portfolio review is required for admission to courses in the specialization for drawing, intermedia, painting, or photography. A senior portfolio and exhibition are required for all BFA programs except Art Education. Guidelines for the portfolio and exhibition are available in the Art Building (room 151) and on the Web at art.asu.edu/ug_advising/UG_index.

BFA Core Curriculum. All students in this degree program follow the same core curriculum in art for the first two semesters:

ARS	101	Art from Prehistory Through Middle Ages *HU, H*	3
ARS	102	Art from Renaissance to Present *HU, H*	3
ART	111	Drawing I	3
ART	112	2-D Design	3
ART	113	Color	3
ART	115	3-D 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" (2.00) 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 88, and "College Degree Requirements," page 276.

Art Education

Core Curriculum. See "BFA Core Curriculum," on this page for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ARE	370	Teaching Visual Culture	3
ARE	440	Disciplines of Art Education	3
ARE	450	Teaching Inquiry in Art	3
ARE	482	Teaching Art Processes	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 two-dimensional or three-dimensional studio art, or art history.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Twelve of these semester hours must be upper-division credits.

Art History. Six semester hours of ARS upper-division courses are required. One course must be a 20th-century ARS course. Non-Western art is recommended for the second course.

Additional Requirements. The following courses are additional requirements:

ART	201	Photography I 3
ART	223	Painting I 3
		or ART 211 Drawing II (3)
		or ART 253 Introduction to Printmaking (3)
		or 300-level printmaking
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 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 art 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.

Teacher Certification. A student pursuing a BFA 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 Initial Teacher Certification (ITC) program in the College of Education. Application deadlines for the ITC programs are February 1 for fall admission and September 1 for spring admission. Appointments with an advisor can be made in the Office of Student Services in the College of Education, or by calling 480/965-5555.

Certification is also available 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	Teaching Inquiry in Art 3
ARE	482	Teaching Art Processes 3
ARE	486	Art Education: Strategies and Applications 3
ARE	496	Methods and Assessment of Learning in Art 3
Total		 12

In addition to the art education courses, students must complete the following: education courses, field experiences, and student teaching.

The BFA degree in Art with a concentration in art education and the postbaccalaureate program for certification in art have a special art education application procedure. 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" (3.00) 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.

To be accepted into student teaching, a student must be recommended in writing by the art education faculty and must have completed all art education classes. For additional student teaching requirements, see "Student Teaching," page 198. Students who are not recommended may complete the BFA degree in Art with a concentration in art education without certification or may reapply after meeting any deficiencies in knowledge and skills related to the teaching of art.

Ceramics

Core Curriculum. See "BFA Core Curriculum," page 281, 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, are required.

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

One semester hour of ART 494 ST: Senior Exhibition and Portfolio is also required.

Art Electives. Fourteen semester hours of ARA, ARE, ARS, and ART courses are required.

Drawing

Core Curriculum. See "BFA Core Curriculum," page 281, for the courses that make up the core curriculum.

Portfolio Review. Admission to the upper-division courses listed below requires a portfolio review, a minimum overall GPA of 2.70, and a School of Art GPA of 3.00. The portfolio deadlines are October 15 for spring classes and March 15 for fall classes.

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, or 494 drawing, painting, or printmaking (three semester hours).

Art History. Nine semester hours, including six semester hours of upper-division and three semester hours of non-Western ARS courses, are required.

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

One semester hour of ART 494 ST: Senior Exhibition and Portfolio is also required.

Art Electives. Eight semester hours of ARA, ARE, ARS, or ART courses are required.

Fibers

Core Curriculum. See "BFA Core Curriculum," page 281, for the courses that make up the core curriculum.

Specialization. The following courses make up the specialization:

ART 276 Fibers I 3
ART 376 Woven Structures I 3
ART 377 Surface Design 3
ART 476 Woven Structures II 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 and a non-Western elective.

Additional Requirements. Three of the following six courses (nine 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

One semester hour of ART 494 ST: Senior Exhibition and Portfolio is also required.

Art Electives. Twenty semester hours of ARA, ARE, ARS, and ART courses are required.

Intermedia

Core Curriculum. See "BFA Core Curriculum," page 281, for the courses that make up the core curriculum.

Portfolio Review. Admission to the upper-division courses listed below requires a portfolio review, a minimum overall GPA of 2.70, and a School of Art GPA of 3.00. Students must also declare an emphasis in mixed media, three-dimensional imaging and animation, or video. The portfolio deadlines are October 15 for spring classes and March 15 for fall classes.

Specialization. Eighteen to 19 semester hours are required. Students must select three semester hours of nonelectronic media and three hours of digital imaging. The remaining 12 to 13 hours are completed in either nonelectronic media or digital imaging, depending on the emphasis selected.

Nonelectronic. Select 15 hours from the following nonelectronic media courses:

ART 439 Mixed Media* 3
ART 443 Intermedia* 3
ART 494 ST: Mixed Media 3

* This course can be repeated for credit.

Electronic. Select 15 to 16 hours from the following electronic media courses (based on emphasis):

ART 345 Visualization and Prototyping I 3
ART 346 3-D Computer Imaging and Animation *CS* 3
ART 348 Animation Motion Studies 3
ART 440 New Media Concepts* 3
ART 441 Video Art* 1
ART 449 Computer Animation and Video* 3
ART 450 Computer Animation and Audio* 3
ART 470 Computer Animation Portfolio *CS** 3
ART 494 ST: Digital 3
ART 494 ST: Intermedia 3

* This course can be repeated for credit.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Nonelectronic. Select three to four semester hours from electronic courses above.

Electronic. Select three semester hours from nonelectronic courses above.

Intermedia-Related Study

Two of the following two-dimensional 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 three-dimensional 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

Art History. Nine semester hours, including three hours of non-Western, and six hours of 20th-century and/or contemporary art history (ARS) classes are required. Six hours must be in the upper division.

Art Electives. Seventeen semester hours of ARA, ARE, ARS, and ART courses are required. One semester hour of ART 494 ST: Senior Exhibition and Portfolio is also required.

The deadline for submitting review materials to enroll in computer animation courses is March 15 for fall semester and October 15 for spring semester.

Metals

Core Curriculum. See "BFA Core Curriculum," page 281, 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. Seventeen semester hours of ARA, ARE, ARS, and ART courses are required. One semester hour of ART 494 ST: Senior Exhibition and Portfolio is also required.

Painting

Core Curriculum. See "BFA Core Curriculum," page 281, for the courses that make up the core curriculum.

Portfolio Review. Admission to the courses listed below requires a portfolio review, a minimum overall GPA of 2.70, and a School of Art GPA of 3.00. The portfolio deadlines are October 15 for spring classes and March 15 for fall classes.

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 427 Advanced Watermedia 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. Eight semester hours of ARA, ARE, ARS, and ART courses are required. One semester hour of ART 494 ST: Senior Exhibition and Portfolio is also required.

Photography

Core Curriculum. See "BFA Core Curriculum," page 281, for the courses that make up the core curriculum.

Portfolio Review. Admission to the upper-division courses listed below requires a portfolio review, a minimum overall GPA of 2.70, and a School of Art GPA of 3.00. The portfolio deadlines are October 15 for spring classes and March 15 for fall classes.

Specialization. The following courses make up the specialization:

ARA	202	Understanding Photographs 3
ART	201	Photography I 3
ART	204	Photography II 3
ART	304	Advanced Photography 3
Total		12

Three of the following 10 courses (nine semester hours) are required:

ART	305	Color Photography I 3
ART	308	Digital Photographic Images 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	409	Photographic Exhibition 3
ART	494	ST: Photo 3

Art History. Twelve semester hours are required, including ARS 250 History of Photography and a non-Western art history course. Six hours must be upper-division.

Additional Requirements. Select one of the following courses:

ART	211	Drawing II 3
ART	214	Life Drawing I 3
ART	223	Painting I 3
ART	227	Watercolor I 3

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. Seventeen semester hours of ARA, ARE, ARS, and ART courses are required. One semester hour of ART 494 ST: Senior Exhibition and Portfolio is also required.

Printmaking

Core Curriculum. See "BFA Core Curriculum," page 281, 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 10 courses (nine semester hours) are required:

ART	253	Introduction to Printmaking 3
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

One semester hour of ART 494 ST: Senior Exhibition and Portfolio is also required.

Art Electives. Seventeen semester hours of ARA, ARE, ARS, and ART courses are required.

Sculpture

Core Curriculum. See "BFA Core Curriculum," page 281, 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

L literacy and critical inquiry / MA mathematics / CS computer/statistics/quantitative applications / HU humanities and fine arts / SB social and behavioral sciences / SG natural science—general core courses / SQ natural science—quantitative / C cultural diversity in the United States / G global / H historical / See "General Studies," page 92.

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 ST: Special Topics in Sculpture 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

One semester hour of ART 494 ST: Senior Exhibition and Portfolio is also required.

Art Electives. Fourteen 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 MA degree in Art, with a concentration in art education or art history; the Master of Fine Arts degree with a concentration in ceramics, digital technology, drawing, fibers, intermedia, metals, painting, photography, printmaking, sculpture, or wood; and a PhD degree in History and Theory of Art. In cooperation with the College of Education, the Doctor of Philosophy degree is offered with a concentration in art education. See the *Graduate Catalog* for requirements for all graduate degrees.

ART AUXILIARY (ARA)

ARA 202 Understanding Photographs. (3)
once a year
Slide lecture course in understanding photography as a fine art form.

ARA 311 Art Appreciation and Human Development. (3)
fall
Foundations of art for children and young adults. Emphasis on learning, development, and understanding art in historical and cultural contexts. Lecture, discussion. Fee (online only). Prerequisites: ENG 101, 102; junior standing.
General Studies: HU

ARA 460 Gallery Exhibitions. (3)
fall and spring
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)
fall and spring
Understanding art as an emergent cultural phenomenon with an emphasis on a critical examination of conceptual issues in art. Requires writing. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: L/HU

ARA 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Advanced Photo Aesthetics. (3)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

ART EDUCATION (ARE)

ARE 301 Studio Art and Human Development. (3)
once a year
Study of human development in studio art from early childhood to adult years.

ARE 370 Teaching Visual Culture. (3)
fall and spring
Explores issues and applications of everyday aesthetics that contain powerful technological, social, and economic factors. Lecture, discussion. Prerequisite: ARE 440 or instructor approval.

ARE 440 Disciplines of Art Education. (3)
fall and spring
Explorations in art education's disciplines, history, and people's artmaking development at diverse age levels and abilities. Lecture, discussion. Prerequisites: a combination of ARS 101 and 102 and ART 113 and 115 or only instructor approval.

ARE 450 Teaching Inquiry in Art. (3)
fall and spring
Designing inquiry-based curriculum units built on developmental levels of art making and art understanding. 2 hours lecture, 2 hours applied practice. Prerequisites: ARS 101, 102.

ARE 482 Teaching Art Processes. (3)
spring
Art traditions of the 20th century as a basis for studio and art history instruction. Meets art postbaccalaureate certification requirement. 2 hours lecture, 2 hours studio. Prerequisite: ARE 450.

ARE 486 Art Education: Strategies and Applications. (3)
fall
Implementation and evaluation of art instruction for K–12 population. Includes teaching of Saturday classes in the Children's Art Workshop. Meets art postbaccalaureate certification requirement. Prerequisite: ARE 482.

ARE 494 Special Topics. (3)
once a year

ARE 496 Methods and Assessment of Learning in Art. (3)
once a year
Individual or group research on the assessment of art learning incorporating theory and practice. Meets art postbaccalaureate certification requirement. Prerequisites: both ARE 370 and 486 or only instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

ART HISTORY (ARS)

ARS 100 Introduction to Art. (3)
fall, spring, summer
Understanding of art and its relationship to everyday life through painting, sculpture, architecture, and design. No credit for Art majors or students who have completed ARS 101 or 102 or 300.
General Studies: HU

ARS 101 Art from Prehistory Through Middle Ages. (3)
fall, spring, summer
History of Western art from the Paleolithic period through the Middle Ages.
General Studies: HU, H

ARS 102 Art from Renaissance to Present. (3)
fall, spring, summer
History of Western art from the Renaissance to the present.
General Studies: HU, H

ARS 201 Art of Asia. (3)
once a year
History of the art of the Asian cultures, with emphasis on China, Japan, and India. Meets non-Western art history requirement.
General Studies: HU, G, H

ARS 202 Art of Africa, Oceania, and the Americas. (3)
spring
History of art of Africa, Oceania, and the New World. Meets non-Western art history requirement. Lecture, discussion. Cross-listed as AFH 202. Credit is allowed for only AFH 202 or ARS 202.
General Studies: HU, G, H

ARS 250 History of Photography. (3)
once a year
History of photography from the 19th century to the present.
General Studies: HU

ARS 300 Introduction to Art. (3)
fall and spring
Course content same as ARS 100 but requires a higher level of accomplishment and comprehension. No credit for students who have completed ARS 100 or used as art history credit by Art majors. Fee.
General Studies: HU

ARS 302 Art of Africa, Oceania, and the Americas. (3)
once a year
History of art of Africa, Oceania, and the New World. Meets non-Western art history requirement. Credit is allowed for only ARS 302 or 202. Prerequisites: ARS 101, 102.
General Studies: HU, G, H

ARS 310 The Renaissance in Tuscany. (3)
summer
Course taught in Florence, Italy. History of arts in Tuscany with focus on city of Florence from 14th through 16th centuries. Completion of ARS 101 and 102 suggested. Lecture, tours.

ARS 340 Art in America. (3)
once a year
American art from colonial times through the Second World War. Not available to students who have completed ARS 542. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Ancient Art
  Fee.
- Art and Culture of Ancient Egypt
  Fee.
- Manga and Anime
  Fee.
- 20th-Century Artists
  Fee.

ARS 400 History of Printmaking. (3)
once a year
History of the print as an art form and its relation to other modes and forms of artistic expression. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 402 Art of Ancient Egypt. (3)
selected semesters
Aesthetic, philosophical, and cultural basis of Egyptian art from pre-Dynastic period through New Kingdom. Emphasis on sculpture and architectural monuments. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 404 Greek Art. (3)
once a year
History of art, architecture of Aegean civilizations (Cycladic, Minoan, Mycenaean) and of Greece to end of Hellenistic period. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 406 Roman Art. (3)
once a year
Art and architecture of Etruria, the Roman Republic, and the Roman Empire. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 410 Early Christian and Byzantine Art. (3)
once a year
Art and architecture of the early church and the Byzantine Empire from the 4th to the 15th century. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU

ARS 412 Early Medieval Art. (3)
selected semesters
Painting, sculpture, architecture, and the minor arts from Migration, Carolingian, and Ottonian periods considered within religious, social, and economic contexts. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 414 Romanesque Art. (3)
once a year
Sculpture, painting, architecture, and minor arts in western Europe, ca. 1030–1200, considered within religious, economic, and social contexts. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 416 Gothic Art. (3)
once a year
Painting, sculpture, and architecture in western Europe during the Gothic period. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU

ARS 417 Late Gothic Art in Central Europe. (3)
selected semesters
Sculpture, painting, and architecture of the late-Gothic style, ca. 1350–1525, considered within religious, social, economic, and political contexts. Prerequisites: both ARS 101 and 102 or only instructor approval.

ARS 418 Renaissance Art in Northern Europe. (3)
once a year
Graphics, painting, sculpture, and architecture, ca. 1450–1550. Reformation themes and Renaissance style considered within religious, political, social, and economic contexts. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU

ARS 420 Early Renaissance Art in Italy. (3)
selected semesters
Painting, sculpture, and architecture in Italy from 1300 to 1500. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 422 Italian High Renaissance Art and Mannerism. (3)
once a year
History of Italian art during the 16th century, including the achievements and influence of Leonardo da Vinci, Raphael, and Michelangelo. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU

ARS 424 Italian Baroque Art. (3)
once a year
Italian painting, sculpture, and architecture of the 17th century. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU

ARS 426 Art of the 17th Century in Northern Europe. (3)
once a year
Baroque painting, sculpture, and architecture in Flanders, the Netherlands, France, and England. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 428 Art of the 18th Century. (3)
once a year
History of painting, sculpture, architecture, graphic arts, and the decorative arts from 1700 to the French Revolution (1789). Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

ARS 430 Art of Spain and Its Colonies. (3)
once a year
Architecture, painting, and sculpture from 1500 to 1800. Colonial focus on central Mexico and the American Southwest. Prerequisite: ARS 102 or instructor approval.
General Studies: HU, H

ARS 432 19th-Century French Art and Culture. (3)
fall
History of painting, graphic arts, sculpture, and architecture, 1800 to 1900 in France in its political, social, and economic contexts. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 434 Art and Visual Culture of 19th Century. (3)
spring
History of European art (all media) from French Revolution to Paris World Fair of 1900. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU

ARS 435 The Pre-Raphaelites. (3)
fall
Looks at visual and literary works by Victorian Pre-Raphaelites as works in themselves and through relations between images and texts. Lecture, discussion. Pre- or corequisite: ARS 102 or ENG 221 or HST 104.

ARS 436 The Artist, War, and Revolution (Versailles to Vietnam). (3)
fall
Critical study of artistic responses to war and revolution in Europe and United States from French Revolution to Vietnam conflict. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU

ARS 438 Art of the 20th Century I. (3)
once a year
Developments and directions in art between 1900 and World War II. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 439 Art of the 20th Century II. (3)
once a year
Art since World War II, with consideration of new concepts and experimentation with media and modes of presentation. Prerequisites: a combination of ARS 101 and 102 and 438 or only instructor approval.
General Studies: HU, H

ARS 442 Critical Issues in American Painting. (3)
once a year
Explores themes and social issues in American art with a critical study of American painting from the 18th century to 1850. Lecture, discussion. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU

ARS 458 Critical Theories in the Visual Arts. (3)
selected semesters
Examines current critical theories through their application to all visual arts. May include new historicism, Marxism, deconstruction, post-structuralism, semiotics, Lacanian psychoanalysis, feminism, postmodernism. Lecture, discussion, student presentations. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU

ARS 459 Writing Art Criticism. (3)
selected semesters
Traditional and contemporary approaches to the criticism of art. Students write critical essays. Latter half of the semester stresses the criticism of contemporary art in various media. Prerequisite: ARS 458 or instructor approval.

ARS 462 Pre-Columbian Art. (3)
once a year
Architecture, sculpture, ceramics, painting, and other arts of Mesoamerica before European contact. Meets non-Western art history requirement. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 465 Native North American Art. (3)
once a year
Native American art forms of the United States and Canada from prehistoric times to the present. Meets non-Western art history requirement. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, C, H

ARS 466 Native American Art of the Southwest. (3)
once a year
American Indian art in the southwestern states from its origins to the present day. Meets non-Western art history requirement. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, C, H

ARS 468 Art of the Arctic and Northwest Coast. (3)
selected semesters
Art associated with ceremony, shamanism, and daily life in the Arctic and on the Northwest Coast. Meets non-Western art history requirement. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, C, H

ARS 469 Mexican Art. (3)
once a year
Art of Mexico and related Central American cultures from the prehistoric to the contemporary schools. Meets non-Western art history requirement. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU, H

ARS 472 Art of China. (3)
once a year
Study of major forms in Chinese art: ritual bronze, sculpture, ceramic, calligraphy, painting, and architecture. Meets non-Western art history requirement. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU

ARS 473 Art of Japan. (3)
once a year
Japanese art from the Joman period to the present. Meets non-Western art history requirement. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU

ARS 475 Chinese Painting. (3)
once a year
From Ku K'ai-chin to Ch'i Pai-shih. Major artists, styles, and movements in Chinese painting. Meets non-Western art history requirement. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: HU

ARS 480 Research Methods. (3)
fall and spring
Methodology and resource material for art historical research. Techniques of scholarly and critical writing and evaluation of bibliographic sources. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: L

ARS 484 Internship. (1–12)
selected semesters
Topics may include the following:
- Museum

ARS 485 Women in the Visual Arts. (3)
spring
Historical study of art by women in various media; related social, political, educational issues; representation of women in art. Lecture, discussion. Prerequisites: both ARS 101 and 102 or only instructor approval.
General Studies: L

ARS 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- History of Photography. (3)
- Introduction to Museums. (3)

ARS 498 Pro-Seminar. (1–7)
once a year
Undergraduate seminar. Problems or criticism in topics that may include the following:
- American Art. (3–6)
- American Indian Art. (3–6)
- Ancient Art. (3–6)
- Art History. (3–6)
- Baroque Art. (3–6)
- British Empire. (3–6)
- Chinese Art. (3–6)
- Medieval Art. (3–6)
- Modern Art. (3–6)
- Photographic History. (3–6)
- Pre-Columbian Art. (3–6)
- Renaissance Art. (3–6)

Prerequisite: instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

ART (ART)

Studio Core Curriculum

ART 111 Drawing I. (3)
fall, spring, summer
Fundamental, technical, and perceptual skills using common drawing media and their application to pictorial organization. 6 hours a week.

ART 112 2-D Design. (3)
fall, spring, summer
Fundamentals of pictorial design. 6 hours a week.

ART 113 Color. (3)
fall, spring, summer
Principles of color theory as related to the visual arts. 6 hours a week. Prerequisites: ART 111, 112.

ART 115 3-D Design. (3)
fall, spring, summer
Fundamentals of 3-D form. 6 hours a week. Fee. Prerequisites: ART 111, 112.

ART 294 Special Topics. (3)
fall and spring

Ceramics

ART 261 Ceramic Survey. (3)
fall, spring, summer
Handforming methods, throwing on the wheel, decorative processes, and glaze application. 6 hours a week. Fee. Prerequisites: ART 112, 115.

ART 360 Ceramic Throwing. (3)
fall and spring
Design analysis and production of functional pottery. Emphasis on throwing techniques, surface enrichment, and glaze application. 6 hours a week. May be repeated once for credit. Fee. Prerequisites: ARS 101, 102.

ART 364 Ceramic Handbuilding I. (3)
fall
Search for form using handbuilding techniques. Kiln firing and related problems. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 113 and 115 and 261 or only instructor approval.

ART 365 Ceramic Handbuilding II. (3)
spring
Continuation of ART 364 with an additional focus on large-scale works, surface treatments, and glaze decoration with related kiln firing applications. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 364 or only instructor approval.

ART 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Ceramics
  Fee.
- Turning
  Fee.

ART 460 Ceramic Clay. (3)
spring
Research into various clay body formulations, local natural materials, slip glazes, and engobes. Lecture, lab, studio. Fee. Prerequisites: both ART 360 and 364 or only instructor approval.

ART 463 Ceramic Glaze. (3)
fall
Glaze calculation and formulation using various glaze colors and surfaces. Lecture, lab, studio. Fee. Prerequisite: ART 460 or instructor approval.

ART 466 Special Problems in Ceramics. (3)
fall, spring, summer
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. Fee. Prerequisite: ART 364 or instructor approval.

ART 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Ceramics Printmaking
  Fee.
- Enameling
  Fee.
- Senior Exhibition and Portfolio
- Turning
  Fee.
- Vapor Glazes
  Fee.

Drawing

ART 211 Drawing II. (3)
fall, spring, summer
Continued development of technical and perceptual skills. Emphasis on materials and pictorial content. 6 hours a week. Prerequisites: ART 113, 115.

ART 214 Life Drawing I. (3)
fall, spring, summer
Development of skill and expressiveness in drawing the basic form, construction, and gesture from the human figure. 6 hours a week. Fee. Prerequisites: ART 113, 115.

ART 311 Drawing III. (3)
fall and spring
Emphasis on composition, exploration of drawing media. 6 hours a week. Prerequisites: a combination of ARS 101 and 102 and ART 211 and 214 or only instructor approval.

ART 314 Life Drawing II. (3)
fall and spring
Drawing from the model with greater reference to structural, graphic, and compositional concerns. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 214 or only instructor approval.

ART 315 Life Drawing III. (3)
fall and spring
The human figure as the subject for drawing. Emphasis on conceptual alternatives and management of materials. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 314 or only instructor approval.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

ART 411 Advanced Drawing. (3)
fall and spring
Visual and intellectual concepts through problem solving and independent study. Emphasis on the individual creative statement. 6 hours a week. May be repeated for credit. Prerequisites: ART 311; instructor approval.

ART 414 Advanced Life Drawing. (3)
fall and spring
Various media and techniques on an advanced level. The human figure as an expressive vehicle in various contexts. 6 hours a week. May be repeated for credit. Fee. Prerequisite: ART 315 or instructor approval.

ART 415 Art Anatomy. (4)
selected semesters
Study of human anatomical structures as applied to the practice of figure-oriented art. 3 hours lecture, 5 hours studio a week. Fee. Prerequisite: ART 214.

ART 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Drawing. (3)

Fibers

ART 276 Fibers I. (3)
fall and spring
Explores traditional and contemporary materials and basic techniques related to fibers. Embroidery, feltmaking, dyeing, block printing, plaiting, 3-D structures. Fee. Prerequisites: both ART 113 and 115 or only instructor approval.

ART 294 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Fibers for Nonmajors
  Fee.

ART 376 Woven Structures I. (3)
once a year
Explores weaver- and loom-controlled structures with an emphasis on formal issues, historic precedence, and contemporary investigations. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 276 or only instructor approval.

ART 377 Surface Design. (3)
fall and spring
Application of dyes and pigments on cloth exploring techniques, formal issues, and content. Cyanotype, monoprinting, painting on silk, resists, stenciling. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 276 or only instructor approval.

ART 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Fibers Design for Nonmajors
  Fee.

ART 476 Woven Structures II. (3)
fall and spring
Emphasizes personal expression and continues technical exploration in woven structures. Fee. Prerequisite: ART 376 or instructor approval.

ART 477 Printed Textiles. (3)
once a year
Techniques for screen printing on fabric exploring pattern as a compositional element. Various stencil methods, including photographic processes. May be repeated for credit. Studio. Fee. Prerequisite: ART 377 or instructor approval.

ART 478 Advanced Surface Design. (3)
spring in odd years
Emphasis on personal expression with advanced problems in stitch resist, arashi shibori, transfers, indigo, vat and disperse dyes, and pigments. Studio. Fee. Prerequisites: both ART 377 and 477 or only instructor approval.

ART 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- 3-D Fibers
  Fee.
- Fibers and Surface
  Fee.
- Print Textiles
  Fee.
- Senior Exhibition and Portfolio

Intermedia

ART 345 Visualization and Prototyping I. (3)
spring in even years
Studio/seminar introduces concepts of computer visualization, modeling, and rapid prototyping in an interdisciplinary manner. Lecture, studio. Prerequisites: a combination of ARS 101 and 102 and a General Studies CS course or only instructor approval.

ART 346 3-D Computer Imaging and Animation. (3)
fall and spring
3-D modeling and animation. Emphasis on concepts and fine arts applications. Studio. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 113 and 115 and junior standing or only instructor approval.
General Studies: CS

ART 348 Animation Motion Studies. (3)
fall and spring
Computer animation motion studies, modeling, and editing for fine arts. Studio. Fee. Prerequisites: ART 346; junior standing; instructor approval.

ART 439 Mixed Media. (3)
fall and spring
Exploring visual effects by combining traditional and nontraditional methods, techniques, and concepts. 6 hours a week. May be repeated for credit. Studio. Prerequisites: a combination of ART 113 and 115 and 6 hours additional studio requirements or only instructor approval.

ART 440 New Media Concepts. (3)
fall and spring
Continued experiments with new media and interdisciplinary concerns in art. 6 hours a week. May be repeated for credit. Fee. Prerequisite: ART 443. Corequisite: ART 441.

ART 441 Video Art. (1)
fall and spring
Utilizing video and audio equipment essential to the production of broadcast quality video art. 2 hours a week. May be repeated for credit. Corequisite: ART 440.

ART 442 Folk/Outsider Art. (3)
fall
Explores ideas, attitudes, and art of contemporary "self-taught," "visionary," and "outsider" artists. Research and studio practice. Lecture, studio. Prerequisites: both ART 113 and 115 or only instructor approval.

ART 443 Intermedia. (3)
fall and spring
Experimental, conceptual, and interdisciplinary studio art with emphasis on new media and technologies. 6 hours a week. May be repeated once for credit. Prerequisites: both ART 113 and 115 or only instructor approval.

ART 449 Computer Animation and Video. (3)
fall and spring
Integrates 3-D fine arts animation with video and compositing. May be repeated for credit. Studio. Fee. Prerequisite: ART 348 or instructor approval.

ART 450 Computer Animation and Audio. (3)
fall and spring
Integrates audio with 3-D animation for fine arts applications. Includes compositing and effects. May be repeated for credit. Studio. Fee. Prerequisites: ART 449; instructor approval.

ART 470 Computer Animation Portfolio. (3)
fall and spring
Production of videotape and CD 3-D animation portfolios for fine arts and industry integrating animation, video, and audio. May be repeated for credit. Studio. Fee. Prerequisites: ART 449; instructor approval.
General Studies: CS

ART 484 Internship. (1–12)
selected semesters

ART 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Digital. (3)
- Digital Individualized Study
  Fee.
- Digital Processes for Printmaking
  Fee.
- Intermedia. (3)
- Intermedia Elective. (3)
- Mixed Media. (3)
- Nonelectronic Intermedia. (3)
- Senior Exhibition and Portfolio
  Fee.
- Visualization and Prototyping II. (3)
- Web Art
  Fee.

ART 499 Individualized Instruction. (1–3)
selected semesters

Metals

ART 272 Jewelry I. (3)
fall and spring
Emphasis on fabrication in jewelry making. Basic techniques of cutting and piercing, forging and soldering, and forming. Not open to seniors. 6 hours a week. Fee.

ART 372 Jewelry II. (3)
fall and spring
Fabricated approach to jewelry making. Techniques in stone setting and surface embellishment. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 113 and 115 and 272 or only instructor approval.

ART 373 Metalworking I. (3)
once a year
Compression, die, and stretch forming as applied to hollow form construction. Hot and cold forging techniques as applied to smithing. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 113 and 115 and 272 or only instructor approval.

ART 472 Advanced Jewelry. (3)
fall and spring
Jewelry making with emphasis on developing personal statements and craftsmanship. 6 hours a week. May be repeated for credit. Fee. Prerequisites: ART 372; instructor approval.

ART 473 Advanced Metalworking. (3)
once a year
Forging and forming techniques in individualized directions. 6 hours a week. May be repeated for credit. Fee. Prerequisites: ART 373; instructor approval.

ART 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Metals. (3)
- Senior Exhibition and Portfolio

Painting

ART 223 Painting I. (3)
fall, spring, summer
Fundamental concepts and materials of traditional and experimental painting media. Emphasis on preparation of painting supports, composition, and color. 6 hours a week. Prerequisites: ART 113, 115.

ART 227 Watercolor I. (3)
fall and spring
Fundamental concepts, materials, and techniques of watercolor. Emphasis on problem solving, basic skills, composition, and color. 6 hours a week. Fee. Prerequisites: ART 113, 115.

ART 323 Painting II. (3)
fall and spring
Development of competency in skills and expression. Assigned problems involve light, space, color, form, and content. 6 hours a week. Prerequisites: a combination of ARS 101 and 102 and ART 223 or only instructor approval.

ART 324 Painting III. (3)
fall and spring
Continuation of ART 323. 6 hours a week. Prerequisites: a combination of ARS 101 and 102 and ART 323 or only instructor approval.

ART 325 Figure Painting. (3)
fall and spring
The human figure clothed and nude as the subject for painting in selected media. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 314 and 323 or only instructor approval.

ART 327 Watercolor II. (3)
once a year
Explorations of personal expression in watercolor. Continued development of watercolor skills using traditional and experimental materials and techniques. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 227 or only instructor approval.

ART 423 Advanced Painting. (3)
fall and spring
Continuation of ART 324. 6 hours a week. May be repeated for credit. Prerequisite: ART 324.

ART 425 Advanced Figure Painting. (3)
fall and spring
Continuation of ART 325. 6 hours a week. May be repeated for credit. Fee. Prerequisites: ART 315, 324, 325.

ART 427 Advanced Watermedia. (3)
fall and spring
Continuation of ART 327. Advanced techniques, concepts, and methods with watercolor and other water-based media on paper. 6 hours a week. May be repeated for credit. Fee. Prerequisite: ART 327 or instructor approval.

ART 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Painting. (3)
- Senior Exhibition and Portfolio

Photography

ART 201 Photography I. (3)
fall and spring
Development of skills and techniques of black and white photography. Emphasis on camera work and darkroom procedures. Must be taken with ART 202.

ART 202 Photography I Lab. (0)
fall and spring
See ART 201. Fee.

ART 204 Photography II. (3)
fall and spring
Photography as an art medium with additional exploration into personal photographic aesthetics. 6 hours a week. Fee. Prerequisite: ART 201.

ART 294 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Digital Art. (3)

ART 304 Advanced Photography. (3)
fall and spring
Interpretation and manipulation of light as a tool in the performance of expressive photography. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 204 or only instructor approval.

ART 305 Color Photography I. (3)
fall and spring
Application of color transparencies and prints to photographic art. 6 hours a week. Fee. Prerequisite: ART 204

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ART 308 Digital Photographic Images I. (3)
fall and spring
Scanning, manipulation, refinement, and compositing of photographic images in the computer. Lab, studio. Fee. Prerequisite: ART 204.

ART 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Digital Art. (3)

ART 401 Nonsilver Photography. (3)
fall and spring
Recognition of the inherent characteristics of nonsilver processes and their use in communicating ideas. 6 hours a week. May be repeated for credit. Fee. Prerequisite: ART 304 or instructor approval.

ART 403 Senior Photographic Projects. (3)
fall and spring
Technical and philosophical refinement of personal aesthetic with various photographic media. 6 hours a week. May be repeated for credit. Fee. Prerequisite: ART 204.

ART 404 Portraiture Photography. (3)
fall and spring
Photographing people. Critical discussions and slide lectures on issues in portraiture. 6 hours a week. May be repeated for credit. Fee. Prerequisite: ART 204.

ART 405 Advanced Color Photography. (3)
fall and spring
Intensive use of subtractive color process in photographic printing. 6 hours a week. May be repeated for credit. Fee. Prerequisite: ART 305 or instructor approval.

ART 406 Photo Techniques. (3)
fall and spring
Camera and darkroom techniques with emphasis on creative control of the black and white print. 6 hours a week. Prerequisite: ART 204 or instructor approval.

ART 407 View Camera. (3)
fall and spring
View camera and darkroom techniques. Studio, lab. Fee. Prerequisite: ART 204.

ART 409 Photographic Exhibition. (3)
once a year
Care of photographic prints, print presentation, and exhibition. Practical experience in gallery operations. 6 hours a week. May be repeated for credit. Prerequisite: ART 304 or instructor approval.

ART 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Collotype
  Fee.
- Digital Photographic Images II. (3)
  Fee.
- Digital Printing
  Fee.
- Documentary Photography
  Fee.
- Issues in Digital Photography
  Fee.
- Landscape Photography
  Fee.
- 19th-Century Photo Processes. (3)
- Photo. (3)
- Photographic Fabrications
  Fee.
- Photogravure
  Fee.
- Senior Exhibition and Portfolio

ART 498 Pro-Seminar. (1–7)
selected semesters
Topics may include the following:
- Landscape Photography: Theory
  Fee.

Printmaking

ART 253 Introduction to Printmaking. (3)
once a year
Introduction to basic monotype, intaglio, relief, and related techniques. Studio. Fee. Prerequisite: ART 113.

ART 351 Intaglio I. (3)
fall and spring
Introduces contemporary and traditional developmental techniques for black and white prints. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 113 and 115 or only instructor approval.

ART 352 Lithography I. (3)
fall and spring
Monochromatic and color planographic printmaking utilizing stone and aluminum plate processes. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 113 and 115 or only instructor approval.

ART 354 Screen Printing I. (3)
fall and spring
Introduces paper, direct, and photographic stencil techniques. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 113 and 115 or only instructor approval.

ART 355 Photo Process for Printmaking I. (3)
fall
Introduces photographic principles and skills for photomechanical printmaking processes, including photosilkscreen, photolitho, and photoetching. 6 hours a week. Fee. Prerequisite: ART 201 (or its equivalent).

ART 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Relief Printmaking
  Fee.

ART 451 Advanced Intaglio. (3)
fall and spring
Various contemporary and traditional methods of printing to achieve color prints. 6 hours a week. May be repeated for credit. Fee. Prerequisite: ART 351 or instructor approval.

ART 452 Advanced Lithography. (3)
fall and spring
Continuation of ART 352. 6 hours a week. May be repeated for credit. Fee. Prerequisite: ART 352 or instructor approval.

ART 454 Advanced Screen Printing. (3)
once a year
Continuation of ART 354. 6 hours a week. May be repeated for credit. Fee. Prerequisite: ART 354 or instructor approval.

ART 455 Advanced Photo Processes for Printmaking. (3)
once a year
Continued study of photomechanical techniques and applications to printmaking or photographic processes. Fee. Prerequisite: ART 355 or instructor approval.

ART 456 Fine Printing and Bookmaking I. (3)
once a year
Letterpress printing and typography as fine art. Study of history, alphabets, mechanics of hand typesetting, presswork, and various forms of printed matter. Fee. Prerequisite: instructor approval.

ART 457 Fine Printing and Bookmaking II. (3)
once a year
Continuation of ART 456. Bookbinding, book design and printing, advanced typography, theory, and presswork. May be repeated for credit. Fee. Prerequisites: ART 456; instructor approval.

ART 458 Papermaking. (3)
fall and spring
History, theory, demonstrations, sheet forming, collage treatments, and 3-D approaches. 6 hours a week. May be repeated for credit. Fee. Prerequisite: instructor approval.

ART 459 Monoprinting. (3)
fall and spring
Nonmultiple printed image using a variety of technical approaches. 6 hours a week. May be repeated for credit. Fee. Prerequisites: ART 311, 323 (or any 300-level printmaking class); instructor approval.

ART 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Artists' Books
  Fee.
- Experimental Paper
  Fee.
- Experimental Printmaking
  Fee.
- Relief Printmaking
  Fee.
- Senior Exhibition and Portfolio

Sculpture

ART 231 Sculpture I. (3)
fall, spring, summer
Explores sculptural forms through concepts related to basic materials. Focus on studio production, safety, aesthetic criticism, and history of sculpture. 6 hours a week. Fee. Prerequisites: both ART 113 and 115 or only instructor approval.

ART 274 Wood I. (3)
fall and spring
Fundamental woodworking techniques to produce creative functional 3-D objects. 6 hours a week. Fee.

ART 331 Sculpture II. (3)
fall and spring
Continuation of ART 231 with an emphasis on metal fabrication as an expressive sculptural process. Techniques in welding, cutting and bending of metals and their aesthetics. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 231 or only instructor approval.

ART 332 Sculpture III. (3)
fall and spring
Explores diverse media with a focus on mold-making processes. Development of the sculpture portfolio. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 331 or only instructor approval.

ART 333 Foundry Casting Methods. (3)
fall and spring
Fine art and techniques of metal casting: mold making, foundry safety, finishing techniques, application of patinas, and history of casting. 6 hours a week. May be repeated for credit. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 332 or only instructor approval.

ART 374 Wood II. (3)
fall and spring
Individual and directed problems in wood related to the production of unique functional art objects. 6 hours a week. Fee. Prerequisites: a combination of ARS 101 and 102 and ART 113 and 115 and 274 or only instructor approval.

ART 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Carving
  Fee.

ART 431 Special Problems in Sculpture. (3)
fall and spring
Development of a personal approach to sculpture. Emphasis on form, individual problems, and related color technology. Professional practices and presentation. 6 hours a week. May be repeated for credit. Fee. Prerequisites: ART 332; instructor approval.

ART 432 Neon Sculpture. (3)
fall
Techniques for creating neon in an art context. Glass tube bending and fabrication. Construction of artworks utilizing light-generating gasses. 6 hours a week. May be repeated for credit. Fee. Prerequisite: instructor approval.

ART 435 Foundry Research Methods. (3)
fall and spring
Research in foundry techniques. Studio. Pre- or corequisite: ART 333 or instructor approval.

ART 436 Architectural Sculpture. (3)
selected semesters
Sculptural concepts as related to architecture and other man-made environments. Scale drawing, models, and relief sculpture. 6 hours a week. May be repeated for credit. Fee. Prerequisite: ART 332 or instructor approval.

ART 437 Film Animation. (3)
fall
Production of short 16mm films that feature articulated sculptural objects, models, dolls, puppets, and graphics through the use of single-frame filming techniques. 6 hours a week. May be repeated for credit. Fee. Prerequisite: instructor approval.

ART 438 Experimental Systems in Sculpture. (3)
spring
Simple electrical and mechanical systems that can be utilized in the context of studio art and installations. Requires active production of studio artworks. 6 hours a week. May be repeated for credit. Fee. Prerequisite: instructor approval.

ART 474 Advanced Wood. (3)
fall and spring
Extended experience and advanced techniques in the use of wood to create functional works of art. 6 hours a week. May be repeated for credit. Fee. Prerequisites: ART 374; instructor approval.

ART 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Advanced Sculpture
- Carving
  Fee.
- Film: Post-Production
  Fee.
- Foundry Casting Methods
  Fee.
- Foundry Research Methods
  Fee.
- Live Action Filmmaking
  Fee.
- Senior Exhibition and Portfolio
- Special Topics in Sculpture

Special Studio Art

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Department of Dance

herberger/dance
480/965-5029
PEBE 107A

Professors: Kaplan, Keuter, Murphey

Associate Professors: Jackson, Mooney

Assistant Professors: Fitzgerald, Parrish, Tsukayama, Vissicaro

Associate Research Professional: Mitchell

Senior Lecturer: Schupp

The Department of Dance is committed to providing a stimulating and diverse environment where students develop as scholars, educators, and artists through participation in innovative programs, residencies, performances, and partnerships. All students registering in a degree program enroll through the Katherine K. Herberger College of Fine Arts. Admission policies and procedures and the specific requirements of each Bachelor of Fine Arts degree concentration are available from the Department of Dance Advisement Office.

Audition/Admission. Students applying to the university as freshmen or transfer students who are interested in becoming dance majors are granted preprofessional status. Individuals intending to enroll in the undergraduate dance degree program and participate in dance major classes are required to pass an entrance audition before being admitted to the department's dance major classes. These auditions take place in the spring of each academic year. Auditions, conducted by the Dance faculty, determine technical proficiency, placement, and scholarship awards. Criteria for placement in dance technique classes are published in the department's student handbook. The handbook is available through the Dance Advisement Office and on the department's Web site. Students who do not successfully complete the audition are allowed to remain in preprofessional status for two semesters. At the end of that term they are allowed to re-audition.

By the second semester of their sophomore year all dance preprofessional students who have passed the audition must petition for admission into one of the four concentrations: choreography, dance education, dance studies, or performance. Depending upon the concentration selected, the petition process may include a technique audition, and the submission of video tapes of choreographed works, an artistic portfolio, a writing sample, a written statement of intent and/or research interests. All students are interviewed and must have a 3.00 GPA before being accepted into an area of concentration.

Specific criteria and policies related to petition procedures for each of the concentrations are available through the Dance Advisement Office and on the Web site. Admission is highly selective. Students who fail to meet the criteria for the concentrations are not dismissed from the Bachelor of Fine Arts program and may re-petition once during the following semester. If a student still fails to meet the criteria of one of the four concentrations, he or she will not be dismissed from the university altogether; the student may transfer to another program. Students should work closely with the department advisor during the decision-making process.

Scholarship Auditions. Highly competitive scholarship auditions are conducted for incoming and transfer students during the Spring Admission Audition. For more information, contact the Dance Advisement Office.

Transfer Students, Dance Minors, and Bachelor of Interdisciplinary Studies Students. Transfer, minor, and BIS students must successfully complete the admittance audition before enrolling in Dance major courses. Additionally, transfer students who have completed music theory for dance, dance production, or choreography courses at other institutions must also take placement examinations in these areas. These examinations are offered during the August and January orientation periods.

DANCE—BFA

The faculty in the Department of Dance offer a Bachelor of Fine Arts (BFA) degree at the undergraduate level with four areas of concentration: choreography, dance education, dance studies, and performance. All new students are admitted into the preprofessional program and petition for admission into one of the concentrations during the sophomore year of study. Transfers, who have successfully completed the admission audition, may petition into one of the four concentrations 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 88, and "College Degree Requirements," page 276.

Preprofessional Dance Major Program. First-semester preprofessional students who passed the audition 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	2
General Studies courses	6
Total	16

Core Curriculum

The Dance major consists of a minimum of 59 semester hours in the dance core. All courses in the major must be completed with a grade of "C" (2.00) or higher. The following areas 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	201 Dance in World Cultures *HU, G*	3
	or DAH 191 First-Year Seminar (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 and Improvisation. 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	301 Philosophy and Criticism of Dance *L/HU*	3
DAH	302 Cross-Cultural Dance Studies *L/HU, G*	3
DAH	401 Dance History *HU*	3

Production. For the concentration in dance studies, choose one of the following two courses:

DAN	210 Dance Production I*	3
DAN	211 Dance Production II*	3

* Both courses are required for performance, choreography, and dance education concentrations. Dance studies students should select one of the two courses.

Dance Concentration Curriculum. Each concentration in the dance curriculum—choreography, dance education, dance studies, and performance—is composed of specific criteria as defined by the concentration. Refer to the following for details.

Choreography Concentration

Core Curriculum. See "Core Curriculum," page 294.

Concentration Requirements. The following courses are required for the choreography concentration:

DAN	321 Music Literature for Dance	3
DAN	364 Choreography and Accompaniment	3
DAN	365 Advanced Choreography	3
DAN	480 Senior Performance in Dance	4
Total		13

Dance Education Concentration

Core Curriculum. See "Core Curriculum," page 294.

Concentration Requirements. The following courses are required for the dance education concentration:

DAN	350 Methods of Teaching Children's Dance	3
DAN	352 Dance Education Theory	3
DAN	356 Methods of Teaching Contemporary Dance Technique and Composition in Secondary Education	4
DAN	364 Choreography and Accompaniment	3
DAN	394 ST: Integrated Approaches in Dance Education	3
DAN	494 ST: Senior Dance Education Project	4
Total		20

A student pursuing the dance education concentration may also choose to become certified to teach dance (K–12) in Arizona public schools. In addition to the dance concentration courses, students must complete education courses, two semesters of field experience, and one semester of student teaching. Students should apply to the College of Education in the middle of the sophomore year. To be considered for admission to the Initial Teacher Certification (ITC) program students must complete an application portfolio specified by the College of Education. Application deadlines for the ITC programs are February 1 for fall admission and September 1 for spring admission. Students should be advised that additional semester hours are required to complete certification requirements. For more information, contact the College of Education Office of Student Services, or phone 480/965-5555.

For specific information related to the ITC application deadlines and eligibility for admission, see "Initial Teacher Certification Professional Program Admission," page 194.

Additional requirements for certification are listed on the check sheet available from the College of Education or Department of Dance.

Dance Studies Concentration

Core Curriculum. See "Core Curriculum," page 294.

Concentration Requirements. The following courses are required for the dance studies concentration:

DAH	495 Theory and Methods of Dance Research	3
DAH	496 Senior Dance Studies Capstone	4
Total		7

Eighteen additional semester hours in related fields must be approved by the BFA Dance Studies Committee. The content of related fields should support the research project.

Additional requirements are listed on the check sheet available from the Department of Dance.

Performance Concentration

Core Curriculum. See "Core Curriculum," page 294.

Concentration Requirements. The following courses are required for the performance concentration:

DAN	321 Music Literature for Dance	3
DAN	380 Performance Studies Practicum	3
DAN	480 Senior Performance in Dance	4
THP	101 Acting: An Introduction	3
Total		13

Performance. Choose from the following four courses (six semester hours are required):

DAN	371 Dance Theatre Performance/Production	1–3
DAN	471 Dance Arizona Repertory Theatre	3–4
DAN	472 Concert Dance	2
DAN	494 ST: Guest Artists	3

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Additional requirements are listed on the check sheet available from the Department of Dance.

MINOR

All students interested in a Dance minor must successfully complete the Audition/Admission. For more information, see "Audition/Admission," page 294. 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" (2.00) is required in all courses. Additional Dance minor requirements include the following:

Performance	3
Technique	6
Theory	6
Elective	3

Interested students should contact the Department of Dance for requirements and audition/admission procedures.

BIS CONCENTRATION

A concentration in dance is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

All students interested in the dance concentration must successfully complete the Audition/Admission. For more information, see "Audition/Admission," page 294.

GRADUATE PROGRAM

Dance—MFA

The MFA degree in Dance is a 60-semester-hour program designed to provide opportunities for the student to continue to develop in areas of dance technique, choreography, performance, and production; to gain further understanding of the philosophy, history, theory, education, and science and somatics of dance; and to begin to chart the direction of the future through technology, media opportunities, outreach, and community partnerships.

DANCE HISTORY (DAH)

DAH 101 Introduction to Dance. (3)
fall and spring
Introduces the art and profession of dance. Explores development of modern, ballet, and other movement forms from global perspectives. Lecture, lab.

DAH 191 First-Year Seminar. (1–3)
selected semesters

DAH 201 Dance in World Cultures. (3)
fall, spring, summer
Orientation to theory and methods of studying dance cultures around the world. Fee. Lecture, lab. Pre- or corequisite: both ENG 101 and 102 or only ENG 105.
General Studies: HU, G

DAH 300 Focus on Dance. (3)
fall, spring, summer
Specialized study of cultural and theatrical aspects of dance, such as social dance forms, specific genres or historical periods. May be repeated for credit. Lecture, studio. Fee.
General Studies: HU

DAH 301 Philosophy and Criticism of Dance. (3)
fall and spring
Philosophical issues in dance and dance criticism, with emphasis on written analysis and interpretation. Fee. Prerequisite: 1 semester of First-Year Composition.
General Studies: L/HU

DAH 302 Cross-Cultural Dance Studies. (3)
fall
Examines the field of ethnochoreology, ethnographic methods, and interpretive research practices. Develops critical writing, thinking, and viewing skills for comparative dance study. Lecture, media lab. Prerequisite: DAH 201. Pre- or corequisite: DAH 191 or instructor approval.
General Studies: L/HU, G

DAH 401 Dance History. (3)
fall and spring
History of dance with a focus on Western forms from the Renaissance to contemporary times. Fee.
General Studies: HU

DAH 492 Honors Directed Study. (1–6)
fall and spring
May be repeated for credit. Prerequisite: honors advisor approval.

DAH 495 Theory and Methods of Dance Research. (3)
spring
Examines modes of inquiry, data gathering techniques, data analysis and representation, prospectus design, and presentation style for dance research studies. Seminar. Fee. Prerequisite: instructor approval. Pre- or corequisite: DAH 301 or 302.

DAH 496 Senior Dance Studies Capstone. (2)
fall and spring
Original research that integrates dance and a related field of interest. Includes production of written document and public presentation. Fall semester must be completed before spring registration. May be repeated for a total of 4 semester hours. Prerequisite: DAH 495.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

DANCE (DAN)

DAN 130 Dance. (2)
fall, spring, summer
Introduces styles and forms of dance; ballet, modern, jazz, tap, ballroom, ethnic. May be repeated for credit. Topics may include the following:

- Ballet I
  Fee.
- Ballet II
  Fee.
- Beginning Modern I
  Fee.
- Jazz I
  Fee.
- Tap I
  Fee.
- Tap II
  Fee.

DAN 134 Technique and Theory of Modern Dance. (3)
fall and spring
Elementary concepts of modern dance technique. Development of movement quality and performance skills. 6 hours weekly. May be repeated for credit. Fee. Prerequisites: Dance major; placement audition.

DAN 135 Technique and Theory of Ballet. (2)
fall and spring
Elementary ballet technique with emphasis on alignment, control, and development of the feet with proper awareness of style and phrasing. 4 hours weekly. May be repeated for credit. Fee. Prerequisite: placement audition.

DAN 194 Special Topics. (1–4)
selected semesters
Topics may include the following:
- African Dance
- Fee.
- Argentine Tango I
- Ballet I
- Beginning Ballet
- Fee.
- Big Band Swing I
- Competitive International Ballroom I
- Contemporary Dance
- Country Western I
- Hip Hop I
- Improvisation
- Irish Dance I
- Irish Step I
- Irish Step II
- Latin Salsa I
  Fee.
- Latin/Swing/Ballroom I
- Strictly Ballroom
- Swing/Lindy I
- Fee.
- West African Dance I

DAN 210 Dance Production I. (3)
fall
Theory and practice of lighting, scenery, sound, and stage management for dance production. Labs cover all areas of production. Lecture, lab. Fee.

DAN 211 Dance Production II. (3)
spring
Theory and practice of arts management and costume design for dance production. Labs cover all areas of production. Lecture, lab. Fee.

DAN 221 Rhythmic Theory for Dance I. (2)
fall
Elements of music, music structures, and their relationship to dance. Emphasis on rhythmic analysis and dance accompaniment. Fee.

DAN 222 Rhythmic Theory for Dance II. (2)
spring
Continuation of DAN 221 with an emphasis on small group/movement projects in relation to musical time and structure. CD-ROM work included. Fee. Prerequisite: DAN 221 or proficiency exam.

DAN 230 Dance. (2)
fall, spring, summer
Intermediate levels. Continuation of DAN 130. May be repeated for credit.

DAN 234 Technique and Theory of Modern Dance. (3)
fall and spring
Intermediate concepts of modern dance technique. Development of movement quality and performance skills. 6 hours weekly. May be repeated for credit. Fee. Prerequisite: placement audition.

DAN 235 Technique and Theory of Ballet. (2)
fall and spring
Advanced study of elementary ballet technique through the traditional exercises, with proper awareness of style and phrasing. 4 hours weekly. May be repeated for credit. Fee. Prerequisite: placement audition.

DAN 237 Beginning Pointe. (1)
fall and spring
Study of elementary pointe technique through the traditional exercises. 2 hours weekly. May be repeated for credit. Prerequisites: basic ballet training; instructor approval.

DAN 264 Improvisational Structures. (3)
fall
Introduces basic improvisational and choreographic principles with emphasis on current media and technology, group structures, and movement invention. Lecture, studio.

DAN 265 Approaches to Choreography. (3)
fall
Intermediate application of basic choreographic principles with emphasis on improvisation, form, content, and evaluative skills. Lecture, studio. Prerequisite: DAN 264 or instructor approval.

DAN 294 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Argentine Tango II
- Ballet II
- Beginning Ballet
- Fee.
- Competitive International Ballroom II
- Country Western II
- Intermediate Ballet
- Fee.
- Irish Dance II
- Irish Step I
- Irish Step II
- Latin Salsa II
- Latin/Swing/Ballroom II
- Latin Team II
- Swing/Lindy II
- West African Dance II

DAN 311 Dance for the Classroom Teacher. (3)
fall and spring
Develops teaching methodology for implementation of dance curriculum in K–12 classrooms. Lecture, lab, studio. Prerequisite: non-Dance major.

DAN 321 Music Literature for Dance. (3)
fall and spring
Historical survey of music and compositional elements relative to dance. Emphasis on analysis of choreography from a musical standpoint. Lecture, lab, CD-ROM lab. Fee. Prerequisites: both DAN 221 and 222 or only instructor approval. Pre- or corequisite: MUS 340.

DAN 330 Dance. (2)
fall, spring, summer
Advanced levels. Continuation of DAN 230. May be repeated for credit.

DAN 334 Technique and Theory of Modern Dance. (3)
fall and spring
Advanced concepts of modern dance technique. Development of movement quality and performance skills. 6 hours weekly. May be repeated for credit. Fee. Prerequisite: placement audition.

DAN 335 Technique and Theory of Ballet. (2)
fall and spring
Intermediate ballet technique with emphasis on strength, dynamics, rhythmical impulses, and transitions with awareness of proper style and phrasing. 4 hours weekly. May be repeated for credit. Fee. Prerequisite: placement audition.

DAN 337 Intermediate Pointe. (1)
fall and spring
Study of intermediate and advanced pointe technique through the traditional exercises. 2 hours weekly. May be repeated for credit. Fee. Prerequisite: DAN 237 or instructor approval.

DAN 340 Dance Kinesiology. (4)
fall and spring
Principles of kinesiology applied to dance movement, including identification of muscular imbalances, inherited anatomical differences, and pathomechanics in dance technique. Prerequisites: both BIO 201 and admission to a Dance BFA concentration or only instructor approval.

DAN 342 Ideokinesis. (2)
selected semesters
Study of posture using the visualization of image/goals to facilitate improved alignment and movement efficiency. May be repeated for credit. Lecture, studio.

DAN 350 Methods of Teaching Children's Dance. (3)
fall
Theory and practice of teaching creative dance to children. Lecture, studio, field experience. Fee. Prerequisite: Dance major or instructor approval.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

DAN 351 Methods of Teaching Ballet. (3)
spring
Analysis and acquisition of teaching techniques and materials for ballet. Lecture, studio. Pre- or corequisite: DAN 352.

DAN 352 Dance Education Theory. (3)
fall
Motivation; learning; assessment; historical, cultural, and social constructs; outreach; service; advocacy; curriculum development in dance education. Lecture, field experience. Fee. Prerequisite: Dance major or instructor approval.

DAN 354 Integrated Approaches in Dance Education. (3)
spring
New methods of dance education pedagogy. Students gain essential skills to employ and integrate instructional technology within their dance curricula. Lecture, lab, field experience, media lab. Prerequisite: both DAN 350 and 352 or only instructor approval.

DAN 356 Methods of Teaching Contemporary Dance Technique and Composition in Secondary Education. (4)
fall
Analysis and acquisition of skills and materials for teaching contemporary dance technique and composition in secondary education. Lecture, studio, field experience. Fee. Pre- or corequisites: both DAN 350 and 352 or only instructor approval.

DAN 364 Choreography and Accompaniment. (3)
fall
Experience in the use of traditional and nontraditional musical structures as a basis for choreographic projects. Lecture, studio. Prerequisite: DAN 321 or instructor approval.

DAN 365 Advanced Choreography. (3)
spring
Investigation and practice of contemporary styles of choreography. Studio. Prerequisites: DAN 264 and 265 (or their equivalents).

DAN 371 Dance Theatre Performance/Production. (1–3)
fall and spring
Performance or technical theatre work in designated dance productions. 3 hours a week per semester hour. May be repeated for credit. Prerequisite: instructor approval.

DAN 380 Performance Studies Practicum. (3)
spring
Focus on developing rehearsal skills and achieving performance excellence through the preparation of three completed works. Studio, lab.

DAN 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Advanced Hip Hop
- Ballet Methodology
- Capoeira
- Competition/Exhibition
- Competition/Exhibition II
- Competitive Ballroom/Latin
- Competitive International Ballroom
- Competitive International Ballroom III
- Integrated Approaches in Dance Education
  Fee.
- Intermediate Ballet
  Fee.
- Intermediate Hip Hop
- Intermediate Modern Dance
- International Ballroom
- Latin Formation Teams
- Latin Salsa III
- Latin Salsa IV
- Latin/Swing/Ballroom III
- Pilates Mat
- Pilates/Yoga
- Swing/Latin/Ballroom III

DAN 423 Dance, Computers, and Multimedia. (3)
fall and spring
Introduces desktop multimedia as it relates to dance creation, education, production, and research. Lecture, lab. Fee.
General Studies: CS

DAN 434 Technique and Theory of Modern Dance. (3)
fall and spring
Preparation in the performance and comprehension of professional-level modern dance technique. 6 hours weekly. May be repeated for credit. Fee. Prerequisite: placement audition.

DAN 435 Technique and Theory of Ballet. (2)
fall and spring
Study of professional advanced ballet technique with emphasis on preparation for performance. 4 hours weekly. May be repeated for credit.Fee. Prerequisite: placement audition.

DAN 443 Bodywork for Dancers. (2)
spring
Introduces various massage therapy modalities for dancers, including Shiatsu, Swedish massage, sports massage and proprioceptive neuromuscular facilitation techniques.

DAN 445 Laban Movement Analysis. (3)
spring
Theory and practice of Laban movement analysis and Bartenieff fundamentals through movement investigation, observation, notation, and analysis. Lecture, studio. Prerequisite: admission to a BFA in Dance concentration.

DAN 471 Dance Arizona Repertory Theatre. (3–4)
fall and spring
Preprofessional modern dance company, emphasizing outreach and performance. Opportunity to work with guest artists and community schools and organizations. Lecture, studio. Fee. Prerequisite: instructor approval.

DAN 472 Concert Dance. (2)
fall and spring
Extensive preparation of repertory or new works created by experienced choreographers. Simulates dance company experience, culminating in performance. Studio. Fee. Prerequisites: audition; instructor approval.

DAN 480 Senior Performance in Dance. (2)
fall
Original choreography for group performance with analysis and critique of problems encountered in production. Must be repeated for a total of 4 semester hours. Prerequisites: DAN 364, 365.

DAN 484 Dance Internship. (1–3)
fall and spring

DAN 494 Special Topics. (1–4)
once a year
Topics may include the following:
- Collaborative Multimedia
  Fee.
- Concert Dance. (2)
- Dance Education and Technology
  Fee.
- Guest Artists
- Integrative Teaching Methods
  Fee.
- Senior Dance Education Project
- Sound Design
  Fee.

DAN 496 Senior Dance Education Capstone. (2)
fall and spring
Original dance education research that includes written document and public presentation. May be repeated for a total of 4 semester hours. Lecture, lab. Prerequisites: a combination of DAN 350 and 352 and 352 and 356 or only instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

School of Music

music.asu.edu
480/965-3371
MUSIC E185

Wayne A. Bailey, Director

Kimberly Marshall, Associate Director, Graduate Studies

Karen M. Bryan, Associate Director, Undergraduate Studies

Regents' Professors: Hickman, Pagano

Professors: Bailey, Britton, Cosand, Crowe, DeMars, Doan, Dreyfoos, Hackbarth, Hamilton, Hill, Humphreys, Koonce, Marshall, Oldani, Pilafian, Reber, Rikakis, Rogers, Russell, Schildkret, Sellheim, Shinn, Smith, Solís, Spring, Stauffer, Sunkett, Swaim, Thompson, Williamson, Wytko

Associate Professors: E. Buck, N. Buck, Bush, E. Carpenter, Haefer, Holbrook, Kocour, Kopta, Lyman, May, McLin, Norton, Rio, Rockmaker, Schuring, Wilson

Assistant Professors: Barefield, Bryan, A. Campbell, Cuciurean, Ericson, Feisst, Gentry, Jiang, Landschoot, Lingas, Meir, Mills, Montilla, Province, Schmidt, Sullivan, Swartz

Senior Lecturer: Shellans

Lecturer: Tongret

The School of Music in the Katherine K. Herberger College of Fine Arts at ASU is an accredited institutional member of the National Association of Schools of Music. The requirements for entrance and graduation set forth in this catalog are in accordance with the published regulations of the association.

The School of Music strives to create an environment that enriches and enlivens the role of music in our society by providing the highest level of instruction and research for music professionals in the fields of performance, conducting, pedagogy, music education, music therapy, music history, music theory, and composition.

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 in studies that prepare the student to function in a variety of musical roles that are supportive of his/her major concentration. All undergraduate curricula, therefore, provide the following:
>
> 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), composer (creation), scholar (research), and teacher.
> 3. A repertory for study that embraces all cultures and historical periods.

All students registering in a School of Music major program enroll through the Katherine K. Herberger College of Fine Arts.

Audition/Admission Requirements. *All students who wish to enroll in an undergraduate music degree program are required to pass an entrance audition in their primary performing medium (instrument or voice) before being admitted 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, or by accessing the Web site at music.asu.edu. Official dates for these auditions are set for each academic year.

Until the audition process is finished, all students interested in majoring in Music at ASU enter the university in the preprofessional program. Upon successful completion of the audition, the student is admitted to his or her specified degree option.

Students who wish to be Music majors who do not successfully complete the audition are allowed to remain in the preprofessional program for two semesters (excluding summer and winter sessions). Students are allowed to reaudition two times in addition to the initial audition; these additional auditions may take place either during or at the end of each fall or spring semester that the student is enrolled under this program. During these semesters, students are allowed to enroll in music ensembles, concert

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

attendance, and general studies courses to be chosen through consultation with a School of Music academic advisor. Students are also encouraged to obtain private instruction on their major instrument through either the School of Music preparatory program or with private instructors. These private instructions are not required and do not generate university course credit hours. The reauditions are heard and evaluated by School of Music faculty.

Admission to the composition concentration is subject to the approval of the composition faculty based upon an evaluation of the student's compositions and/or interview.

Diagnostic Examinations. All transfer students and entering freshmen with a background in piano must take a diagnostic examination in piano during orientation week of their first semester on campus. All students are required to attain 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 postbaccalaureate 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—BA

The Bachelor of Arts degree requires a minimum of 120 semester hours for graduation.

The Music major consists of 70 semester hours and includes the requirements that follow for each area of study.

In addition to fulfilling the major requirements, students must meet all university graduation requirements and college degree requirements. See "University Graduation Requirements," page 88, and "College Degree Requirements," page 276.

Music History. The following music history courses are required:

MHL 194 ST: Music and Culture	3
MHL 341 Music History	3
MHL 342 Music History	3
Upper-division MHL course	3
Total	12

Nine elective upper-division hours in music history and/or theory are also required.

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 422 Musical Acoustics	3
Total	17

Major Performing Medium. Eight semester hours of MUP 111 Studio Instruction or MUP 311 Studio Instruction are required. At least four of these hours must be at ASU. Four semester hours of ensemble participation are 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.

The remaining semester hours in music are selected by the student in consultation with an advisor. Course work may be chosen from ethnomusicology, music education, music history, music theory, and performance. Students must select sufficient elective courses to complete the 120 hours required for graduation.

Foreign Language. Sixteen semester hours in one language are required for the Bachelor of Arts degree.

BACHELOR OF MUSIC DEGREE

All Bachelor of Music (BM) degree programs require 120 semester hours for graduation excluding Music Education (125 to 129 semester hours) and Music Therapy (128 semester hours). The BM curriculum offers majors in Music Education, Music Therapy, Performance, and Theory and Composition.

The curricula for the Music Education and Music Therapy majors require more than 120 semester hours. A student 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 BM majors on the pages that follow consists of a minimum of 79 semester hours. In addition, the Music Education 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 88, and "College Degree Requirements," page 276.

MUSIC EDUCATION—BM

Students in Music Education must complete the requirements for the Initial Teacher Certification program offered through the College of Education.

Teacher Certification. A student pursuing a degree in Music Education may also choose to become certified for teaching music K–12. If certification is selected while pursuing the music education undergraduate degree, additional semester hours are required in the College of Education.

The undergraduate music education program contains three concentrations. The instrumental concentration is designed for those interested in teaching band in the public schools. The string concentration focuses on those who wish to teach strings and orchestra. The choral/general concentration is geared toward those interested in teaching general music or choir.

Teaching music education requires a K–12 endorsement in Arizona. All students in the Initial Teacher Certification

(ITC) program take classes in elementary and secondary methods. The field experience requirement (three semesters) usually involves placements at the elementary, middle, and high school levels. Student teaching includes two experiences: elementary/middle, elementary/high, or middle/high school.

Students submit a special application to the ITC program in the College of Education. Application deadlines for the ITC program are February 1 for fall admission and September 1 for spring admission. Appointments with an advisor can be made in the Office of Student Services, College of Education, by calling 480/965-5555.

Certification is also available through the postbaccalaureate program in the College of Education. Interested students should contact an advisor in the College of Education and in music education for admission requirements to the postbaccalaureate program.

Choral-General Concentration

This degree program may include instrumental music as a minor teaching field.

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
Total	12

Music History. The following music history courses are required:

MHL 194 ST: Music and Culture	3
MHL 341 Music History	3
MHL 342 Music History	3
Total	9

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 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 wishing 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
Total	12

Music History. The following music history courses are required:

MHL 194 ST: Music and Culture	3
MHL 341 Music History	3
MHL 342 Music History	3
Total	9

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

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

requirement. MUP 495 Performance completes the requirement.

Ensemble. Eight different semesters of participation in an ensemble are required, four of which must be at ASU. Two of the four ASU semesters must be in marching band. Wind and percussion players must have a minimum of six semesters of MUP 361 Marching and Concert Bands or equivalent large ensemble.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Two semesters of class piano (MUP 131, 132), unless waived by a diagnostic examination at the time of entrance, are required.

Additional Requirements. One semester of class voice and one semester of small ensemble 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
Total	12

Music History. The following music history courses are required:

MHL 194 ST: Music and Culture	3
MHL 341 Music History	3
MHL 342 Music History	3
Total	9

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
or MUE 318 Educational Methods for Cello and String Bass (1)	
MUE 327 Educational Methods for Trumpet and Horn	1
or MUE 328 Educational Methods for Trombone, Euphonium, and Tuba (1)	
MUE 335 Educational Methods for Guitar	1
MUE 336 Educational Methods for Percussion	1
MUE 337 Educational Methods for Flute, Clarinet, and Saxophone	1
or MUE 338 Educational Methods for Double Reed Instruments (1)	
MUE 482 Instrumental Practicum/Methods	5
MUE 485 String Practicum/Methods	5
Total	18

Also required are three semesters of MUP 121 Studio Instruction on string instruments other than the major instrument, to be chosen in consultation with Music Education faculty.

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 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 is recommended.

Diagnostic Examination. Two semesters of class piano (MUP 131, 132), unless waived by a diagnostic examination at the time of entrance, are required.

Additional Requirements. One semester of class voice and one semester of small ensemble are required.

MUSIC THERAPY—BM

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
Total	12

Music History. The following music history courses are required:

MHL 194 ST: Music and Culture	3
MHL 201 MacLiteracy for Musicians *CS*	3
MHL 341 Music History	3
MHL 342 Music History	3
Total	12

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. A minimum of 12 semester hours are required in the major performing medium, which must include at least four 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. These courses are also required:

BIO	201	Human Anatomy and Physiology I *SG* 4
CDE	232	Human Development *SB* 3
PGS	101	Introduction to Psychology *SB* 3
PGS	466	Abnormal Psychology *SB* 3
PSY	230	Introduction to Statistics *CS* 3
		or STP 226 Elements of Statistics *CS* (3)
SOC	101	Introductory Sociology *SB* 3
SPE	311	Orientation to Education of Exceptional Children *SB, C* 3
DAN		dance course 3–4
Total		 25–26

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 competencies (as established by the American Music Therapy Association) are evaluated before and after the music therapy internship, to determine entry-level skill acquisition before graduation.

PERFORMANCE—BM

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 2
		or MTC 321 Tonal Counterpoint (2)
Total		 14

Music History. The following music history courses are required:

MHL	194	ST: Music and Culture 3
MHL	341	Music History 3
MHL	342	Music History 3
MHL		upper-division course 3
Total		 12

Repertoire and Pedagogy. The following courses are required:

MUP	451	Repertoire 2
MUP	481	Performance Pedagogy and Materials 2
Total		 4

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 Performance) and a full recital (MUP 496 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 Ensembles: 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.

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	440	Jazz Theory and Ear Training 2
MTC	441	Jazz Composition 2
Total		 20

Music History. The following music history courses are required:

MHL	194	ST: Music and Culture 3
MHL	341	Music History 3
MHL	342	Music History 3

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MHL elective 3
Total 12

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 Performance) are required, with one in the jazz idiom.

Four semesters of MUP 379 Studio Instruction: Jazz are required.

Improvisation. The following courses are required:

MUP 141 Jazz Fundamentals 1
MUP 142 Jazz Listening Lab 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 235 Jazz Piano 1
MUP 236 Jazz Piano 1
MUP 319 Recording Studio Techniques 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 Jazz Band.

Recital Attendance. Six semesters of MUP 100 Concert Attendance are required.

Diagnostic Examination. Two semesters of class piano (MUP 131, 132), 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 425 Studies in 20th-Century Theory 3
or MTC 428 Advanced Form and Analysis (3)
Total 15

Music History. The following music history courses are required:

MHL 194 ST: Music and Culture 3
MHL 341 Music History 3
MHL 342 Music History 3
MHL 440 Music Since 1900 *L* 3
MHL upper-division course 3
Total 15

Repertoire and Pedagogy. The following courses are required:

MUP 440 Keyboard Harmony 1
MUP 451 Repertoire 2
MUP 481 Performance Pedagogy and Materials 2
or MUP 482 Piano Pedagogy (2)
Total 5

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 Performance) and a full recital (MUP 496 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.

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
Total 12

Music History. The following music history courses are required:

MHL 194 ST: Music and Culture 3
MHL 341 Music History 3
MHL 342 Music History 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 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.

Conducting. MUP 209 Beginning Choral Conducting is required.

Additional Requirements. Six semester hours in theatre and 11 semester hours in dance are required.

Diagnostic Examination. Three semesters of class piano (MUP 131, 132, 231), unless waived by a diagnostic examination at the time of entrance, are required.

Opera Option. For those students whose goal is opera performance, 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: Workshops (Aria Preparation) and three semesters 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
Total	12

Music History. The following courses are required:

MHL 194 ST: Music and Culture	3
MHL 341 Music History	3
MHL 342 Music History	3
MHL upper-division course	3
Total	12

Repertoire and Pedagogy. The following courses are required:

MUP 451 Repertoire	2
MUP 481 Performance Pedagogy and Materials	2
Total	4

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 Performance) and a full recital (MUP 496 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.

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 428 Advanced Form and Analysis	3
Total	15

Music History. The following courses are required:

MHL 194 ST: Music and Culture	3
MHL 341 Music History	3
MHL 342 Music History	3
MHL upper-division course	3
Total	12

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 337 Studio Instruction: Piano Accompanying	8
Total	32

In addition, each student accompanies two half recitals (MUP 495 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 Performance), one vocal and one instrumental.

Ensemble. Two semesters of MUP 379 Chamber Music Ensembles, one semester of MUP 379 Chamber Music Ensembles: Piano, four semesters of MUP 388 Piano Accompanying, one semester of MUP 487 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.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

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
Total	12

Music History. The following music history courses are required:

MHL 194 ST: Music and Culture	3
MHL 341 Music History	3
MHL 342 Music History	3
MHL upper-division course	3
Total	12

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, which includes one hour each of 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 Performance) and a full recital (MUP 496 Performance) are required.

Ensemble. Four different semesters of large vocal ensembles are required plus four semester hours of ensembles within four different semesters to be selected from large and/or small ensembles.

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 one semester of the others, chosen in conference with the 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.

THEORY AND COMPOSITION—BM

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 433 Orchestration	3
MTC 436 Electronic Studio Techniques I	2
Total	21

An additional five hours, to be selected from MTC 422, 425, 428, 429, 430, 437, and 441 are required.

Three semesters of MTC 123 Beginning Composition and four semesters of MTC 323 Composition are also required. At least three semesters of MTC 323 Composition must be taken at ASU.

Music History. The following courses are required:

MHL 194 ST: Music and Culture	3
MHL 341 Music History	3
MHL 342 Music History	3
MHL upper-division course	3
Total	12

Conducting. Choose between MUP 209 Beginning Choral Conducting or MUP 210 Beginning Instrumental Conducting.

Applied Music. Ten semester hours of study in applied music are required, at least eight of which must be in MUP 111 Studio Instruction.

Ensemble. Six 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. At least nine hours of electives to be chosen from MTC, MHL, or MUP (excluding courses taken to meet Class Piano proficiency) are required. MHL 440 Music Since 1900 may 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 Theory: 20th Century	3
MTC 320 Modal Counterpoint	2
MTC 321 Tonal Counterpoint	2
MTC 323 Composition	2–3
MTC 422 Musical Acoustics	3
MTC 425 Studies in 20th-Century Theory	3
MTC 428 Advanced Form and Analysis	3
MTC 496 Theory Project	3
Total	30–31

Also required are 10 semester hours of electives in MTC courses at the 300 level or above, to be chosen in consultation with an advisor.

Music History. The following courses are required:

MHL 194 ST: Music and Culture	3
MHL 341 Music History	3
MHL 342 Music History	3
MHL upper-division course	3
Total	12

Conducting. Choose between MUP 209 Beginning Choral Conducting or MUP 210 Beginning 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.

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 440 Music Since 1900 may be used to satisfy the General Studies L requirement.

MUSIC MINOR

The School of Music offers a minor in Music consisting of 20 semester hours of course work. A minimum grade of "C" (2.00) 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

* Electives may be chosen from MUS, MHL, MTC, and selected MUP courses. The minor does not include Studio Instruction.

Diagnostic Examination. Students pursuing a minor in music must first take a Theory Diagnostic Exam. This exam may be taken in the Music Building's Electronic Classroom, room W-225.

Interested students should contact the School of Music for specific requirements and admission procedures.

BIS CONCENTRATION

A concentration in music is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

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 "Katherine K. Herberger College of Fine Arts Graduate Degrees and Majors" table, page 276, 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 194 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Music and Culture. (3)

MHL 201 MacLiteracy for Musicians. (3)
fall, spring, summer
Instruction in basic Macintosh computer literacy, including generic applications and music-specific programs with hands-on experience. Lecture, lab. Fee.
General Studies: CS

MHL 341 Music History. (3)
fall and spring
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)
fall and spring
See MHL 341. Prerequisite: MTC 221.

MHL 344 Music in World Cultures. (3)
spring
Examines 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)
selected semesters
Origin, development, and styles of jazz music and its exponents. Prerequisite: MTC 223.
General Studies: H

MHL 363 Survey of Russian Music. (3)
fall in odd years
Examines music and musical life in Russia, the Soviet Union, and the post-Soviet C.I.S. from the Middle Ages to the present. Lecture, discussion. Prerequisite: MHL 342 or instructor approval.
General Studies: HU

MHL 437 Topics in 17th-Century Music. (3)
fall in odd years
Selected topics exploring the musical styles of the 17th century and their cultural contexts. Prerequisites: MHL 341, 342; MTC 223.
General Studies: L

MHL 438 Topics in 18th-Century Music. (3)
fall in even years
Selected topics exploring the musical styles of the 18th century and their cultural contexts. Prerequisites: MHL 341, 342; MTC 223.
General Studies: H

MHL 439 Topics in 19th-Century Music. (3)
spring
Selected topics exploring the musical styles of the 19th century and their cultural contexts. Prerequisites: MHL 341, 342; MTC 223.
General Studies: L, H

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

MHL 440 Music Since 1900. (3)
fall and summer
Examines stylistic trends, major composers and their works, and cultural contexts in music since 1900. Prerequisites: MHL 341, 342; MTC 223.
General Studies: L

MHL 456 History of Opera. (3)
spring in odd years
Development of opera from its creation ca. 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)
spring in odd years
Various styles of Indian music in the United States, Canada, and Mexico. Open to Music majors and nonmajors.
General Studies: L/HU, C

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog,* or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

MUSIC THEORY AND COMPOSITION (MTC)

MTC 123 Beginning Composition. (1)
fall and spring
Intended for freshmen and sophomores in the composition concentration. Introduces composing. May be repeated for credit. Prerequisite: instructor approval.

MTC 125 Basic Music Theory. (3)
fall
Notation, scales, keys, modes, intervals, chords, basic part writing and composition. Development of related aural skills through sightsinging and dictation. Prerequisite: any music major or instructor approval.

MTC 221 Music Theory: 18th Century. (3)
spring
Styles, techniques, and idioms of 18th-century music; emphasizes analysis, composition (part writing), and related aural skills, with applications for performance. Prerequisite: MTC 125.

MTC 222 Music Theory: 19th Century. (3)
fall
Styles, techniques, and idioms of 19th-century music; emphasizes analysis, composition (part writing), and related aural skills, with applications for performance. Prerequisite: MTC 221.

MTC 223 Music Theory: 20th Century. (3)
spring
Styles, techniques, and idioms of 20th-century music; emphasizes innovative treatments of musical elements, analysis, and composition; related aural skills. Prerequisite: MTC 222.

MTC 315 Modern Arranging. (2)
fall
Techniques in arranging for the contemporary jazz, radio, television, and studio orchestra. Prerequisite: MTC 223.

MTC 316 Modern Arranging. (2)
spring
Continuation of MTC 315. Prerequisite: MTC 315.

MTC 320 Modal Counterpoint. (2)
fall
Counterpoint based on 16th-century vocal polyphonic style. Prerequisite: MTC 221.

MTC 321 Tonal Counterpoint. (2)
spring
Counterpoint based on 18th-century polyphonic style. Prerequisite: MTC 221.

MTC 323 Composition. (2–3)
fall and spring
Writing music compositions, with emphasis on basic techniques and smaller structures. May be repeated for credit. Prerequisite: 3 semesters of MTC 123 or instructor approval.

MTC 327 Intermediate Form and Analysis. (3)
fall and spring
Organizing elements in the most important contrapuntal and homophonic musical forms from the Renaissance through the 19th century. Prerequisite: MTC 222.

MTC 422 Musical Acoustics. (3)
fall
Properties of sound and tone. Harmonic series, instruments, the ear, auditorium acoustics, and the reproduction of sound. Assumes a thorough knowledge of musical notation, intervals, scales, and harmony, or 2 years of music theory.

MTC 425 Studies in 20th-Century Theory. (3)
fall
Continued development of analytical techniques and aural skill, with an examination of theoretical systems applicable to 20th-century music. Prerequisite: MTC 223.

MTC 428 Advanced Form and Analysis. (3)
spring
Organizing principles of the large forms of musical composition in the 19th and 20th centuries. Prerequisite: MTC 327.

MTC 429 Canon and Fugue. (2)
fall in odd years
Writing of canons and fugues in tonal style. Prerequisite: MTC 321.

MTC 430 20th-Century Counterpoint. (2)
spring in even years
Counterpoint studies utilizing 20th-century idioms. Prerequisite: MTC 223.

MTC 433 Orchestration. (3)
spring in odd years
Studies scoring music for full and chamber orchestras. Includes examination of individual orchestral instruments (characteristics and performance techniques). Prerequisite: MTC 223.

MTC 436 Electronic Studio Techniques I. (2)
fall
Principles of analog electronic music systems and their application in the composition of electronic music. Assumes a thorough knowledge of music notation and intervals.

MTC 437 Electronic Studio Techniques II. (2)
spring
Principles of digital electronic music systems and their applications in the composition of electronic music. Prerequisite: MTC 436.

MTC 440 Jazz Theory and Ear Training. (2)
fall
Advanced study of jazz harmonic systems. Daily oral drills. Prerequisite: MTC 223.

MTC 441 Jazz Composition. (2)
fall
Creative writing in the smaller forms and in the idiom of jazz. Prerequisite: MTC 321.

MTC 495 Final Project. (0)
fall and spring
Half recital of compositions or approval of a large-scale composition or a research paper.

MTC 496 Theory Project. (3)
fall and spring
Supervised individual writing project dealing with music theory.

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MUSIC EDUCATION (MUE)

MUE 110 Introduction to Music Education. (1)
spring
Overview of music education. Orientation to student characteristics, teacher roles, and foundations of philosophy and history. Requires school observations.

MUE 161 Introduction to Music Therapy. (2)
fall
Overview of the profession of music therapy and its applications in mental health, rehabilitation, and special education.

MUE 211 Music in Recreation. (2)
fall
Materials, methods, and organizational structures appropriate for recreational music. Prerequisite: ability to read music, as determined by the instructor.

MUE 261 Music Therapy as a Behavioral Science. (2)
fall
Orientation to preclinical experience with emphasis on observation skills, assessment, goal setting, and professional ethics. Requires off-campus observations. Prerequisite: MUE 161.

MUE 310 Music in Early Childhood Education. (3)
spring
Identifying and understanding musical needs of young children. Methods and materials for program development for classroom teachers.

MUE 311 Music for the Classroom Teacher. (3)
fall and spring
Development of the classroom music program in the elementary school. Requires no previous music experience or course work. Prerequisite: nonmusic major or minor.

MUE 313 Elementary Music Methods. (3)
fall
Methods of instruction, planning, and presentation of appropriate contents in music. For music educators and music therapists. Prerequisite: any music major.

MUE 315 General Music in the Secondary Schools. (2)
fall and spring
Curriculum, student characteristics, and teaching strategies for general music. Prerequisite: any music major.

MUE 317 Educational Methods for Violin and Viola. (1)
fall and spring
Teaching and playing skills for music teachers. 3 hours per week.

MUE 318 Educational Methods for Cello and String Bass. (1)
fall and spring
Teaching and playing skills for music teachers. 3 hours per week.

MUE 327 Educational Methods for Trumpet and Horn. (1)
fall and spring
Teaching and playing skills for music teachers. 3 hours per week.

MUE 328 Educational Methods for Trombone, Euphonium, and Tuba. (1)
fall and spring
Teaching and playing skills for music teachers. 3 hours per week.

MUE 335 Educational Methods for Guitar. (1)
fall and spring
Teaching and playing skills for music teachers. 3 hours per week.

MUE 336 Educational Methods for Percussion. (1)
fall and spring
Teaching and playing skills for music teachers. 3 hours per week.

MUE 337 Educational Methods for Flute, Clarinet, and Saxophone. (1)
fall and spring
Teaching and playing skills for music teachers. 3 hours per week.

MUE 338 Educational Methods for Double Reed Instruments. (1)
fall and spring
Teaching and playing skills for music teachers. 3 hours per week.

MUE 361 Music Therapy Theory and Practice in Psychopathology. (3)
fall
Influence of music on behavior; principles and practices of music therapy and psychiatric clients. Prerequisites: MUE 211, 261; Music Therapy major.

MUE 362 Music Therapy Techniques. (3)
spring
Organization, administration, and use of music in rehabilitation with various client populations. Prerequisites: MUE 361; Music Therapy major.

MUE 381 Music Therapy Research. (3)
spring
Statistics and research design appropriate for investigations in music therapy.
General Studies: L

MUE 384 Therapy Preclinical I. (1)
fall and spring
Paired students provide music therapy for small groups at community agency for mentally retarded, geriatric, or physically disabled clients for a minimum of 10 clock hours. Prerequisites: MUE 211, 261.

MUE 385 Therapy Preclinical II. (1)
fall and spring
Individual placement in ASU Music Therapy Clinic.

MUE 386 Therapy Preclinical III. (1)
fall and spring
See MUE 385.

MUE 387 Therapy Preclinical IV. (1)
fall and spring
Individual clinical work in a community mental health facility.

MUE 388 Therapy Preclinical V. (1)
fall and spring
See MUE 387.

MUE 389 Repertoire for Music Therapy. (3)
spring
Music skills repertoire for music therapy, including units on brass, strings, woodwinds, electronic instruments, computer music, and improvisation techniques. Lab. Prerequisites: MUE 211; Music Therapy major.

MUE 441 Psychology of Music. (3)
spring
Psychological and physiological aspects of music emphasizing musical behavior, function, perception, and learning. Prerequisite: junior standing or instructor approval.

MUE 475 Group Process and Music Therapy. (1)
fall
Principles of group process, verbal counseling, professional writing, as related to music therapy practice. Prerequisites: MUE 362; Music Therapy major.

MUE 476 Internship in Music Therapy. (1)
fall and spring
Full-time, 6-month, off-campus residency in an approved clinical institution.

MUE 480 Choral Methods. (3)
spring
Methods of instruction, organization, and presentation of appropriate content in choral music classes. Prerequisite: Secondary Education major.

MUE 481 Instrumental Practicum/Methods. (5)
fall
Instrumental music as a means of developing music skills, understandings, and attitudes in elementary and secondary school students. Prerequisite: Secondary Education major.

MUE 482 Instrumental Practicum/Methods. (5)
spring
See MUE 481. Prerequisites: MUE 481 (or 485); Secondary Education major.

MUE 485 String Practicum/Methods. (5)
fall
For students preparing to administer a string program and teach strings at the elementary level. Lecture, lab.

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L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

MUSIC PERFORMANCE (MUP)

MUP 100 Concert Attendance. (0)
fall and spring
6 semesters required for all music majors. A total of 4 convocations and 6 approved recitals required each semester.

MUP 111 Studio Instruction. (2)
fall and spring
Bassoon, cello, clarinet, contrabass, cornet, euphonium, flute, guitar, harp, harpsichord, horn, oboe, organ, percussion, piano, saxophone, trombone, trumpet, tuba, viola, violin, voice. Minimum contact of 1 hour plus studio class weekly. May be repeated for credit. May not be taken for audit. Fee. Prerequisites: any music major; placement examination; audition.

MUP 117 Applied Jazz Improvisation. (1)
fall and spring
Principles, methods, and theory of jazz performance and pedagogy. May be repeated for credit. Studio. Prerequisites: placement examination; audition.

MUP 121 Studio Instruction. (1)
fall, spring, summer
Secondary or minor instrument instruction. Bassoon, cello, clarinet, contrabass, cornet, euphonium, flute, guitar, harp, harpsichord, horn, oboe, organ, percussion, piano, saxophone, trombone, trumpet, tuba, viola, violin, voice. Minimum contact of 1/2 hour per week. May be repeated for credit. May not be taken for audit. Fee. Prerequisites: any music major; instructor approval.

MUP 127 Studio Instruction. (4)
fall and spring
Bassoon, cello, clarinet, contrabass, cornet, euphonium, flute, guitar, harp, harpsichord, horn, oboe, organ, percussion, piano, saxophone, trombone, trumpet, tuba, viola, violin, voice. Minimum contact of 1 hour plus studio class weekly. May be repeated for credit. May not be taken for audit. Fee. Prerequisites: Performance major; placement examination; audition.

MUP 131 Class Piano. (1)
fall and spring
4-semester sequence (with MUP 132, 231, and 232) designed for those with little or no piano experience. Emphasizes keyboard technique, sight reading, simple accompaniments, and improvisation. 2 hours per week. May not be taken for audit. Prerequisite: any music major.

MUP 132 Class Piano. (1)
spring
See MUP 131.

MUP 133 Class Voice. (1)
fall and spring
4-semester sequence (MUP 134, 233, and 234) open to all students. 2 hours per week. May not be taken for audit.

MUP 134 Class Voice. (1)
fall and spring
See MUP 133. Prerequisite: MUP 133 or instructor approval.

MUP 141 Jazz Fundamentals. (1)
fall
Principles, methods, and theory of jazz performance and pedagogy.

MUP 209 Beginning Choral Conducting. (1)
fall and spring
Essentials of choral conducting techniques. 2 hours per week.

MUP 210 Beginning Instrumental Conducting. (1)
spring
Essentials of instrumental conducting techniques. 2 hours per week.

MUP 217 Applied Jazz Improvisation. (2)
fall and spring
Emphasizes basic jazz literature, chord symbol reading, melodic patterns, ear training, melodic concepts, analysis of improvised solos, and pedagogical issues. May be repeated for credit. Studio. Prerequisites: MUP 117 (2 semesters); placement examination; audition.

MUP 231 Class Piano. (1)
fall
See MUP 131.

MUP 232 Class Piano. (1)
spring
See MUP 131.

MUP 233 Class Voice. (1)
fall and spring
See MUP 133. Prerequisite: MUP 134 or instructor approval.

MUP 234 Class Voice. (1)
fall and spring
See MUP 133. Prerequisite: MUP 233 or instructor approval.

MUP 235 Jazz Piano. (1)
fall
2-semester sequence (with MUP 236) designed for jazz keyboard experience. Emphasizes chord symbol reading, simple improvisation, and voicing. 2 hours per week. Prerequisite: MUP 132.

MUP 236 Jazz Piano. (1)
spring
See MUP 235. Prerequisite: MUP 132.

MUP 237 Fretboard Harmony. (1)
fall and spring
Scales, chords, harmony, basic improvisation for the guitar. 2 hours per week.

MUP 250 Diction for Singers. (1)
fall and spring
Use of phonetics in the study of song and opera literature. Language emphasis differs each semester. May be repeated for credit.

MUP 301 Advanced Class Piano. (1)
fall
Required for the choral-general concentration of the Music Education major. Open to other music majors who have completed MUP 232. Emphasizes accompaniments, ensemble playing, score reading, advanced harmonizations, repertoire, technique, and improvisation. 2 hours per week. May not be taken for audit. Prerequisites: MUP 232 (or proficiency); any music major; placement examination.

MUP 302 Advanced Class Piano. (1)
spring
Required for the choral-general concentration of the Music Education major. Open to other music majors who have completed MUP 301. A sequential continuation of MUP 301 skills that include both group and studio instruction. 2 hours per week. May not be taken for audit. Prerequisites: MUP 301 (or proficiency); any music major; placement examination.

MUP 311 Studio Instruction. (2)
fall and spring
See MUP 111. Fee.

MUP 317 Applied Jazz Improvisation. (2)
fall and spring
Emphasizes listening, analysis, and performance of advanced jazz literature and composition in contemporary styles. May be repeated for credit. Studio. Prerequisites: MUP 217 (2 semesters); placement examination; audition.

MUP 319 Recording Studio Techniques. (2)
spring
Study of both analog and digital recording methods. Includes lab time on recording console and tape machines. Lab.

MUP 321 Studio Instruction. (1)
fall, spring, summer
See MUP 121. Fee.

MUP 327 Studio Instruction. (4)
fall and spring
See MUP 127. Fee.

MUP 337 Studio Instruction: Piano Accompanying. (2)
spring
Repertoire to be selected from vocal and instrumental literature. 1 hour lesson per week. May be repeated for credit. Prerequisites: Performance major with a concentration in piano accompanying; placement examination.

MUP 339 Choral Conducting. (2)
fall and spring
Elements of choral conducting technique and interpretation. 3 hours per week. Prerequisite: MUP 209.

MUP 340 Instrumental Conducting. (2)
fall
Fundamentals of score reading and interpretation of instrumental music. 3 hours per week. Prerequisite: MUP 210.

MUP 344 Chamber Orchestra. (1)
fall and spring
Important masterpieces from all periods of music are performed throughout the year. May be repeated for credit. Prerequisite: audition with director.

MUP 345 Symphony Orchestra. (1)
fall and spring
Over a 4-year period, the student is introduced to the masterpieces of symphony orchestra literature. 3 times per week. May be repeated for credit. Prerequisite: audition with director.

MUP 346 Sinfonietta. (1)
fall and spring
Symphonic orchestra that presents approximately six concerts annually, performing masterpieces of the classical repertoire. 3 times per week. May be repeated for credit. Prerequisite: audition with director.

MUP 350 Choral Union. (1)
fall and spring
Open to all students in the university and to interested singers in the community by audition. Preparation and performance of the larger choral works. 2 hours per week. May be repeated for credit. Prerequisite: audition with director.

MUP 352 Concert Choir. (1)
fall and spring
Important masterpieces from all periods of music are performed. May be repeated for credit. Prerequisite: instructor approval.

MUP 353 University Choir. (1)
fall and spring
4 hours per week. May be repeated for credit. Prerequisite: instructor approval.

MUP 355 Sun Devil Singers. (1)
fall and spring
Rehearsal and performance of music for mixed voices. 3 hours per week. May be repeated for credit. Prerequisites: audition with director; instructor approval.

MUP 357 Women's Chorus. (1)
fall and spring
2 hours per week. May be repeated for credit. Prerequisite: instructor approval.

MUP 361 Marching and Concert Bands. (1)
fall and spring
Staging of formations and drills for football games and other events (fall); masterpieces of symphonic band literature (spring). Meets daily. May be repeated for credit. Prerequisite: audition with director.

MUP 362 Wind Ensemble. (1)
fall and spring
Rehearsal and performance of literature for wind ensemble. 2 hours per week in fall, 4 hours in spring. Performing ensemble. May be repeated for credit. Prerequisite: instructor approval.

MUP 363 Chamber Winds. (1)
fall and spring
Rehearsal and performance of advanced literature for chamber winds. 2 hours per week. Performing ensemble. May be repeated for credit. Prerequisite: instructor approval.

MUP 370 Music Theatre: Techniques. (1)
fall and spring
Exercises and improvisations for the singer/actor emphasizing body awareness, basic music theater performance skills, and freedom of the vocal and breath mechanisms. Section 1 (Movement for Singers); Section 2 (Expression); Section 3 (Interpretation); Section 4 (Advanced Expression); Section 5 (Advanced Interpretation). Sections 2 through 5 must be taken in sequence. Each section: 3 hours per week. May be repeated for credit.

MUP 371 Music Theatre: Workshops. (1)
fall and spring
Development of specific skills for musical-dramatic interpretation. Section 1 (Aria Preparation); Section 2 (Broadway I); Section 3 (Broadway II). Each section: 1 hour lecture, demonstration, 1 lab per week. May be repeated for credit.

MUP 372 Music Theatre: Orchestras. (1)
fall and spring
Participation in Lyric Opera Theatre productions. Section 1 (Orchestra); Section 2 (Chamber Orchestra); Section 3 (Chamber Ensemble). May be repeated for credit. Prerequisites: audition with director; instructor approval.

MUP 373 Music Theatre: Performance. (1)
fall and spring
Participation in Lyric Opera Theatre productions. Section 1 (Principal Roles); Section 2 (Chorus). May be repeated for credit. Prerequisites: audition with director; instructor approval.

MUP 374 Music Theatre: Production. (1)
fall and spring
Participation in Lyric Opera Theatre productions. Section 1 (Vocal Performance); Section 2 (Technical Music Theatre); Section 3 (Problems in Production) to be taken concurrently with MUP 373, Section 2. May be repeated for credit.

MUP 376 New Music Ensemble. (1)
fall and spring
Rehearsal and performance of music written in the last 20 years. May be repeated for credit. Prerequisite: instructor approval.

MUP 377 Brass Choir. (1)
fall and spring
Specializing in public performance of music written for brass instruments. 2 hours per week. May be repeated for credit. Prerequisite: instructor approval.

MUP 379 Chamber Music Ensembles. (1)
fall and spring
Brass, guitar, keyboard, mixed, percussion, string, vocal, and woodwinds ensembles. 2 hours per week. May be repeated for credit. Prerequisite: instructor approval.

MUP 385 Percussion Ensemble. (1)
fall and spring
Rehearsal and performance of standard and original repertoire for the percussion ensemble and related instruments. 2 hours per week. May be repeated for credit. Prerequisite: instructor approval.

MUP 386 Jazz Band. (1)
fall and spring
Rehearsal and performance of new, traditional, and Latin literature for jazz bands. 4 hours per week. May be repeated for credit. Prerequisite: instructor approval.

MUP 387 Ethnomusicology Ensembles. (1)
fall and spring
Performance learning experience for the music of various cultures of the world. May be repeated for credit. Prerequisite: knowledge of instrument or instructor approval.

MUP 388 Piano Accompanying. (1)
fall and spring
Piano accompaniments found in vocal and instrumental literature; discussion of styles and performance practices; experience in public performance. 2 hours per week. May be repeated for credit. Prerequisite: Performance major with a concentration in piano accompanying or instructor approval.

MUP 440 Keyboard Harmony. (1)
fall
Performance-oriented class emphasizing chord progressions, harmonization, figured bass realization, stylistic improvisation, transposition, open score reading, and sight reading. Prerequisite: Performance major with a concentration in keyboard or instructor approval.

MUP 451 Repertoire. (2)
fall and spring
Literature available for performance in all performing media. May be repeated for credit. Prerequisite: junior standing in major performance field.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

MUP 453 Song Literature. (2)
once a year
Early Italian, English, German, and French art song.

MUP 454 Song Literature. (2)
once a year
American, Russian, Spanish, Scandinavian, and contemporary song.

MUP 481 Performance Pedagogy and Materials. (2)
fall and spring
Principles and methods of performance techniques for each performance field. May be repeated for credit. Prerequisite: senior standing or instructor approval.

MUP 482 Piano Pedagogy. (2)
selected semesters
Continuation of MUP 481 (Piano). Problems and techniques of teaching intermediate to advanced piano students. Prerequisites: junior standing in Performance (keyboard or piano accompanying concentration); instructor approval.

MUP 487 Piano Accompanying. (1)
fall and spring
Piano accompaniments found in vocal and instrumental literature; discussion of styles and performance practices; experience in public performance. 2 hours per week. May be repeated for credit. May not be taken for audit. Prerequisite: Performance major with a concentration in keyboard or piano accompanying.

MUP 495 Performance. (0)
fall
For candidates of a BM degree in which 1/2 recital is a requirement. Prerequisite: BM degree candidate.

MUP 496 Performance. (0)
fall
For candidates of a BM degree in which a full recital is a requirement. Prerequisites: BM degree candidate; MUP 495.

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MUSIC (MUS)

MUS 100 Fundamentals of Music Notation. (3)
fall and spring
Provides nonmusic majors with sufficient symbol literacy to begin work in the field of musical learning. Credit not applicable toward any music degree.

MUS 340 Survey of Music History. (3)
fall, spring, summer
Major composers, compositions, and periods in the history of music. Credit does not apply to major requirements for music degrees. Fee.
General Studies: HU, H

MUS 347 Jazz in America. (3)
fall, spring, summer
Current practices employed by contemporary jazz musicians; the historical development of jazz techniques. Credit does not apply to major requirements for music degrees. Lecture, discussion. Cross-listed as AFH 347. Credit is allowed for only AFH 347 or MUS 347. Fee.
General Studies: HU, C

MUS 354 Popular Music. (3)
fall, spring, summer
Emphasizes historical, cultural, and performance patterns in a variety of popular idioms such as, but not limited to, rock, folk, jazz, and Afro-American music. May be repeated for credit. Credit does not apply to major requirements for music degrees. Fee.
General Studies: HU

MUS 355 Survey of American Music. (3)
fall, spring, summer
Growth and development of American music. Credit does not apply to major requirements for music degrees. Fee.
General Studies: HU, C, H

MUS 356 Survey of the Musical Theatre. (3)
once a year
Music's place in the theatre, viewed in terms of historical importance and relative function. Credit does not apply to major requirements for music degrees. Fee.
General Studies: HU

MUS 410 History of Women in Music. (3)
fall
Surveys musical achievements of women as well as the historical contexts that shaped and defined their artistic development. Pre- or corequisite: ENG 102 or 105.
General Studies: HU, C, H

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Department of Theatre

theatre.asu.edu
480/965-5337
GHALL 232

Linda Essig, Chair

Professors: Barker, Bedard, Eckard, Essig, Giner, Honegger, Knapp, Saldaña, Thomson, Valenti, Wills

Associate Professors: Acker, Edwards, Furr-Soloman, Holloway, Reyes, Riske, Underiner

Assistant Professors: Gharavi, Rivera-Servera, Sterling, Woodson

Senior Lecturer: McMahon

For advising purposes, all students registering in a Theatre degree program enroll through the Katherine K. Herberger College of Fine Arts. Special advising check sheets, providing complete information regarding requirements and suggested electives, are available in the Department of Theatre office and on its Web site for the BA degree program.

For eligibility to enroll in theatre courses as majors, incoming freshman and transfer students must submit a one- or two-page, typed, double-spaced letter of intent that answers the questions (1) What is it about theatre and the performing arts that interest and excite you? and (2) What are the qualities you possess that can contribute to the study and creation of theatre at ASU and beyond? and a one-page narrative biography of the applicant's life and artistic experiences. Materials must be delivered by hand to GHALL 232 or mailed to

ACADEMIC ADVISOR
ARIZONA STATE UNIVERSITY
DEPARTMENT OF THEATRE
PO BOX 872002
TEMPE, AZ 85287-2002

Fax and e-mail submissions are not accepted or considered.

Freshmen and sophomores who meet university and departmental standards must receive a grade of "C" (2.00) or higher in all major courses and a 2.50 cumulative GPA during their first semester to continue in the BA Theatre program. Students failing to meet these requirements have one semester of departmental probation to receive a "C" (2.00) 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) are asked to seek advising regarding other majors.

THEATRE—BA

The major in Theatre consists of 57 or 58 semester hours. The following 33 or 34 semester hours of core courses are required of all BA degree candidates:

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
THE	440 Experimental Theatre and Performance	3
THP	102 Acting: Fundamentals	3
THP	218 The Director's Vision	3
THP	301 Theatre Production	1
THP	301 Theatre Production*	1
THP	313 Fundamentals of Design	3
THP	428 Theatre and the Future	3
Total		27

* One semester hour in a different production option is required.

One of the following two courses (three or four semester hours) is required:

THP	213 Introduction to Technical Theatre	4
THP	214 Introduction to Costuming	3

Three semester hours of departmental approved course work in developing new work is also required (e.g., playwriting, solo performance, theatre for social change). Check the department advising office for a list of eligible courses.

Twenty-four semester hours of THE and THP electives are selected by the student and advisor to complete the 57 or 58 semester hours required in the major. These 24 semester hours can constitute an optional focus area for the student, which involves enrolling in related course work from one of six subject areas in Theatre: (1) theatre and performance studies; (2) directing and performance; (3) design and production; (4) playwriting and dramaturgy; (5) theatre for youth; and (6) film studies. A list of recommended courses appropriate to each area is available from the department advising office. Undergraduate students interested in pursuing Arizona teacher certification or endorsement for Theatre are encouraged to pursue the focus area in theatre for youth, then obtain postbaccalaureate teacher certification through the ASU College of Education or another Arizona educational institution. General Studies courses make up 35 semester hours of the total courses required. Additional elective courses are selected with an advisor to meet the total 120 semester hours required for the degree.

Within the major only courses with a grade of "C" (2.00) or higher may be applied toward graduation.

Students who transfer 55 semester hours or more are required to enter with and retain a 2.50 GPA in theatre courses and a 2.00 cumulative GPA.

Acting Concentration

The major in Theatre with a concentration in acting prepares students for both advanced graduate study in the field and independent career pursuits in performance. In addition to required core courses, the acting concentration consists of 23 or 24 semester hours. The following six semester hours are required:

THP	272 Acting: Introduction to Movement	3
THP	277 Acting: Introduction to Voice	3

One of the following two courses (three semester hours) is also required:

THP	207 Acting: The Creative Imagination	3
THP	285 Acting: Beginning Scene Study	3

One of the following two courses (two or three semester hours) is also required toward the end of the program of study:

THP	388 Acting: Audition Techniques	3
THP	489 Acting: Career Development	2

Twelve semester hours in acting elective course work completes the concentration.

Students are strongly encouraged to apply for admission to the concentration at the end of the freshman year to allow for three academic years of supervision. Transfer students should apply for the concentration at the end of their first semester at ASU. Admission requirements include an audition with a committee of acting faculty members (conducted at the end of each semester) plus the submission of a one-page letter of intent, a résumé, and an unofficial transcript (minimum 2.50 overall GPA and a 3.00 Theatre GPA required). Retention in the concentration is based on satisfactory artistic work and growth, production participation, evidence of a strong work ethic, and maintenance of a minimum 2.50 overall GPA and a 3.00 Theatre GPA.

Eligible students denied admission into the acting concentration can appeal in writing to the director of the undergraduate acting program.

Scenography Concentration

The major in Theatre with a concentration in scenography prepares students for advanced graduate study in the field and entry-level careers in performance design and technology. In addition to core course requirements, the concentration in scenography consists of 24 or 25 semester hours. The following 12 semester hours are required:

THP	340 Scene Design	3
THP	345 Lighting Design	3
THP	430 Costume Design	3
THP	442 Drawing	3

One of the following two courses (three or four semester hours), not taken as part of the core, is also required:

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

THP	213 Introduction to Technical Theatre	4
THP	214 Introduction to Costuming	3

Nine semester hours in theatre design or theatre technology elective course work completes the concentration.

Application for admission into the concentration is suggested at the end of the freshman year to allow three years of academic supervision. Transfer students should apply for the concentration during their first semester at ASU. Admission requirements include an interview with scenography faculty (conducted at the end of each semester) and submission of a letter of intent, a portfolio, and an unofficial transcript (a minimum GPA of 2.50 is required). A résumé is optional. Scenography faculty will meet monthly with students as a group to monitor personal progress, to assess portfolio development, and to develop a community. Retention in the program is based on satisfactory artistic growth, production participation, and maintenance of a 2.50 GPA.

Eligible students denied admission into the scenography concentration can appeal in writing to the director of the undergraduate scenography program.

GRADUATION REQUIREMENTS

In addition to fulfilling the major requirements, students must meet all university graduation requirements. See "University Graduation Requirements," page 88.

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	300 Film: The Creative Process I *HU*	3
THE	320 History of the Theatre I *HU, H*	3
THP	101 Acting: An Introduction	3
THP	301 Theatre Production	1
Concentration area*		9
Total		22

* Also required are three 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. A "C" (2.00) or higher is required for all courses in the minor.

BIS CONCENTRATION

A concentration in theatre is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

GRADUATE PROGRAMS

The faculty in the Department of Theatre offer programs leading to the MA degree in Theatre; the Master of Fine Arts degree in Theatre with concentrations in performance, scenography, theatre for youth, and interdisciplinary digital media; the PhD 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). See the *Graduate Catalog* for details.

THEATRE (THE)

THE 100 Introduction to Theatre. (3)
fall, spring, summer
Surveys theatre production from the Greeks to contemporary theatre. Taught in conjunction with distance learning. Lecture, discussion, guest artists. Fee. Prerequisite: nonmajor.
General Studies: HU

THE 125 Orientation to Theatre. (1)
fall
Orientation to university and department resources and procedures. Career planning and guidance. Attendance and written responses to theatre productions. Required for BA Theatre majors. Prerequisite: Theatre major.

THE 220 Principles of Dramatic Analysis. (3)
fall and spring
Analysis, evaluation, and interpretation of dramatic literature for theatrical production. Emphasizes the traditional canon of dramatic literature and traditional structures and forms of drama. Prerequisites: ENG 101 (or 105 or 107); Theatre major. Prerequisite with a grade of "B" (3.00) or higher: THE 125.
General Studies: L

THE 300 Film: The Creative Process I. (3)
fall, spring, summer
History, elements, and techniques of theatrical film: cinematography, directing, acting, scriptwriting, producing, and criticism. Lecture, demonstration via film, video, and DVD. Fee.
General Studies: HU

THE 301 Film: The Creative Process II. (3)
fall and spring
Advanced study of contemporary cinema history and film techniques; analyzes social changes in film, multicultural filmmaking, and the star system. Lecture, demonstration via film, video, and DVD. Prerequisite: THE 300.
General Studies: HU

THE 320 History of the Theatre I. (3)
fall and spring
Traces major developments in theatre production and dramatic literature from their beginnings to the mid-17th century. Lecture, student presentations.
General Studies: HU, H

THE 321 History of the Theatre II. (3)
spring
Traces major developments in theatre production and dramatic literature from the mid-17th century to the 20th century. Lecture, student presentations.
General Studies: HU, H

THE 325 Play Reading for Educational Theatre. (1)
fall and spring
Assigned independent readings in plays for secondary school play production. Prerequisite: written instructor approval.

THE 400 Focus on Film. (3)
fall and spring
Specialized study of prominent film artists, techniques, and genres. Emphasizes the creative process. May be repeated for credit. Topics may include the following:
- Film Production Part I
  Fee.
- Film Production Part II
  Fee.

Prerequisite: ENG 102 or 105 or 108.

THE 402 Gender Identity in Film. (3)
selected semesters
Examines the representation of gender in Hollywood cinema with particular focus on films from 1970 to the present. Prerequisite: THE 300.

THE 403 Independent Film. (3)
once a year
Examines the independent film movement from the French New Wave to contemporary independent filmmakers. Lecture, demonstration via film, video, and DVD.
General Studies: HU

THE 404 Foreign Films and Filmmakers. (3)
fall and spring
Films and filmmakers from Europe, Asia, Australia, the Far East, South America, and the Caribbean. Emphasizes cultural content and filmmaking philosophies.
General Studies: G

THE 405 Film: Great Performers and Directors. (3)
fall, spring, summer
Examines processes and influences of one or more great film performers and/or directors. May be repeated for credit when topics vary. Topics may include the following:
- Alfred Hitchcock
  Fee.
- Hollywood Rebels
  Fee.

General Studies: HU

THE 406 American Multicultural Film. (3)
fall and spring
Examines Native, African, Asian, and Latina and Latino American films and film artists in cinema history and production. Internet course. Fee. Prerequisite: ENG 102 or 105 or 108.
General Studies: HU, C

THE 422 Latina and Latino Theatre. (3)
selected semesters
Readings, discussion, video of dramatic literature and production styles of Latina and Latino playwrights and theatre companies in the United States. Prerequisite: ENG 102 or 105 or 108.

THE 423 African American Theatre. (3)
selected semesters
Readings, discussion, video of the history and dramatic literature of African American playwrights and theatre companies in the United States. Prerequisite: ENG 102 or 105 or 108.
General Studies: C

THE 424 Trends in Theatre for Youth. (3)
selected semesters
Surveys the history, literature, and contemporary practices in theatre for youth.

THE 426 Theatre of the Americas. (3)
fall and spring
Selected studies in pre-Columbian theatre forms and texts of the Aztecs, Mayans, Caribbean islands, and North American Indians. Internet course. Prerequisite: ENG 102 or 105 or 108.

THE 430 History of Costume: Western Tradition. (3)
selected semesters
Studies major costume styles throughout history of Western civilization and how these fashions reflected society. Explores how styles can be used by theatrical costumers.

THE 440 Experimental Theatre and Performance. (3)
fall and spring
Explores 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. (3)
spring
Applies materials, techniques, and theories for theatre with 9th- through 12th-grade students. Emphasizes curriculum development and praxis. Prerequisite: Theatre Education or Theatre for Youth majors or instructor approval.

THE 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Performance Technology I
  Fee.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

THEATRE PERFORMANCE AND PRODUCTION (THP)

THP 101 Acting: An Introduction. (3)
fall, spring, summer
Introduces basic principles of acting. Topics include terminology, scene and character analysis, exercises and improvisation, audition preparation. Studio. Prerequisite: nonmajor.

THP 102 Acting: Fundamentals. (3)
fall and spring
Explores and applies basic principles of acting. Topics include terminology, scene and character analysis, exercises and improvisation, audition preparation. Studio. Prerequisite: Theatre major.

THP 113 Techniques of Theatrical Makeup. (3)
selected semesters
Techniques of theatrical makeup: age, corrective, masks, and special effects. 1 hour lecture, 2 hours lab. Fee.

THP 207 Acting: The Creative Imagination. (3)
fall
Develops the actor as an artist, introducing the use of the creative imagination through sensory experience as led by Stanislavski. Studio. Prerequisites: Theatre major; interview. Prerequisite with a grade of "B" (3.00) or higher: THP 101 or 102. Pre- or corequisite: THE 220.

THP 208 Acting: The Reality of Doing. (3)
spring
Continuation of the inner process, applying the techniques of Sanford Meisner to discover the creativity in the spontaneous experience. Prerequisite: written instructor approval. Prerequisite with a grade of "B" (3.00) or higher: THP 207.

THP 213 Introduction to Technical Theatre. (4)
fall and spring
Procedures of technical theatre production and demonstration. Topics include design and construction of scenery, lighting, and properties. 2 hours lecture, 3 hours lab. Fee. Prerequisite: Theatre major.

THP 214 Introduction to Costuming. (3)
fall and spring
Basic principles of costume design, construction, and survey of selected historical periods, including makeup styles. Costume design project and production experience. 3 hours lecture, 2 hours lab. Fee. Prerequisite: Theatre major.

THP 218 The Director's Vision. (3)
fall and spring
History, theory, and principles of directing. Examines director's role and responsibilities, play selection, conceptualizing, ground plans, blocking. Fee. Prerequisites: THE 220; THP 102.

THP 260 Introduction to Playwriting. (3)
selected semesters
Basic skills of playwriting, including exercises in monologues, scenes, and conflict and resolution, leading to completion of a one-act play. Prerequisite: ENG 101 or 105 or 107.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

THP 261 Introduction to Screenwriting. (3)
once a year
Basic skills of screenwriting, including exercises in conflict and resolution, plot points, and theories of three-act structure and design. Prerequisite: ENG 101 or 105 or 107.

THP 272 Acting: Introduction to Movement. (3)
fall and spring
Movement vocabulary and physical training in relaxation, alignment, conditioning, and stage presence. Application to performance. Studio. Prerequisite with a grade of "B" (3.00) or higher: THP 101 or 102 or written instructor approval.

THP 277 Acting: Introduction to Voice. (3)
fall and spring
Exercises and techniques to free the voice and improve quality and projection. Application to performance. Studio. Prerequisite with a grade of "B" (3.00) or higher: THP 101 or 102 or written instructor approval.

THP 285 Acting: Beginning Scene Study. (3)
fall and spring
Rehearsal techniques and application of action to dramatic text. Emphasizes realistic drama. Studio. Prerequisite with a grade of "B" (3.00) or higher: THP 101 or 102 or written instructor approval. Pre- or corequisite: THE 220.

THP 301 Theatre Production. (1–4)
fall, spring, summer
Participation in university mainstage theatre productions (acting, running crew, etc.). May be repeated for credit. Prerequisites: application; written instructor approval.

THP 307 Acting: Research and Performance. (1–3)
once a year
Acting in theatre projects, productions, or collaborative performances in directing classes. May be repeated for credit. Studio. Prerequisite: written instructor approval.

THP 311 Improvisation with Youth. (3)
fall, spring, summer
Basic materials, techniques, and theories for facilitating improvisational drama with children and youth. Not open to freshmen.

THP 312 Puppetry and Children. (3)
fall, spring, summer
Construction and manipulation of puppets; practice in performance skills. Emphasizes educational and recreational uses of puppetry by and with children. Fee. Prerequisite: junior standing or above.

THP 313 Fundamentals of Design. (3)
fall and spring
Art and practice of scenic, costume, and lighting design for the theatre and the media. Prerequisite: THP 213 or 214.

THP 317 Stage Management. (3)
selected semesters
Readings in stage management and participation as a stage manager in a university theatre production. Prerequisite: written instructor approval. Prerequisite with a grade of "C" (2.00) or higher: THE 220.

THP 318 Directing for the Stage. (3)
fall and spring
Director's approach to text analysis and articulation of ideas. Basic tools, rehearsal schedules, staging, rehearsal and audition techniques, scene work. Prerequisites: THP 213, 218; instructor approval.

THP 320 Acting: Solo and Collaborative Performance. (3)
once a year
Creation and development of original performance art works combining text, movement, multimedia, visual art; the actor as writer, designer, performer. Studio. Prerequisite: written instructor approval.

THP 322 Acting: Voice Overs and Radio Drama. (3)
selected semesters
Applies effective vocal techniques to commercials, books on tape, radio dramas. Preparation of audition tape, performance in radio drama. Studio. Prerequisite: written instructor approval.

THP 331 Costume Construction. (3)
selected semesters
Uses of materials and techniques for stage costumes with actual construction of period apparel. Prerequisite: THP 214 or instructor approval.

THP 340 Scene Design. (3)
once a year
Studio projects in designing realistic scenery for the contemporary proscenium stage. Fee. Prerequisite: THP 213 or written instructor approval. Prerequisite with a grade of "C" (2.00) or higher: THE 220.

THP 345 Lighting Design. (3)
once a year
Principles and theory of stage lighting design, including design process and execution, equipment, and light plots. Lecture, lab. Fee. Prerequisite: THP 213 or written instructor approval. Prerequisite with a grade of "C" (2.00) or higher: THE 220.

THP 350 Sound Design. (3)
once a year
Introduces the equipment, process, and recording techniques used in sound design for the theatre. Lecture, studio. Fee. Prerequisite with a grade of "C" (2.00) or higher: THE 220.

THP 360 Intermediate Playwriting. (3)
once a year
Continued development of skills in playwriting through specific exercises and completion of a full-length play. Prerequisite: ENG 210 Introduction to Creative Writing (drama) or THP 260.

THP 372 Acting: Advanced Movement. (3)
once a year
Movement techniques for the classical and nonrealistic theatre. Studio. Prerequisite: THP 272 or written instructor approval.

THP 377 Acting: Voice and Speech. (3)
once a year
Introduces phonetic alphabet, exercises, and techniques for voice and speech improvement. Application to performance. Studio. Prerequisite: THP 277.

THP 378 Acting: Stage Dialects. (3)
once a year
Major dialects needed for actors; techniques for researching and learning dialects; phonetic analysis of dialects. Studio. Prerequisite: THP 377 or written instructor approval.

THP 385 Acting: Classical Scene Study. (3)
once a year
Rehearsal and performance of Shakespeare and other classical playwrights. Emphasizes understanding poetic language, vocal and physical skills. Studio. Prerequisites: THP 377; written instructor approval.

THP 386 Acting: The Meisner Approach. (3)
fall and spring
Improvisations and exercises developed by Sanford Meisner applied to scene work. Studio. Prerequisite with a grade of "B" (3.00) or higher: THP 101 or 102 or written instructor approval.

THP 387 Acting: TV and Film. (3)
fall and spring
Professional television and film acting techniques, terminology, and on-camera experience. Studio. Fee. Prerequisite with a grade of "B" (3.00) or higher: THP 101 or 102 or written instructor approval.

THP 388 Acting: Audition Techniques. (3)
once a year
Techniques and preparation for stage, commercial, and TV/film auditions utilizing monologues, cold readings, and personal style. Studio. Prerequisite with a grade of "B" (3.00) or higher: THP 101 or 102 or written instructor approval.

THP 394 Special Topics. (1–4)
fall and spring

THP 401 Theatre Practicum. (1–3)
fall and spring
Production assignments for advanced students of technical production, stage and business management, and design. May be repeated for credit. Prerequisites: THP 301; written instructor approval.

THP 406 Advanced Scenography. (3)
selected semesters
Process of production collaboration among scenographers, directors, and playwrights. Taught in conjunction with THP 519. Prerequisites: a combination of THP 214 and 340 and 345 or both THP 313 and 340.

THP 411 Methods of Teaching Drama. (3)
fall
Applies materials, techniques, and theories with grades K–8 youth. Regular participation with children. Prerequisite: THP 311 or written instructor approval.

THP 418 Directing the Actor. (3)
once a year
Practical applications of directing for the stage. Rehearsal and presentation of scenes and short plays. Prerequisites: THP 318; instructor approval.

THP 428 Theatre and the Future. (3)
fall and spring
Capstone course exploring visions of the future of theatre. Results in a project in creative or scholarly form. Prerequisites: THE 440; senior standing; Theatre major.

THP 430 Costume Design. (3)
selected semesters
Principles of costume design with projects in both modern and period styles. Includes budgets and fabric/pattern estimates. Lecture, studio. Prerequisite: THP 214.

THP 431 Advanced Costume Construction. (3)
selected semesters
Specialized training in costume construction problems and crafts with projects in tailoring, millinery, and period accessories. Prerequisites: both THP 214 and 331 or only instructor approval.

THP 435 Advanced Technical Theatre. (3)
selected semesters
Selection of materials, drafting of working drawings, tool operation, and construction techniques. 2 hours lecture, 2 hours lab. Prerequisites: both THP 340 and 345 or only written instructor approval.

THP 440 Advanced Scene Design. (3)
selected semesters
Advanced studio projects in designing scenery for a variety of stage forms. Fee. Prerequisite: THP 340 or written instructor approval.

THP 441 Scene Painting. (3)
selected semesters
Studio projects in painting stage scenery. Fee. Prerequisite: THP 340 or written instructor approval.

THP 442 Drawing. (3)
selected semesters
Techniques in drawing and rendering for scenic, costume, and lighting design. Prerequisite: written instructor approval.

THP 444 Drafting for the Stage. (3)
selected semesters
Fundamentals of and practice in graphic techniques for the stage. Introduces computer-aided design for the stage. 2 hours lecture, 3 hours studio. Fee. Prerequisites: THP 213; written instructor approval.

THP 445 Advanced Lighting Design. (3)
selected semesters
Specialized techniques in stage lighting. Advanced application of design process, graphic techniques of design presentation, and use of qualities of light. Lecture, class workshops. Fee. Prerequisite: THP 345 or written instructor approval.

THP 450 Theatre Organization and Management. (3)
once a year
Overview of nonprofit arts: organizational design, strategic planning, financial management, and leadership. Prerequisite: THE 220.

THP 460 Advanced Playwriting. (3)
selected semesters
Practice and study of creating characters, dialogue, scenes, plays, and monologues for the stage, culminating in a full-length script. May be repeated for credit. Studio, lecture. Prerequisite: instructor approval.

THP 461 Scripts in Progress. (3)
fall and spring
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 481 Secondary School Play Production. (3)
fall
Methods of directing, designing, and coordinating play production experiences at the secondary school level. Off-campus practicum. Prerequisite: THP 318 or instructor approval.

THP 482 Theatre for Social Change. (3)
fall and spring
Interactive theatre techniques (e.g., Boal, drama therapy, playback theatre) to examine and combat institutional, social, cultural, interpersonal, and personal oppressions. Lecture, lab.
General Studies: C

THP 483 Acting: Viewpoints and Composition. (3)
spring
Training in Anne Bogart's viewpoints and composition techniques; application to rehearsal and performance, and creating new work. Studio. Prerequisite: THP 207 or 285 or written instructor approval.

THP 484 Internship. (1–4)
selected semesters

THP 489 Acting: Career Development. (2)
selected semesters
Familiarization with the business of acting: self-promotional tools and techniques, marketing strategies, finances, interview skills, and actor unions. Studio. Prerequisites with a grade of "B" (3.00) or higher: both THP 101 (or 102) and junior (or senior) standing or only written instructor approval.

THP 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Advanced Screenwriting
- Performance and Technology
- Problems in Directing
- Storytelling
- Student Production Board
- Theory and Practice of Performance

THP 498 Pro-Seminar. (1–7)
once a year
Topics may include the following:
- Directing. (1–6)
- Theatre-for-Youth Tour. (1–6)
- Theatre in Education. (1–6)

Prerequisite: written instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Walter Cronkite School of Journalism and Mass Communication

cronkite.asu.edu **Stephen K. Doig, BA, Interim Director**

PURPOSE AND PHILOSOPHY

The faculty of the Walter Cronkite School of Journalism and Mass Communication offer a strong professional program that values applied scholarship. Faculty members combine excellent professional experiences with outstanding records as productive scholars.

The primary mission of the school is to

1. prepare students for careers in journalism and related fields;
2. examine mass communication through research and teaching, thereby preparing informed life-long consumers of the mass media; and
3. develop new approaches to practicing journalism in a university setting, providing ample opportunities for students and faculty to serve audiences beyond the classroom.

To that end, the school offers classroom instruction in a blend of conceptual courses (such as media law, media ethics, media history and media management) and professional skills courses (such as print and broadcast writing, editing, reporting, and production techniques). The school also offers on-campus media work experiences, including the campus newspaper *The State Press*; The Blaze radio station; "Newswatch," a weekly student-produced cable television news magazine; "ASU Web Devil"; and "Channel 2," the student-run campus cable station. Off-campus work experience opportunities include internships at newspapers, magazines, and television and radio stations. Other off-campus options include: public relations, visual journalism, sales and promotions, and media analysis and criticism.

ADMISSION

Preprofessional Admission

Students admitted to ASU also may be admitted to the Walter Cronkite School of Journalism and Mass Communication with preprofessional status. Preprofessional admission to the school does not guarantee admission to the upper-division professional program. All preprofessional students enrolling in courses in the school must complete a minimum of 12 semester hours with a minimum 2.50 GPA before they are permitted to enroll in school courses at the 200-level. All preprofessional students who intend to take courses beyond the 100-level must pass an English proficiency examination administered by the school.

Professional Program Admission

Admission to the Walter Cronkite School of Journalism and Mass Communication professional program, which enrolls students in their junior and senior years, is competitive and based on available resources. Once a student is granted admission, the upper-division professional program may require two years to complete.

A separate application procedure is required for entry to the upper-division professional program. To be eligible to apply for admission to the professional program, students must

1. be admitted to ASU as a classified student;
2. have completed at least 56 semester hours by the close of the semester in which the application is submitted;
3. have completed lower-division courses or their equivalents, as specified below;
4. have completed, with a passing score, the English proficiency examination administered by the school; and
5. have at least a 2.50 cumulative and major GPA.

Preprofessional status students must complete the following courses:

JMC 201 Journalism Newswriting *L*	3
MCO 110 Introduction to Mass Communication *SB* or MCO 120 Media and Society *SB* (3)	3
Total	6

To be considered for admission to the school's upper-division professional program, students must obtain an application form from the school office in STAUF A231, or online at cronkite.asu.edu. Precise application procedures and submission deadlines are outlined on the form. *Completion of the minimum requirements for eligibility does not guarantee admission to the upper-division professional program.* The admissions committee considers a variety of criteria, including major and cumulative GPA, media experience, writing ability, and commitment to the field. Students may apply twice.

ADVISING

Students should follow the sequence of courses outlined on school curriculum check sheets, their online degree audit, and the advice of the school's academic advisors.

Students who enroll as preprofessional or who seek and ultimately gain professional status should meet regularly with their Walter Cronkite School of Journalism and Mass Communication academic advisor. Conscientious, careful planning and early advising are crucial to students who desire to progress through the program in a timely fashion.

DEGREES

The school offers a program leading to one Bachelor of Arts degree in Journalism and Mass Communication. Students select one of five concentrations: journalism, media analysis and criticism, media management, media production, or strategic media and public relations.

The school offers a program leading to the graduate degree Master of Mass Communication.

TRANSFER STUDENTS

Transfer students must be admitted formally to ASU to be considered for admission to the professional program in the Walter Cronkite School of Journalism and Mass Communication.

Students completing their first two years of course work at a community college or four-year institution other than ASU should consult the school's academic advisors at least one full semester before they hope to be considered for admission to the school's professional program. Transfer student admission to ASU does not guarantee admission to the upper-division professional program.

PROGRAM REQUIREMENTS

Because the Walter Cronkite School of Journalism and Mass Communication is accredited by the Accrediting Council on Education in Journalism and Mass Communication, its students are required to take a minimum of 80 semester hours in courses outside the major of Journalism and Mass Communication, with no fewer than 65 semester hours in liberal arts and sciences. This requirement ensures that students receive a broad academic background.

At least 18 semester hours of major courses required by the school, including one writing course, must be taken at ASU. A student must receive a grade of "C" (2.00) or higher in all courses taken in the major and in the required related area.

BA REQUIREMENTS

All students are required to demonstrate proficiency in a language other than English (a spoken language or American Sign Language). Proficiency is defined as completing the second semester intermediate level, or higher, of a language other than English with a grade of "C" (2.00) or higher.

The undergraduate major in Journalism and Mass Communication consists of a minimum of 30 semester hours in Walter Cronkite School of Journalism and Mass Communication courses.

Required core courses (12 of the 30 to 39 hours are required of all students in all five concentrations):

JMC	201 Journalism Newswriting *L*	3
MCO	110 Introduction to Mass Communication *SB*	3
	or MCO 120 Media and Society *SB* (3)	
MCO	302 Media Research Methods	3
MCO	402 Mass Communication Law *L*	3
Total		12

The San Pablo residence hall on Tempe campus

Tim Trumble photo

Students complete the required core courses of the major (12 semester hours) plus the required courses of one concentration area (15 semester hours) and elective courses (from three to 12 hours) from other areas in the major.

These courses are in addition to other degree requirements. See "University Graduation Requirements," page 88.

Related Area. Each student is required to complete a 12-semester-hour related area to complement the courses taken in the major and concentration areas.

GENERAL STUDIES REQUIREMENTS

Students must satisfy the university General Studies requirement found in "General Studies," page 92. Students are advised to review carefully the appropriate school curriculum check sheet to be sure courses taken move the student toward graduation with the least amount of delay and difficulty. Note that all three General Studies awareness areas are required.

General education requirements for the Walter Cronkite School of Journalism and Mass Communication follow.

Students are required to take one course in each of the following areas: communication (applied speech), computer science, economics, English composition (beyond the freshman level), English literature, history, mathematics (numeracy requirement), two natural science lab courses, philosophy, political science (either POS 110 or 310), and psychology.

MINOR IN MASS COMMUNICATION

The Cronkite School of Journalism and Mass Communication offers a minor in Mass Communication consisting of the required course MCO 120 Media and Society and 12 additional semester hours (nine of which must be upper-division hours) of Tempe campus resident credit taken from a list of approved courses. The following courses are included:

JMC 200 Introduction to Electronic Media 3
JMC 270 Public Relations Techniques 3
MCO 240 Media Issues in American Pop Culture 3
MCO 418 History of Mass Communication *SB, H* 3
MCO 430 International Mass Communication *G* 3
MCO 435 Emerging Media Technologies 3
MCO 450 Visual Communication *HU* 3
MCO 456 Political Communication *SB* 3
MCO 460 Race, Gender, and Media *C* 3
MCO 473 Sex, Love, and Romance in the Mass Media *SB* 3
MCO 494 Special Topics 3

To take upper-division courses, the student must be at least a sophomore (25 semester hours). To pursue the minor in Mass Communication, the student must maintain a minimum 2.00 overall GPA, must obtain a minimum grade of "C" (2.00) in each course in the minor, and must have a major other than Journalism and Mass Communication.

BIS CONCENTRATION

A concentration in mass communication is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

COLLEGE OF EXTENDED EDUCATION

The university-wide College of Extended Education provides an interactive link between ASU and the diverse communities it serves. The college assesses lifelong learning requirements and works in partnership with campuses, other colleges, and the community to serve learners, using a network of locations, programs, schedules, and technologies.

For more information, see "College of Extended Education," page 703, or access the Web site at www.asu.edu/xed.

GRADUATE PROGRAM

Master of Mass Communication. The curriculum for the MMC degree is designed to help students achieve intellectual and professional growth, to prepare students for positions in the mass media, and to provide a background to enable those currently in the media to advance their careers. Information on the Master of Mass Communication program is detailed in the *Graduate Catalog.*

Walter Cronkite School of Journalism and Mass Communication

www.cronkite.asu.edu
480/965-5011
STAUF A231

Stephen K. Doig, Interim Director

Professors: Craft, Cronkite, Doig, Godfrey, Goldstein, Merrill, Sylvester, Watson

Associate Professors: Allen, Barrett, Bramlett-Solomon, Galician, Matera, Russell, Russomanno

Assistant Professors: Gavrilos, Schwalbe, Silcock

Clinical Professors: Itule, Leigh

Lecturer: Casavantes

Senior Administrative Professional: Leigh

JOURNALISM AND MASS COMMUNICATION (JMC)

JMC 200 Introduction to Electronic Media. (3)
fall, spring, summer
Surveys electronic media in the United States: history, regulation, organization, programming, and effects. Prerequisites: MCO 110 (or 120); successful completion of English proficiency exam; JMC major.

JMC 201 Journalism Newswriting. (3)
fall, spring, summer
Writing news for the print media. Fee. Prerequisites: ENG 101 (or 105); MCO 110 (or 120); successful completion of English proficiency exam; JMC major.
General Studies: L

JMC 202 Radio-Television Writing. (3)
fall and spring
Writing for electronic media, news, and continuity. Fee. Prerequisites: MCO 110 (or 120); successful completion of English proficiency exam; JMC major.
General Studies: L

JMC 235 Electronic Media Production. (3)
fall and spring
Introduces basic concepts of audio and video production. Introduces operation of portable cameras, recorders, microphones, lights, editing, and postproduction equipment. Prerequisites: MCO 110 (or 120); successful completion of English proficiency exam; JMC major.

JMC 270 Public Relations Techniques. (3)
fall, spring, summer
Theory and practice of publicity, public relations, and related techniques and procedures. Prerequisite: MCO 110 or 120.

JMC 300 Advanced Broadcast Newswriting. (3)
fall and spring
Technique and practice in newswriting for broadcast and cable applications. Fee. Prerequisites: JMC 201; JMC professional status.

JMC 301 Reporting. (3)
fall and spring
Fundamentals of news gathering, interviewing, and in-depth reporting. Fee. Prerequisites: JMC 201; JMC professional status.
General Studies: L

JMC 313 Introduction to Editing. (3)
fall and spring
Copyediting and headline writing. Electronic editing on personal computer terminals. Fee. Prerequisites: JMC 301; JMC professional status.

JMC 315 Broadcast News Reporting. (3)
fall and spring
News and information practices of networks, stations, and industry. Practice in writing, reporting, and editing with emphasis on audio. Prerequisites: JMC 301; JMC professional status.
General Studies: L

JMC 330 Advanced Broadcast Reporting. (3)
fall and spring
News and information practices of networks, stations, and industry. Advanced practice in writing, reporting, and editing with emphasis on video. Prerequisites: JMC 300, 301; JMC professional status.

JMC 332 Electronic Media Programming. (3)
fall and spring
Programming theory and evaluation, regulation, ethics, and responsibilities and basics of audience psychographics and effects. Prerequisites: JMC 200; JMC professional status.

JMC 345 Videography. (3)
fall and spring
Develops an understanding of visual storytelling and how to craft a good, compelling story with pictures and sound. Lecture, lab. Fee. Prerequisites: JMC 235; JMC professional status.

JMC 351 Photojournalism I. (3)
fall and spring
Basic camera, lighting, and scanning skills. Discusses ethics. Emphasizes shooting pictures for newspaper assignments on deadline. Students should have a 35mm (film) camera. Fee. Prerequisite: JMC 201 or instructor approval.

JMC 401 Advanced Public Relations. (3)
fall and spring
Advanced theory and practice of publicity, public relations, and related techniques and procedures. Prerequisites for undergraduates: JMC 270; JMC professional status.

JMC 412 Editorial Interpretation. (3)
selected semesters
The press as an influence on public opinion. Role of the editorial in analyzing and interpreting current events. Prerequisites for undergraduates: JMC 301; JMC professional status.

JMC 413 Advanced Editing. (3)
fall and spring
Theory and practice of newspaper editing, layout and design, picture and story selection. Fee. Prerequisites for undergraduates: JMC 313; JMC professional status.

JMC 414 Electronic Publication Design. (3)
fall and spring
Theory, organization, and practice of layout, typography, and design in traditional and multimedia publishing. Fee. Prerequisites for undergraduates: JMC 270; JMC professional status.

JMC 415 Writing for Public Relations. (3)
fall and spring
Development of specific writing techniques for the practitioner in public relations agencies and divisions of major organizations. Fee. Prerequisites for undergraduates: JMC 270; JMC professional status.

JMC 417 Public Relations Campaigns. (3)
fall and spring
Theory, principles, and literature of public relations and how they relate to audiences, campaigns, and ethics. Prerequisite: JMC 401. Prerequisite for undergraduates: JMC professional status.

JMC 420 Reporting Public Affairs. (3)
fall and spring
Instruction and assignments in reporting the courts, schools, government, city hall, social problems, and other areas involving public issues. Prerequisites for undergraduates: JMC 301; JMC professional status.

JMC 425 Online Media. (3)
fall and spring
Focuses on the Internet from the perspective of the journalist—the best way to tell a story using words, photos, video, and audio. Lecture, lab. Fee. Prerequisites: JMC 201 (or its equivalent); JMC professional status.

JMC 433 Media Sales and Promotion. (3)
fall and spring
Basics of electronic media marketing practices, including commercial time sales techniques and radio/TV promotion fundamentals. Prerequisites for undergraduates: JMC 200; JMC professional status.

JMC 437 Documentary Production. (3)
fall and spring
Emphasizes individual production projects of the student's own conception and design utilizing studio, field, and postproduction techniques. Prerequisites for undergraduates: JMC 235; JMC professional status.

JMC 440 Magazine Writing. (3)
fall and spring
Writing and marketing magazine articles for publication. Prerequisites for undergraduates: JMC 301; JMC professional status.

JMC 445 Science Writing. (3)
once a year
Develops writing, interviewing, reporting skills, and an understanding of key concepts in science. Lecture, lab. Fee. Prerequisites: student in BA in Journalism and Mass Communication or MMC in Mass Communication; instructor approval.

JMC 451 Photojournalism II. (3)
fall
Emphasizes shooting and Photoshop skills for newspaper and magazine assignments. Film and digital photography, flash and studio lighting. Fee. Prerequisite: JMC 351. Prerequisite for undergraduates: JMC professional status.

JMC 452 Photojournalism III. (3)
spring
Continued practice in shooting (film and digital) and Photoshop skills for newspapers and magazines. Emphasizes single images, picture stories, editorial illustrations, and portfolio development. 2 hours lecture, 2 hours lab. Fee. Prerequisite: JMC 451. Prerequisite for undergraduates: JMC professional status.

JMC 465 Precision Journalism. (3)
fall and spring
Advanced reporting methods using Internet research and data analysis tools for beat and investigative stories. Lecture, lab. Fee. Prerequisites for undergraduates: JMC 301; JMC professional status.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

JMC 470 Depth Reporting. (3)
fall and spring
Introduces strategies for writing in-depth newspaper or magazine articles. Lecture, lab. Fee. Prerequisites for undergraduates: JMC 301; JMC professional status; instructor approval.

JMC 472 Media Management. (3)
fall, spring, summer
Management principles and practices, including organization, procedures, policies, personnel problems, and financial aspects of station management. Pre- or corequisites for undergraduates: JMC 332; JMC professional status.

JMC 475 Television Newscast Production. (3)
fall and spring
Writing, reporting, and production of the television newscast. Prerequisite: instructor approval. Prerequisite for undergraduates: JMC professional status.

JMC 494 Special Topics. (1–4)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

MASS COMMUNICATION (MCO)

MCO 110 Introduction to Mass Communication. (3)
fall and spring
Organization, function, and responsibilities of the media and adjunct services. Primary emphasis on newspapers, radio, television, and magazines. Credit is allowed for only MCO 110 or 120. Prerequisite: ENG 101 or 105 or 107.
General Studies: SB

MCO 120 Media and Society. (3)
fall, spring, summer
Role of newspapers, magazines, radio, television, and motion pictures in American society. Credit is allowed for only MCO 120 or 110. Designed for nonmajors.
General Studies: SB

MCO 240 Media Issues in American Pop Culture. (3)
fall and spring
Examines the production and consumption of popular culture as disseminated by the mass media with emphasis on the societal implications. Lecture, discussion.

MCO 302 Media Research Methods. (3)
fall, spring, summer
Surveys research methods used in the social sciences, with a focus on mass communication. Prerequisite: JMC professional status.

MCO 402 Mass Communication Law. (3)
fall, spring, summer
Legal aspects of the rights, privileges, and obligations of the press, radio, and television. Prerequisites: 87 earned hours; JMC professional status.
General Studies: L

MCO 418 History of Mass Communication. (3)
fall and spring
American journalism from its English and colonial origins to the present day. Development and influence of newspapers, magazines, radio, television, and news gathering agencies.
General Studies: SB, H

MCO 421 Media Problems. (3)
fall and spring
Trends and problems of the mass media, emphasizing editorial decisions in the processing of information. Prerequisite: JMC professional status.

MCO 430 International Mass Communication. (3)
fall and spring
Comparative study of communication and media systems. Information gathering and dissemination under different political and cultural systems.
General Studies: G

MCO 435 Emerging Media Technologies. (3)
once a year
Surveys new telecommunication technologies in a convergent environment.

MCO 440 Applied Media Research. (3)
fall and spring
Design, conduct, and analysis of applied media research. Students participate in the Cactus State Poll. Lab setting. Prerequisite: JMC professional status.

MCO 450 Visual Communication. (3)
fall, spring, summer
Theory and tradition of communication through the visual media with emphasis on the continuity of traditions common to modern visual media.
General Studies: HU

MCO 453 American Political Film. (3)
fall and spring
Studies the depiction of the American political process, especially the electoral process, through film. Lecture, discussion.

MCO 456 Political Communication. (3)
fall and spring
Theory and research related to political campaign communication. The persuasive process of political campaigning, the role of the media, the candidate, and image creation.
General Studies: SB

MCO 460 Race, Gender, and Media. (3)
spring and summer
Reading seminar designed to give a probing examination of the interface between AHANA Americans and the mass media in the United States. Lecture, discussion. Cross-listed as AFR 460. Credit is allowed for only AFR 460 or MCO 460.
General Studies: C

MCO 464 Media and Politics: The Fourth Estate. (3)
fall and spring
Understanding and articulation of the place of the press as the Fourth Estate in the political life of the U.S.

MCO 470 Issues Management and Media Strategy. (3)
selected semesters
Strategic aspects of media planning and management in public relations, public affairs, crisis communication lobbying, media ethics, and government relations. Seminar. Prerequisite: JMC professional status.

MCO 473 Sex, Love, and Romance in the Mass Media. (3)
fall, spring, summer
The role of the mass media in constructing and/or reinforcing unrealistic mythic and stereotypic images of sex, love, and romance. Lecture, discussion. Prerequisites for nonmajors: 24 hours; 2.00 GPA. Prerequisites for majors: 40 hours; 2.50 GPA.
General Studies: SB

MCO 494 Special Topics. (3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

College of Law

www.law.asu.edu **Patricia D. White, JD, Dean**

PURPOSE

As the only law school in the fifth largest U.S. metropolitan area and Arizona's capital, the College of Law plays a significant role in the legal profession nationally and serves as the region's principal intellectual center for the profession. In addition to training men and women for the profession and related assignments, the college contributes to the creation and administration of law and justice through the efforts of its faculty and students.

ORGANIZATION

Law Building and Law Library

The John S. Armstrong Law Building is located near other colleges on the university's Tempe campus. The Law Building provides every modern facility for legal education and has been described by experts involved in law building planning 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. The library houses a collection of more than 406,000 volumes and microform volume equivalents. The collection includes a broad selection of Anglo-American case reports and statutes as well as legal treatises, periodicals, encyclopedias, digests, citators, and administrative materials. The collection also includes a growing selection of special materials dealing with international law, Indian law, Mexican law, English legal history, and law and technology.

The library, housed in a dramatic and functional building that opened in August 1993, is also a selective U.S. government depository. The building provides accessible shelving for the expanding collections and comfortable study space at carrels, tables, and lounge seating located throughout the library. Additionally, the law library has a 20-station computer lab, LEXIS and WESTLAW rooms with 10 stations each, 27 meeting and study rooms, a microforms facility, and a classroom. Both buildings are equipped with wireless Ethernet access.

Students may access 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 maintained in all university libraries comprise more than 3 million volumes.

Special Programs

Center for the Study of Law, Science, and Technology. The Center, founded by the Arizona Board of Regents in 1984, is a multidisciplinary research center and a national leader in training law students to understand and manage the legal implications of new technologies. The center anticipates issues raised by new knowledge, stimulates dialogue between legal and scientific scholars, and conducts research that promotes the legal community's engagement with scientific and technological developments. The unique breadth of faculty expertise within the College of Law—28 faculty members are center fellows—supports course offerings in a broad range of law, science, and technology subjects, such as scientific evidence, intellectual property and cyberlaw, behavioral biology, health care and bioethics, information and communication technologies, statistics and mathematical methods, biotechnology, environmental and natural resource law and policy, and risk management. A certificate program provides coherence and structure to student academic development; there are specializations in intellectual property, health care law, and environmental law. Externships in the local legal community provide students with hands-on experience under the guidance of skilled practitioners. The center's Technology Transfer Clinic provides a unique applied clinical experience where students evaluate inventions generated by ASU researchers, devise marketing strategies, and file patent documentation. The center is a key player in several contemporary debates within the legal academic community. For example, it sponsors an annual conference on genetics and the law. It also sponsors a speaker series each semester that attracts the country's best legal scholars. The center also copublishes, with the American Bar Association Section of Science and Technology Law, *Jurimetrics: The Journal of Law, Science, and Technology*, the oldest and most widely circulated journal in the field of law and science. Students serve as editors and officers of the journal, editing articles for publication, conducting research, and developing and writing articles under the direction of the faculty editor.

Indian Legal Program. The Indian Legal Program was established in 1988 to provide legal education to law students on topics in Indian law, generate scholarship in Indian law, and provide public service to tribal governments. The college is a strong choice for students interested in studying Native American legal systems, federal Indian law, and the complex issues confronting Indian nations and individuals.

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 have the opportunity to participate in all phases of the Indian Legal Program and gain an 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 and government, gaming, and American Indian cultural resources protection 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 students with an outstanding legal education and a firm grounding in both the theoretical and practical aspects of Indian law.

Clinical Program. The College of Law's Clinical Program provides second- and third-year students with an opportunity to handle actual cases with the direct guidance of skilled faculty members. The college offers six real-client clinics: the Civil Practice Clinic, the Criminal Practice Clinic, the Public Defender Clinic, the Mediation Clinic, the Technology Ventures Clinic, and the Indian Law Clinic. The college's extensive and diverse clinical program allows students to choose among a variety of different work environments.

The Civil Practice Clinic, for example, operates as a functioning law firm within the college, while students in the criminal litigation clinics work in prosecution or public defender agencies in the Phoenix area. Students in the Mediation Clinic learn how to facilitate the resolution of disputes without litigation, and students serve as mediators in real disputes in the small claims court system. Students in the Technology Ventures Clinic work collaboratively with students from other disciplines to analyze technology portfolios and participate in an intellectual property review process for technologies. Finally, students provide legal assistance to tribal communities and governments through the Indian Law Clinic. To help prepare for participation in a clinic, second-year students are offered "simulation-based" courses in lawyering theory and practice, trial advocacy, pretrial practice, and negotiation.

Committee on Law and Philosophy. Both the College of Law and the College of Liberal Arts and Sciences have groups of excellent faculty with expertise in the philosophy of the law and related areas of moral and political philosophy. These faculty members have been brought together to form the Committee on Law and Philosophy. The overall goal of the committee is to create and maintain a rich and active intellectual community in this area and to use the resources of that community to offer conferences, lectures, courses, and seminars. Areas of particular interest to members of the committee include criminal law theory, punishment, forgiveness, constitutional interpretation, human rights theory, law and literature, law and religion, and political obligation.

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 Services, Box 2000, Newtown, Pennsylvania 18940, in centers throughout the country.

For more information regarding admission, call 480/965-1474 or write

ADMISSIONS OFFICE
COLLEGE OF LAW
ARIZONA STATE UNIVERSITY
PO BOX 877906
TEMPE AZ 85287-7906

Retention Standards

To be eligible to continue in the College 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 automatically placed on probation. Continuation of enrollment for 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 consecutive 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. Cases in which the GPA deficiency is slight and evidence of extenuating circumstances is convincing, readmission may be granted on a probationary status after a review of the reasons contributing to unsatisfactory performance and a finding that there is substantial prospect for acceptable academic performance. Continuation in the College of Law 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 *Statement of Student Policies*, which is available on the college's Web site at www.law.asu.edu.

Honor Code. The legal profession, a self-regulating association, 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 Association and is a member of the Association of American Law Schools.

JURIS DOCTOR DEGREE

The College of Law offers a three-year program of professional studies at the graduate level leading to the degree of Juris Doctor.

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 program, 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 basic legal processes.

As a part of the program, first-year students are assigned to small sections. In the Legal Research and Writing program, first-year students prepare legal briefs and memoranda and receive feedback through the use of practice examinations. The 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 externships.

MORE INFORMATION

Further detailed information concerning the course of study, admission practices, expenses, and financial assistance can be found on the college's Web site at www.law.asu.edu. To request application forms, call 480/965-7207 or write

ADMISSIONS OFFICE
COLLEGE OF LAW
ARIZONA STATE UNIVERSITY
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.asu.edu
480/965-6181
LAW 101

Patricia D. White, Dean

Andrew Askland, Director
Center for the Study of Law, Science, and Technology

Catherine O'Grady, Executive Director,
Clinical Programs

Jeffrie G. Murphy, and James Nickel, Codirectors,
Committee on Law and Philosophy

Kathlene Rosier, Director,
Indian Legal Program

Judith M. Stinson, Director,
Legal Research and Writing and Academic Success Programs

Regents' Professors: Kaye, Murphy

Professors: Bartels, Bender, Berch, Calleros, Clinton, Ellman, Feller, Gorman, Gover, Grey, Guerin, Herrera, Kader, Karjala, Lowenthal, Lynk, Marchant, Nickel, Noreuil, O'Grady, Rose, Saks, Schatzki, Schroeder, Stanton, Strouse, Tsosie, Tucker, Weinstein, M. White, P. White, Winer

Visiting Professors: Barnes, Crimm, Davis, Spritzer

Associate Professors: Brauner, Chodorow, Demaine, Fellmeth, Gopolan, Jinks, Kittrie, Sigler, Sylvester

Clinical Professors: Dallyn, Dauber, Hinshaw

Legal Writing Instructors: Davis, Popko

Senior Instructional Professional: Stinson

LAW (LAW)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog,* or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

College of Liberal Arts and Sciences

www.asu.edu/clas

David A. Young, PhD, Vice President and Dean

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 Barrett 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 Division of Graduate Studies 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 the School of Global Studies, the Hugh Downs School of Human Communication, the School of Justice and Social Inquiry, the School of Life Sciences, 20 academic departments, several interdisciplinary programs, 10 centers, and several research institutes and laboratories. The college offers 40 programs leading to a bachelor's degree, 31 programs leading to a master's degree, 22 programs leading to a doctoral degree, and interdisciplinary graduate programs in cooperation with other colleges. Undergraduate customized interdisciplinary degrees are also available.

For more information, access 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 "exploratory/undeclared" prelaw or "exploratory/undeclared" premedicine. Students with 50 or more hours must declare a major to be accepted into the college.

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.

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 major of Economics must have an ASU cumulative GPA of at least 2.50.) Current ASU students who are changing their majors to CLAS from another ASU college must first contact the advisor in the department they are moving to.

Transfer Students. The university standards for evaluation of transfer credit are listed under "Transfer Credit," page 69. All students who meet the university standards are admissible to CLAS. Transfer students are urged to contact the relevant academic department or the Office of Undergraduate Programs in FOUND 1120, 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 FOUND 1120. 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 70).

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 and deadlines pertaining to enrollment, adding/dropping classes, and withdrawals.

In addition to information provided by an advisor, students must read the requirements for university General Studies, college graduation, and major degree requirements in their edition of the ASU *General Catalog*. See "General Studies," page 92, "University Graduation Requirements," page 88, "CLAS Graduation Requirements," page 331, and the section of the department offering the major. The ASU *General Catalog* is the governing source for all degree requirements.

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, on this page.

The Office of Undergraduate Programs, in FOUND 1120, 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
Career advising (all majors)	FOUND 1120 (480/965-6506)
Declared majors	Department of major
Exploratory/undeclared, prelaw	FOUND 1120 (480/965-6506)
Exploratory/undeclared, premedical	Pre-Health Professions, 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 of Undergraduate Programs in FOUND 1120).

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

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

encouraged to check their mandatory advising status each semester before attempting registration transactions.

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.

Advising for Preprofessional Programs

Professional Field	Office Where Advisor Is Located
Dentistry[1, 2]	Pre-Health Professions, LSC 206C
Foreign service	Department of chosen major
Health physics	Pre-Health Professions, LSC 206C
Law	Office of Undergraduate Programs, FOUND 1120
Medicine[1]	Pre-Health Professions, LSC 206C
Ministry	Department of Religious Studies, ECA 365
Occupational therapy[1]	Pre-Health Professions, LSC 206C
Optometry[1, 2]	Pre-Health Professions, LSC 206C
Osteopathy[1]	Pre-Health Professions, LSC 206C
Pharmacy[1]	Pre-Health Professions, LSC 206C
Physical therapy[1]	Pre-Health Professions, LSC 206C
Podiatry[1, 2]	Pre-Health Professions, LSC 206C

[1] Students preparing for a career in these areas should register in the Pre-Health Professions office, 480/965-2365.

[2] No school in Arizona offers a program in dentistry, optometry, or podiatry. Students interested in pursuing these professions should confer with Pre-Health Professions advisors concerning out-of-state schools where they may complete their training.

Pre-Health Professions. Students pursuing professional schools in the health professions must choose a major offered by ASU. However, certain specific courses must be taken to prepare the student to take the MCAT or other entrance examinations and to succeed in postbaccalaureate training. Therefore, students who plan to pursue a health profession should meet regularly with the Pre-Health Professions office for guidance. While this guidance does not replace the need to meet with an advisor in the department of the student's major, pre-health advising is a necessary supplement. To schedule a meeting with Pre-Health Professions, located in LSC 206, call 480/965-2365.

Prelaw. The American Bar Association does not recommend any specific major for students who wish to apply to law school upon graduation. ASU does not have a "prelaw" degree program. Therefore, students should select a major that interests them. Recent surveys of law school graduates indicate that students would be well advised to take one or two semesters of accounting as a supplement to their major curriculum. In addition, the American Bar Association recommends a variety of courses in the classics, in economics, and in mathematical reasoning. Courses that engage the student in intense critical analysis and a substantial amount of writing are also recommended. As the student approaches the second semester of his or her junior year, the student should contact the prelaw advisor in the college or department of his or her major to obtain information regarding the procedure to apply to law school.

Career Advising: CLASWorks. A degree in the liberal arts and sciences prepares a student for careers that include but are not limited to business, government/public service, nonprofit organizations, the arts, science and research, and most corporate environments. By the time of graduation, CLAS students have developed the ability to solve problems, analyze data, communicate ideas, and execute complex plans. To identify career paths that best fit a student's interests and talents, the Office of Undergraduate Programs offers individualized career advising. To make an appointment, call 480/965-6506.

Internships. All students are encouraged to complete at least one internship before graduation. Many CLAS disciplines have well-established internship programs, so students should begin with their academic departments. Contact information may be found on the Web at www.asu.edu/clasworks. To develop a successful internship experience, students are encouraged to meet with the director of CLASWorks for a career advising session soon after arriving on campus.

DEGREES

Majors. Programs leading to the BA and BS 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 329. Each major is administered by the academic department indicated.

Concurrent degrees and second baccalaureate degrees. Students who wish to pursue a concurrent degree in CLAS may not double count courses from one major to the other. Each major must consist of a minimum of 30 semester hours unique to that major. Similarly, students who earn one baccalaureate degree may not earn a second baccalaureate degree in the same major or in a major that does not contain 30 core hours unique to that major. For example, a student may not pursue a degree in two life science fields (with the exception of Clinical Laboratory Sciences).

Minors. Although not required for graduation, special college-approved minors are available in most departments. Check department program descriptions for details. Minors 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" (2.00) 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 the Tempe campus.

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

College of Liberal Arts and Sciences Baccalaureate Degrees and Majors

Major	Degree	Concentration[1]	Administered By
African and African American Studies	BA	Humanities/arts, politics and society, or social and behavioral sciences	African and African American Studies Program
American Indian Studies	BS	—	American Indian Studies Program
Anthropology	BA	—	Department of Anthropology
Asian Languages (Chinese/ Japanese)	BA	—	Department of Languages and Literatures
Biochemistry	BA	—	Department of Chemistry and Biochemistry
	BS	Optional: medicinal chemistry[1]	Department of Chemistry and Biochemistry
Biology	BS	Optional: biology and society[1]	School of Life Sciences
Chemistry	BA	—	Department of Chemistry and Biochemistry
	BS	Optional: environmental chemistry[1]	Department of Chemistry and Biochemistry
Chicana and Chicano Studies	BA	Humanities/cultural sciences or social sciences/policy	Department of Chicana and Chicano Studies
Clinical Laboratory Sciences	BS	—	School of Life Sciences
Communication	BA, BS	—	Hugh Downs School of Human Communication
Computational Mathematical Sciences	BS	—	Department of Mathematics and Statistics
Conservation Biology	BS	—	School of Life Sciences
Economics	BA, BS	—	Department of Economics[2]
English	BA	Creative writing, linguistics, or literature	Department of English
Family and Human Development	BS	Optional: family studies/child development[1]	Department of Family and Human Development
French	BA	—	Department of Languages and Literatures
Geography	BA, BS	Meteorology-climatology or urban studies	Department of Geography
Geological Sciences	BS	—	Department of Geological Sciences
German	BA	—	Department of Languages and Literatures
History	BA	—	Department of History
Integrated Studies	BA, BS	—	College of Liberal Arts and Sciences
Italian	BA	—	Department of Languages and Literatures
Justice Studies	BS	—	School of Justice and Social Inquiry
Kinesiology	BS	Exercise science, movement science, or teacher preparation	Department of Kinesiology
Mathematics	BA	—	Department of Mathematics and Statistics
	BS	Optional: statistics[1]	Department of Mathematics and Statistics
Microbiology	BS	—	School of Life Sciences
Molecular Biosciences/ Biotechnology	BS	—	School of Life Sciences

[1] If a major offers concentrations, one must be selected unless noted as *optional*.

[2] The department is in the W. P. Carey School of Business, which also offers this major, with different requirements.

College of Liberal Arts and Sciences Baccalaureate Degrees and Majors (continued)

Major	Degree	Concentration[1]	Administered By
Philosophy	BA	—	Department of Philosophy
Physics	BS	—	Department of Physics and Astronomy
Plant Biology	BS	Environmental science and ecology or plant biochemistry and molecular biology	School of Life Sciences
Political Science	BA	—	Department of Political Science
	BS	—	Department of Political Science
Psychology	BA, BS	—	Department of Psychology
Religious Studies	BA	—	Department of Religious Studies
Russian	BA	—	Department of Languages and Literatures
Sociology	BA	—	Department of Sociology
Spanish	BA	—	Department of Languages and Literatures
Speech and Hearing Science	BS	—	Department of Speech and Hearing Science
Women and Gender Studies	BA	—	Women and Gender Studies Program

[1] If a major offers concentrations, one must be selected unless noted as *optional*.

[2] The department is in the W. P. Carey School of Business, which also offers this major, with different requirements.

with an academic advisor in the department offering the minor or the Office of Undergraduate Programs in FOUND 1120.

Refer to the CLAS portion of the "ASU Minors" table, page 118.

Graduate Degrees. See the "College of Liberal Arts and Sciences Graduate Degrees and Majors" table, page 334. Refer to the *Graduate Catalog* for requirements.

COLLEGE OF EXTENDED EDUCATION

The university-wide College of Extended Education provides an interactive link between ASU and the diverse communities it serves. The college assesses lifelong learning requirements and works in partnership with campuses, other colleges, and the community to serve learners, using a network of locations, programs, schedules, and technologies.

For more information, see "College of Extended Education," page 703, or access the Web site at www.asu.edu/xed.

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 88.

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 92. Note that all three General Studies awareness areas are required. Consult an advisor for an approved list of courses.

General Studies courses are listed in the "General Studies Courses" table, page 94, 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.

To graduate from CLAS, a student must satisfy college requirements in addition to university General Studies requirements. These requirements consist of *major requirements* which involve concentrated course work in a selected field; and CLAS *graduation requirements* which ensure that the student demonstrates proficiency in a second language while exposing 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 the Tempe campus.

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" (2.00). 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" (2.00) had the normal grading scheme been used.

See the individual departments for other minimum grade requirements.

C. Major fields of study are classified into the following three divisions:

1. Humanities:
   - Asian Languages (Chinese/Japanese) (CHI/JPN)
   - Chicana and Chicano Studies (CSH)
   - English (ENG)
   - French (FRE)
   - Film and Media Studies (FMS)
   - German (GER)
   - History (HST)
   - Italian (ITA)
   - Philosophy (HPS, PHI)
   - Religious Studies (REL)
   - Russian (Only meets CLAS graduation requirements in humanities if at least two upper-division literature or civilization courses are taken.) (RUS)
   - Spanish (SPA)
2. Natural sciences and mathematics:
   - Biochemistry (BCH)
   - Biology (BIO)
   - Chemistry (CHM)
   - Clinical Laboratory Sciences (CLS)
   - Computational Mathematical Sciences (MAT)
   - Conservation Biology (BIO)
   - Geological Sciences (GLG)
   - Kinesiology (KIN)
   - Mathematics (MAT)
   - Microbiology (MIC)
   - Molecular Biosciences/Biotechnology (MBB)
   - Physics (AST, PHS, PHY)
   - Plant Biology (PLB)
   - Psychology (PGS, PSY)
   - Speech and Hearing Science (SHS)
3. Social Sciences:
   - African and African American Studies (AFH, AFS)
   - American Indian Studies (AIS)
   - Anthropology (ASB)
   - Chicana and Chicano Studies (CSS)
   - Communication (COM)
   - Economics (ECN)
   - Family and Human Development (CDE, FAS)
   - Geography (GCU)
   - Global Studies (SGS)
   - History (HST)
   - Justice and Social Inquiry (JUS)
   - Political Science (POS)
   - Sociology (SOC)
   - Women and Gender Studies (WSH, WST)

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 in section I, subsection C.

Unless the major field notes otherwise in section I, subsection C, students are considered to have fulfilled the CLAS graduation requirements in the division of the major.

Students majoring in African and African American Studies or Chicana and Chicano Studies satisfy the CLAS graduation requirements in either the humanities or the social and behavioral sciences, depending upon their concentrations; that is, these students fill the CLAS requirements within the concentration of their major only. They may not use courses in the department to fill the CLAS requirements outside their major concentration.

Students majoring in Women and Gender Studies may complete the CLAS Social and Behavioral Sciences distribution area using courses within the major.

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 Psychology majors to satisfy the CLAS graduation requirements in the natural sciences and mathematics.

Note: Courses used to fill the university General Studies requirement in Humanities and Fine Arts (HU), Social and Behavioral Sciences (SB), or laboratory sciences (SQ or SG) may not be used to fill CLAS graduation requirements in the humanities, social and behavioral sciences, and the natural sciences and mathematics.

A. Humanities (six semester hours). Each student is required to complete two upper-division courses of at least three semester hours each. Course prefixes are identified in the following section.

Course prefixes for the CLAS graduation requirement in the Humanities:

1. AFH (African and African American Studies Program)
2. CSH (Department of Chicana and Chicano Studies)
3. ENG (Department of English)
4. FMS (Film and Media Studies)

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

5. CHI, FLA, FRE, GER, GRK, HEB, ITA, JPN, KOR, LAT, POR, RUS, SCA, SPA (Department of Languages and Literatures; literature or "civilization" courses at the 300 level or above that are not also used to meet the minimum language proficiency requirement)
6. HPS (School of Life Sciences)
7. HUM (Humanities)
8. PHI (Department of Philosophy)
9. REL (Department of Religious Studies; religion, Bible, or theology courses from sectarian institutions may not be used to fill any CLAS Humanities requirement; such courses may be used only for elective credit toward a student's graduation).
10. WSH (Women and Gender Studies Program)

B. Natural sciences and mathematics (six semester hours). Each student is required to complete two courses of at least three semester hours each.

Course prefixes for the CLAS graduation requirements in the natural sciences and mathematics:

1. ASM (Department of Anthropology)
2. BIO (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 Geological Sciences)
7. MAT, STP (Department of Mathematics and Statistics)

   Note: Only MAT 119 and 170 or higher may be used to satisfy the CLAS graduation requirements in Natural Sciences and Mathematics.
8. MIC (Microbiology)
9. AST, PHS, PHY (Department of Physics and Astronomy)
10. PLB, MBB (Plant Biology)
11. PSY (Department of Psychology)

C. Social sciences (six semester hours). Each student is required to complete two upper-division courses of at least three semester hours each. Course prefixes of approved courses are identified in the following section.

Course prefixes for the CLAS graduation requirements in the social and behavioral sciences:

1. AFS (African and 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. HST (Department of History)
7. PGS (Department of Psychology)
8. POS (Department of Political Science)
9. SGS (School of Global Studies)
10. SOC (Department of Sociology)
11. WST (Women and Gender 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 verify if an earlier WST course should be considered WSH or WST.

D. Bridge course requirement (three semester hours). Each student is required to complete one CLAS bridge course of at least three semester hours. Bridge courses contain substantial content that bridges at least two of the areas of inquiry noted in sections *A*, *B*, and *C*. Bridge courses cannot be double-counted to fill any other CLAS graduation requirement or the HU, SB, SQ, or SG portions of the General Studies requirement. Bridge courses may be double-counted with the major or Literacy and Critical Inquiry, Mathematical Studies, or any of the awareness areas when applicable.

For a list of currently approved CLAS bridge courses, access the Web site at asu.edu/clas/bridgecourses.

E. Second Language Requirement. Each student is required to demonstrate proficiency by completing the courses in a second language specified below with a grade of "C" (2.00) 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, those students completing this requirement in Ancient Greek must take both GRK 301 and 302; students completing the requirements in Portuguese or Romanian must complete POR 314 or ROM 314);
2. a foreign language course at the 300 level or higher taught in the foreign language and having 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 Language IV or its equivalent.

F. Students are required to take a minimum of MAT 119 or higher. A grade of "C" (2.00) or higher must be earned in the chosen Mathematics course.

III. General Electives. Most CLAS majors can meet all of the above requirements with fewer than the 120 semester hours required for graduation. Remaining hours are general electives that may be selected from any of the

departments of CLAS and from the offerings of the other colleges.

Declaration of Graduation. The 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 should run a new Degree Audit Reporting System report every semester to gauge how well they are meeting all requirements for graduation. Students should contact the Office of Undergraduate Programs, in FOUND 1120, regarding college graduation rules and deadlines. Deadlines for filing the 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 declaration of graduation before registering for the next semester.

Credit Requirement. All candidates for graduation in the BA and BS 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 cumulative GPA of 2.00 is required for graduation.

Concurrent Degrees. Students who wish to obtain concurrent degrees must realize that there are certain combinations that would not be approved because there is too great an overlap between the courses required for each major. For example, students may not obtain concurrent degrees in two life sciences. Students who wish to obtain concurrent degrees may not double-count courses from one major to the next, but must have at least 30 different semester hours in each major.

Course Load. The normal course load is 15 to 16 semester hours. First-semester freshmen and entering transfer students 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 of Undergraduate Programs, in FOUND 1120, before registration. Any petition for an overload in excess of 21 hours must be presented to the Standards Committee of the college. No student should assume that his or her petition for overload will be granted.

SPECIAL CREDIT OPTIONS

Pass/Fail Grade Option. The pass/fail grade option is intended to broaden the education of Liberal Arts and Sciences 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 during 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 graduation requirements or the General Studies requirement.

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 81.

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 circumstances must exist for a degree-seeking student to take Independent Learning courses. Any enrollment in such courses must have the prior approval of the college.

ACADEMIC STANDARDS

The standards for GPA and the terms of probation, disqualification, reinstatement, and appeal are identical to those of the university as set forth under "Retention and Academic Standards," page 84, 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 academic good standing (see "Academic Good Standing," page 84) 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 academic good standing 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 to good standing; 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 automatically readmitted. Such students, as well as all disqualified

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

College of Liberal Arts and Sciences Graduate Degrees and Majors

Major	Degree	Concentration[1]	Administered By
Anthropology	MA	Archaeology, bioarchaeology, linguistics, museum studies, physical anthropology, or social-cultural anthropology	Department of Anthropology
	PhD	Archaeology, physical anthropology, or social-cultural anthropology	Department of Anthropology
Asian Languages and Civilizations—Chinese/Japanese	MA	—	Department of Languages and Literatures
Audiology	AuD	—	Department of Speech and Hearing Science
Biology	MS, PhD	Optional: ecology[1]	School of Life Sciences
Chemistry	MS, PhD	Analytical chemistry, biochemistry, geochemistry, inorganic chemistry, organic chemistry, physical chemistry, or solid-state chemistry	Department of Chemistry and Biochemistry
Communication	MA	—	Hugh Downs School of Human Communication
	PhD	Communicative development, intercultural communication, or organizational communication	Hugh Downs School of Human Communication
Communication Disorders	MS	—	Department of Speech and Hearing Science
Computational Biosciences	PSM	—	College of Liberal Arts and Sciences
Creative Writing[2]	MFA	—	Creative Writing Committee
English	MA	Comparative literature, English linguistics, literature and language, or rhetoric and composition	Department of English
	PhD	Literature or rhetoric/composition and linguistics	Department of English
Exercise Science[2]	PhD	Biomechanics, motor behavior/sport psychology, or physiology of exercise	Committee on Exercise Science
Family and Human Development	MS	Optional: family studies[1]	Department of Family and Human Development
Family Science	PhD	Optional: marriage and family therapy[1]	Department of Family and Human Development
French	MA	Comparative literature, linguistics, or literature	Department of Languages and Literatures
Geographic Information Systems	MAS	—	Department of Geography
Geography	MA, PhD	—	Department of Geography
Geological Sciences	MS, PhD	—	Department of Geological Sciences
German	MA	Comparative literature, language and culture, or literature	Department of Languages and Literatures
History	MA	Asian history, British history, European history, Latin American history, public history, U.S. history, or U.S. Western history	Department of History
	PhD	Asian history, British history, European history, Latin American history, or U.S. history	Department of History

[1] If a major offers concentrations, one must be selected unless noted as *optional*.

[2] This program is administered by the Division of Graduate Studies.

College of Liberal Arts and Sciences Graduate Degrees and Majors (continued)

Major	Degree	Concentration[1]	Administered By
Justice Studies	MS	—	School of Justice and Social Inquiry
	PhD	Optional: criminal and juvenile justice; dispute resolution; law, justice, and minority populations; law, policy, and evaluation; or women, law, and justice[1]	School of Justice and Social Inquiry
Kinesiology	MS	—	Department of Kinesiology
Materials Science[2]	MS	—	Committee on the Science and Engineering of Materials
Mathematics	MA, PhD	—	Department of Mathematics and Statistics
Microbiology	MS, PhD	—	School of Life Sciences
Molecular and Cellular Biology	MS, PhD	—	Interdisciplinary Committee on Molecular and Cellular Biology
Natural Science	MNS	Biology, microbiology, or plant biology	School of Life Sciences
		Chemistry	Department of Chemistry and Biochemistry
		Geological sciences	Department of Geological Sciences
		Mathematics	Department of Mathematics and Statistics
		Physics	Department of Physics and Astronomy
Philosophy	MA, PhD	—	Department of Philosophy
Physics	MS, PhD	—	Department of Physics and Astronomy
Plant Biology	MS, PhD	Optional: ecology or photosynthesis[1]	School of Life Sciences
Political Science	MA, PhD	American politics, comparative politics, international relations, or political theory	Department of Political Science
Psychology	PhD	Behavioral neuroscience, clinical psychology, cognitive/behavioral systems, developmental psychology, quantitative research methods, or social psychology	Department of Psychology
Religious Studies	MA, PhD	—	Department of Religious Studies
Science and Engineering of Materials[2]	PhD	High-resolution nanostructure analysis or solid-state device materials design	Committee on the Science and Engineering of Materials
Sociology	MA, PhD	—	Department of Sociology
Spanish	MA	Comparative literature, language and culture, linguistics, or literature	Department of Languages and Literatures
	PhD	Cultural studies or literature	Department of Languages and Literatures
Speech and Hearing Science	PhD	Developmental neurolinguistic disorders, neuroauditory processes, or neurogerontologic communication disorders	Department of Speech and Hearing Science
Statistics[2]	MS	—	Committee on Statistics
Teaching English as a Second Language	MTESL	—	Department of English

[1] If a major offers concentrations, one must be selected unless noted as *optional*.

[2] This program is administered by the Division of Graduate Studies.

students, should contact the Office of Undergraduate Programs in FOUND 1120, regarding procedures and guidance for reinstatement and returning to good standing. By following recommendations 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 of Undergraduate Programs. 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 of Undergraduate Programs, in FOUND 1120, regarding the academic rules of the college and the university.

SPECIAL PROGRAMS

Barrett Honors College. CLAS works closely with the Barrett Honors College, which affords qualified undergraduates opportunities for enhanced educational experiences. For a complete description of requirements and opportunities, see "The Barrett Honors College," page 129.

CLASWorks. The college provides a comprehensive career management program for all CLAS majors: CLASWorks. This program includes a first-year seminar as well as an upper-division course in career management. Individualized advising sessions, career events, and a Web-based list of CLASWorks contacts are available. Students are encouraged to meet with the director of CLASWorks during their first semester at ASU to explore opportunities in full- and part-time employment, volunteerism, and internships. For more information, call 480/965-6506, or access the Web site at www.asu.edu/clasworks.

Integrated Studies. An Integrated Studies major leading to the BA or BS degree provides students of outstanding ability in the humanities, natural sciences and mathematics, and social and behavioral sciences opportunities to pursue courses of study 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, visit the Office of Undergraduate Programs in FOUND 1120.

Learning Communities. These nine, ten, and 12 semester hour communities allow students to explore an important topic in depth, in mainly small classes, while earning a number of General Studies credits and completing their university writing requirement. The CLAS Learning Communities offer students an opportunity to learn how to think about issues on multiple levels and apply skills across different domains. Course material and extracurricular activities are integrated to enhance the student's intellectual development. Each Learning Community is limited to fewer than 100 students, enabling the student to develop a supportive network of peers on campus. For more information, including residence hall information, access the Web site at www.asu.edu/clas/lcsite.

Bachelor of Liberal Studies. Pending the Arizona Board of Regents approval, the College of Liberal Arts and Sciences will offer a 120-semester-hour undergraduate degree completion program in Liberal Studies to Arizona students who have earned 60 to 90 semester hours at one of the Arizona universities or community colleges and meet our eligibility requirements. This degree completion program is most suitable for working adults since courses will be offered online and via independent study. There will be registration and individualized instruction fees in addition to tuition. For more information on eligibility requirements, call the Office of Undergraduate Programs at 480/965-6506.

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 at 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

Certificates are available from numerous 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, page 338. Areas of emphasis are also available in some of the same subjects (e.g., Latin American Studies).

Enriched College Degree. CLAS offers an Enriched College Degree Certificate, available to any student within the university.

The Enriched College Degree Certificate consists of a minimum of 15 semester hours of a minimum of "C" (2.00) grade credit. The certificate consists of

1. a theme requirement composed of a three-course sequence outside the student's major, characterized by an identifiable theme of intellectual relevance for students (courses used for the theme requirement cannot be from one's major, minor, or another certificate);
2. an approved upper-division bridge course selected to address the relationships among areas of inquiry and means of acquiring knowledge; and
3. an approved upper-division course in spoken English to provide a meaningful opportunity for substantive oral presentations.

For more information, visit the CLAS Office of Undergraduate Programs, in FOUND 1120, 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, Japanese, or Korean 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 advisor.

A Graduate Certificate in Asian Studies is also available. For more information, see the *Graduate Catalog*.

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. The center also offers several professional development seminars to K–12 teachers.

For more information, contact the Center for Asian Studies in COOR 6611, or call 480/965-7184.

BIS Concentrations. Concentrations in Asian studies and East Asian studies are available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that are not satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

Civic Education. See "Certificate in Civic Education," page 453.

Classical Studies. Students admitted to undergraduate degree programs in any field are eligible for the Classical 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:

1. five semesters of ancient Greek (17 semester hours; GRK 301 and 302 may be repeated for credit) or Latin (19 semester hours) language and literature instruction;
2. two semesters (six semester hours), in courses related to classical studies (to be approved by coordinators of the certificate);
3. a thesis (three semester hours), a Barrett Honors College thesis (six semester hours) or two additional courses at or above the 300 level (six semester hours); and
4. a minimum grade of "C" (2.00) in each course leading to the certificate.

Students interested in the Classical Studies certificate program need to submit an application before being accepted into the program. For more information, call the program coordinators at 480/965-1110 or 727-6512.

BIS Concentration. Concentrations in (1) classical studies—Greek or (2) classical studies—Latin are available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

Early Intervention. The Early Intervention Certificate is cross-disciplinary and is certified by the Arizona Early Intervention Program in the Arizona State Department of Economic Security. Students interested in earning the certificate must make formal application to the director of the Early Intervention Training Program. Students must have completed 56 semester hours and have a cumulative GPA of at least 2.50. Students are required to complete the application form for the Early Intervention Certificate.
The proposed certificate entails 17 semester hours of required course work. All 17 semester hours must be ASU credit.

Required Courses

CDE 337	Early Childhood Intervention	3
SWU 437	Infant Family Assessment and Observation	3
	or CDE 437 Infant Family Assessment and Observation *L/SB* (3)	
SWU 446	Risk and Variation in Child Development	3
	or CDE 444 Risk and Variation in Child Development (3)	

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

CLAS Certificates

Certificate Program	Administered By	Page
College of Liberal Arts and Sciences Enriched Certificate	CLAS	336
African and African American Studies Certificate	African and African American Studies Program	346
African and African Diaspora Studies, Graduate Certificate in[1]	African American Studies Program	—
American Indian Studies Certificate	American Indian Studies Program	348
Asian Pacific American Studies Certificate	Asian Pacific American Studies Program	354
Asian Studies Certificate[2]	Center for Asian Studies	337
Asian Studies, Graduate Certificate in[1]	Center for Asian Studies	—
Atmospheric Sciences, Graduate Certificate in[1]	CLAS and Ira A. Fulton School of Engineering	—
Civic Education Certificate	Department of Political Science	453
Classical Studies Certificate	Department of Languages and Literatures	337
Early Intervention Certificate	Department of Family and Human Development and School of Social Work	337
East Asian Studies Certificate	Center for Asian Studies	337
Ethics Certificate	Department of Philosophy	339
Geographic Information Science Certificate	Department of Geography	339
Geographic Information Science, Interdisciplinary Certificate in[1]	CLAS and Division of Graduate Studies	—
Healthcare Organizations and Society	School of Life Sciences and the W. P. Carey School of Business	339
Health Physics Certificate	Pre-Health Professions Office	339
History and Philosophy of Science Certificate	School of Life Sciences	340
International Studies Certificate	Department of Political Science	454
Islamic Studies Certificate	Department of Religious Studies	340
Jewish Studies Certificate	Jewish Studies Committee	340
Latin American Studies Certificate[2]	Latin American Studies Center	340
Linguistics, Graduate Certificate in[1]	Committee on Linguistics	—
Medieval and Renaissance Studies Certificate	Arizona Center for Medieval and Renaissance Studies (ACMRS)	341
Medieval Studies Certificate[1]	ACMRS	—
Museum Studies Certificate[1]	Department of Anthropology	—
Renaissance Studies Certificate[1]	ACMRS	—
Russian and East European Studies Certificate[2]	Russian and East European Studies Center	341
Scandinavian Studies Certificate	Department of Languages and Literatures	341
Scholarly Publishing Certificate[1]	Department of History	—
Southeast Asian Studies Certificate	Program for Southeast Asian Studies	342
Statistics, Certificate in[1]	Committee on Statistics and the Division of Graduate Studies	—
Symbolic Systems, Certificate in	Department of Philosophy	342
Translation Certificate	Department of Languages and Literatures	408
Women and Gender Studies Certificate	Women and Gender Studies Program	342
Writing Certificate	Department of English	369

[1] For more information, see the *Graduate Catalog*.

[2] Emphases are also available in these programs.

Choose from the following combinations 8
CDE 338 Child Development Practicum (3)
FAS 484 Internship (5)
— *or* —
SWU 412 Field Instruction I (5)
SWU 414 Field Instruction II (3)

All students admitted by the program are advised by the director of the Early Intervention Training Program through completion of the certificate requirements. Advising includes identifying field placements for FAS 484 and SWU 412 and SWU 414. Completion of the certificate is verified by completion of all required courses with a grade of "C" or higher in each course.

Ethics. This certificate is designed to give students a richer understanding of systematic philosophical thinking about ethics. Students with majors in business, nursing, journalism, and public administration, among others, may well find that training in ethics is beneficial for their career goals. The certificate program permits some flexibility about course selection, thereby facilitating the interests of many students. For more information, visit the Department of Philosophy in COOR 3307, or call 480/965-3394.

BIS Concentration. A concentration in ethics is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

Geographic Information Science. The cross-disciplinary undergraduate certificate in Geographic Information Science (GIS) is designed for undergraduates wishing to pursue a GIS-related career. The certificate is awarded to students completing the following 19 semester hours with a grade of "C" (2.00) or higher.

Required Courses
CSE 100 Principles of Programming with C++ *CS* 3
GCU 495 Quantitative Methods in Geography *CS* 3
GPH 370 Geographic Information Technologies *CS* 3
GPH 373 Geographic Information Science I *CS* 4
GPH 473 Geographic Information Science II *CS* 3
Elective (choose from the courses below) 3
ABS 485 GIS in Natural Resources (3)
ABS 586 Remote Sensing in Environmental Resources (4)
GCU 361 Urban Geography *SB* (3)
GCU 441 Economic Geography *SB* (3)
GCU 442 Geographical Analysis of Transportation *SB* (3)
GPH 371 Introduction to Cartography and Georepresentation *CS* (3)
GPH 372 Air Photo Interpretation (3)
GPH 471 Geographics: Interactive and Animated Cartography and Geovisualization *CS* (3)
GPH 481 Environmental Geography (3)
GPH 483 Geographic Information Analysis (3)
GPH 484 Internship: GIS-Based (3)
PLB 434 Landscape Ecological Analysis and Modeling (3)

For more information, call the Department of Geography at 480/965-7533.

Healthcare Organizations and Society. The certificate program is designed to allow undergraduate students interested in healthcare and the healthcare industry to access a broad range of disciplinary approaches and issues relevant to the subject.

To complete the certificate, students must take 18 semester hours of course work. Before starting the program students should seek advice and information in the School of Life Sciences Student Services Office in the College of Liberal Arts and Sciences or Business Honors advising in the W. P. Carey School of Business.

The course work must conform to the following structure and must be drawn from the three areas listed below. Additional courses are permissible with the approval of an advisor. In addition, students must meet the following requirements:

1. complete 18 semester hours, 12 of which must be in the upper division;
2. earn a "C" or higher in all upper-division courses taken for the certificate; and
3. complete at least 12 of the semester hours for the certificate in residence at ASU.

Overview of the U.S. Healthcare Industry. HSM 220 Healthcare Organizations is required. HSM 498 PS: Healthcare Economics is required for business students. HSM 561 Biostatistics may be taken by petition. No more than three courses in this area may be taken.

Ethical and Legal Issues in Healthcare. PHI 320 Bioethics is required. A second course is also required, PAF 460 Public Service Ethics or HSM 498 PS: Legal and Ethical Issues in Healthcare. No more than three courses in this area may be taken.

Anthropological, Historical, and Social Perspectives on Healthcare. One course is required. No more than two courses in this area may be taken, from among ASB 462 Medical Anthropology: Culture and Health, HPS 331 History of Medicine, and SOC 427 Sociology of Health and Illness.

For more information, visit the School of Life Sciences in LSC 206, or call 480/727-6277. Or visit Business Honors in the W. P. Carey School of Business in BAC 150, or call 480/965-8710.

Health Physics. The curriculum of health physics involves work in CLAS and the Ira A. Fulton School of Engineering. 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 BS 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 BS degree in a physical or life science that follows a prescribed program. For more information, visit the Pre-Health Professions

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Office in LSC 206C, or call 480/965-2365, where academic advising is available.

History and Philosophy of Science. The School of Life Sciences offers an undergraduate History and Philosophy of Science Certificate. The certificate program is designed to give students an understanding of both traditional philosophic issues surrounding science and the historical development of concrete scientific theories and ideas. The philosophic questions, of the belief-worthiness and interpretation of scientific claims as well as norms within or about science, both enrich and are enriched by their combination with historical study. Such philosophic and historical study will also often include the examination of contemporary sciences and their place within the larger society.

The certificate requires 18 semester hours bearing a PHI or HPS prefix of which 12 semester hours must be upper-division. Included within the 18 semester hours, at least nine must bear the HPS prefix. PHI 314 Philosophy of Science is also required. All courses counting toward the certificate must be approved for this purpose by an undergraduate advisor and passed with a grade of "C" (2.00) or higher.

For more information, visit the School of Life Sciences in LSC 206, or call 480/727-6277.

International Studies. See "Certificate in International Studies," page 454.

Islamic Studies Certificate. Students admitted to undergraduate degree programs in any field are eligible for the Islamic Studies Certificate program. Students who complete all the requirements of their major, their college, and the certificate program receive the certificate plus transcript recognition of their particular emphasis. The certificate program is designed to prepare students for graduate programs in Religious Studies, Islamic studies, and area studies or for any academic discipline (such as professional programs in international law and business) that focuses on global Muslim societies. Students must complete a minimum total of 26 semester hours, chosen in consultation with the Islamic Studies program coordinator. A minimum grade of "C" (2.00) is required in each course. To earn the certificate, students must complete these requirements:

1. eight semester hours of Arabic, Indonesian, or another language approved by the program coordinator; students who are native speakers of these languages or who otherwise have equivalent knowledge substitute two additional courses approved by the program coordinator;
2. nine semester hours from REL 260 Introduction to Islam, REL 365 Islamic Civilization, and REL 366 Islam in the Modern World;
3. three semester hours taken from REL 394 (topics may vary) or REL 460 Studies in Islamic Religion (topics may vary); and
4. six semester hours drawn from an approved list of courses in Arabic, anthropology, French, geography, history, religious studies, Spanish or from other courses approved by the program coordinator.

Direct inquiries about the program to the Department of Religious Studies, ECA 377, or call 480/965-7145.

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, visit the Jewish Studies program office or access the Web site at asu.edu/clas/jewishstudies/certificateinfo.htm.

BIS Concentration. A concentration in Jewish studies is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

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), and Political Science and the W. P. Carey School of Business offer courses that combine to make up the interdisciplinary certificate. Students must complete 30 semester hours of upper-division courses from the above departments/colleges with a concentration in Latin America—15 semester hours in the major subject and 15 semester 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 count toward a major or interdisciplinary areas of preparation. Spanish and Portuguese courses above 313 in grammar and phonology do 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 in COOR 4450, or call 480/965-5127.

BIS Concentration. A concentration in Latin American studies is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations

(or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

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 Barrett Honors College; and
4. a minimum of a "C" (2.00) 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 or visiting COOR 4429.

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," page 37, for information about the center.

BIS Concentration. A concentration in medieval and Renaissance studies is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

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 in Russian and East European studies while pursuing a bachelor's degree in their chosen field. The requirements for the Russian and East European Studies Certificate comprise (1) three years (22 semester hours) of Russian or another Eurasian or East European language and (2) 30 upper-division semester hours in Russian, East European, and Eurasian area-related course work.

At least three disciplines must be represented in the area-related course work, and at least 12 semester 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 Center and is recognized on the transcript by a bachelor's degree with "Major in [Discipline], and Certificate 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 student with a major in any department may pursue this certificate.

For more information, call 480/965-4188, or visit COOR 4465.

BIS Concentration. A concentration in Russian and East European studies is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

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" (2.00) 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 Barrett Honors College thesis requirement for students enrolled in the Barrett Honors College.

Students who test out of the basic language courses would, with advising, take other approved courses to fulfill the minimum requirement of 21 semester hours.

For more information, call the Department of Languages and Literatures at 480/965-6281.

BIS Concentration. A concentration in Scandinavian studies is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

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/HST/POS/REL 240 Introduction to Southeast Asia;
3. HST 391 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.

For more information, visit the Program for Southeast Asian Studies in COOR 6611 or call 480/965-4232.

BIS Concentrations. Concentrations in Southeast Asian studies (area studies option or language option) are available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

Symbolic Systems. The Department of Philosophy offers a Certificate in Symbolic Systems. The certificate program takes an interdisciplinary approach to cognition, computation, and meaning. Course work is divided evenly between philosophy, psychology, and computer science in order to expose students to the subject matter from a conceptual, empirical, and practical point of view. The certificate may interest students with majors in any of the three disciplines on topics of common interest.

The certificate consists of 28 semester hours approved by an advisor in the Department of Philosophy and divided evenly between computer science and engineering, psychology, and philosophy as follows:

1. CSE 200, 210, and 240;
2. PSY 230 and 290 and either PSY 323, 324, or 437; and
3. either PHI 319, or 333, either PHI 315 or 317, and either PHI 312 or 314.

Students must satisfy the prerequisites for the listed courses. With written approval from the director of undergraduates studies in the Department of Philosophy, one substitution course from outside this list is allowed. All courses must be passed with a minimum grade of "C" (2.00).

For more information, visit the Department of Philosophy in COOR 3307, or call 480/965-3394.

Translation. See "Translation Certificate (Spanish/English)," page 408, for information about the Certificate in Translation.

Women and Gender Studies. Women and Gender Studies provides students with an intensive interdisciplinary liberal arts education that enables them to write well, think critically, and analyze problems effectively.

The certificate program is equivalent to an interdisciplinary minor, consisting of 18 credit hours, and is open to graduate as well as undergraduate students. Students pursuing a certificate in Women and Gender Studies must consult with the Women and Gender Studies advisor to select appropriate courses and fulfill requirements.

A Certificate of Concentration in Women and Gender Studies is awarded for the successful completion of WST 100 (or 300) and WST 377 or 378 and an additional 12 semester hours from the list of approved Women and Gender Studies courses.

Inquiries about the certificate program should be addressed to the Women and Gender Studies Program academic advisor in ECA 209, 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 Biology and Society

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
Joan and David Lincoln Center for Applied Ethics
Latin American Studies Center
Russian and East European Studies Center

CLAS also participates with the College of Education and the Ira A. Fulton School of Engineering in maintaining the Center for Research on Education in Science, Mathematics, Engineering, and Technology. See "Research Centers," page 33, for more information.

Courses. The faculty also offers the following LIA courses to familiarize students with available resources and services for research purposes.

For information on these courses, see the *Schedule of Classes,* visit the Office of Undergraduate Programs in FOUND 1120, or call 480/965-6506.

LIBERAL ARTS AND SCIENCES (LIA)

LIA 191 First-Year Seminar. (1–3)
selected semesters

LIA 394 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Career Management for CLAS Majors. (1–3)

LIA 484 CLAS Internship. (1–12)
fall, spring, summer

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

HUMANITIES (HUM)

As of fall 2005 the BA degree in Interdisciplinary Humanities was disestablished. A limited number of HUM courses are offered each semester. Access www.asu.edu/aad/catalogs/courses for the most current list of courses.

MASTER OF LIBERAL STUDIES (MLS)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog,* or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Department of Aerospace Studies

Air Force ROTC

www.asu.edu/clas/afrotc
480/965-3181
SS 352

Col. David W. Guthrie, Chair

Professor: Guthrie

Assistant Professors: Greensfelder, Kwasnoski, Marks

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. Students entering the Air Force Reserve Officers' Training Corps (AFROTC) must meet the following requirements:

1. be a citizen of the United States (noncitizens may enroll but must obtain citizenship before commissioning);
2. be of sound physical condition; and
3. be 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 29; persons in other categories must be able to complete all commissioning requirements before age 35.

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

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

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 test 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 $350 and $400 respectively 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 $250 to $400 depending on the year. 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 contact AFROTC at ASU for application forms to be submitted to

HQ AFROTC
MAXWELL AFB
AL 36112-6663

Applications can also be submitted online at www.afrotc.com.

Students enrolled in AFROTC at ASU are eligible for a limited number of three- or two-year scholarships. Those 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)
fall
Introduces U.S. Air Force and AFROTC. Topics include: the Air Force mission and organization, customs and courtesies, officer opportunities, officership, and professionalism.

AES 102 Leadership Lab. (0)
fall
Emphasizes 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)
spring
Continuation of AES 101. Topics include: the Air Force mission and organization, customs and courtesies, officer opportunities, officership, and professionalism. Prerequisite: AES 101 or department approval.

AES 104 Leadership Lab. (0)
spring
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)
fall
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)
fall
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)
spring
Continuation of AES 201. Topics include: the Air Force mission and organization, customs and courtesies, officer opportunities, officership, and professionalism. Prerequisite: AES 201 or department approval.

AES 204 Leadership Lab. (0)
spring
Continuation of AES 202 with emphasis on preparation for field training. Corequisite: AES 203.

AES 301 Air Force Leadership Studies I. (3)
fall
Study of communication skills, leadership 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)
fall
Advanced leadership experiences applying leadership and management principles to motivate and enhance the performance of other cadets. Corequisite: AES 301.

AES 303 Air Force Leadership Studies II. (3)
spring
Continuation of AES 301. Topics include: communication skills, ethics, leadership, 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)
spring
Continuation of AES 302 with emphasis on planning the military activities of the cadet corps and applying advanced leadership methods. Corequisite: AES 303.

AES 401 National Security Affairs. (3)
fall
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)
fall
Advanced leadership experience demonstrating learned skills in planning and controlling the military activities of the corps. Corequisite: AES 401.

AES 403 Preparation for Active Duty II. (3)
spring
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)
spring
Continuation of AES 402 with emphasis on preparation for transition from civilian to military life. Corequisite: AES 403.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

African and African American Studies Program

www.asu.edu/clas/aframstu
480/965-4399
COWDN 227

Okechukwu Iheduru, Director

CORE FACULTY
Professors: Boulin Johnson, Iheduru, Reyes
Associate Professor: Bontemps
Assistant Professors: Hinds, Robillard, Usman
Clinical Associate Professor: Cox

AFFILIATED FACULTY

Anthropology
Associate Professor: Winkelman

Art
Professors: Sweeney, Young
Associate Professor: Umberger

Asian Pacific American Studies
Assistant Professor: Rosa

Community Resources and Development
Associate Professor: Teye

English
Professors: Lester, Miller
Associate Professor: DeLamotte
Lecturer: Fuse

History
Associate Professors: Barnes, El Hamel
Assistant Professor: Whitaker

Human Communication
Professors: Jain, Martin
Associate Professors: Davey, Davis

Interdisciplinary Humanities
Assistant Professor: Lund

Journalism and Mass Communication
Associate Professor: Bramlett-Solomon

Justice and Social Inquiry
Professors: Jurik, Romero, Zatz

Music
Professors: Pilafian, Smith, Solís, Sunkett

Political Science
Associate Professor: Mitchell

Psychology in Education
Professor: Hood

Religious Studies
Associate Professor: Moore

Sociology
Professor: Cobas
Associate Professor: Keith
Instructor: Williams

Theatre
Associate Professor: Edwards

Women and Gender Studies
Professor: Rothschild
Assistant Professors: Anderson, Leong

African and African American Studies (AAAS) is interdisciplinary and focuses on people of African descent throughout the world. Current concentrations focus on 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.

The program welcomes and prepares students of all ethnicities to better understand, value, and more effectively participate in an increasingly diverse society. Students 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. AAAS also provides 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. The program also strives to utilize channels for informing policies

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

that affect the lives of Africans and people of African descent everywhere.

AFRICAN AND AFRICAN AMERICAN STUDIES—BA

Course Requirements. The major in African and 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 AAAS advisor. All majors must take 21 hours in the following core courses:

AFH 353 African American Literature: Beginnings Through the Harlem Renaissance *L/HU, C* 3
AFH 354 African American Literature: Harlem Renaissance to the Present *L/HU, C* 3
AFR 210 Introduction to African American Studies *C* 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 to 1865 *SB, C, H* 3
AFS 364 African American History Since 1865 *SB, C, H* 3

Within the 45 semester hours, AAAS 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 21 core course semester hours. Of the remaining course work, 12 hours must be taken in related courses (i.e., non-African American Studies prefixes). In addition to course work within the student's chosen concentration, six additional hours are required. Students should consult with an advisor.

In addition, AAAS majors are required to take a minor or a certificate program of a minimum of 18 hours in another academic field.

CERTIFICATE IN AFRICAN AND 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 *C* 3
AFR 429 African American Studies Theory and Methods 3
AFS 363 African American History to 1865 *SB, C, H* 3
AFS 364 African American History Since 1865 *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 AND AFRICAN AMERICAN STUDIES

Course Requirements. The minor requires 18 semester hours. All African and 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 *C* 3
AFS 363 African American History to 1865 *SB, C, H* 3
or AFS 364 African American History Since 1865 *SB, C, H* (3)

In addition, one course from each of three concentrations (i.e., social and behavioral sciences, humanities/arts, politics and society) must be taken. A minimum of 12 semester hours of upper-division courses is required. Courses should be selected in consultation with the major advisor.

BIS CONCENTRATION

A concentration in African and African American studies is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

AFRICAN AND AFRICAN AMERICAN STUDIES HUMANITIES (AFH)

AFH Note 1. Completion of the First-Year Composition requirement (ENG 101 and 102 [or 105] or ENG 107 and 108 with a grade of "C" [2.00] or higher) is a prerequisite for all English courses above the 100 level.

AFH Note 2. A term paper or equivalent out-of-class written work is required in all upper-division (300- and 400-level) ENG courses.

AFH Note 3. English majors and minors are expected to have completed ENG 200 before taking 400-level literature courses.

AFH 202 Art of Africa, Oceania, and the Americas. (3)
spring
History of art of Africa, Oceania, and the New World. Meets non-Western art history requirement. Lecture, discussion. Cross-listed as ARS 202. Credit is allowed for only AFH 202 or ARS 202.
General Studies: HU, G, H

AFH 303 African and African American Art. (3)
fall, spring, summer
Anthropological perspective of African and African American visual art traditions from the past to 1970. Lecture, discussion, video and slide films.

AFH 333 American Ethnic Literature. (3)
once a year
Examines America's multiethnic identity through works of literature that depict American ethnic, gender, and class sensibilities. Cross-listed as ENG 333. Credit is allowed for only AFH 333 or ENG 333. See AFH Notes 1, 2.
General Studies: L/HU, C

AFH 347 Jazz in America. (3)
fall, spring, summer
Current practices employed by contemporary jazz musicians; the historical development of jazz techniques. Credit not applicable toward any Music degree. Lecture, discussion. Cross-listed as MUS 347. Credit is allowed for only AFH 347 or MUS 347. Fee.
General Studies: HU, C

AFH 353 African American Literature: Beginnings Through the Harlem Renaissance. (3)
fall
Historical survey of African American literary traditions and cultural contexts from slavery through the 1930s. Cross-listed as ENG 353. Credit is allowed for only AFH 353 or ENG 353. See AFH Notes 1, 2.
General Studies: L/HU, C

AFH 354 African American Literature: Harlem Renaissance to the Present. (3)
spring
Historical survey of African American literary traditions and cultural contexts from the 1920s to the present. Cross-listed as ENG 354. Credit is allowed for only AFH 354 or ENG 354. See AFH Notes 1, 2.
General Studies: L/HU, C

AFH 459 Studies in African American/Caribbean Literatures. (3)
selected semesters
Studies in African American or Caribbean literatures according to genre, period, theory, or selected authors. May be repeated for credit when topics vary. Cross-listed as ENG 459. Credit is allowed for only AFH 459 or ENG 459. See AFH Notes 1, 2, 3. Topics may include the following:

- African American Short Story
  General Studies: L

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

AFRICAN AND AFRICAN AMERICAN STUDIES (AFR)

AFR 191 First Year Seminar. (1–3)
selected semesters

AFR 194 Special Topics. (1–4)
selected semesters

AFR 210 Introduction to African American Studies. (3)
fall
Examines the political, historical, and cultural origins of African American studies as an academic discipline. Lecture, discussion.
General Studies: C

AFR 294 Special Topics. (1–4)
selected semesters

AFR 298 Honors Directed Study. (1–6)
selected semesters

AFR 317 Genes, Race, and Society. (3)
spring
Examines history of biological and social constructions of "race" in western society. Lecture, discussion.
General Studies: SB, C, H

AFR 375 Race, Gender, and Sport. (3)
fall and spring
Interdisciplinary examination of the social concepts of race and gender and their economic impact on sports in America. Lecture, discussion. Prerequisite: ENG 102 (or its equivalent) or instructor approval.
General Studies: SB, C

AFR 394 Special Topics. (1–4)
selected semesters

AFR 428 Critical Race Theory. (3)
spring
Examines ways in which race has been historically utilized, constructed, and contested in American civil society. Lecture, discussion.

AFR 429 African American Studies Theory and Methods. (3)
spring
Examines social and behavioral science theories and methodological procedures pertaining to African Americans. Prerequisite: senior standing.

AFR 460 Race, Gender, and Media. (3)
spring
Reading seminar designed to give a probing examination of the interface between AHANA Americans and the mass media in the United States. Lecture, discussion. Cross-listed as MCO 460. Credit is allowed for only AFR 460 or MCO 460.
General Studies: C

AFR 484 Internship. (1–12)
selected semesters

AFR 490 Field Studies in the Diaspora. (3)
spring
Introduces 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.

AFR 492 Honors Directed Study. (1–6)
selected semesters

AFR 493 Honors Thesis. (1–6)
selected semesters
General Studies: L

AFR 494 Special Topics. (1–4)
selected semesters

AFR 497 Honors Colloquium. (1–6)
selected semesters

AFR 498 Pro-Seminar. (3)
spring
Topic is selected by instructor in consultation with the student. Designed to integrate and develop research skills. Required for majors. Prerequisite: senior standing. Pre- or corequisite: AFR 429.

AFR 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

AFRICAN AND AFRICAN AMERICAN STUDIES SOCIAL SCIENCE (AFS)

AFS 202 Ethnic Relations in the United States. (3)
fall and spring
Processes of intercultural relations; systems approach to history of U.S. interethnic relations; psychocultural analysis of contemporary U.S. ethnic relations. Lecture, discussion. Cross-listed as ASB 202. Credit is allowed for only AFS 202 or ASB 202.
General Studies: SB, C, H

AFS 210 Introduction to Ethnic Studies in the U.S. (3)
fall and spring
Covers diversity of experiences and relations among racial and ethnic groups in the United States. Lecture, discussion. Cross-listed as APA 210/CCS 210. Credit is allowed for only AFS 210 or APA 210 or CCS 210.
General Studies: C

AFS 310 African/African American Psychology. (3)
fall and spring
Historical and contemporary overview of the development of African/Black psychology and African American frame of reference. Lecture, discussion.

AFS 363 African American History to 1865. (3)
once a year
The African American in American history, thought, and culture from slavery to 1865. Cross-listed as HST 333. Credit is allowed for only AFS 363 or HST 333.
General Studies: SB, C, H

AFS 364 African American History Since 1865. (3)
once a year
The African American in American history, thought, and culture from 1865 to the present. Cross-listed as HST 334. Credit is allowed for only AFS 364 or HST 334.
General Studies: SB, C, H

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

AFS 366 African Archaeology: Precolonial Urban Culture. (3)
fall and spring
Overview of African civilization from the last 10,000 years up to 1850 via archaeological, documentary, and oral data. Lecture, discussion. Cross-listed as ASB 366. Credit is allowed for only AFS 366 or ASB 366.
General Studies: SB, G, H

AFS 370 Family, Ethnic, and Cultural Diversity. (3)
fall and spring
Integrative approach to understanding historical and current issues related to the structure and internal dynamics of diverse American families. Lecture, discussion. Cross-listed as FAS 370. Credit is allowed for only AFS 370 or FAS 370. Prerequisite: PGS 101 or SOC 101.
General Studies: SB, C

AFS 466 Peoples and Cultures of Africa. (3)
fall and spring
Survey of African peoples and their cultures, external contact, and changes. Meets non-Western requirement. Lecture, discussion. Cross-listed as ASB 466. Credit is allowed for only AFS 466 or ASB 466.
General Studies: SB, G, H

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

American Indian Studies Program

www.asu.edu/clas/americanindian
480/965-3634
AG 372

Eddie F. Brown, Director

Professor: Brown

Assistant Professors: Miller, Vicenti Carpio

The American Indian Studies Program is an academic discipline that emphasizes the political and cultural experience of the various American Indian Nations and peoples of the United States. Course work focuses on the cultures, arts, history, and contemporary experiences of the various American Indian nations. The curriculum also concentrates on the practical application for professional career development, preparation for advanced degree programs, and preparation for service to Indian governments and reservations. It emphasizes scholarly expertise in selected fields of study and its practical application to community service.

AMERICAN INDIAN STUDIES—BS

Students pursuing a BS degree in American Indian Studies gain a broad knowledge of American Indian nations and peoples, with particular emphasis on Southwest American Indian nations. The degree program offers courses that provide students with intellectual and practical knowledge pertaining to American Indian cultures, history, law, literature, language, art, and government.

Students are required to take 42 semester hours, including 24 hours of required courses and 18 hours in one of two areas of emphasis: (1) legal policy, community, and nation building; or (2) arts, languages, and cultures. Contact the program office for a current list of elective courses. Students must receive a minimum grade of "C" (2.00) in required and emphasis courses. The following courses are required for all students majoring in American Indian Studies:

AIS	180	Introduction to American Indian Studies *C*	3
AIS	280	Indigenous Law and Society *C*	3
AIS	370	American Indian Languages and Cultures	3
AIS	380	Contemporary Issues of American Indian Nations	3
AIS	385	Federal Indian Policy	3
AIS	394	ST: Basic Statistical Analysis*	3
AIS	420	American Indian Studies Research Methods	3
AIS	498	Pro-Seminar	3

* Until American Indian Studies is able to offer its own course in statistical research methods, students must take JUS 302, or a comparable course, in consultation with an advisor.

To assure the breadth and depth of their education, all American Indian Studies undergraduates must complete the requirements of the university General Studies program and the College of Liberal Arts and Sciences. For descriptive information on university requirements, see "General Studies," page 92, and "University Graduation Requirements," page 88. For descriptive information on College of Liberal Arts and Sciences requirements, see "CLAS Graduation Requirements," page 331.

MINOR IN AMERICAN INDIAN STUDIES

The minor in American Indian Studies is designed for students interested in developing an understanding of American Indian issues and analyzing issues through critical inquiry. Fifteen semester hours are required, including AIS 180, 380, and 385 and six elective semester hours from the two areas of emphasis. No pass/fail or credit/noncredit course work may be applied to the minor. A minimum of nine hours must be in resident credit at the Tempe campus. Students must receive a minimum grade of "C" (2.00) for all courses in the minor and meet all course eligibility requirements.

CERTIFICATE IN AMERICAN INDIAN STUDIES

The certificate program recognizes the need for training American Indian and non-Indian students for employment and leadership roles in American Indian government, in state/federal agencies, in education programs, and in urban and Indian community programs.

To this end, the American Indian Studies Certificate program seeks to address the myriad of contemporary social, political, and economic problems and issues impacting American Indian people.

The program provides students with

1. useful knowledge pertaining to American Indian sovereignty, government, law, history, economic development, and culture;
2. practical experience in the form of an off-campus internship working in an American Indian government, a community program, an educational entity, an urban program, or a state/federal agency; and
3. educational skills so that graduates can pursue jobs with an American Indian focus.

A certificate in American Indian Studies requires the completion of 21 semester hours. A minimum of 12 hours must be upper division, and a minimum grade of "C" (2.00) or higher is required except for the AIS Internship course, which requires a passing "Y" grade.

AIS 180 Introduction to American Indian Studies *C* 3
AIS 280 Indigenous Law and Society *C* 3
AIS 380 Contemporary Issues of American Indian Nations 3
AIS 484 Internship 3
AIS 494 ST: Law, Policy, and American Indians 3
Emphasis courses* 6

* Select courses from the two areas of emphasis; contact the program office for a current list.

For more information, call the director of the American Indian Studies Program at 480/965-3634.

BIS CONCENTRATION

A concentration in American Indian studies is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

AMERICAN INDIAN STUDIES (AIS)

AIS 180 Introduction to American Indian Studies. (3)
once a year
Introduction to the study of American Indian justice issues from an interdisciplinary perspective. Primary topics include sovereignty, law, and culture.
General Studies: C

AIS 194 Special Topics. (1–4)
fall and spring

AIS 280 Indigenous Law and Society. (3)
fall and spring
Examines the sovereign status of American Indians and legal relationships between the tribes and the U.S. government. Lecture, discussion.
General Studies: C

AIS 294 Special Topics. (1–4)
selected semesters

AIS 370 American Indian Languages and Cultures. (3)
fall
Emphasizes understanding of Indian language families and the relationship of oral traditions to culture. Prerequisite: AIS 180.

AIS 380 Contemporary Issues of American Indian Nations. (3)
spring
Survey of legal, socioeconomic, political, and educational state of contemporary reservation and urban Indians. Prerequisite: AIS 180.

AIS 385 Federal Indian Policy. (3)
spring
Historical overview of political and legal frameworks, executive policies, and judicial decisions in the context of Indian affairs. Prerequisite: AIS 180.

AIS 394 Special Topics. (1–4)
fall and spring
Topics may include the following:
- American Indian World Views and Philosophies. (3)
- Basic Statistical Analysis. (3)

AIS 420 American Indian Studies Research Methods. (3)
fall
Survey of diverse research methods, including statistical, historical, interpretative, and narrative approaches. Prerequisite: AIS 180.

AIS 484 Internship. (1–12)
selected semesters
Fee.

AIS 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Law, Policy, and American Indians. (3)

AIS 498 Pro-Seminar. (1–7)
selected semesters

AIS 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Department of Anthropology

www.asu.edu/clas/anthropology
480/965-6213
ANTH 233

Sander van der Leeuw, Chair
Ben A. Nelson, Associate Chair

Regents' Professor: Clark

Professors: Barton, Brandt, Carr, Chance, Cowgill, Eder, Falconer, Hegmon, Hudak, Johanson, Kimbel, Kintigh, Marean, Martin, Nash, B. Nelson, M. Nelson, Redman, Spielmann, Stark, van der Leeuw, Williams

Associate Professors: Abbott, Baker, Reed, Rice, Stone, Welsh, Winkelman

Assistant Professors: Haenn, Isaac, Jonsson, Schwartz, Spencer, Steadman

Associate Research Professors: Simon, Sugiyama

ANTHROPOLOGY—BA

Course Requirements. The Anthropology major consists of a minimum of 39 or 40 semester hours in anthropology and a minimum of three semester hours in statistics. At least 18 of the semester hours must be in upper-division courses (300–400 level). No ASU course is automatically classified as being either related or unrelated. Course requirements for the major are distributed as follows:

Required Introductory Courses
ASB 102 Introduction to Cultural and Social Anthropology *SB, G* 3

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

ASB 222 Buried Cities and Lost Tribes: Our Human Heritage *HU/SB, G, H* 3
or ASB 223 Buried Civilizations of the Americas *HU/SB, G, H* (3)
ASM 104 Bones, Stones, and Human Evolution *SB/SG* 4

Distribution Requirements
Archaeology 6
Geographic area course in archaeology or physical anthropology 3
Geographic area course in ethnography 3
Upper-division linguistics 3
Physical anthropology 6
Social/cultural 6

Elective
Anthropology 2–3

Related Fields
Statistics 3

Total 42–43

Consultation with the undergraduate advisor and a faculty mentor in the Department of Anthropology is recommended each semester. The anthropology undergraduate advising office is located in ANTH 208.

Course work in anthropology completed at other institutions is evaluated by the undergraduate advisor. The College of Liberal Arts and Sciences requires that transfer students complete at least 12 semester hours of upper-division course work at ASU in the department of their major in order 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" (2.00) in all upper- and lower-division anthropology courses and all related fields.

Each student's Declaration of Graduation and Degree Audit Report, or Program of Study, must be reviewed and approved by the anthropology undergraduate advisor.

Introductory, Distribution, and Related Fields Requirements

Consult with an anthropology undergraduate advisor for semester course description booklets and semester schedules, which indicate the regular and omnibus courses being offered. No courses may be used to fulfill more than one Anthropology major or minor requirement.

Required Introductory Courses
ASB 102 Introduction to Cultural and Social Anthropology *SB, G* 3
ASB 222 Buried Cities and Lost Tribes: Our Human Heritage *HU/SB, G, H* 3
or ASB 223 Buried Civilizations of the Americas *HU/SB, G, H* (3)
ASM 104 Bones, Stones, and Human Evolution *SB/SG* 4

Distribution Requirements
Upper-Division Linguistics
One course chosen from the following list* 3
- ASB 480 Introduction to Linguistics *SB* (3)
- ASB 481 Language and Culture *SB* (3)
- ASB 483 Sociolinguistics and the Ethnography of Communication *SB* (3)

Sociocultural
Two courses chosen from the following list* 6
- ASB 202 Ethnic Relations in the United States *SB, C, H* (3)
- ASB 211 Women in Other Cultures *HU/SB, G* (3)
- ASB 311 Principles of Social Anthropology *SB* (3)
- ASB 314 Comparative Religion (3)
- ASB 319 The North American Indian (3)
- ASB 321 Indians of the Southwest *L/SB, C, H* (3)
- ASB 322 Peoples of Mesoamerica *SB, G* (3)
- ASB 323 Indians of Latin America *SB, G* (3)
- ASB 324 Peoples of the Pacific *G (3)*
- ASB 325 Peoples of Southeast Asia *G (3)*
- ASB 350 Anthropology and Art (3)
- ASB 351 Psychological Anthropology *SB* (3)
- ASB 353 Death and Dying in Cross-Cultural Perspective *HU/SB, G* (4)
- ASB 412 History of Anthropology *L/SB* (3)
- ASB 416 Economic Anthropology *L/SB* (3)
- ASB 417 Political Anthropology (3)
- ASB 485 U.S.-Mexico Border in Comparative Perspective (3)

Archaeology
Two courses chosen from the following list* 6
- ASB 231 Archaeological Field Methods *SG* (4)
- ASB 326 Human Impacts on Ancient Environments *SB, H* (3)
- ASB 330 Principles of Archaeology *SB* (3)
- ASB 335 Prehistory of the Southwest *SB, C, H* (3)
- ASB 337 Pre-Hispanic Civilization of Middle America *HU/SB, G, H* (3)
- ASB 338 Archaeology of North America *SB, H* (3)
- ASB 361 Old World Prehistory I *H* (3)
- ASB 362 Old World Prehistory II *H* (3)
- ASM 338 Anthropological Field Session (2–8)
- ASM 365 Laboratory Methods in Archaeology (4)
- ASM 435 Archaeological Pollen Analysis (3)
- ASM 472 Archaeological Ceramics (3)

Physical Anthropology
Two courses chosen from the following list* 6
- ASM 246 Human Origins (3)
- ASM 301 Peopling of the World *SB* (3)
- ASM 341 Human Osteology (4)
- ASM 342 Human Biological Variation *SG* (4)
- ASM 343 Primatology (3)
- ASM 344 Fossil Hominids *H* (3)
- ASM 345 Disease and Human Evolution (3)
- ASM 348 Social Issues in Human Genetics *SB* (3)
- ASM 452 Dental Anthropology *SG* (4)
- ASM 454 Comparative Primate Anatomy (4)
- ASM 455 Primate Behavior Laboratory *L* (3)

Geographic Area Courses
Archaeology or Physical Anthropology
One course chosen from the following list* 3
- ASB 335 Prehistory of the Southwest *SB, C, H* (3)
- ASB 337 Pre-Hispanic Civilization of Middle America *HU/SB, G, H* (3)
- ASB 338 Archaeology of North America *SB, H* (3)
- ASB 361 Old World Prehistory I *H* (3)
- ASB 362 Old World Prehistory II *H* (3)
- ASM 301 Peopling of the World *SB* (3)

Ethnographic
One course chosen from the following list* 3
- ASB 319 The North American Indian (3)
- ASB 321 Indians of the Southwest *L/SB, C, H* (3)
- ASB 322 Peoples of Mesoamerica *SB, G* (3)

ASB 323 Indians of Latin America *SB, G* (3)
ASB 324 Peoples of the Pacific *G* (3)
ASB 325 Peoples of Southeast Asia *G* (3)
ASB 485 U.S.-Mexico Border in Comparative Perspective (3)

Anthropology Elective
Any anthropology course 2–3

Related Fields
One lower- or upper-division statistics course 3

Total 42–43

* Consult with an anthropology undergraduate advisor for courses not listed that may fulfill distribution requirements.

MINOR IN ANTHROPOLOGY

The Anthropology minor requires a minimum of 18 semester hours. Two of the introductory courses—from ASB 102, ASM 104, and ASB 222 or 223—are required. However, the particular introductory courses selected may limit the anthropology courses available in the upper division. Twelve semester hours must be upper division and represent at least two of the three subfields of anthropology. The three subfields are:

1. sociocultural anthropology (with linguistics);
2. archaeology; and
3. physical anthropology.

The courses chosen to represent two of the three subfields must be drawn from the "Distribution Requirements," page 350, of those two subfields. A minimum grade of "C" (2.00) is required for all courses taken for the minor in Anthropology.

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 students interested in the Anthropology minor are encouraged to discuss the options available with an anthropology undergraduate advisor.

BIS CONCENTRATION

For students pursuing the Bachelor of Interdisciplinary Studies (BIS) degree, a concentration in anthropology requires 24 or 25 semester hours. All three of the introductory courses—ASB 102, ASM 104, and ASB 222 or 223—are required. Fifteen semester hours must be upper division and represent two of the three subfields:

1. sociocultural anthropology (with linguistics);
2. archaeology; and
3. physical anthropology.

The courses chosen to represent the two subfields must be drawn from the "Distribution Requirements," page 350. A minimum grade of "C" (2.00) is required for all courses taken for the minor in Anthropology for BIS students.

CERTIFICATES

Latin American Studies Certificate or Emphasis. Students majoring in Anthropology 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. For more information, see "Latin American Studies," page 340.

Certificate in Museum Studies. See the *Graduate Catalog* or contact the Department of Anthropology for more information.

GRADUATE PROGRAM

The faculty in the Department of Anthropology offer programs leading to the MA and PhD degrees. See the *Graduate Catalog* for requirements.

SECONDARY EDUCATION—BAE

This degree is offered through the Initial Teacher Certification program in the College of Education. Students pursuing a major in Secondary Education have an advisor in the College of Education and an advisor within the department of their academic specialization area.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

For more information, call the Office of Student Services in the College of Education at 480/965-5555.

ANTHROPOLOGY (SOCIAL AND BEHAVIORAL) (ASB)

ASB 102 Introduction to Cultural and Social Anthropology. (3)
fall and spring
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)
fall and spring
Processes of intercultural relations; systems approach to history of U.S. interethnic relations; psychocultural analysis of contemporary U.S. ethnic relations. Lecture, discussion. Cross-listed as AFS 202. Credit is allowed for only AFS 202 or ASB 202.
General Studies: SB, C, H

ASB 210 Sex, Marriage, and Evolution. (3)
selected semesters
Examines the sexual nature and behavior of humans from both a biological and an anthropological point of view.

ASB 211 Women in Other Cultures. (3)
selected semesters
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)
spring
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

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

ASB 223 Buried Civilizations of the Americas. (3)
fall and spring
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)
spring
Excavation of archaeological sites and recording and interpretation of data. Includes local field experience. 2 hours lecture, 8 hours lab. Prerequisite: instructor approval.
General Studies: SG

ASB 240 Introduction to Southeast Asia. (3)
fall and spring
Interdisciplinary introduction to the cultures, religions, political systems, geography, and history of Southeast Asia. Cross-listed as GCU 240/HST 240/POS 240/REL 240. Credit is allowed for only ASB 240 or GCU 240 or HST 240 or POS 240 or REL 240.
General Studies: HU/SB, G

ASB 242 Asian American Experiences: An Anthropological Perspective. (3)
fall
Historical and contemporary experiences of Asian Americans in terms of the anthropological concepts of culture, ethnicity, and adaptation. Prerequisite: ENG 101 or 105.
General Studies: C

ASB 252 Anthropology of Sports. (3)
fall and spring
Cross-cultural examination of symbolic and social dimensions of sports past and present.

ASB 302 Ethnographic Field Study in Mexico. (3)
summer
Fieldwork study of cultural adaptation, Mexican culture, United States-Mexican cultural conflict, ethnographic research methods, and local culture. Lecture, discussion, field research. Pre- or corequisite: SPA 101 (or its equivalent).
General Studies: L/SB, G

ASB 311 Principles of Social Anthropology. (3)
spring
Comparative analysis of domestic groups and economic and political organizations in primitive and peasant societies.
General Studies: SB

ASB 314 Comparative Religion. (3)
fall and spring
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)
once a year
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)
selected semesters
Traditional cultures and the development and nature of contemporary political, economic, and educational conditions among Arizona Indians.

ASB 321 Indians of the Southwest. (3)
spring
Cultures of the contemporary Indians of the southwestern United States and their historic antecedents. Prerequisite: ASB 102 or instructor approval.
General Studies: L/SB, C, H

ASB 322 Peoples of Mesoamerica. (3)
once a year
Indigenous, mestizo, and national cultures, rural and urban peoples. Lecture, discussion, video. Prerequisite: ASB 102 or instructor approval.
General Studies: SB, G

ASB 323 Indians of Latin America. (3)
fall
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)
selected semesters
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)
fall
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)
spring
World survey of successful and unsuccessful ancient societies and their impacts on the environment.
General Studies: SB, H

ASB 327 Action Anthropology. (3)
fall
Explores contemporary issues and problem solving in Cuna, Micronesia, Mayan, and U.S. Latino communities, through applied anthropology and community initiatives.

ASB 330 Principles of Archaeology. (3)
fall and spring
Methods and theories for reconstructing and explaining the lifeways of prehistoric peoples. Prerequisite: 3 hours in archaeology.
General Studies: SB

ASB 335 Prehistory of the Southwest. (3)
fall and spring
Anthropological understandings of major cultural processes and events in the prehistory of the American Southwest using evidence from archaeology.
General Studies: SB, C, H

ASB 337 Pre-Hispanic Civilization of Middle America. (3)
spring
Preconquest cultures and civilizations of Mexico. The Aztecs, Mayas, and their predecessors. Prerequisite: instructor approval.
General Studies: HU/SB, G, H

ASB 338 Archaeology of North America. (3)
selected semesters
Origin, spread, and development of the prehistoric Indians of North America up to the historic tribes. Does not include the Southwest. Prerequisite: instructor approval.
General Studies: SB, H

ASB 350 Anthropology and Art. (3)
once a year
Art forms of people in relationship to their social and cultural setting. Prerequisite: ASB 102 or instructor approval.

ASB 351 Psychological Anthropology. (3)
spring
Approaches to the interrelations between the personality system and the sociocultural environment. Prerequisite: ASB 102 or instructor approval.
General Studies: SB

ASB 353 Death and Dying in Cross-Cultural Perspective. (4)
fall
Humanistic and scientific study of aging, sickness, dying, death, funerals, and grief and their philosophy and ecology in non-Western and Western cultures. 3 hours lecture, 1 hour discussion.
General Studies: HU/SB, G

ASB 355 Shamanism, Healing, and Consciousness. (3)
spring
World views, practices, and roles of shamans and traditional and contemporary healers; explanatory biopsychological models of consciousness.
General Studies: HU/SB

ASB 361 Old World Prehistory I. (3)
fall
Biosocial evolution in the Pleistocene, emphasizing technological achievements and the relationship between technology and environment in western Europe, sub-Saharan Africa. Prerequisite: instructor approval.
General Studies: H

ASB 362 Old World Prehistory II. (3)
spring
Transition from hunting and collecting societies to domestication economies; establishment of settled village life, emphasizing the Near East, Egypt, Southwest Europe. Prerequisite: ASB 361 or instructor approval.
General Studies: H

ASB 366 African Archaeology: Precolonial Urban Culture. (3)
fall and spring
Overview of African civilization from the last 10,000 years up to 1850 via archaeological, documentary, and oral data. Lecture, discussion. Cross-listed as AFS 366. Credit allowed for only AFS 366 or ASB 366.
General Studies: SB, G, H

ASB 400 Cultural Factors in International Business. (3)
spring
Anthropological perspectives on international business relations; applied principles of cross-cultural communication and management; regional approaches to culture and business.
General Studies: G

ASB 412 History of Anthropology. (3)
fall
Historical treatment of the development of the culture concept and its expression in the chief theoretical trends in anthropology between 1860 and 1950. Prerequisite: ASB 102 or instructor approval.
General Studies: L/SB

ASB 416 Economic Anthropology. (3)
fall
Economic behavior and the economy in preindustrial societies; description and classification of exchange systems; relations between production, exchange systems, and other societal subsystems. Prerequisite: ASB 102 or instructor approval.
General Studies: L/SB

ASB 417 Political Anthropology. (3)
selected semesters
Comparative examination of the forms and processes of political organization and activity in primitive, peasant, and complex societies. Prerequisite: ASB 102 or instructor approval.

ASB 462 Medical Anthropology: Culture and Health. (3)
fall
Role of culture in health, illness, and curing; health status, provider relations, and indigenous healing practices in United States ethnic groups. Lecture, discussion.
General Studies: C

ASB 466 Peoples and Cultures of Africa. (3)
fall and spring
Survey of African peoples and their cultures, external contact, and changes. Meets non-Western requirement. Lecture, discussion. Cross-listed as AFS 466. Credit is allowed for only AFS 466 or ASB 466.
General Studies: SB, G, H

ASB 471 Introduction to Museums. (3)
fall
History, philosophy, and current status of museums. Explores collecting, preservation, exhibition, education, and research activities in different types of museums. Prerequisites: both ASB 102 and ASM 104 or only instructor approval.
General Studies: L

ASB 480 Introduction to Linguistics. (3)
fall and spring
Descriptive and historical linguistics. Survey of theories of human language, emphasizing synchronic linguistics.
General Studies: SB

ASB 481 Language and Culture. (3)
spring
Applies linguistic theories and findings to nonlinguistic aspects of culture; language change; psycholinguistics. Prerequisite: ASB 102 or instructor approval.
General Studies: SB

ASB 483 Sociolinguistics and the Ethnography of Communication. (3)
selected semesters
Relationships between linguistic and social categories; functional analysis of language use, maintenance, and diversity; interaction between verbal and nonverbal communication. Prerequisites: both ASB 480 and ENG 213 (or FLA 400) or only instructor approval.
General Studies: SB

ASB 485 U.S.-Mexico Border in Comparative Perspective. (3)
spring in odd years
Explores the multicultural and social dimensions of communities along the U.S.-Mexico border, emphasizing social organization, migration, culture, and frontier ideology. Prerequisite: 6 hours in anthropology or instructor approval.

ASB 489 Doing Research in Anthropology. (3)
fall and spring
Research process learned through critical evaluation of literature, hands-on analysis and interpretation of data, and scientific writing Rotating topics. May be repeated for credit. Seminar, lab. Prerequisite: instructor approval.
General Studies: SB

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

ANTHROPOLOGY (SCIENCE AND MATHEMATICS) (ASM)

ASM 104 Bones, Stones, and Human Evolution. (4)
fall and spring
Physical anthropology and archaeology. Evidence and processes of human evolution and of culture change. Primates. Fossil hominids and their tools. Race, variation, and heredity. Environment and human biology. Prehistoric culture and society. Lecture, lab.
General Studies: SB/SG

ASM 241 Biology of Race. (3)
fall and spring
Human variation and its interpretation in an evolutionary context.

ASM 246 Human Origins. (3)
fall
History of discoveries and changing interpretations of human evolution. Earliest ancestors to emergence of modern humans. Humanity's place in nature.

ASM 248 Bioarchaeology of Cannibalism, Violence, and Social Pathology. (3)
spring
Worldwide review of claims of severely abnormal behavior in prehistory based on perimortem bone taphonomy, analogues, and comparative cases. Lecture, class demonstrations.

ASM 301 Peopling of the World. (3)
fall
Reviews all evidence for human dispersal during the last 100,000 years, origins of language, cultures, races, and beginnings of modern humans. Prerequisite: ASM 104.
General Studies: SB

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

ASM 338 Anthropological Field Session. (2–8)
spring
Anthropological field techniques, analysis of data, and preparation of field reports. May be repeated for credit. Prerequisite: instructor approval.

ASM 341 Human Osteology. (4)
fall
Osteology, human paleontology, and osteometry. Description and analysis of archaeological and contemporary human populations. 3 hours lecture, 3 hours lab. Prerequisite: ASM 104 or instructor approval.

ASM 342 Human Biological Variation. (4)
spring
Evolutionary interpretations of biological variation in living human populations, with emphasis on anthropological genetics and adaptation. Nutrition and disease and their relation to genetics and behavior. 3 hours lecture, 3 hours lab. Prerequisites: both ASM 104 and MAT 106 (or its equivalent) or only instructor approval.
General Studies: SG

ASM 343 Primatology. (3)
fall
Evolution and adaptations of nonhuman primates, emphasizing social behavior. Includes material from fossil evidence and field and laboratory studies in behavior and biology. Prerequisite: ASM 104 or instructor approval.

ASM 344 Fossil Hominids. (3)
once a year
Ancient African, Asian, and European human and primate skeletal, dental, and cultural remains. Human biological, behavioral, and cultural evolution. Prerequisite: ASM 104 or instructor approval.
General Studies: H

ASM 345 Disease and Human Evolution. (3)
fall
Interaction of people and pathogens from prehistoric times to the present, with emphasis on disease as an agent of genetic selection. Prerequisite: ASM 104 or instructor approval.

ASM 348 Social Issues in Human Genetics. (3)
spring
Moral and social implications of developments in genetic science, particularly as they affect reproduction, medicine, and evolution.
General Studies: SB

ASM 365 Laboratory Methods in Archaeology. (4)
selected semesters
Techniques of artifact analysis. Basic archaeological research techniques; methods of report writing. May be repeated for credit for total of 8 hours. Prerequisite: instructor approval.

ASM 435 Archaeological Pollen Analysis. (3)
selected semesters
Theory, methodology, and practice of pollen analytic techniques. Compares uses in botany, geology, and archaeology. 2 hours lecture, 3 hours lab, possible field trips. Prerequisite: instructor approval.

ASM 448 Geoarchaeology. (3)
fall and spring
Geologic context relevant to archaeological research. Topics include sediments, deposition environments, soils, anthropogenic and biogenic deposits, and quaternary chronology. Lecture, discussion, field experiences. Prerequisites: ASB 222 (or 223) or GLG 101 (or 103) or GPH 111; instructor approval.

ASM 450 Bioarchaeology. (3)
spring
Surveys archaeological and physical anthropological methods and theories for evaluating skeletal and burial remains to reconstruct biocultural adaptation and lifeways. Prerequisite: ASM 104 or instructor approval.

ASM 452 Dental Anthropology. (4)
fall
Human and primate dental morphology, growth, evolution, and genetics. Within- and between-group variation. Dental pathology and behavioral-cultural-dietary factors. 3 hours lecture, 3 hours lab. Prerequisite: instructor approval.
General Studies: SG

ASM 454 Comparative Primate Anatomy. (4)
spring
Functional anatomy of the cranial, dental, and locomotor apparatus of primates, including humans, emphasizing the relation of morphology to behavior and environment. 3 hours lecture, 3 hours lab, dissections, demonstrations. Prerequisite: instructor approval.

ASM 455 Primate Behavior Laboratory. (3)
selected semesters
Instruction and practice in methods of observation and analysis of primate behavior. Discussion of the relationship between class work on captive animals and field techniques for studying free-ranging groups. Directed readings, 6 hours lab. Prerequisites: ASM 343; instructor approval.
General Studies: L

ASM 456 Infectious Disease and Human Evolution. (3)
once a year
Study of infectious disease and humanity, using evidence from anthropology, history, medicine, and ancient skeletons. Prerequisite: ASM 345.

ASM 472 Archaeological Ceramics. (3)
selected semesters
Analysis and identification of pottery wares, types, and varieties. Systems for ceramic classification and cultural interpretation. 2 hours lecture, 3 hours lab. Prerequisite: instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Asian Pacific American Studies Program

www.asu.edu/copp/asianamerican
480/965-9711
AG 352

Thomas K. Nakayama, Director

CORE FACULTY

Professor: Nakayama
Associate Professor: Li
Assistant Professors: de Jesús, Rosa
Academic Associate: Kuo

AFFILIATED FACULTY

Anthropology
Professor: Eder

Community Resources and Development
Professor: Yoshioka

English
Lecturer: Fuse

Human Communication
Associate Professor: Martínez

Justice and Social Inquiry
Professor: Romero
Associate Professor: Menjivar

Languages and Literatures
Associate Professor: Choi

Psychology in Education
Associate Professor: Nakagawa

Social Work
Assistant Professor: Okamoto

Women and Gender Studies
Assistant Professor: Leong

PURPOSE

Asian Pacific American Studies is an interdisciplinary undergraduate program that examines the experiences of Asian Americans and Pacific Islanders within the United States, particularly in the Southwest. The program is designed to help students of all ethnicities to

1. appreciate the diversity of Asian American and Pacific Islander cultures, experiences, and histories;
2. understand the U.S. experience in new ways; and
3. participate more effectively in an increasingly diverse society.

A certificate program offers courses that provide students with opportunities to think critically about interethnic cooperation and conflict. The program integrates teaching, research, and community service.

CERTIFICATE IN ASIAN PACIFIC AMERICAN STUDIES

Course Requirements. The certificate program requires 18 semester hours. Twelve core hours must be fulfilled by the following courses:

APA 200 Introduction to Asian Pacific American Studies *HU/SB, C* 3
APA 360 Asian Pacific American Experience *HU/SB, C* 3
APA 450 Asian Pacific American Contemporary Issues *SB, C* 3
APA 484 Internship 3
or APA 494 ST: Asian Pacific American Communities (3)

The remaining six semester hours must be filled by courses from an approved list, including any additional courses with an APA prefix, as well as ASB 242, COM 263, and MCO 460.

Students must apply for the certificate program through the Asian Pacific American Studies Program office. For more information, call the program director at 480/965-9711.

BIS CONCENTRATION

A concentration in Asian Pacific American studies is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

ASIAN PACIFIC AMERICAN STUDIES (APA)

APA 194 Special Topics. (1–4)
fall and spring

APA 200 Introduction to Asian Pacific American Studies. (3)
fall and spring
Examines historical and contemporary issues facing Asian Americans and Pacific Islanders in the United States. Lecture, discussion.
General Studies: HU/SB, C

APA 210 Introduction to Ethnic Studies in the U.S. (3)
fall and spring
Covers diversity of experiences and relations among racial and ethnic groups in the United States. Lecture, discussion. Cross-listed as AFS 210/CCS 210. Credit is allowed for only AFS 210 or APA 210 or CCS 210.
General Studies: C

APA 294 Special Topics. (1–4)
fall and spring
Open to all students. May be repeated for credit.

APA 310 Asian Pacific American Arts and Cultures. (3)
fall and spring
Explores Asian Pacific American cultural expression in art, literature, film, theatre, dance, and music. Lecture, discussion.
General Studies: HU, C

APA 315 Asian Pacific American Literature. (3)
fall
Explores the literary history, critical reception, and major theories in Asian Pacific American poetry, fiction, and prose. Lecture, discussion.
General Studies: HU, C

APA 330 Asian Pacific American Genders and Sexualities. (3)
spring
Explores gender and sexuality issues as they relate to Asian Pacific American experiences, including interracial relationships, stereotypes, feminism, queer theory. Lecture, discussion.
General Studies: SB, C

APA 340 Asian Pacific Americans and Media. (3)
fall
Analyzes social construction of Asian Pacific American media images and resistance to those images in various historical contexts. Lecture, discussion.
General Studies: HU, C

APA 345 Asian Pacific Americans and Film. (3)
spring
Examines representations of Asian Pacific Americans in narrative, popular, experimental, and documentary film. Lecture, discussion.

APA 360 Asian Pacific American Experience. (3)
fall and spring
Historical and contemporary experiences of Asian Pacific American racial/ethnic groups in the United States. Lecture, discussion. Topics may include the following:
- Chinese American
- Filipina and Filipino American
- Japanese American
- Korean American
- Pacific Islander
- South Asian American
- Southeast Asian American

General Studies: HU/SB, C

APA 394 Special Topics. (1–4)
fall and spring
Open to all students. May be repeated for credit. Topics may include the following:
- Asian Pacific American Immigration Issues
- Asian Pacific American Legal History

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

- Asian Pacific American Women Issues and Identities
- Asian Pacific Americans and Politics

APA 450 Asian Pacific American Contemporary Issues. (3)
fall and spring
Focuses on issues shaping Asian Pacific American communities, including immigration, politics, education, health, family, gender, youth, interracial relations, and other contemporary topics. Lecture, discussion. Prerequisite: APA 200 or instructor approval.
General Studies: SB, C

APA 484 Internship. (1–12)
fall and spring
Fee.

APA 494 Special Topics. (1–4)
fall and spring
Open to all students. May be repeated for credit. Topics may include the following:

- Asian Pacific American Communities. (3)
- Asian Pacific American Leadership
- Voices and Visions: Asian Pacific American Women, Issues, and Identities

APA 498 Pro-Seminar. (1–7)
fall and spring

APA 499 Individualized Instruction. (1–3)
fall and spring

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Department of Chemistry and Biochemistry

www.asu.edu/clas/chemistry
480/965-3461
PS D102

Robert E. Blankenship, Chair

Regents' Professors: Angell, Buseck, Pettit

Professors: Allen, Blankenship, Fromme, Fuchs, Glick, Gould, Gust, Holloway, Kouvetakis, Lohr, A. Moore, T. Moore, Petuskey, Rose, Shock, Skibo, Steimle, Wang, Williams, Woodbury

Associate Professors: Anbar, Booksh, Hayes, Richert, Wolf

Assistant Professors: Caudle, Chaput, Chen, Francisco, Ghirlanda, Herckes, Matyushov, Seo, Wachter, Yan

Senior Lecturer: Bauer

Lecturers: Briggs, Lefler, Marks

CHEMISTRY—BA

The BA 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 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* (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 2

Minimum total 29–30

* CHM 117, 118, 317, 318, 319, and 320 are strongly recommended for qualified students.

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, 2] 3
PHY 112 General Physics *SQ*[1, 2] 3
PHY 113 General Physics Laboratory *SQ*[1, 2] 1
PHY 114 General Physics Laboratory *SQ*[1, 2] 1

Total 16

[1] More advanced PHY courses may be taken in place of PHY 111, 112, 113, and 114.

[2] 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—BS

The program consists of 46 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* (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:

CHM 240 Introduction to Physical Chemistry *CS*[1] 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 3
CHM 346 Physical Chemistry II 3
CHM 348 Physical Chemistry Laboratory 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) 3
CHM 302 Environmental Chemistry (3)
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 Geochemistry (3)
CHM 485 Meteorites and Cosmochemistry (3)

Total 30

[1] Completing MAT 274 and 342 satisfies CHM 240 requirement.
[2] 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*[1] 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 20

[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.

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 330.

CHEMISTRY—BS

Environmental Chemistry Concentration

The program consists of a minimum of 40 semester hours in chemistry or biochemistry and 26 hours of related courses. Required courses are as follows:

CHM 113 General Chemistry *SQ* 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* 5

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* (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 17

* CHM 117, 118, 317, 318, 319, and 320 are strongly recommended for qualified students.

Additional required chemistry and biochemistry courses are as follows:

CHM 240 Introduction to Physical Chemistry *CS*[1] 3
CHM 302 Environmental Chemistry 3
CHM 303 Environmental Chemistry Laboratory 2
CHM 327 Instrumental Analysis 3
CHM 328 Instrumental Analysis Laboratory 2
CHM 345 Physical Chemistry I 3
CHM 348 Physical Chemistry Laboratory I *L** 1
CHM 460 Biological Chemistry 3
CHM 481 Geochemistry 3

Total 23

* CHM 303 or both 349 and 452 must also be taken with CHM 348 to secure L credit.

Additional required related field courses are as follows:

GLG 321 Mineralogy 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
PHY 121 University Physics I: Mechanics *SQ*[1] 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
Related field elective (choose from the courses below) 3
BIO 320 Fundamentals of Ecology (3)
BIO 426 Limnology *L* (3)
GLG 461 Geomicrobiology (3)

Total 26

[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.

American Chemical Society Certification. A student who satisfactorily completes the BS in Chemistry 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.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

BIOCHEMISTRY—BA

The program consists of a minimum of 38 semester hours in chemistry and biochemistry and 18 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 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* (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 and biochemistry courses are as follows:

BCH 461 General Biochemistry 3
BCH 462 General Biochemistry 3
BCH 467 Analytical Biochemistry Laboratory *L* 3
CHM 302 Environmental Chemistry 3
or CHM 325 Analytical Chemistry (3)
CHM 341 Elementary Physical Chemistry[1] 3
Chemistry electives (choose from the courses below).....6
- BCH 392 Introduction to Research Techniques (1–3)
- BCH 463 Biophysical Chemistry (3)
- BCH 464 Biophysical Chemistry Laboratory (2)
- BCH 465 Protein and Nucleic Acid Biochemistry (3)
- CHM 302 Environmental 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 392 Introduction to Research Techniques (1–3)
- CHM 424 Separation Science (3)
- CHM 452 Inorganic Chemistry Laboratory *L*[2] (1–2)
- CHM 453 Inorganic Chemistry (3)
- CHM 471 Solid-State Chemistry (3)
- CHM 481 Geochemistry (3)

Total 21

[1] CHM 345 may be taken in place of CHM 341.

[2] Both CHM 348 and 349 must also be taken with CHM 452 to secure L credit.

Additional required related field courses are as follows:

Choose from the course combinations below ..... 11 or 12
- BIO 187 General Biology I *SG* (4)
- BIO 188 General Biology II *SQ* (4)
- BIO 340 General Genetics (4)

— or —

- BIO 187 General Biology I *SG* (4)
- BIO 188 General Biology II *SQ* (4)
- BIO 353 Cell Biology (3)

— or —

- MBB 245 Cellular and Molecular Biology (3)
- MBB 343 Genetic Engineering and Society *L* (4)
- MBB 350 Applied Genetics (4)

Choose between the course combinations below.....7
- MAT 251 Calculus for Life Sciences *MA*[1] (3)
- PHY 101 Introduction to Physics *SQ*[2] (4)

— or —

- MAT 210 Brief Calculus *MA*[1] (3)
- PHY 101 Introduction to Physics *SQ*[2] (4)

Total ..... 18 or 19

[1] MAT 270 may be taken in place of MAT 210 or 251.

[2] The combination of PHY 111, 112, 113, and 114 may be taken in place of PHY 101.

BIOCHEMISTRY—BS

The program consists of 36 semester hours in chemistry and biochemistry and 31 semester hours of related courses. Required courses are as follows:

Choose between the course combinations below..... 8 or 9
- 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 and biochemistry 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 392 Introduction to Research Techniques (1–3)
- BCH 465 Protein and Nucleic Acid Biochemistry (3)
- CHM 325 Analytical Chemistry (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)
CHM 481 Geochemistry (3)
CHM 485 Meterorites and Cosmochemistry (3)

Total 20

* CHM 345 may be taken in place of CHM 341.

Additional required related field courses are as follows:

BIO 187 General Biology I *SG* 4
BIO 188 General Biology II *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 111 General Physics *SQ*[1] 3
PHY 112 General Physics *SQ*[2] 3
PHY 113 General Physics Laboratory *SQ*[1] 1
PHY 114 General Physics Laboratory *SQ*[2] 1

Total 31

[1] 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.

Additional biology courses selected from BIO 343, 351, 360, 441, 450, and 465 are strongly recommended.

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.

BIOCHEMISTRY—BS

Medicinal Chemistry Concentration

The program consists of a minimum of 41 semester hours in chemistry or biochemistry and 26 hours of related courses. Required courses are as follows:

Choose between the course combinations below ..... 8 or 9
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 and biochemistry courses are as follows:

BCH 461 General Biochemistry 3
BCH 462 General Biochemistry 3
BCH 463 Biophysical Chemistry 3
BCH 467 Analytical Biochemistry Laboratory *L* 3
CHM 341 Elementary Physical Chemistry 3
CHM 343 Physical Chemistry Laboratory 1
CHM 433 Advanced Organic Chemistry I 3
CHM 435 Medicinal Chemistry 3
Chemistry or biochemistry elective (choose from the courses below) 3
BCH 465 Protein and Nucleic Acid Biochemistry (3)
CHM 434 Advanced Organic Chemistry II (3)
CHM 453 Inorganic Chemistry (3)

Total 25

Additional required related field courses are as follows:

Choose between the course combinations below 4
BIO 187 General Biology I *SG* (4)
— or —
BIO 188 General Biology II *SQ* (4)
— or —
MBB 245 Cellular and Molecular Biology *SQ** (3)
MBB 246 Cellular and Molecular Biology Laboratory *SQ** (1)

Total 4

* Both MBB 245 and 246 must be taken to secure SQ credit.

Additional required related field courses are as follows:

BIO 353 Cell Biology 3
BIO 360 Animal Physiology[1] 3
MAT 270 Calculus with Analytic Geometry I *MA* 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
PHY 111 General Physics *SQ*[2] 3
PHY 112 General Physics *SQ*[3] 3
PHY 113 General Physics Laboratory *SQ*[2] 1
PHY 114 General Physics Laboratory *SQ*[3] 1

Total 22

[1] BIO 340 may be taken in place of BIO 360.
[2] Both PHY 111 and 113 must be taken to secure SQ credit.
[3] Both PHY 112 and 114 must be taken to secure SQ credit.

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 8
BCH 361 Principles of Biochemistry (3)
BCH 367 Elementary Biochemistry Laboratory (1)
CHM 231 Elementary Organic Chemistry *SQ*[2] (3)
CHM 235 Elementary Organic Chemistry Laboratory *SQ*[2] (1)

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

— *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)
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 25

[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.

MINOR IN BIOCHEMISTRY

A minor in Biochemistry is awarded to students who complete the following required courses:

BCH 461 General Biochemistry 3
BCH 462 General Biochemistry 3
Choose between the course combinations below ..... 8 or 9
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*[1] (4)
CHM 118 General Chemistry for Majors II *SQ*[1] (4)
Choose between the combinations of courses below 8
CHM 317 Organic Chemistry for Majors I[1] (3)
CHM 318 Organic Chemistry for Majors II[1] (3)
CHM 319 Organic Chemistry Laboratory for Majors I[1] (1)
CHM 320 Organic Chemistry Laboratory for Majors II[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)
CHM 341 Elementary Physical Chemistry[2] 3
Minimum total 25

[1] CHM 117, 118, 317, 318, 319, and 320 are strongly recommended for qualified students.
[2] CHM 345 may be taken in place of CHM 341.

BIS CONCENTRATION

A concentration in chemistry is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

SECONDARY EDUCATION—BAE

Chemistry. This degree is offered through the Initial Teacher Certification (ITC) program in the College of Education. Students pursuing a major in Secondary Education have an advisor in the College of Education and an advisor within the department of their academic specialization area.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

Academic Specialization ITC Admission Requirements. The following courses must be completed with a "C" (2.00) or higher before applying to the ITC program: CHM 113, 115, 331, and 335. The following courses may be in progress when applying to the ITC program but must be completed with a "C" (2.00) or higher before starting the program: CHM 332 and 336.

The academic specialization requires 46 semester hours. 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)
CHM 453 Inorganic Chemistry 3
Total 30

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.

Teaching Methods
CHM 480 Methods of Teaching Chemistry 3

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, MS, and PhD. See the *Graduate Catalog* for requirements.

The department participates in the interdisciplinary program for the MS and PhD degrees in Molecular and Cellular Biology. For more information, visit the program office in LSE 411, or call 480/965-1768.

BIOCHEMISTRY (BCH)

BCH 361 Principles of Biochemistry. (3)
fall and summer
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. Credit is allowed for only BCH 361 or 461. Prerequisite: CHM 231 or 318 or 332.

BCH 367 Elementary Biochemistry Laboratory. (1)
fall and summer
Qualitative/quantitative analyses of constituents of biological systems, enzyme activity measurements and metabolic studies. 1 hour conference, 3 hours lab. Pre- or corequisite: BCH 361 or instructor approval.

BCH 392 Introduction to Research Techniques. (1–3)
fall, spring, summer
Instrumental methods and philosophy of research by actual participation in chemical research projects. May be repeated for total of 6 semester hours. Prerequisite: advisor and research supervisor approval.

BCH 461 General Biochemistry. (3)
fall and spring
Structure, chemistry, and metabolism of biomolecules and their role in the biochemical processes of living organisms. Credit is allowed for only BCH 461 or 361. Prerequisite: CHM 318 or 332. Corequisite: CHM 341 or 346.

BCH 462 General Biochemistry. (3)
spring
Continuation of BCH 461. Prerequisite: BCH 461 or instructor approval.

BCH 463 Biophysical Chemistry. (3)
spring
Principles of physical chemistry as applied to biological systems. Prerequisite: CHM 341 or 346.

BCH 464 Biophysical Chemistry Laboratory. (2)
fall
Introduces physical methods in modern biochemistry. Prerequisite: BCH 463.

BCH 465 Protein and Nucleic Acid Biochemistry. (3)
spring
Structure and function of proteins and nucleic acids, including protein folding, enzymology, proteomics, DNA/RNA structure, replication, transcription, and genomics. Prerequisite: BCH 461.

BCH 467 Analytical Biochemistry Laboratory. (3)
fall and spring
Quantitative analysis, separation and purification of biological molecules. Applies 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 484 Internship. (3)
selected semesters

BCH 494 Special Topics. (1–4)
selected semesters
Various topics.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

CHEMISTRY (CHM)

CHM 101 Introductory Chemistry. (4)
fall, spring, summer
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. Credit is allowed for only CHM 101 or 107 or 113 or 114 or 117. 3 hours lecture, 1 hour discussion, 2 hours lab. Fee.
General Studies: SQ

CHM 107 Chemistry and Society. (4)
fall and spring
General chemical principles and concepts presented in context of social and technological issues, e.g., energy, pollution, global warming, and others. Credit is allowed for only CHM 107 or 101 or 113 or 114 or 117. 3 hours lecture, 1 hour discussion, 2 hours lab. Fee.
General Studies: SQ, G

CHM 113 General Chemistry. (4)
fall, spring, summer
Principles of chemistry. Adapted to the needs of students in the physical, biological, and earth sciences. Credit is allowed for only CHM 113 or 101 or 107 or 114 or 117. 3 hours lecture, 1 hour discussion, 2 hours lab. Fee. Prerequisites: MAT 106 or 3 semesters of high school algebra; 1 year of high school chemistry recommended.
General Studies: SQ

CHM 114 General Chemistry for Engineers. (4)
fall and spring
Emphasis toward engineering. 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 114 or 101 or 107 or 113 or 117 and for only CHM 114 or 115 or 116 or 118. 3 hours lecture, 1 hour discussion, 2 hours lab. Fee. 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)
fall, spring, summer
Continuation of CHM 113. Equilibrium theory, chemistry of metals, nonmetals, and metalloids; introduces organic chemistry. Laboratory includes qualitative analysis. Credit is allowed for only CHM 115 or 114 or 116 or 118. 3 hours lecture, 2 hours discussion, 4 hours lab. Fee. Prerequisite: CHM 113 or 2 years of high school chemistry.
General Studies: SQ

CHM 116 General Chemistry. (4)
fall and spring
Continuation of CHM 113. Equilibrium theory, chemistry of metals, nonmetals, and metalloids; introduces organic chemistry. Credit is allowed for only CHM 116 or 114 or 115 or 118. 3 hours lecture, 1 hour discussion, 2 hours lab. Fee. Prerequisite: CHM 113 or 2 years of high school chemistry.
General Studies: SQ

CHM 117 General Chemistry for Majors I. (4)
fall
Atomic and molecular structure, properties and physical states of matter, thermodynamics, kinetics, acids and bases, chemical analysis, and stoichiometry. Credit is allowed for only CHM 117 or 101 or 107 or 113 or 114. 3 hours lecture, 1 conference, 2 hours lab. Fee. Prerequisites: 3 years of high school mathematics; minimum of 1 year of high school physics. Prerequisite with a grade of "B" (3.00) or higher: minimum of 1 year of high school chemistry.
General Studies: SQ

CHM 118 General Chemistry for Majors II. (4)
spring
Continuation of CHM 117. Credit is allowed for only CHM 118 or 114 or 115 or 116. 3 hours lecture, 1 conference, 2 hours lab. Fee. Prerequisite: CHM 117. Corequisite: MAT 270.
General Studies: SQ

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

CHM 231 Elementary Organic Chemistry. (3)
fall and spring
Survey of organic chemistry, with emphasis on the reactivity of basic functional groups. Credit is allowed for only CHM 231 or 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)
fall and spring
Organic chemistry experiments in synthesis, purification, analysis, and identification. Lab. Fee. Pre- or corequisite: CHM 231.
General Studies: SQ (if credit also earned in CHM 231)

CHM 240 Introduction to Physical Chemistry. (3)
spring
Introduces mathematical/computational methods in chemical kinetics, thermodynamics, quantum chemistry. Mathematical-based computer laboratory. 2 hours lecture, 4 hours lab. Fee. Prerequisite with a grade of "C" (2.00) or higher: MAT 272.
General Studies: CS

CHM 302 Environmental Chemistry. (3)
spring
Explores major environmental issues, problems, and solutions from analytical and chemistry perspectives. Prerequisites: CHM 114 (or 115 or 116 or 118), 231 (or 331).

CHM 303 Environmental Chemistry Laboratory. (2)
spring
Lab in environmental chemistry to complement CHM 302. First-hand experience with sampling methods, analytical techniques, and environmental lab methods. Lab. Fee. Prerequisite: CHM 231 or 331. Pre- or corequisite: CHM 302.
General Studies: L (if credit also earned in CHM 348)

CHM 317 Organic Chemistry for Majors I. (3)
fall
Structures, reaction mechanisms and kinetics, and systematic syntheses of organic compounds. Credit is allowed for only CHM 317 or 231 or 331. Prerequisite: CHM 115 or 118. Corequisite: CHM 319.

CHM 318 Organic Chemistry for Majors II. (3)
spring
Continuation of CHM 317. Credit is allowed for only CHM 318 or 332. Prerequisite: CHM 317. Corequisite: CHM 320.

CHM 319 Organic Chemistry Laboratory for Majors I. (1)
fall
Emphasizes mechanisms, kinetics, and products of organic reactions. Credit is allowed for only CHM 319 or 335. 1 conference, 3 hours lab. Fee. Pre- or corequisite: CHM 317.

CHM 320 Organic Chemistry Laboratory for Majors II. (1)
spring
Continuation of CHM 319. Credit is allowed for only CHM 320 or 336. 1 conference, 3 hours lab. Fee. Prerequisite: CHM 319. Corequisite: CHM 318.

CHM 325 Analytical Chemistry. (3)
fall and summer
Principles and methods of chemical analysis. Prerequisite: CHM 115 or 116.

CHM 326 Analytical Chemistry Laboratory. (1)
fall and summer
Experiments in chemical analysis. 4 hours lab. Fee. Corequisite: CHM 325.

CHM 327 Instrumental Analysis. (3)
spring
Principles of instrumental methods in chemical analysis. Electroanalytical and optical techniques. Prerequisites: CHM 325, 326. Pre- or corequisite: CHM 346.

CHM 328 Instrumental Analysis Laboratory. (2)
spring
Experiments in chemical analysis by electroanalytical and optical techniques. 6 hours lab. Fee. Corequisite: CHM 327.

CHM 331 General Organic Chemistry. (3)
fall, spring, summer
Chemistry of organic compounds. Credit is allowed for only CHM 331 or 231 or 317. Prerequisite: CHM 115 or 116 or 118.

CHM 332 General Organic Chemistry. (3)
fall and spring or summer
Continuation of CHM 331. Credit is allowed for only CHM 332 or 318. Prerequisite: CHM 331.

CHM 335 General Organic Chemistry Laboratory. (1)
fall, spring, summer
Microscale organic chemical experiments in separation techniques, synthesis, analysis and identification, and relative reactivity. Credit is allowed for only CHM 335 or 319. 4 hours lab. Fee. Corequisite: CHM 331.

CHM 336 General Organic Chemistry Laboratory. (1)
fall and spring or summer
Continuation of CHM 335. Credit is allowed for only CHM 336 or 320. 4 hours lab. Fee. Prerequisite: CHM 335. Corequisite: CHM 332. þ

CHM 341 Elementary Physical Chemistry. (3)
fall
Thermodynamics, equilibrium, states of matter, solutions, and chemical kinetics. For students in premedical, biological, and educational curricula. Prerequisites: CHM 115 (or 114 or 118 or 325), 231 (or 331); MAT 271; PHY 112.

CHM 343 Physical Chemistry Laboratory. (1)
fall
Physical chemistry experiments. Credit is allowed for only CHM 343 or both CHM 348 and 349. 1 hour conference, 3 hours lab. Fee. Corequisite: CHM 341 or 345.

CHM 345 Physical Chemistry I. (3)
fall
Introduces quantum chemistry with application to electronic structure and dynamics of atoms and molecules. Prerequisite: only CHM 240 or both MAT 272 and 274 (with grades of "C" (2.00) or higher).

CHM 346 Physical Chemistry II. (3)
spring
Introduces equilibrium and statistical thermodynamics. Laws of thermodynamics, equations of state, multicomponent chemical and phase equilibria, and electrochemistry. Prerequisite: CHM 345. Corequisite: MAT 274.

CHM 348 Physical Chemistry Laboratory I. (1)
fall
Laboratory experiments in spectroscopy and computational chemistry. Credit is allowed for both CHM 348 and 349 or only CHM 343. 4 hours lab. Fee. Pre- or corequisite: CHM 345.
General Studies: L (if credit also earned in only CHM 303 or both CHM 349 and 452)

CHM 349 Physical Chemistry Laboratory II. (1)
spring
Laboratory experiments in thermodynamics, electrochemistry, and computational chemistry. Credit is allowed for both CHM 349 and 348 or only CHM 343. 4 hours lab. Fee. Pre- or corequisite: CHM 346.
General Studies: L (if credit also earned in CHM 348 and 452)

CHM 392 Introduction to Research Techniques. (1–3)
fall, spring, summer
Instrumental methods and philosophy of research by actual participation in chemical research projects. May be repeated for a total of 6 semester hours. Prerequisite: approval of advisor and research supervisor.

CHM 424 Separation Science. (3)
selected semesters
Basic theory and practical aspects of gas, liquid, ion-exchange, and gel-permeation chromatographies, and other important industrial and research techniques. 2 hours lecture, 4 hours lab. Fee. Prerequisite: CHM 318 or 332 or 346 or instructor approval.

CHM 431 Qualitative Organic Analysis. (3)
spring
Systematic identification of organic compounds. 1 hour lecture, 6 hours lab. Fee. Prerequisites: both CHM 118 (or 327) and 320 (or 336) or only instructor approval.

CHM 433 Advanced Organic Chemistry I. (3)
fall
Reaction mechanisms, reaction kinetics, linear free energy relationships, transition state theory, and Woodward-Hoffmann rules. Prerequisites: both CHM 318 (or 332) and 341 (or 346) or only instructor approval.

CHM 434 Advanced Organic Chemistry II. (3)
spring
Continuation of CHM 433. Prerequisite: CHM 433 (or CHM 531) or instructor approval.

CHM 435 Medicinal Chemistry. (3)
spring
Principles of medicinal and pharmaceutical chemistry. Drug design, synthesis, and mechanism of action. Prerequisites: a combination of BCH 361 (or 461) and BIO 353 and CHM 318 (or 332) or only instructor approval.

CHM 452 Inorganic Chemistry Laboratory. (1–2)
spring
Preparation and characterization of typical inorganic substances, emphasizing methods and techniques. 1 conference, 5 hours lab. Fee. Prerequisite: instructor approval.
General Studies: L (if credit also earned in CHM 348 and 349)

CHM 453 Inorganic Chemistry. (3)
fall
Principles and applications of inorganic chemistry. Prerequisite: CHM 341 or 346.

CHM 460 Biological Chemistry. (3)
spring
Structure and function of macromolecules and their involvement in the processing of energy and information by living cells. Prerequisites: CHM 318, 346, 453.

CHM 471 Solid-State Chemistry. (3)
fall
Crystal chemistry, thermodynamics and electrochemistry of solids, nonstoichiometric compounds, diffusion and solid-state reactions, crystal growth, and selected topics. Pre- or corequisite: CHM 346 or instructor approval.

CHM 480 Methods of Teaching Chemistry. (3)
spring
Organization and presentation of appropriate content of chemistry; preparation of reagents, experiments, and demonstrations; organization of stock rooms and laboratories; experience in problem solving. Fee. Prerequisite: instructor approval.

CHM 481 Geochemistry. (3)
spring
Origin and distribution of the chemical elements. Geochemical cycles operating in the earth's atmosphere, hydrosphere, and lithosphere. Cross-listed as GLG 481. Credit is allowed for only CHM 481 or GLG 481. Prerequisite: CHM 341 (or 346) or GLG 321.

CHM 483 Astrobiology. (3)
fall and spring
Origin, early evolution, distribution, and future of life on Earth and elsewhere in the cosmos. May be repeated for credit. Lecture, discussion, video conferences, possible field trips. Cross-listed as AST 460/BIO 460/GLG 460/MIC 475. Credit is allowed for only AST 460 or BIO 460 or CHM 483 or GLG 460 or MIC 475. Prerequisite: instructor approval.

CHM 484 Internship. (3)
selected semesters

CHM 485 Meteorites and Cosmochemistry. (3)
selected semesters
Chemistry of meteorites and their relationship to the origin of the earth, solar system, and universe. Cross-listed as GLG 485. Credit is allowed for only CHM 485 or GLG 485.

CHM 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Chemistry of Global Climate Change. (3)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Department of Chicana and Chicano Studies

www.asu.edu/clas/chicana
480/965-5091
COOR 6633

Cordelia Candelaria, Chair

Professors: Candelaria, Espinosa

Associate Professors: Bernardi, Escobar, Magaña

Assistant Professors: Danielson, García, Leaños, Szkupinski-Quiroga

The Department of Chicana and Chicano Studies (CCS) is an interdisciplinary degree program whose central mission is to increase the direct participation of Mexican Americans and Latinos in the human and capital development of American society. This mission is advanced by the department's core undergraduate curriculum and related programs that examine the culture, artistic achievements, history, and current status of people of Mexican descent and other Latinas and Latinos living in the United States. The curriculum combines a research-based understanding of the humanities, social sciences, and the arts with practical CCS applications (studio formats, internships, community research projects, etc.) as preparation for successful careers and productive public service in diverse communities.

CHICANA AND CHICANO STUDIES—BA

The major in Chicana and Chicano Studies requires 45 semester hours of course work. A minimum of 30 semester hours must be in CCS, CSH, and CSS courses. The remaining course work must be in a related field and 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
HST 331 Mexican American History to 1900 *SB, C, H*.....3
HST 332 Mexican American History Since 1900 *SB, C, H*.....3

Within the 45 semester hours, CCS majors must also take 18 semester hours in one of two concentrations—humanities/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.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

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*	3
	or CCS 111 Introduction to Chicana and Chicano Culture *C* (3)	
HST	417 Topics in Mexican American 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.

BIS CONCENTRATION

A concentration in Chicana and Chicano studies is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

SECONDARY EDUCATION—BAE

Chicana and Chicano Studies. Applications are not being accepted at this time.

CHICANA AND CHICANO STUDIES (CCS)

CCS 101 Introduction to Chicana and Chicano Studies. (3)
fall
Historical and contemporary issues in the Chicana and Chicano community; focus on economic, sociological, cultural, and political status of Chicanas and Chicanos in the U.S.
General Studies: C

CCS 111 Introduction to Chicana and Chicano Culture. (3)
fall
Interdisciplinary analysis of customs, values, belief systems, and cultural symbols; special attention is given to cultural continuity and change.
General Studies: C

CCS 210 Introduction to Ethnic Studies in the U.S. (3)
fall and spring
Covers diversity of experiences and relations among racial and ethnic groups in the United States. Lecture, discussion. Cross-listed as AFS 210/APA 210. Credit is allowed for only AFS 210 or APA 210 or CCS 210.
General Studies: C

CCS 300 Chicana and Chicano Culture and Society. (3)
fall
Intensive analysis of how Mexican American writers, artists, film makers, entertainers, and academicians have interpreted aspects of the Chicana and Chicano experience.
General Studies: C

CCS 446 Teaching Chicana and Chicano Studies in the Schools. (3)
selected semesters
Approaches/techniques for infusion of Chicana and Chicano Studies content into elementary and secondary curriculum; designed for teachers who work with Chicana and Chicano students.

CCS 498 Pro-Seminar. (3)
once a year
Required courses for majors on topic selected by instructor; writing-intensive course related to the development of interdisciplinary research skills.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

CHICANA AND CHICANO STUDIES HUMANITIES (CSH)

CSH Note 1. Completion of the First-Year Composition requirement (ENG 101 and 102 [or 105] or ENG 107 and 108 with a grade of "C" [2.00] or higher) is a prerequisite for all English courses above the 100 level.

CSH Note 2. A term paper or equivalent out-of-class written work is required in all upper-division (300- and 400-level) ENG courses.

CSH 210 Chicana and Chicano Poetry. (3)
fall
Writing seminar on Chicana and Chicano poetics and intensive creative writing workshop. Workshop, seminar.

CSH 220 Chicana and Chicano Cultural Expression. (3)
once a year
Interrelation between economic, social, and political status and forms of artistic expression; i.e., music, dance, drama, literature, and graphic arts.

CSH 310 Chicana and Chicano Folklore. (3)
once a year
Analyzes Chicana and Chicano folk beliefs, traditions, and practices.
General Studies: HU, C

CSH 350 Mexican and Mexican American Artistic Production. (3)
once a year
Overview of Mexican and Mexican American artistic production from colonial times to present; emphasis on religious and folk art.
General Studies: HU, C, G

CSH 351 Contemporary Chicana and Chicano Art. (3)
once a year
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)
fall
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. See CSH Notes 1, 2.
General Studies: L/HU, C

CSH 484 Internship. (3)
selected semesters

CSH 485 Chicana Writers. (3)
once a year
Critical reading of Mexican American women authors; emphasis on contemporary (post-1970) poetry, novels, short stories, and essays.
General Studies: HU, C

CSH 498 Pro-Seminar. (3)
once a year
Required course for majors on topic selected by instructor; writing-intensive course related to the development of interdisciplinary research skills.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

CHICANA AND CHICANO STUDIES SOCIAL SCIENCE (CSS)

CSS 315 Chicano Family Structures and Perceptions. (3)
once a year
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 and Policy. (3)
once a year
Historical/contemporary analysis of Chicana and Chicano political ideologies, attitudes, strategies, and movements; relations with governmental agencies; and public policy issues.
General Studies: C

CSS 331 Policy Issues in Chicana and Chicano Urban Settings. (3)
spring
Historical, demographic, and sociological overview of the status of Chicanas and Chicanos in urban settings as well as the public policy relevance.
General Studies: C

CSS 336 Issues in Immigration and Migration. (3)
once a year
Historical/contemporary overview of Mexican immigration into and within the U.S.; factors affecting population movement, settlement patterns, and migrants' incorporation into society.
General Studies: C, H

CSS 432 Issues in Chicana and Chicano Gender. (3)
once a year
Analyzes social construction of gender identities; emphasizes 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)
once a year
Introduces principles and methods of qualitative research applied to the Chicana and Chicano community.

CSS 498 Pro-Seminar. (3)
once a year
Required course for majors on topic selected by instructor; writing-intensive course related to the development of interdisciplinary research skills.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Computational Biosciences

Professional Science Master's Degree

www.asu.edu/compbiosci
480/965-5519
GWC 699

Rosemary Renaut, Director

GRADUATE PROGRAMS

The Professional Science Master's degree in Computational Biosciences is administered by an interdisciplinary committee. The faculty participating in this PSM program are drawn from departments that include Biology, Chemistry and Biochemistry, Computer Science Engineering, Health Management and Policy, Mathematics and Statistics, and Plant Biology.

For more information, contact the program office or refer to the *Graduate Catalog.*

COMPUTATIONAL BIOSCIENCES (CBS)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog,* or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Economics

The College of Liberal Arts and Sciences offers a Bachelor of Arts (BA) degree and a Bachelor of Science (BS) degree in Economics. The BS degree is designed primarily for students intending to seek employment upon completion of their undergraduate studies. The BA degree is designed primarily for students intending to go on to graduate school or law school. The W. P. Carey School of Business also offers a BS degree in Economics. Faculty, course descriptions, and the major requirements in the W. P. Carey School of Business are described under "Department of Economics," see page 177.

ECONOMICS—BA

The BA is designed to prepare students for graduate programs in economics, business, or law. Concurrent degree programs such as mathematics and physics coordinate well with the BA program in economics.

The requirements for the BA in Economics consist of three parts: the university requirements for all students at ASU, see "University Graduation Requirements," page 88; the requirements of the College of Liberal Arts and Sciences, see "College Degree Requirements," page 330; and the requirements of the Department of Economics.

Requirements of the Department of Economics. The program consists of at least 43 semester hours of course work distributed between economics and related fields as shown below. Students must earn grades of "C" (2.00) or higher in all courses in the major. If a student receives a grade below "C" (2.00) in any course in the major, this course must be repeated. Students must meet all prerequisites and course requirements as listed in the catalog. These include

A. Mathematics and Statistics: MAT 270, 271, and 272 or MAT 290 and 291; STP 226 or QBA 221; and ECN 470

B. Principles of Economics: ECN 111 and 112

C. Completion of 21 semester hours in economics courses and quantitative business analysis courses

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

at the 300-level or above. These 21 hours must include

1. Economic Theory: ECN 313 and 314;
2. Econometrics and Statistics: ECN 410 or 425 or QBA 321 or STP 421;
3. a Capstone course or Honors Thesis: ECN 475 or 493; and
4. economics electives at the 400-level or above to fill out the remaining hours. A maximum of three hours of ECN 484 Economics Internship can be used to satisfy this requirement. ECN 475 and 493 cannot be used to satisfy the requirement.

ECONOMICS—BS

The BS degree is designed to prepare students for employment in the private or public sectors of the economy. This program will provide students with the typical analytical and quantitative skills employers expect of individuals holding economics degrees.

Requirements for the College of Liberal Arts and Sciences BS in Economics consist of three parts: the university requirements for all students at ASU, see "University Graduation Requirements," page 88; the requirements of the College of Liberal Arts and Sciences, see "College Degree Requirements," page 330; and the requirements of the Department of Economics.

Requirements of the Department of Economics. The program consists of at least 45 semester hours of course work distributed between economics and related fields as shown below. Students must earn grades of "C" (2.00) or higher in all courses in the major. If a student receives a grade below "C" (2.00) in any course in the major, this course must be repeated. Students must meet all prerequisites and course requirements as listed in the catalog. These include

A. Mathematics and Statistics: MAT 210 or 270 or 290; STP 226 or QBA 221

B. Principles of Economics: ECN 111 and 112

C. Completion of 24 semester hours in economics courses and quantitative business analysis courses at the 300-level or above. At least four of these courses must be at the 400-level or above. These 24 semester hours must include
   1. Economic Theory: ECN 313 and 314;
   2. Econometrics and Statistics: ECN 410 or 425 or QBA 321 or STP 421;
   3. a Capstone course or Honors Thesis: ECN 475 or 493; and
   4. Economics electives at the 300-level or above to fill out the remaining hours. A maximum of three hours of ECN 484 Economics Internship can be used to satisfy this requirement. ECN 475 and 493 cannot be used to satisfy the requirement.

D. A total of nine semester hours from the Approved List of Related Field Courses.

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.

Certificate in International Business Studies. Students majoring in Economics may elect to pursue a Certificate in International Business Studies, combining courses from the major with selected international business courses. For more information see "Certificate in International Business Studies," page 183.

Certificate in Quality Analysis. Students majoring in Economics may elect to pursue a Certificate in Quality Analysis, combining courses from the major with selected quantitative business analysis courses. For more information, see "Certificate in Quality Analysis," page 172.

MINOR

Minor in General Economics. This minor (and BIS area of concentration) requires 18 semester hours of course work which includes ECN 111 and 112, and 12 semester hours of economics courses at the 300-level or above for which all prerequisites have been met. Students must earn grades of "C" (2.00) or higher in all courses in the minor. If a student receives a grade below "C" (2.00) in any course in the minor, this course must be repeated.

Minor in Economics for Students Planning a Career in Law. This minor requires 18 semester hours of course work that includes ECN 111, 112, 314, 450, 453, and one additional economics course at the 300-level or above for which all prerequisites have been met. Students must earn grades of "C" (2.00) or higher in all courses in the minor. If a student receives a grade below "C" (2.00) in any course in the minor, this course must be repeated.

Honors Students

Students admitted to the Barrett Honors College may substitute ECN 294 ST: Macroeconomics for ECN 111 and 313, and ECN 294 ST: Microeconomics for ECN 112 and 314. These courses with grades of "C" (2.00) or higher satisfy the prerequisites and pre/corequisites for all upper-division economics courses.

BIS CONCENTRATIONS

Concentrations in (1) economics and (2) economics for students planning a career in law are available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

SECONDARY EDUCATION—BAE

This degree is offered through the Initial Teacher Certification (ITC) program in the College of Education. Students

pursuing a major in Secondary Education (Economics) have an advisor in the College of Education and an advisor within the Department of Economics.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

Academic Specialization ITC Admission Requirements. The following courses must be completed with a grade of "C" (2.00) or higher before applying to the ITC professional program:

ECN 111 Macroeconomic Principles *SB* 3
ECN 112 Microeconomic Principles *SB* 3
ECN 313 Intermediate Macroeconomic Theory *SB* 3
ECN 314 Intermediate Microeconomic Theory *SB* 3
MAT 210 Brief Calculus *MA* 3

Economics. The major teaching field consists of 45 semester hours and six hours in teaching methods. A minimum grade of "C" (2.00) is required in all academic specialization courses. Required major courses are as follows:

ECN 111 Macroeconomic Principles *SB* 3
ECN 112 Microeconomic Principles *SB* 3
ECN 313 Intermediate Macroeconomic Theory *SB* 3
ECN 314 Intermediate Microeconomic Theory *SB* 3
MAT 210 Brief Calculus *MA* 3
Choose one of the following courses 3
  QBA 221 Statistical Analysis *CS* (3)
  STP 226 Elements of Statistics *CS* (3)
Choose one of the following courses 3
  ECN 410 Applied Business Forecasting (3)
  ECN 425 Introduction to Econometrics *CS* (3)
  QBA 321 Applied Quality Analysis I (3)
Choose one of the following courses 3
  ECN 475 Capstone in Economics *L* (3)
  ECN 493 Honors Thesis *L* (3)
Upper-division economics electives 12
Related area course* 9
Total 45

* Choose in consultation with an economics advisor.

Teaching Methods
SED 480 Methods of Teaching Social Studies 3
Additional teaching methods course* 3
Total 6

* Choose in consultation with an education advisor.

Social Studies. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

GRADUATE PROGRAMS

The faculty in the Department of Economics offer programs leading to the MS and PhD degrees. See the *Graduate Catalog* for requirements.

For faculty and course descriptions see "Department of Economics," page 177.

COURSES

For courses, see "Economics (ECN)," page 178.

Department of English

www.asu.edu/clas/english
480/965-3168
LL 542

Neal A. Lester, Chair

Regents' Professors: Carlson, Dubie, Ríos

Professors: Adams, Bjork, Boyer, Brack, Candelaria, Crowley, Goldberg, Gutierrez, Helms, Hogue, Horan, Kehl, Lester, Major, Miller, A. Nilsen, D. Nilsen, Rhodes, Roen, Tobin, van Gelderen

Associate Professors: Bates, Bivona, Castle, Corse, DeLamotte, Gerson, M. Goggin, Lussier, Mahoney, McNally, Nelson, Perry, Pritchard, Ramage, Savard, Schwalm, Tohe, Voaden, Webb

Assistant Professors: Bernick, Blasingame, Fox, P. Goggin, Lockard, Milun, Parchesky, Sadowski-Smith, Thompson

Senior Lecturers: Cook, Cooper, Duerden, Dugan, Dwyer, Heenan, Norton, Sudol, Wheeler

Lecturers: Binkley, Duttagupta, Fuse

Academic Associate: McNeil

Associate Instructional Professional: Glau

ENGLISH—BA

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 BA degree in English, with a concentration in linguistics, literature, or creative writing, and a Secondary Education Bachelor of Arts in Education degree. The faculty also offer a Writing Certificate. Students should work with advisors to design an individual program of study that takes full advantage of the diversity within the department as well as interdisciplinary and multicultural contexts available in the college and university.

The BA degree in English with a concentration in creative writing consists of 45 semester hours. Application to the

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

program requires a minimum cumulative GPA of 3.00. Students must also have completed 45 hours of course work. Required courses are as follows:

ENG 200 Critical Reading and Writing About Literature *L/HU* 3
ENG 210 Introduction to Creative Writing 3
ENG 221 Survey of English Literature *HU* 3
or ENG 222 Survey of English Literature *HU, H* (3)
ENG 241 Literatures of the United States to 1860 *HU* 3
ENG 242 Literatures of the United States, 1860 to Present *HU* 3
ENG 310 Intermediate Creative Writing 3
ENG 411 Advanced Creative Writing 3
ENG 495 Literary Forms: Theory and Practice 3
ENG 498 PS: Directions in Creative Writing 3
ENG 498 Another Pro-Seminar course 3
Total 30

Six additional hours must be chosen from a course list supplied by the departmental advisor.

The nine remaining hours needed to complete the 45 semester hours are 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. At least 12 of these upper-division semester hours must be completed at the Tempe campus, including at least one ENG 310 or ENG 411 writing workshop in the student's chosen genre. All students in the major must earn a grade of "C" (2.00) or higher. A 3.00 GPA in the major is required for graduation.

The BA 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* 3
or ENG 222 Survey of English Literature *HU, H* (3)
or ENG 241 Literatures of the United States to 1860 *HU* (3)
or ENG 242 Literatures of the United States, 1860–Present *HU* (3)
ENG 312 English in Its Social Setting *L/HU/SB* 3
ENG 313 Phonology and Morphology *L* 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" (2.00) or higher is required in all courses taken for the major. *No course may be used to satisfy more than one requirement.*

The BA 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* 3
ENG 222 Survey of English Literature *HU, H* 3
ENG 241 Literatures of the United States to 1860 *HU* 3
ENG 242 Literatures of the United States, 1860–Present *HU* 3
ENG 421 Shakespeare *HU* 3

Courses taken to fulfill the areas and periods listed below can be used to satisfy more than one of these requirements:

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 321 and 421 (3)
Upper-division course in literature between 1660 and 1900 (3)
Upper-division course in literature after 1900 (3)

Additional hours needed to complete the 45 hours are 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" (2.00) 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
ENG 221 Survey of English Literature *HU* 3
or ENG 222 Survey of English Literature *HU, H* (3)
or ENG 241 Literatures of the United States to 1860 *HU* (3)
or ENG 242 Literatures of the United States, 1860–Present *HU* (3)
ENG 312 English in Its Social Setting *L/HU/SB* 3
ENG 314 Modern Grammar 3
ENG 413 History 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" (2.00) or higher is required in all courses for the minor.

The minor in English with a concentration in literature consists of 24 semester hours. These courses are required:

ENG 200 Critical Reading and Writing About Literature *L/HU* 3
ENG 221 Survey of English Literature *HU* 3
or ENG 222 Survey of English Literature *HU, H* (3)
ENG 241 Literatures of the United States to 1860 *HU* 3
or ENG 242 Literatures of the United States, 1860–Present *HU* (3)
ENG 321 Introduction to Shakespeare *L/HU* 3
or 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" (2.00) or higher is required in all courses taken for the minor.

BIS CONCENTRATIONS

Four concentrations in English (creative writing, linguistics concentration, literature concentration, and writing certificate) are available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

WRITING CERTIFICATE

The Writing Certificate consists of 19 semester hours. Initial entry into the program requires a minimum GPA of 3.00 in ENG 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* or ENG 412 Creative Nonfiction (3) 3
ENG 301	Writing for the Professions *L* 3
ENG 372	Document Production *L* 3
ENG 472	Rhetorical Studies *L* 3
ENG 484	Internship: Writing Certificate 3
ENG 498	PS: Writing Certificate Portfolio 1
Total	16

Also required is an additional writing course in English (three hours) or a writing or design course (three hours) selected from an approved list of courses from across campus. All students are required to submit a portfolio before receiving the certificate.

SECONDARY EDUCATION—BAE

This degree is offered through the Initial Teacher Certification (ITC) program in the College of Education. Students pursuing a major in Secondary Education with an academic specialization in English have an advisor in the College of Education and an advisor within the Department of English.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

Academic Specialization ITC Admission Requirements. The following courses must be completed with a grade of "C" (2.00) or higher before applying to the ITC professional program:

ENG 200	Critical Reading and Writing About Literature *L/HU* 3
At least three additional required courses in the academic specialization	9

English. The major teaching field consists of 39 semester hours with an additional six hours of teaching methods in English. A grade of "C" (2.00) or higher is required in all academic specialization courses. Required courses are as follows:

ENG 200	Critical Reading and Writing About Literature *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* 3
ENG 222	Survey of English Literature *HU, H* 3
ENG 241	Literatures of the United States to 1860 *HU* 3
ENG 242	Literatures of the United States, 1860–Present *HU* 3
ENG 312	English in Its Social Setting *L/HU/SB* 3
	or ENG 314 Modern Grammar (3)
ENG 421	Shakespeare *HU* 3
	or ENG 422 Studies in Shakespeare *HU* (3)
ENG 471	Literature for Adolescents *HU* 3
An upper-division course in women's literature or American ethnic literature	3
Electives	3
Upper-division electives	6
Total	39

Teaching Methods

ENG 480	Methods of Teaching English: Composition *L* 3
ENG 482	Methods of Teaching English: Language *L* 3
Total	6

GRADUATE PROGRAMS

The faculty in the Department of English offer programs leading to the MA 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 PhD degree in English with two concentrations, one in literature and one in rhetoric/composition and linguistics. See the *Graduate Catalog* for requirements.

ENGLISH (ENG)

ENG Note 1. Completion of the First-Year Composition requirement (ENG 101 and 102 [or 105] or ENG 107 and 108 with a grade of "C" [2.00] or higher) is a prerequisite for all English courses above the 100 level.

ENG Note 2. A term paper or equivalent out-of-class written work is required in all upper-division (300- and 400-level) ENG courses.

ENG Note 3. English majors and minors are expected to have completed ENG 200 before taking 400-level literature courses.

ENG 101 First-Year Composition. (3)
fall, spring, summer
Discovering, organizing, and developing ideas in relation to the writer's purpose, subject, and audience. Emphasizes modes of written discourse and effective use of rhetorical principles. Foreign students, see ENG 107. Prerequisite: see "University Testing Requirements," page 77, and "First-Year Composition Requirement," page 88.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

ENG 102 First-Year Composition. (3)
fall, spring, summer
Critical reading and writing; emphasis on strategies of academic discourse. Requires research paper. Foreign students, see ENG 108. Prerequisite with a grade of "C" (2.00) or higher: ENG 101.

ENG 105 Advanced First-Year Composition. (3)
fall and spring
Concentrated composition course for students with superior writing skills; intensive reading; research papers; logical and rhetorical effectiveness. Credit is allowed for only ENG 105 or First-Year Composition. Prerequisite: see "University Testing Requirements," page 77, and "First-Year Composition Requirement," page 88.

ENG 107 English for Foreign Students. (3)
fall and spring
For students from non-English-speaking countries who have studied English in their native countries, but who require practice in the idioms of English. Intensive reading, writing, and discussion. Satisfies the graduation requirement of ENG 101.

ENG 108 English for Foreign Students. (3)
fall and spring
For foreign students; critical reading and writing; strategies of academic discourse. Requires research paper. Satisfies graduation requirement of ENG 102. Prerequisite with a grade of "C" (2.00) or higher: ENG 107.

ENG 114 English Grammar and Usage. (3)
fall and spring
Fundamentals of English grammar (word and phrase structure) and of English usage (punctuation, grammatical correctness).

ENG 200 Critical Reading and Writing About Literature. (3)
fall and spring
Introduces the terminology, methods, and objectives of the study of literature, with practice in interpretation and evaluation. See ENG Note 1. Prerequisite: English major or minor.
General Studies: L/HU

ENG 201 World Literature. (3)
fall
Classical and medieval periods. Selections from the great literature of the world in translation and lectures on the cultural background. See ENG Note 1.
General Studies: HU, G, H

ENG 202 World Literature. (3)
spring
Renaissance and modern periods. Selections from the great literature of the world in translation and lectures on the cultural background. See ENG Note 1.
General Studies: HU, H

ENG 204 Introduction to Contemporary Literature. (3)
once a year
Poetry, fiction, drama, and possibly other genres. See ENG Note 1.
General Studies: HU

ENG 210 Introduction to Creative Writing. (3)
fall and spring
Beginning writing of poetry, fiction, drama, or mixed genre. Separate sections for each genre. Each genre may be taken once. See ENG Note 1.

ENG 212 English Prose Style. (3)
selected semesters
Analysis and practice of writing in various classical and modern prose styles. See ENG Note 1. Prerequisite: preferably English major or both approval of advisor and instructor. Prerequisite with a grade of "B" (3.00) or higher: ENG 102 or 105.
General Studies: L

ENG 213 Introduction to the Study of Language. (3)
fall and spring
Language as code; phonetics, phonology, morphology, and syntax; the lexicon; language acquisition; sociolinguistics. See ENG Note 1.

ENG 215 Strategies of Academic Writing. (3)
fall and spring
Advanced course in techniques of analyzing and writing academic expository prose. Writing is research based. See ENG Note 1.
General Studies: L

ENG 216 Persuasive Writing on Public Issues. (3)
fall and spring
Advanced course in techniques of analyzing and writing persuasive arguments addressing topics of current public interest. Papers are research based. See ENG Note 1.
General Studies: L

ENG 217 Writing Reflective Essays. (3)
fall and spring
Critical examination of the influences discourse has on formation of identity; narrative analyses of self and culture. See ENG Note 1.
General Studies: L

ENG 218 Writing About Literature. (3)
fall and spring
Advanced writing course requiring analytical and expository essays about fiction, poetry, and drama. For non-English majors. See ENG Note 1.
General Studies: L/HU

ENG 221 Survey of English Literature. (3)
fall and spring
Medieval, Renaissance, and 18th-century literature. Emphasizes major writers and their works in their literary and historical contexts. See ENG Note 1.
General Studies: HU

ENG 222 Survey of English Literature. (3)
fall and spring
Romantic, Victorian, and 20th-century literature. Emphasizes major writers and their works in their literary and historical contexts. See ENG Note 1.
General Studies: HU, H

ENG 241 Literatures of the United States to 1860. (3)
fall and spring
Survey of literary movements and genres from colonization to the Civil War. See ENG Note 1.
General Studies: HU

ENG 242 Literatures of the United States, 1860–Present. (3)
fall and spring
Survey of literary movements and genres from the Civil War to the present. See ENG Note 1.
General Studies: HU

ENG 245 Popular Culture Issues. (3)
fall and spring
Selected topics in various forms of popular culture related to written texts. May be repeated for credit when topics vary. See ENG Note 1.
General Studies: L

ENG 301 Writing for the Professions. (3)
fall and spring
Advanced practice in writing and editing expository prose. Primarily for preprofessional majors. See ENG Notes 1, 2.
General Studies: L

ENG 303 Classical Backgrounds of English Literature. (3)
selected semesters
Readings of Greek and Latin literature in translation as they relate to literature in English. See ENG Notes 1, 2.
General Studies: HU

ENG 307 Writing Science Fiction. (3)
selected semesters
Writing science fiction, primarily the short story. Lecture, workshop, online supplements. See ENG Notes 1, 2.

ENG 310 Intermediate Creative Writing. (3)
fall and spring
Separate sections for fiction and poetry. May be taken once for poetry, once for fiction. Lecture, writing assignments, discussion, criticism. See ENG Notes 1, 2. Prerequisite: ENG 210 or instructor approval.

ENG 312 English in Its Social Setting. (3)
fall and spring
Introduces the sociolinguistic study of the English language. See ENG Notes 1, 2.
General Studies: L/HU/SB

ENG 313 Phonology and Morphology. (3)
spring
Introduces English morphology, phonology, etymology, and phonetic aspects of rhyme, alliteration, and other sound-based literary devices. See ENG Notes 1, 2.
General Studies: L

ENG 314 Modern Grammar. (3)
fall and spring
Modern descriptive models of English grammar. See ENG Notes 1, 2.

ENG 315 Medieval Literature in Translation. (3)
once a year
Medieval literature (insular and continental) in translation, from Beowulf to Malory (excluding Chaucer), emphasizing cultural and intellectual backgrounds. Lecture, discussion. See ENG Notes 1, 2.

ENG 321 Introduction to Shakespeare. (3)
fall and spring
Shakespeare's major comedies, histories, and tragedies. See ENG Notes 1, 2.
General Studies: L/HU

ENG 325 Restoration and the 18th Century. (3)
once a year
Writers and movements in nondramatic literature of the restoration and early 18th century. Lecture, discussion. See ENG Notes 1, 2.

ENG 326 English Drama 1660–1800. (3)
once a year
English drama 1660–1800. See ENG Notes 1, 2.
General Studies: HU

ENG 328 The Novel to Jane Austen. (3)
selected semesters
From origins of prose fiction through the 18th century. See ENG Notes 1, 2.
General Studies: HU, H

ENG 329 19th-Century British Fiction. (3)
selected semesters
Includes such authors as Austen, Dickens, Eliot, and Conrad. See ENG Notes 1, 2.
General Studies: L/HU

ENG 330 19th-Century British Poetry. (3)
selected semesters
Romantic and Victorian poets studied in context. Lecture, discussion. See ENG Notes 1, 2.

ENG 331 American Drama. (3)
once a year
Major works in the development of American drama from its beginnings to the present. See ENG Notes 1, 2.
General Studies: L/HU

ENG 332 Major American Novels. (3)
once a year
Major American novels studied in their ethnically diverse literary, historical, and cultural contexts. See ENG Notes 1, 2.
General Studies: L/HU

ENG 333 American Ethnic Literature. (3)
once a year
Examines America's multiethnic identity through works of literature that depict American ethnic, gender, and class sensibilities. Cross-listed as AFH 333. Credit is allowed for only AFH 333 or ENG 333. See ENG Notes 1, 2.
General Studies: L/HU, C

ENG 335 American Poetry. (3)
selected semesters
Themes and developments in American poetry. Lecture, discussion. See ENG Notes 1, 2.

ENG 342 20th-Century British and Irish Literature. (3)
selected semesters
Major works in the development of literature since 1900, studied in their historical and cultural contexts. Lecture, discussion. See ENG Notes 1, 2.
General Studies: HU

ENG 345 Selected Authors or Issues. (3–4)
selected semesters
Different topics may be offered. Film topics with lab may carry 4 credits. May be repeated for credit when topics vary. See ENG Notes 1, 2.

ENG 352 Short Story. (3)
fall and spring
Development of the short story as a literary form; analysis of its technique from the work of representative authors. See ENG Notes 1, 2.
General Studies: L/HU

ENG 353 African American Literature: Beginnings Through the Harlem Renaissance. (3)
fall
Historical survey of African American literary traditions and cultural contexts from slavery through the 1930s. Cross-listed as AFH 353. Credit is allowed for only AFH 353 or ENG 353. See ENG Notes 1, 2.
General Studies: L/HU, C

ENG 354 African American Literature: Harlem Renaissance to the Present. (3)
spring
Historical survey of African American literary traditions and cultural contexts from the 1920s to the present. Cross-listed as AFH 354. Credit is allowed for only AFH 354 or ENG 354. See ENG Notes 1, 2.
General Studies: L/HU, C

ENG 355 European Dramatic Traditions. (3)
selected semesters
Development of European drama since Aeschylus. See ENG Notes 1, 2.
General Studies: L/HU

ENG 356 The Bible as Literature. (3)
fall and spring
Readings in the Jewish and Christian Scriptures in modern translation. See ENG Notes 1, 2.
General Studies: HU

ENG 357 Introduction to Folklore. (3)
selected semesters
Survey of the history, genres, and dynamics of folklore, with emphasis on oral traditions. See ENG Notes 1, 2.
General Studies: HU

ENG 359 American Indian Literatures. (3)
selected semesters
Selected oral traditions and contemporary works by American Indian authors. See ENG Notes 1, 2.
General Studies: L/HU, C

ENG 360 Western American Literature. (3)
once a year
Critical examination of ideas and traditions of the literature of the western United States, including the novel. See ENG Notes 1, 2.
General Studies: L/HU

ENG 361 Silent Film. (4)
fall
Development of motion pictures from 1850 through 1930. 3 hours lecture, screenings. See ENG Notes 1, 2.
General Studies: HU

ENG 362 Sound Film Genres. (4)
spring
Examines the western, the horror film, the comedy, and other genres. 3 hours lecture, screenings. See ENG Notes 1, 2.
General Studies: HU

ENG 363 Chicana and Chicano Literature. (3)
fall
Development of Chicana and Chicano literature; study of genres and themes; attention to literary antecedents. Cross-listed as CSH 363. Credit is allowed for only CSH 363 or ENG 363. See ENG Notes 1, 2.
General Studies: L/HU, C

ENG 364 Women and Literature. (3)
selected semesters
Approaches to issues of gender and representation in literature by and about women. See ENG Notes 1, 2.
General Studies: HU

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

ENG 369 Science Fiction Studies. (3)
selected semesters
Examines science fiction in cultural context. May be repeated for credit. Lecture, discussion, face-to-face, hybrid, or online. See ENG Notes 1, 2.

ENG 372 Document Production. (3)
fall and spring
Introduces document design and production. Practice in critique and in writing the content of publications. Lecture, discussion. See ENG Notes 1, 2. Prerequisite: instructor approval.
General Studies: L

ENG 374 Technical Editing. (3)
fall and spring
Fundamentals of editing technical and professional materials. Role of editors in analyzing, revising, and polishing manuscripts. Successful writer-editor dialogues. See ENG Notes 1, 2.

ENG 385 Career Development for English Majors. (3)
selected semesters
Theoretical and practical aspects of career planning related to skills and interests developed in English studies. Lecture, discussion, workshop. See ENG Notes 1, 2.
General Studies: L

ENG 400 History of Literary Criticism. (3)
selected semesters
Major critics and critical traditions in the Western world. See ENG Notes 1, 2, 3. Prerequisite: 6 hours in literature or instructor approval.
General Studies: L/HU, H

ENG 401 Topics in Critical Theory. (3)
selected semesters
Major critical schools of recent decades—postcolonialist, psychoanalytic, deconstructionist, feminist, new historicist. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: 6 hours in literature or instructor approval.

ENG 409 Advanced Screenwriting. (3)
selected semesters
Applies the principles taught in a complete feature-length screenplay. See ENG Notes 1, 2. Prerequisite: instructor approval.

ENG 411 Advanced Creative Writing. (3)
fall and spring
Poetry, fiction, and drama for experienced writers, emphasizing individual style. Each genre may be taken once. See ENG Notes 1, 2. Prerequisite: ENG 310 or instructor approval.

ENG 412 Creative Nonfiction. (3)
selected semesters
Lectures, discussion, and criticism concerning techniques of writing creative nonfiction for publication. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 411 or instructor approval.

ENG 413 History of the English Language. (3)
once a year
Development of English from the earliest times to the modern period. See ENG Notes 1, 2. Prerequisite: junior standing or instructor approval.
General Studies: HU

ENG 414 Studies in Linguistics. (3)
fall and spring
Relationship of linguistics to literature, gender, power, and other social issues. May be repeated for credit. See ENG Notes 1, 2. Prerequisite: ENG 213 or 312 or 314 or 413 or instructor approval.

ENG 415 Topics in Medieval Literature and Culture. (3)
selected semesters
Interdisciplinary approach to medieval literature, emphasizing cultural and historical context. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.
General Studies: HU

ENG 416 Chaucer in Middle English. (3)
once a year
Yearly alternate between Chaucer's *The Canterbury Tales* and *Troilus and Criseyde*. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.
General Studies: HU

ENG 418 Renaissance Literature. (3)
once a year
Selected topics, authors, contexts, and themes in Renaissance literature. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.
General Studies: L/HU

ENG 419 English Literature in the Early 17th Century. (3)
once a year
Topics, authors, and themes in English literature, 1603–1660. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.
General Studies: HU

ENG 421 Shakespeare. (3)
fall and spring
A selection of Shakespeare's works in different genres. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.
General Studies: HU

ENG 422 Studies in Shakespeare. (3)
once a year
Topics for close examination in selected dramatic and/or nondramatic works. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 421 or instructor approval.
General Studies: HU

ENG 423 Renaissance Drama. (3)
spring
Topics, authors, and themes in the drama of the Tudor and early Stuart periods. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.
General Studies: L/HU

ENG 424 Milton. (3)
once a year
Selected prose and poetry, emphasizing *Paradise Lost, Paradise Regained,* and *Samson Agonistes*. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.
General Studies: HU

ENG 425 Studies in Romanticism. (3)
fall
Romanticism in continental, British, and American literature and culture. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or 241 or instructor approval.
General Studies: HU

ENG 427 Studies in 18th-Century Literature and Culture. (3)
selected semesters
Literary, social, and cultural issues of the period studied in an interdisciplinary format. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or 222 or instructor approval.
General Studies: HU

ENG 429 Studies in European Literature and Culture. (3)
selected semesters
Literary, cultural, and historical issues. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Topics may include the following:

- Feminist Political Writing in Contemporary Europe. (3)
  Examines the discourse of gender-politics in Central Eastern Europe before and after Soviet hegemony. Cross-listed as FLA 461. Credit is allowed for only ENG 429 or FLA 461.
- Literature and Film in 20th-Century Eastern Europe. (3)
  Evaluates literary texts and films as a massive propaganda machine of the totalitarian state. Cross-listed as FLA 476. Credit is allowed for only ENG 429 or FLA 476.
- Literature and Politics in Pre- and Post-Communist Europe. (3)
  Interdisciplinary examination of the cultures of Eastern Europe from WWI to the present. Cross-listed as FLA 472. Credit is allowed for only ENG 429 or FLA 472.
- Politics of Drama in 20th-Century Europe. (3)
  Interdisciplinary examination of European drama before and after WWII. Cross-listed as FLA 464. Credit is allowed for only ENG 429 or FLA 464.

ENG 430 Studies in Victorian Literature and Culture. (3)
once a year
Literary, social, and cultural issues of the period studied in an interdisciplinary format. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or instructor approval.
General Studies: L/HU

ENG 434 Studies in the Literature and Culture of the Americas. (3)
selected semesters
Literature and culture of North America, South America, and the Caribbean. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: ENG 241 or 242 or instructor approval.
General Studies: HU, C

ENG 436 Studies in Anglophone Literature and Culture. (3)
selected semesters
Literary, social, and cultural issues of English-speaking former colonial territories. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or 242 or instructor approval.

ENG 440 Studies in American Literature and Culture. (3)
once a year
Various genres in their literary, political, theoretical, and historical contexts. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 241 or 242 or instructor approval.
General Studies: HU

ENG 442 Studies in 20th-Century British and Irish Literature and Culture. (3)
once a year
Major literary genres (novel, poetry, and drama) in their cultural and historical contexts. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or instructor approval.

ENG 444 Studies in American Romanticism. (3)
once a year
Fiction, poetry, and essays of such 19th-century authors as Hawthorne, Emerson, Melville, Thoreau, Fuller, Whitman, and Dickinson. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 241 or instructor approval.
General Studies: HU

ENG 445 Studies in American Realism. (3)
once a year
Writers and influences that shaped the development of literary realism. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 242 or instructor approval.
General Studies: L/HU

ENG 446 Studies in Modernism. (3)
selected semesters
Cultural, historical, and literary problems in American and European modernism. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or 242 or instructor approval.
General Studies: HU

ENG 447 Studies in Postmodernism. (3)
selected semesters
Literary, social, and cultural issues. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or 242 or instructor approval.

ENG 448 Studies in Irish Literature and Culture. (3)
selected semesters
Themes and problems pertaining to Irish literature, film, and social and cultural history. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or instructor approval.
General Studies: HU

ENG 452 Studies in the Novel. (3)
selected semesters
May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or 222 or 241 or 242 or instructor approval.
General Studies: HU

ENG 453 Studies in the American Novel. (3)
fall and spring
Poetics and politics of the novel, 18th through 21st centuries. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 241 or 242 or instructor approval.
General Studies: HU

ENG 457 Studies in American Poetry. (3)
selected semesters
May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 241 or 242 or instructor approval.
General Studies: HU

ENG 459 Studies in African American/Caribbean Literatures. (3)
selected semesters
May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Topics may include the following:
- African American Short Story
  Studies in African American or Caribbean literatures according to genre, period, theory, or selected authors. Cross-listed as AFH 459. Credit is allowed for only AFH 459 or ENG 459.
  General Studies: L

ENG 461 Studies in Women and Literature. (3)
selected semesters
Advanced topics in literature by or about women. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3.
General Studies: HU

ENG 464 Studies in Drama. (3)
selected semesters
Selected topics in the history and theory of the genre. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or 222 or 241 or 242 or instructor approval.
General Studies: L/HU

ENG 465 Studies in Film. (3–4)
selected semesters
Advanced topics in cinema. May be repeated for credit when topics vary. Lecture, viewing, discussion. See ENG Notes 1, 2.

ENG 469 Science and Literature. (3)
selected semesters
Historical and theoretical links between science and literature, from Francis Bacon to the present, examined in cultural context. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3.
General Studies: L/HU

ENG 470 Symbols and Archetypes in Children's Literature. (3)
fall
Various critical approaches and recurring themes studied in relation to classical and contemporary children's literature. Lecture, discussion, reading. See ENG Notes 1, 2, 3.
General Studies: L/HU

ENG 471 Literature for Adolescents. (3)
fall and spring
Prose and poetry that meet the interests and capabilities of junior high and high school students. Stresses recent literature. Requires passing grade of at least "C" (2.00) before students are permitted to student teach in English. See ENG Notes 1, 2, 3.
General Studies: HU

ENG 472 Rhetorical Studies. (3)
fall and spring
Developments in theory and practice of major rhetorical inquiries. Seminar, workshop. See ENG Notes 1, 2. Prerequisite: junior standing.
General Studies: L

ENG 480 Methods of Teaching English: Composition. (3)
fall or spring and summer
Methods of instruction, organization, and presentation of appropriate content in the teaching of composition and other writing skills. See ENG Notes 1, 2.
General Studies: L

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

ENG 482 Methods of Teaching English: Language. (3)
fall or spring and summer
Methods of instruction, organization, and presentation of appropriate content in language and usage for junior and senior high schools. Lecture, discussion, lab. See ENG Notes 1, 2.
General Studies: L

ENG 484 Internship. (1–12)
fall and spring
Selected from the following areas. May be repeated for credit. See ENG Notes 1, 2. Topics may include the following:
- General. (1–12)
- Service Learning. (3)
  Fee.
- Writing Certificate. (3)

ENG 493 Honors Thesis. (1–6)
selected semesters
General Studies: L

ENG 495 Literary Forms: Theory and Practice. (3)
selected semesters
Types, history, analysis of traditional forms and contemporary adaptations. Separate sections for poetry, fiction. Each genre may be taken once. See ENG Notes 1, 2. Prerequisite: ENG 411 in same genre or instructor approval.

ENG 498 Pro-Seminar. (1–7)
fall and spring
Selected from the following areas. May be repeated for credit when topics vary. See ENG Notes 1, 2. Topics may include the following:
- Directions in Creative Writing. (3)
- Introduction to Graduate Studies. (1)
- Issues in Creative Writing. (3)
- Writing Certificate Portfolio. (1)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

LINGUISTICS (LIN)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

WRITING ACROSS THE CURRICULUM (WAC)

WAC 101 Introduction to Academic Writing. (3)
fall and spring
Combines classroom and supplemental instruction to teach academic genres of writing, including definition, summary, and analysis.

WAC 107 Introduction to Academic Writing for International Students. (3)
fall and spring
For students from non-English-speaking countries. Combines classroom and supplemental instruction with intensive reading, writing, and discussion.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Department of Family and Human Development

www.asu.edu/clas/fhd
480/965-6978
COWDN 106

Richard A. Fabes, Chair

Professors: Christopher, Fabes, Griffin, Ladd, Martin, Roosa

Associate Professors: Dumka, Hanish, Madden-Derdich, Neff, Updegraff

Assistant Professors: Gager, Liu, Simpkins, Spinrad, Umaña-Taylor, Valiente

Senior Lecturers: Bodman, Weigand

FAMILY AND HUMAN DEVELOPMENT—BS

For the BS degree in Family and Human Development at the Tempe campus, students must pursue the concentration in family studies/child development. The mathematics proficiency must be met by completing MAT 117 or higher. (Note: MAT 117 does not satisfy the university General Studies MA requirement.)

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	338	Child Development Practicum	3
FAS	331	Marriage and Family Relationships *SB*	3
FAS	361	Introduction to Family/Child Research Methods *L*	3
FAS	370	Family, Ethnic, and Cultural 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
FAS	484	Internship	3
		or FAS 390 Supervised Research Experience (3)	
FAS	498	Pro-Seminar	3
Total			33

In addition, nine semester hours of unrestricted electives must be taken from the following:

CDE	337	Early Childhood Intervention	3
CDE	437	Infant Family Assessment and Observation *L/SB*	3
CDE	444	Risk and Variation in Child Development	3
CDE	498	Pro-Seminar	3
		or FAS 498 Pro-Seminar (3)	
FAS	499	Individualized Instruction	3
		or CDE 499 Individualized Instruction (3)	
FAS	301	Introduction to Parenting	3
FAS	330	Personal Growth in Human Relationships *SB*	3
FAS	332	Human Sexuality *SB*	3
FAS	390	Supervised Research Experience	1–3
FAS	484	Internship	1–3

One statistics course is required; students may choose from courses such as PSY 230 Introduction to Statistics or EDP 454 Statistical Data Analysis in Education.

FAMILY AND HUMAN DEVELOPMENT MINOR

The minor in Family and Human Development consists of 18 semester hours in which students specialize in family studies/child development.

At least 12 of the 18 semester hours must be in upper-division courses.

Students take the following courses:

CDE	232	Human Development *SB* 3
FAS	331	Marriage and Family Relationships *SB* 3
FAS	440	Fundamentals of Marriage and Family Therapy 3
Total		 9

Three courses (or nine semester hours) must be selected from the following and at least one course must be a CDE course:

CDE	337	Early Childhood Intervention 3
CDE	430	Infant/Toddler Development in the Family *SB* 3
CDE	444	Risk and Variation in Child Development 3
CDE	498	Pro-Seminar 3
		or FAS 498 Pro-Seminar (3)
FAS	370	Family, Ethnic, and Cultural Diversity *SB, C* 3
FAS	431	Parent-Adolescent Relationships *SB* 3

BIS CONCENTRATION

A concentration in family studies/child development is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

SECONDARY EDUCATION—BAE

Family and Human Development. Applications are not being accepted at this time.

GRADUATE PROGRAMS

The faculty in the Department of Family and Human Development offer programs leading to the MS and PhD degrees. See the *Graduate Catalog* for requirements.

CHILD DEVELOPMENT (CDE)

CDE 232 Human Development. (3)
fall, spring, summer
Lifespan development from conception through adulthood, with emphasis on family influences. Recognizes individuality within the universal pattern of development.
General Studies: SB

CDE 337 Early Childhood Intervention. (3)
fall
Explores how child development theory affects practice with children and families, emphasizing development of young children and early intervention. Prerequisite: CDE 232 (or its equivalent).

CDE 338 Child Development Practicum. (2–4)
fall, spring, summer session 1
Supervised practicum in the Child Development Lab preparing students for work in child care centers and agencies serving young children and families. May be repeated for credit. Lab. Prerequisite: CDE 232.

CDE 430 Infant/Toddler Development in the Family. (3)
fall and spring
Examines the development of infants/toddlers, the socialization processes of families, and the interactions of these processes. Prerequisite: CDE 232 (or its equivalent).
General Studies: SB

CDE 437 Infant Family Assessment and Observation. (3)
fall
Examines strategies for implementing developmental assessments and observations of young children and their families. Cross-listed as SWU 437. Credit is allowed for only CDE 437 or SWU 437. Prerequisite: CDE 232 or SWU 301 (or their equivalents).þ
General Studies: L/SB

CDE 444 Risk and Variation in Child Development. (3)
fall and spring
Impact that constitutional and environmental risk factors have on young children and their families. Cross-listed as SWU 446. Credit is allowed for only CDE 444 or SWU 446. Prerequisite: CDE 232 or SWU 301 (or their equivalents).

CDE 498 Pro-Seminar. (1–7)
fall and spring

CDE 499 Individualized Instruction. (3)
fall and spring

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

FAMILY STUDIES (FAS)

FAS 301 Introduction to Parenting. (3)
fall and spring
Integrated approach to understanding parenting and parent-child interactions. Television course. Prerequisites: PGS 101; SOC 101 (or its equivalent).

FAS 330 Personal Growth in Human Relationships. (3)
fall and spring
Personal development and behavior as related to competency in interpersonal relationships within the family. Processes of family interaction. Prerequisites: PGS 101; SOC 101 (or its equivalent).
General Studies: SB

FAS 331 Marriage and Family Relationships. (3)
fall and spring
Issues, challenges, and opportunities relating to present-day marriage and family living. Factors influencing interrelations within the family. Prerequisite: a course in psychology or sociology.
General Studies: SB

FAS 332 Human Sexuality. (3)
fall and spring
Relationship of sexuality to family life and to major societal issues. Emphasizes developing healthy, positive, and responsive ways of integrating sexual and other aspects of human living. Prerequisite: PGS 101.
General Studies: SB

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

FAS 361 Introduction to Family/Child Research Methods. (3)
fall and spring
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)
fall and spring
Integrative approach to understanding historical and current issues related to the structure and internal dynamics of diverse American families. Lecture, discussion. Cross-listed as AFS 370. Credit is allowed for only AFS 370 or FAS 370. Prerequisite: PGS 101 or SOC 101.
General Studies: SB, C

FAS 390 Supervised Research Experience. (1–3)
fall, spring, summer
Practical, firsthand experience within 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)
fall
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 435 Advanced Marriage and Family Relationships. (3)
fall and spring
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 440 Fundamentals of Marriage and Family Therapy. (3)
fall and spring
Introduces the fundamental orientations of marriage and family therapy.

FAS 484 Internship. (1–12)
fall and spring

FAS 498 Pro-Seminar. (1–7)
fall and spring

FAS 499 Individualized Instruction. (3)
fall, spring, summer

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

FAMILY AND HUMAN DEVELOPMENT (FRD)

FRD 451 Field Experience. (1–12)
selected semesters
Supervised field placement in the area of student's concentration with a community business or agency. Students must make arrangements with instructor 1 semester in advance of enrollment. Prerequisites: completion of 60 hours; instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Film and Media Studies

Pending Arizona Board of Regents approval, the College of Liberal Arts and Sciences will offer a BA degree in Film and Media Studies. For more information, call the Office of Undergraduate Programs at 480/965-6506.

FILM AND MEDIA STUDIES (FMS)

FMS Note 1. With the exception of omnibus courses, all FMS courses have a teaching method of lecture, discussion, and screening.

ENG Note 2. With the exception of FMS 490, all FMS courses numbered 300 and higher have a prerequisite of ENG 102 (or 105 or 108) and FMS 100 with a grade of "C" or higher.

FMS 100 Introduction to Film. (3)
fall and spring
Introduces the narrative structure, visual style, and cultural elements of film. Fee. See FMS Note 1.

FMS 110 New Media and New Worlds. (3)
once a year
Explores the cultural effects of new media technologies. Fee. See FMS Note 1.

FMS 200 Film History. (3)
spring
Introduces the technological, aesthetic, social, and economic aspects of international film history. Fee. See FMS Note 1.

FMS 270 Race and Ethnicity in American Cinema. (3)
fall and summer
Explores how Hollywood shapes perceptions of race and ethnicity in American society. Fee. See FMS Note 1.

FMS 294 Special Topics. (1–4)
selected semesters

FMS 300 Media and Cultural Studies. (3)
once a year
The history of media and its cultural impact. Fee. See FMS Notes 1, 2.

FMS 340 Contemporary American Film and Popular Culture. (3)
fall
Analyzes American films, television programs, and music as popular cultural documents. Fee. See FMS Notes 1, 2.

FMS 350 Virtual Reality in Film and Media. (3)
fall
Analyzes virtual reality in films, media, and fiction. Fee. See FMS Notes 1, 2.

FMS 351 Digital, Cyberspace, and Information Cultures. (3)
spring
Analyzes modern cultural and digital technologies. Fee. See FMS Notes 1, 2.

FMS 394 Special Topics. (1–4)
selected semesters

FMS 440 Los Angeles: Movies and Culture. (3)
spring
Explores film treatment of the historical culture of Los Angeles. Fee. See FMS Notes 1, 2.

FMS 441 Global Cinema. (3)
fall
Examines how film represents three important dimensions of globalization: its relationship to national culture, terrorism, and immigration. Fee. See FMS Notes 1, 2.

FMS 450 Technology, Culture, and Media. (3)
fall
Studies the socio-political relationships among technology, culture, and media. Fee. See FMS Notes 1, 2.

FMS 460 Masculinity and Film. (3)
spring
Examines the representation of masculinity and the male body in film. Fee. See FMS Notes 1, 2.

FMS 461 Film Theory and Criticism. (3)
spring
Examines the major positions and issues in film theory from an historical perspective. Fee. See FMS Notes 1, 2.

FMS 480 Globalization, Technology, and Culture. (3)
spring
Studies the socio-political relationship between media and the evolution of globalization. Fee. See FMS Notes 1, 2.

FMS 490 Capstone Seminar. (3)
once a year
Capstone seminar. See FMS Note 1. Prerequisites: major in Film and Media Studies; senior standing.

FMS 494 Special Topics. (1–4)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Department of Geography

geography.asu.edu
480/965-7533
SCOB 330

Richard Aspinall, Chair

Professors: Arreola, Aspinall, Balling, Brazel, Cerveny, Dorn, Gober, Ó hUallacháin, Pasqualetti, Zehnder

Associate Professors: Ellis, Fall, Kuby, McHugh, Wentz

Assistant Professors: Edsall, Keys, Li, Lukinbeal, Schmeeckle

Lecturers: Larson-Keagy, Shaeffer

Geography is a discipline that integrates the physical 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 BA degree in Geography, BS degree in Geography, BAE degree in Secondary Education, or minor in Geography. A grade of "C" (2.00) or higher is necessary in all required Department of Geography courses. Both BA and BS degrees in Geography consist of a minimum of 45 semester hours. A minor consists of a minimum of 18 semester hours.

GEOGRAPHY—BA

A student choosing a BA degree in Geography may be interested in a liberal arts and sciences focus on the breadth of the field. A BA 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 BA degree consists of courses in core geographic knowledge (10–11 semester hours), core geographic skills (12 semester hours), a regional course (three semester hours), and electives (12 semester hours), for a minimum of 37 semester hours in geography. At least 18 semester hours in geography must be in upper-division courses. The remaining hours are made up of electives from geography courses or related fields of study, chosen in consultation with an advisor.

Core Geographic Knowledge

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

* Completion of three semester hours of transfer course work can also be used to fulfill this requirement.

Core Geographic Skills

GCU	495	Quantitative Methods in Geography *CS* 3
GCU	496	Geographic Research Methods *L* 3
GPH	371	Introduction to Cartography and Georepresentation *CS* 3
GPH	491	Geographic Field Methods 3
Total		 12

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 Middle 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 Middle 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 BA degree in Geography. In addition, there are three cooperative programs whereby a student receives a BA degree in Geography and an emphasis in Asian Studies, 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

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

selected courses of wholly Asian or Southeast Asian content. 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, Japanese, Thai, or Vietnamese. The Southeast Asian Studies Certificate is awarded to Geography students who emphasize a regional studies specialization in Geography and one year of Indonesian, Thai, or Vietnamese. For more information, see "Asian Studies," page 337, and "Southeast Asian Studies," page 342.

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 either 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—BS

The BS degree consists of courses in core geographic knowledge (10–11 semester hours), core geographic skills (12 semester hours) and a geographic techniques course (from three to four semester hours), and electives (12 semester hours)—for a minimum of 37 semester hours in geography. At least 18 semester hours in geography must be in upper-division courses. The remaining hours are made up of electives from geography courses or related fields of study, chosen in consultation with an advisor.

Core Geographic Knowledge

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

* Completion of three semester hours of transfer course work can also be used to fulfill this requirement.

Core Geographic Skills

GCU	495	Quantitative Methods in Geography *CS* 3
GCU	496	Geographic Research Methods *L* 3
GPH	371	Introduction to Cartography and Georepresentation *CS* 3
GPH	491	Geographic Field Methods 3
Total		 12

Core Geographic Techniques

Choose one of the courses below, in consultation with an advisor. 3–4

- GPH 372 Air Photo Interpretation (3)
- GPH 373 Geographic Information Science I *CS* (4)
- GPH 471 Geographics: Interactive and Animated Cartography and Geovisualization *CS* (3)

The remaining four courses (12 semester hours) of geography electives and nine hours of geography or related fields of study vary among the options available for a BS 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 BS degree emphasizing other areas within the major.

Meteorology-Climatology Concentration. See an undergraduate 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 40 semester hours in geography plus course work in mathematics and physics:

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	370	Geographic Information Technologies *CS* 3
GPH	371	Introduction to Cartography and Georepresentation *CS* 3
GPH	491	Geographic Field Methods 3
Total		 25–26

* Completion of three semester hours of transfer course work can also be used to fulfill this requirement.

Required Meteorology Courses

GPH	213	Introduction to Climatology *SG** 3
GPH	215	Introduction to Climatology Laboratory *SG** 1
GPH	409	Synoptic Meteorology I 4
GPH	410	Synoptic Meteorology II 4
GPH	412	Physical Climatology 3
		or GPH 413 Meteorological Instruments and Measurement (3)
		or GPH 414 Climate Change *G* (3)
Total		 15

* Both GPH 213 and 215 must be taken to secure SG credit.

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*[1] 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		 20

[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.

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 Introduction to Cartography and Georepresentation *CS* 3
GPH 373 Geographic Information Science I *CS* 4
GPH 491 Geographic Field Methods 3
Total 26–27

* Completion of three semester hours of transfer course work can also be used to fulfill this requirement.

Required Urban Studies Courses

GCU 361 Urban Geography *SB* 3
GCU 484 Human Geography Internship 3
or GPH 484 Internship (3)
or one upper-division course outside the department in a related field of study chosen in consultation with an advisor (3)
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 GCU or GPH 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)
Urban studies total 15

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" (2.00) 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. Possible courses include: Geographic Information Technologies (GPH 370), Introduction to Cartography and Georepresentation (GPH 371), Air Photo Interpretation (GPH 372), Geographic Field Methods (GPH 491), or a course in Geographic Information Science I (GPH 373). At least four courses should be upper-division courses in geography.

UNDERGRADUATE CERTIFICATE IN GEOGRAPHIC INFORMATION SCIENCE

This cross-disciplinary certificate is designed for undergraduates wishing to pursue a GIS-related career. The certificate is awarded to students completing the following 19 semester hours with a grade of "C" or higher.

Required courses

CSE 100 Principles of Programing with C++ *CS* 3
or CSE 110 Principles of Programming with Java *CS* (3)
GCU 495 Quantitative Methods in Geography *CS* 3
GPH 370 Geographic Information Technologies *CS* 3
GPH 373 Geographic Information Science I *CS* 4
GPH 473 Geographic Information Science II *CS* 3

Elective Courses

Choose one of the courses below 3
ABS 485 GIS in Natural Resources (3)
ABS 586 Remote Sensing in Environmental Resources (4)
CSE 181 Applied Problem Solving with Visual BASIC *CS* (3)
GCU 361 Urban Geography *SB* (3)
GCU 441 Economic Geography *SB* (3)
GCU 442 Geographical Analysis of Transportation *SB* (3)
GCU 484 Human Geography Internship* (3)
GPH 371 Introduction to Cartography and Georepresentation *CS* (3)
GPH 372 Air Photo Interpretation (3)
GPH 471 Geographics: Interactive and Animated Cartography and Geovisualization *CS* (3)
GPH 481 Environmental Geography (3)
GPH 483 Geographic Information Analysis (3)
GPH 484 Internship: GIS based (3)
PLB 434 Landscape Ecological Analysis and Modeling (3)
Total 19

* A GIS-based internship may be taken.

BIS CONCENTRATIONS

Five concentrations in Geography (geography, environmental geography, geographical information science, geography for business, and international geography) are available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

SECONDARY EDUCATION—BAE

This degree is offered through the Initial Teacher Certification (ITC) program in the College of Education. Students pursuing a major in Secondary Education (Geography) have an advisor in the College of Education and an advisor within the Department of Geography.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Academic Specialization ITC Admission Requirements. At least three required courses in the academic specialization must be completed with a grade of "C" (2.00) or higher before applying to the ITC professional program.

Geography. The major teaching field consists of 30 semester hours and six hours in teaching methods. A grade of "C" (2.00) or higher is required in all academic specialization courses. Required major courses are as follows:

GCU	102	Introduction to Human Geography *SB* 3
GCU	121	World Geography *SB, G* 4
GCU	141	Introduction to Economic Geography *SB, G* 3
		or GCU 351 Population Geography *SB, G* (3)
		or GCU 361 Urban Geography *SB* (3)
GPH	111	Introduction to Physical Geography *SQ* 4
GPH	210	Society and Environment *G* 3
		or GPH 211 Landform Processes *L* (3)
		or GPH 212 Introduction to Meteorology *SQ*[1] (3)
		and GPH 214 Introduction to Meteorology Lab *SQ*[1] (1)
		or GPH 314 Global Change *HU, G* (3)
Electives[2]		12–13
Minimum total		30

[1] Both GPH 212 and 214 must be taken to secure SQ credit.

[2] Electives must be upper-division level geography courses chosen in conjunction with an advisor.

Teaching Methods

GCU	414	Teaching Geography Standards 3
SED	480	Special Methods of Teaching Social Studies 3
		or GCU 494 ST: Geography Methods
Total		6

CULTURAL GEOGRAPHY (GCU)

GCU 102 Introduction to Human Geography. (3)
fall and spring
Systematic study of human use of the earth. Spatial organization of economic, social, political, and perceptual environments. Fee.
General Studies: SB

GCU 121 World Geography. (4)
fall and spring
Description and analysis of areal variations in social, economic, and political phenomena in major world regions.
General Studies: SB, G

GCU 141 Introduction to Economic Geography. (3)
fall
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)
fall
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)
fall and spring
Interdisciplinary introduction to the cultures, religions, political systems, geography, and history of Southeast Asia. Cross-listed as ASB 240/HST 240/POS 240/REL 240. Credit is allowed for only ASB 240 or GCU 240 or HST 240 or POS 240 or REL 240.
General Studies: HU/SB, G

GCU 253 Introduction to Cultural and Historical Geography. (3)
selected semesters
Cultural patterns, including such phenomena as language, religion, and various aspects of material culture. Origins and diffusion and division of the world into cultural areas.
General Studies: SB, G

GCU 294 Special Topics. (4)
once a year
Topics include global awareness.

GCU 322 Geography of U.S. and Canada. (3)
fall
Spatial distribution of relevant physical, economic, and cultural phenomena in the United States and Canada.
General Studies: SB, C

GCU 323 Geography of Latin America. (3)
fall and spring
Spatial distribution of relevant physical, economic, and cultural phenomena in South, Middle, and Caribbean America.
General Studies: SB, G

GCU 325 Geography of Europe. (3)
fall and spring
Broad and systematic overview of Europe, emphasizing physical, economic, and cultural phenomena.
General Studies: SB, G

GCU 326 Geography of Asia. (3)
once a year
Spatial distribution of relevant physical, economic, and cultural phenomena in Asia, excluding the former Soviet Union.
General Studies: SB, G

GCU 327 Geography of Africa. (3)
selected semesters
Spatial distribution of relevant physical, economic, and cultural phenomena in Africa.
General Studies: SB, G

GCU 328 Geography of Middle East and North Africa. (3)
selected semesters
Spatial distribution of relevant physical, economic, and cultural phenomena in the Middle East and North Africa. Prerequisite: GCU 121 or instructor approval.
General Studies: SB, G

GCU 332 Geography of Australia and Oceania. (3)
selected semesters
Spatial distribution of relevant physical, economic, and cultural phenomena in Australia, New Zealand, and Pacific Islands.
General Studies: SB, G

GCU 344 Geography of Hispanic Americans. (3)
fall
Examines the homelands, migrations, settlements, landscapes, roles, and selected cultural traditions of Hispanic Americans.
General Studies: SB, C

GCU 350 The Geography of World Crises. (3)
fall and spring
Contemporary world crises viewed from a perspective of geographic concepts and techniques.
General Studies: SB, G

GCU 351 Population Geography. (3)
fall
Demographic patterns; spatial, temporal, and structural investigation of the relationship of demographic variables to cultural, economic, and environmental factors.
General Studies: SB, G

GCU 352 Political Geography. (3)
selected semesters
Relationship between the sociophysical environment and the state.
General Studies: SB, G

GCU 357 Social Geography. (3)
once a year
Environmental perception of individuals and groups. Stresses the spatial aspect of social and physical environments.
General Studies: SB

GCU 359 Cities of the World I. (3)
fall
Historical evolution of urban patterns and structures in the Middle East, India, Southeast Asia, China, Japan, and Europe.
General Studies: SB, G, H

GCU 360 Cities of the World II. (3)
spring
Historical evolution of urban patterns and structures in Latin America, North America, Sub-Saharan Africa, and Australasia.
General Studies: SB, G

GCU 361 Urban Geography. (3)
fall and spring
External spatial relations of cities, internal city structure, and spatial aspects of urban problems in various parts of the world, particularly in the United States. Fee.
General Studies: SB

GCU 364 Energy in the Global Arena. (3)
spring
Production, transportation, and consumption of energy, emphasizing the electric power industry and its environmental problems.
General Studies: SB, G

GCU 394 Special Topics. (1–4)
fall and spring

GCU 414 Teaching Geography Standards. (3)
fall and summer
Introduces Arizona Geography Standards for K–12 educators, emphasizing exciting curricula and illustrated with best practices by master teachers. Internet.

GCU 421 Geography of Arizona and Southwestern United States. (3)
fall and spring
Geography of the Southwest with an emphasis on Arizona. Divided into physical geography, history, people, and economy.
General Studies: SB, C

GCU 423 Geography of South America. (3)
selected semesters
Prerequisite: GCU 323 or instructor approval.
General Studies: SB, G

GCU 424 Geography of Mexico and Middle America. (3)
selected semesters
Central America and Mexico. Prerequisite: GCU 323 or instructor approval.
General Studies: SB, G

GCU 425 Geography of the Mexican American Borderland. (3)
spring
Geography of a binational and bicultural region. Examines settlement, boundary issues, ethnic subregions, population change, industrial development, and urban growth. Field trips. Fee.
General Studies: L/SB, G

GCU 426 Geography of Russia and Surroundings. (3)
selected semesters
Examines the geography of Russia and other post-Soviet states. Prerequisite: GCU 121 or instructor approval.
General Studies: SB, G

GCU 432 Geography of China. (3)
selected semesters
Examines the physical, economic, cultural, social, demographic, agricultural, political, historical, and environmental aspects of the geography of China. Lecture, discussion. Prerequisite: GCU 326 or instructor approval.
General Studies: SB, G

GCU 433 Geography of Southeast Asia. (3)
selected semesters
Examines the biophysical and social features of Southeast Asian nations and peoples. Prerequisite: GCU 326 or instructor approval.

GCU 441 Economic Geography. (3)
once a year
Spatial distribution of primary, secondary, and tertiary economic and production activities. Prerequisite: GCU 141 or instructor approval.
General Studies: SB

GCU 442 Geographical Analysis of Transportation. (3)
fall
Networks, modes, economics, and flows at the urban, national, and international scales. Prerequisite: GCU 141 or 441.
General Studies: SB

GCU 444 Geographic Studies in Urban Transportation. (3)
selected semesters
Current urban transportation issues in metropolitan Phoenix. Lecture, team project. Fee. Prerequisite: GCU 361.
General Studies: SB

GCU 453 Recreational Geography. (3)
selected semesters
Examines problems surrounding the organization and use of space for recreation. Introduces geographic field survey methods of data collection and analysis. Possible Saturday field trips.

GCU 455 Historical Geography of U.S. and Canada. (3)
selected semesters
Geographical perspective on the evolution of the United States and Canada from pre-Columbian times to early 20th century.
General Studies: SB, H

GCU 474 Public Land Policy. (3)
selected semesters
Geographic aspects of federal public lands, policy, management, and issues. Emphasizes western wilderness and resource development problems.
General Studies: SB

GCU 484 Human Geography Internship. (3)
fall and spring

GCU 494 Special Topics. (1–4)
once a year
Topics may include the following:
- Geography in the K–12 Classroom. (3)
- Geography Methods. (3)
- Geography of Phoenix. (3)

GCU 495 Quantitative Methods in Geography. (3)
fall and spring
Statistical techniques applied to the analysis of spatial distributions and relationships. Introduces models and theory in geography. Fee. Prerequisite: MAT 119.
General Studies: CS

GCU 496 Geographic Research Methods. (3)
fall and spring
Scientific techniques used in geographic research. Fee. Prerequisites: GCU 495; GPH 371, 491.
General Studies: L

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

PHYSICAL GEOGRAPHY (GPH)

GPH 111 Introduction to Physical Geography. (4)
fall and spring
Spatial and functional relationships among climates, landforms, soils, water, and plants. Credit is allowed for only GPH 111 or 411. 3 hours lecture, 3 hours lab, field trips. Fee.
General Studies: SQ

GPH 200 Orientation to Geography. (1)
fall
Basic introduction to the Department of Geography faculty, undergraduate graduation requirements, and possible jobs and skills in geography. Cross-listed as GCU 200. Credit is allowed for only GCU 200 or GPH 200.

GPH 210 Society and Environment. (3)
fall
Examines the interaction between social processes, key environmental issues, and nature's role as a resource at global and regional scales.
General Studies: G

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

GPH 211 Landform Processes. (3)
once a year
Geographic characteristics of landforms and earth-surface processes, emphasizing erosion, transportation, deposition, and implications for human management of the environment. Fee. Prerequisites: ENG 101 (or 105); GPH 111.
General Studies: L

GPH 212 Introduction to Meteorology. (3)
fall
Fundamentals of weather and climate, including basic atmospheric processes and elements. Students whose curricula require a laboratory course must also register for GPH 214. Prerequisite: GPH 111 or instructor approval.
General Studies: SQ (if credit also earned in GPH 214)

GPH 213 Introduction to Climatology. (3)
spring
Fundamentals of meteorological/climatological analysis, including terminology and symbology. Recommended for meteorology/climatology program students. Prerequisite: instructor approval.
General Studies: SG (if credit also earned in GPH 215)

GPH 214 Introduction to Meteorology Laboratory. (1)
fall
Introduces basic meteorological/climatological data and measurements. Suggested concurrent enrollment in GPH 212. 3 hours lab.
General Studies: SQ (if credit also earned in GPH 212)

GPH 215 Introduction to Climatology Laboratory. (1)
spring
Fundamentals of meteorological/climatological map analysis and interpretation. Recommended for meteorology/climatology program students. May be taken concurrently with GPH 213. Prerequisite: instructor approval.
General Studies: SG (if credit also earned in GPH 213)

GPH 271 Maps and Map Reading. (3)
selected semesters
Map types, uses, limitations, and evolution. Communication via paper and digital medium. Navigation, interpretation, projections, sources, symbols, classification, case, handling.

GPH 314 Global Change. (3)
fall
Response of Earth's natural systems (atmosphere, hydrosphere, lithosphere, biosphere) to past environmental change, and effects of potential future changes.
General Studies: HU, G

GPH 370 Geographic Information Technologies. (3)
fall and spring
Introduces modern geographic information technologies, including cartography, GIS, remote sensing, global positioning systems, and statistical analyses. Lecture, lab.
General Studies: CS

GPH 371 Introduction to Cartography and Georepresentation. (3)
fall and spring
Study and creation of maps. Fundamental mapping principles (projection, scale, generalization, symbolization) and computer-based cartographic production. Lecture, lab. Prerequisite: GPH 111.
General Studies: CS

GPH 372 Air Photo Interpretation. (3)
once a year
Subset, remote sensing, includes photography, films, aerial geometry, image components, stereoscopy, photogrammetry, ground truthing; interpret physical, cultural, economic, intelligence information. Prerequisite: GPH 211 or a course in Cultural Geography (GCU) or instructor approval.

GPH 373 Geographic Information Science I. (4)
fall and spring
History and basic aspects of GIS, including map and data file structure, conversions, and synthesis with a computerized environment. Fee. Prerequisite: GPH 370.
General Studies: CS

GPH 381 Geography of Natural Resources. (3)
once a year
Nature and distribution of natural resources and the problems and principles associated with their use.
General Studies: G

GPH 394 Special Topics. (1–4)
fall and spring

GPH 401 Topics in Physical Geography. (1–3)
selected semesters
Open to students qualified to pursue independent studies. Possible field trips. Prerequisite: instructor approval.

GPH 402 Service Learning. (3)
fall and spring
K–12 tutoring and mentoring internship related to academic course work in physical geography. Requires weekly reflective reading and writing. May be repeated for credit. Internship. Fee. Pre- or corequisite: GPH 111.
General Studies: C

GPH 405 Energy and Environment. (3)
spring
Sources, regulatory and technical controls, distribution, and consequences of the supply and human use of energy. Fee. Prerequisite: a course in physical or life sciences or instructor approval.

GPH 409 Synoptic Meteorology I. (4)
selected semesters
Diagnostic techniques and synoptic forecasting. Includes techniques of weather analysis, map interpretation, and satellite and radar analysis. Prerequisites: MAT 270; PHY 131, 132.

GPH 410 Synoptic Meteorology II. (4)
selected semesters
Diagnostic techniques and synoptic forecasting. Includes techniques of weather analysis, map interpretation, and satellite and radar analysis. Prerequisite: GPH 409.

GPH 411 Physical Geography. (3)
once a year
Introduces physiography and the physical elements of the environment. Credit is allowed for only GPH 411 or 111. Field trips.

GPH 412 Physical Climatology. (3)
once a year
Physical processes in the earth-atmosphere system on regional and global scales; concepts and analysis of energy, momentum, and mass balances. Prerequisites: both GPH 212 and 213 or only instructor approval.

GPH 413 Meteorological Instruments and Measurement. (3)
once a year
Design and operation of ground-base and aerological weather measurement systems. Collection, reduction, storage, retrieval, and analysis of data. Field trips. Prerequisites: both GPH 212 and 213 or only instructor approval.

GPH 414 Climate Change. (3)
once a year
Survey of three climate research areas: paleoclimatology, theories (e.g., greenhouse warming), numerical modeling. Prerequisite: GPH 212 or instructor approval.
General Studies: G

GPH 418 Landforms of the Western United States. (3)
once a year
Studies landforms and geomorphic processes in the western United States, including lecture, topographical maps, aerial photographs, satellite imagery, and field trips. Lecture, critical inquiry, laboratory, field work. Fee. Prerequisites: GPH 211 (or its equivalent); a General Studies L course.
General Studies: L

GPH 422 Plant Geography. (3)
once a year
Plant communities of the world and their interpretation, emphasizing North American plant associations. Cross-listed as PLB 422. Credit is allowed for only GPH 422 or PLB 422. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 or only GPH 111.

GPH 433 Alpine and Arctic Environments. (3)
selected semesters
Regional study of advantages and limitations of the natural environment upon present and future problems involving resource distribution, human activities, and regional and interregional adjustments. Field trips. Prerequisite: GPH 111 or instructor approval.
General Studies: G

GPH 471 Geographics: Interactive and Animated Cartography and Geovisualization. (3)
selected semesters
Advanced cartography, stressing influence and application of the computer on geographic representation. Emphasizes creation of maps for the Internet. Lecture, lab. Fee. Prerequisite: GPH 371 or instructor approval.
General Studies: CS

GPH 473 Geographic Information Science II. (3)
fall
GIS as a basis for microcomputer spatial analysis and synthesis. Includes digitizing, database organization, spatial retrieval, and graphics. Lecture, lab. Fee. Prerequisites: GPH 373 (or instructor approval); CSE 100.
General Studies: CS

GPH 474 Dynamic Meteorology I. (3)
selected semesters
Large-scale atmospheric motion, kinematics, Newton's laws, wind equation, baroclinics, vorticity, and the midlatitude depression. Prerequisites: GPH 213, 215; MAT 271; PHY 131, 132.

GPH 475 Dynamic Meteorology II. (3)
selected semesters
Topics in climate dynamics. General circulation, numerical modeling, teleconnection phenomena, and surface-atmosphere interaction. Prerequisite: GPH 474 or instructor approval.

GPH 481 Environmental Geography. (3)
selected semesters
Problems of environmental quality, including uses of spatial analysis, research design, and field work in urban and rural systems. Field trips. Prerequisite: instructor approval.

GPH 483 Geographic Information Analysis. (3)
selected semesters
Basics of spatial data analysis. Topics include point pattern analysis, spatial autocorrelation, spatial regression, and kriging. Lecture, lab. Fee. Prerequisites: both one 200-level or above course in geography or biology or plant biology or geology or planning and one basic statistics course (GCU 495).

GPH 484 Internship. (1–12)
selected semesters

GPH 491 Geographic Field Methods. (3)
once a year
Field techniques, including use of aerial photos, large-scale maps, and fractional code system of mapping; urban and rural field analysis to be done off campus. Fee. Prerequisites: GCU 102, 121; GPH 111.

GPH 494 Special Topics. (1–4)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Department of Geological Sciences

geology.asu.edu
480/965-5081
PS F686

James A. Tyburczy, Chair

Regents' Professors: Buseck, Christensen, Greeley

Dee and John Whiteman Dean's Distinguished Professor: Leshin

Professors: Burt, Farmer, Fink, Hervig, Holloway, Knauth, Peacock, Reynolds, Sarewitz, Shock, Stump, Tyburczy, S. Williams

Associate Professors: Anbar, Arrowsmith, Sharp

Assistant Professors: Clarke, Fouch, Garnero, Hartnett, McNamara, Semken

Associate Research Professor: L. Williams

Lecturer: Johnson

GEOLOGICAL SCIENCES—BS

The BS degree in Geological Sciences requires 39 semester hours, including the following core courses or their equivalents:

GLG	101	Introduction to Geology I (Physical) *SQ*,[1] *G* 3
GLG	102	Introduction to Geology II (Historical) *SG*,[2] *H* 3
GLG	103	Introduction to Geology I—Laboratory *SQ*[1] 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	451	Field Geology I *L* 3
GLG	452	Field Geology II *L* 3
Total		 27

[1] 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.

In addition, two of the following four branch courses must be taken:

GLG	418	Geophysics 3
GLG	430	Paleontology 3
GLG	470	Hydrogeology 3
GLG	481	Geochemistry 3

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

To complete the total required hours, other upper-division courses in geological sciences (excluding GLG 300 and 304) or courses in related fields listed as approved by the department may be taken. See "College Degree Requirements," page 330.

Supporting courses required in related fields include the following:

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*	4
	or MAT 274 Elementary Differential Equations *MA* (3)	
PHY	121 University Physics I: Mechanics *SQ*[1]	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		28

[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.

MAT 290 Calculus I and MAT 291 Calculus II may be substituted for MAT 270, 271, and 272.

MINOR IN GEOLOGICAL SCIENCES

A minor in Geological Sciences is awarded to students who complete a minimum of 21 hours of geological science courses. Required courses are as follows:

GLG	101 Introduction to Geology I (Physical) *SQ*,[1] *G*	3
GLG	102 Introduction to Geology II (Historical) *SG*,[2] *H*	3
GLG	103 Introduction to Geology I—Laboratory *SQ*[1]	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

[1] 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 geological sciences courses, except GLG 300 and 400, after consultation with a departmental advisor.

BIS CONCENTRATION

A concentration in geological sciences is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

GRADUATE PROGRAMS

The faculty in the Department of Geological Sciences offer programs leading to the degrees of Master of Natural Science, MS, and PhD. See the *Graduate Catalog* for requirements.

GEOLOGICAL SCIENCES (GLG)

GLG 101 Introduction to Geology I (Physical). (3)
fall, spring, summer
Basic principles of geology, geochemistry, and geophysics. Rocks, minerals, weathering, earthquakes, mountain building, volcanoes, water, and glaciers. Possible weekend field trips.
General Studies: SQ (if credit also earned in GLG 103), G

GLG 102 Introduction to Geology II (Historical). (3)
spring
Basic principles of applied geology and the use of these principles in the interpretation of geologic history. Possible weekend field trips. Fee. Prerequisite: GLG 101.
General Studies: SG (if credit also earned in GLG 104), H

GLG 103 Introduction to Geology I—Laboratory. (1)
fall, spring, summer
3 hours lab, some field trips. Fee. Corequisite: GLG 101.
General Studies: SQ (if credit also earned in GLG 101)

GLG 104 Introduction to Geology II—Laboratory. (1)
spring
Laboratory techniques involving map interpretation, cross sections, and fossils. 3 hours lab, possible field trips. Prerequisite: GLG 103 (or its equivalent). Corequisite: GLG 102.
General Studies: SG (if credit also earned in GLG 102)

GLG 105 Introduction to Planetary Science. (4)
spring
Solar system objects and their geologic evolution, surfaces, interiors, and atmospheres; weekly laboratory for data analysis and experiments. Lecture, lab, weekend field trip.
General Studies: SG

GLG 110 Geologic Disasters and the Environment. (3)
fall
Geological studies as they apply to interactions between humans and earth. Includes geological processes and hazards, resources, and global change.
General Studies: SG (if credit also earned in GLG 111), G

GLG 111 Geologic Disasters Laboratory. (1)
fall
Basic geological processes and concepts. Emphasizes geology-related environmental problems. Case histories, field studies, lab. Corequisite: GLG 110.
General Studies: SG (if credit also earned in GLG 110)

GLG 294 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Geology of the Planets
  Fee.

GLG 300 Geology of Arizona. (3)
once a year
Basic and historical geology, fossils, mining, energy resources, environmental problems, landscape development, and meteorites, cast in examples from Arizona. Majors who have taken GLG 101 for credit may not enroll.

GLG 304 Geology of the Grand Canyon. (2)
selected semesters
Reviews the discovery, history, origin, and geology of the Grand Canyon of the Colorado River in Arizona. Requires 6-day field trip down the river (first 6 days after commencement in May) at student's expense. Requires field research and term paper on trip.

GLG 310 Structural Geology. (3)
fall
Geologic structures and the mechanical processes involved in their formation. 2 hours lecture, 3 hours lab. Possible field trips. Fee. Prerequisites: GLG 101; MAT 270 (or 290).

GLG 321 Mineralogy. (3)
spring
Crystal chemistry, crystallography, mineral identification, origin and occurrence of minerals, systematic mineralogy. 2 hours lecture, 3 hours lab, possible field trips. Prerequisites: CHM 113; MAT 270 (or 290). Pre- or corequisite: CHM 116.

GLG 362 Geomorphology. (3)
selected semesters
Land forms and processes that create and modify them. Laboratory and field study of physiographic features. 2 hours lecture, 3 hours lab, possible weekend field trips. Prerequisite: GLG 101. Pre- or corequisite: GLG 310.

GLG 400 Geology Colloquium. (1)
fall and spring
Presentation of recent research by faculty and guests. Requires written assignments. 1 semester hour required for Geological Sciences majors; may be repeated for a total of 2 semester hours. Prerequisite: 2 courses in the department or instructor approval.

GLG 402 Service Learning. (3)
fall and spring
K–12 tutoring and mentoring internship related to academic course work in geological sciences. Requires weekly reflective reading and writing. May be repeated for credit. Internship. Fee. Pre- or corequisites: GLG 101, 103.
General Studies: C

GLG 404 Fundamentals of Planetary Geology. (3)
fall
Surveys planetary topics, including impacts, tectonics, and volcanism on planetary objects, and use of spacecraft data, including geological mapping. Lectures, problem sets, weekend field trip. Fee. Prerequisite: Geology major or degree or instructor approval.

GLG 405 Geology of the Moon. (3)
selected semesters
Current theories of the origin and evolution of the moon through photogeological analyses and consideration of geochemical and geophysical constraints. Possible field trips to examine Arizona geology. Fee. Prerequisite: GLG 105 or instructor approval.

GLG 406 Geology of Mars. (3)
selected semesters
Geological evolution of Mars through analyses of spacecraft data, theoretical modeling, and study of terrestrial analogs; emphasizes current work. Possible field trips to examine Arizona geology. Fee. Prerequisite: GLG 105 or instructor approval.

GLG 410 Computers in Geology. (3)
fall
Geological computer skills, including data processing, visualization, presentation, numerical analysis, software and hardware applications. 2 hours lecture, 3 hours lab. Prerequisites: both GLG 101 and an upper-division course in geology or only instructor approval.
General Studies: CS

GLG 412 Geotectonics. (3)
selected semesters
Earthquakes, earth's interior, formation of oceanic and continental crust, and plate tectonics. Emphasizes current work. Prerequisite: GLG 310.

GLG 416 Field Geophysics. (3)
spring
Methods of applied geophysical exploration; seismic refraction, gravity, electrical resistivity, geomagnetics. Includes survey planning, data acquisition, processing, analysis, and interpretation. Lecture, field exercises. Prerequisite: a course in geology or instructor approval.

GLG 418 Geophysics. (3)
fall
Solid earth geophysics; geomagnetism, gravity, seismology, heat flow. Emphasizes crust and upper mantle. Prerequisites: a combination of GLG 310 and MAT 272 and PHY 131 or only instructor approval.

GLG 419 Geodynamics. (3)
selected semesters
Emphasizes application of continuum principles to geological problems, including lithospheric stresses, heat transfer, fluid mechanics, and rock rheology. Prerequisite: PHY 131.

GLG 420 Volcanology. (3)
once a year
Distribution of past and present volcanism, types of volcanic activity, mechanism of eruption, form and structure of volcanoes, and geochemistry of volcanic activity. Possible weekend field trips. Fee. Prerequisite: GLG 424.

GLG 424 Petrology. (3)
fall
Origin of igneous and metamorphic rocks. Optical mineralogy, hand specimen identification, and thin-section analysis. 2 hours lecture, 3 hours lab, possible weekend field trips. Fee. Prerequisite: GLG 321.

GLG 430 Paleontology. (3)
fall
Introduces concepts and analytical techniques in biogeology, paleobiology, paleoecology, and paleoenvironmental reconstruction from the fossil record. 2 hours lecture, 3 hours lab. Fee. Prerequisites: both GLG 102 and MAT 270 (or 290) or only instructor approval.

GLG 435 Sedimentology. (3)
spring
Origin, transport, deposition, and diagenesis of sediments and sedimentary rocks. Physical analysis, hand specimen examination, and interpretation of rocks and sediments. 2 hours lecture, 3 hours lab, possible weekend field trips. Fee. Prerequisites: GLG 102, 321.

GLG 441 Ore Deposits. (3)
selected semesters
Origin, occurrence, structure, and mineralogy of ore deposits. Possible weekend field trips. Fee. Prerequisite: GLG 424 or instructor approval.

GLG 451 Field Geology I. (3)
spring
Geological mapping techniques using topographic maps and aerial photos. Intensive field-based instruction. Lab. Fee. Prerequisites: GLG 310, 321.
General Studies: L

GLG 452 Field Geology II. (3)
summer
Continuation of GLG 451. Lab. Fee. Prerequisite: GLG 451.
General Studies: L

GLG 455 Advanced Field Geology. (3–4)
once a year
Geologic mapping in igneous, sedimentary, and metamorphic terrains of the Basin and Range province of Arizona. May be repeated for credit. Weekend field trips. Fee. Prerequisite: instructor approval.

GLG 456 Cordilleran Regional Geology. (3)
selected semesters
Systematic coverage through space and time of the geological development of western North America, emphasizing the western United States. Fee. Prerequisite: senior major or graduate student in Geological Sciences or instructor approval.

GLG 460 Astrobiology. (3)
fall and spring
Origin, early evolution, distribution, and future of life on Earth and elsewhere in the cosmos. May be repeated for credit. Lecture, discussion, video conferences, possible field trips. Cross-listed as AST 460/BIO 460/CHM 483/MIC 475. Credit is allowed for only AST 460 or BIO 460 or CHM 483 or GLG 460 or MIC 475. Prerequisite: instructor approval.

GLG 461 Geomicrobiology. (3)
spring
Past and present interactions among microbial life, geological materials, and biogeochemical cycles involving carbon, sulfur, phosphate, nitrogen, and minerals. Cross-listed as MIC 461. Credit is allowed for only GLG 461 or MIC 461. Prerequisites: introductory courses in chemistry and microbiology (or geological sciences); instructor approval.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

GLG 470 Hydrogeology. (3)
spring
Geology of groundwater occurrence, aquifer and well hydraulics, water chemistry and quality, contaminant transport, remediation. Emphasizes quantitative methods. Prerequisites: GLG 101 (or 103); MAT 270; PHY 121.

GLG 481 Geochemistry. (3)
spring
Origin and distribution of the chemical elements. Geochemical cycles operating in the earth's atmosphere, hydrosphere, and lithosphere. Cross-listed as CHM 481. Credit is allowed for only CHM 481 or GLG 481. Prerequisite: CHM 341 (or 346) or GLG 321.

GLG 484 Internship. (1–4)
selected semesters

GLG 485 Meteorites and Cosmochemistry. (3)
selected semesters
Chemistry of meteorites and their relationship to the origin of the earth, solar system, and universe. Cross-listed as CHM 485. Credit is allowed for only CHM 485 or GLG 485.

GLG 490 Topics in Geology. (1–3)
fall, spring, summer
Special topics in a range of fields in geology. May be repeated for credit. Fee. Prerequisite: instructor approval.

GLG 495 Undergraduate Thesis. (3)
fall, spring, summer
Guided research culminating in the completion and presentation of an undergraduate thesis based on supervised research. Independent study. Prerequisite: GLG 499 (3 hours); formal conference with instructor; instructor and department chair approval.

GLG 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

School of Global Studies

www.asu.edu/clas/globalstudies
480/965-6506
COOR 5634

The School of Global Studies is being established. Access the Web site at www.asu.edu/clas/globalstudies for the latest information about the school.

SCHOOL OF GLOBAL STUDIES (SGS)

SGS 101 Thinking Globally: The Individual and Authority. (3)
fall
Examines the changing notions of the individual and authority over history. Lecture, discussion.

SGS 102 Thinking Globally: Technology and Nature in World Settings. (3)
fall
Examines changing interactions between humans and nature, geographic systems, global demography, and environment. Lecture, discussion.

SGS 103 Contemporary Global Trends. (3)
spring
Gives a grounding in patterns of international politics and global social change. Lecture, discussion.

SGS 194 Special Topics. (1–4)
selected semesters

SGS 294 Special Topics. (1–4)
selected semesters

SGS 394 Special Topics. (1–4)
selected semesters

SGS 494 Special Topics. (1–4)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Department of History

www.asu.edu/clas/history
480/965-5778
COOR 4595

Noel J. Stowe, Chair

CORE FACULTY

Regents' Professor: Iverson
Snell Family Dean's Distinguished Professor of History: Longley
Distinguished Foundation Professor of History: Fixico
Professors: Adelson, Batalden, Burg, Davis, Fuchs, Gratton, Green, Lavrin, MacKinnon, Rosales, Samuelson, Simpson, Stowe, Tillman, Warnicke
Associate Professors: Barnes, Carroll, El Hamel, Gray, Gullett, Hirt, Powers, Rush, Smith, Soergel, Stoner, Thompson, Thornton, VanderMeer, Warren-Findley, Wright
Assistant Professors: Holian, Kaplan, Koopmans, Manchester, Miller, Pitti, Plotkin, Whitaker, Wilson
Senior Instructional Professional: Luey

AFFILIATED FACULTY

Art
Associate Professor: Brown

Chicana and Chicano Studies
Associate Professor: Escobar

Interdisciplinary Humanities
Assistant Professor: Taylor

Women and Gender Studies
Professor: Rothschild
Assistant Professor: Leong

HISTORY—BA

The BA degree in History consists of 30 semester hours in history and 15 hours in closely related fields, as approved by an undergraduate advisor in consultation with the student. At least 18 hours in history courses and nine hours in related fields must be in upper-division course work, with at least 12 of the upper-division HST hours taken in residence at the Tempe campus. HST 300 Historical Inquiry and HST 498 History Pro-Seminar are required for all

degree candidates. (Honors students may substitute HST 493 Honors Thesis for HST 498.)

Students are required to complete course work in two different areas of concentration. One concentration must be defined geographically: Asia, Europe, Latin America, or the United States. The second concentration may be thematic or geographic. Students completing a thematic concentration must complete two courses outside the field of their geographic concentration. At least two history courses in either concentration must include topics outside the United States and Europe. Students must complete at least one course in the HST 302–307 "Studies in History" sequence.

The major includes the following:

1. one concentration of 18 hours (12 hours HST and six hours related field);
2. one concentration of 15 hours (12 hours HST and three hours related field);
3. HST 300, three hours (may be within a concentration);
4. HST 498, three hours (may be within a concentration);
5. elective related field courses, six hours;
6. two HST courses with content outside Europe and the United States (may be within a concentration);
7. two HST courses in thematic concentration outside the geographic concentration; and
8. at least one course in the HST 302–307 "Studies in History" sequence as part of one concentration.

A minimum GPA of 2.25 in the 30 hours of history course work 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 337, 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 341, 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 342, for more information.

Women and Gender Studies Certificate. Students majoring in History may elect to pursue a Women and Gender Studies Certificate by successfully completing the requirements. See "Women and Gender Studies," page 342, 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 upper-division course work. Students earning a minor in history must complete one 12 hour HST concentration (geographic or thematic), HST 300, and 498. The Department of History requires a grade of at least "C" (2.00) in all courses in the minor. A minimum of six upper-division hours in the minor must be taken in residence at the Tempe campus.

BIS CONCENTRATION

A concentration in history is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

SECONDARY EDUCATION—BAE

This degree is offered through the Initial Teacher Certification (ITC) program in the College of Education. Students pursuing a major in Secondary Education with an academic specialization in history have an advisor in the College of Education and an advisor within the Department of History.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

Academic Specialization ITC Admission Requirements. At least four required courses in the academic specialization must be completed with a grade of "C" (2.00) or higher before applying to the ITC professional program.

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. Six hours of teaching methods courses are also required. A minimum

L literacy and critical inquiry / MA mathematics / CS computer/statistics/ quantitative applications / HU humanities and fine arts / SB social and behavioral sciences / SG natural science—general core courses / SQ natural science—quantitative / C cultural diversity in the United States / G global / H historical / See "General Studies," page 92.

grade of "C" (2.00) is required in all academic specialization courses. Required major courses are as follows:

HST 300 Historical Inquiry *L/SB, H*	3
HST 498 PS: History Pro-Seminar *L*	3
U.S. history courses	15
HST electives* (non-U.S. history courses)	9
Related areas*	12
Total	42

* Choose in consultation with a department advisor.

Teaching Methods

HST 480 Methods of Teaching History: Classroom Resources	3
HST 481 Methods of Teaching History: Community Resources	3
Total	6

Students must complete HST 300 before enrolling in HST 480, 481, and 498. A minimum GPA of 2.50 in history courses is required for admission to the ITC program and for graduation. HST 480 and 481 may not be counted as part of the 42-hour requirement for the academic specialization.

Social Studies. An academic specialization in social studies is also available. Students pursuing a major in Secondary Education have an advisor in the College of Education and an advisor within the department of their academic specialization area.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

GRADUATE PROGRAMS

The faculty in the Department of History offer programs leading to the MA and PhD degrees. A Scholarly Publishing Certificate is also available. See the *Graduate Catalog* for requirements.

HISTORY (HST)

HST 101 Global History Since 1500. (3)
fall and spring
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

HST 102 Western Civilization. (3)
fall and spring
Origins and development of Western societies and institutions from the ancient world through the Middle Ages.
General Studies: SB, H

HST 103 Western Civilization. (3)
fall and spring
Origins and development of Western societies and institutions from Black Death through the Renaissance and Reformation to the Enlightenment.
General Studies: SB, H

HST 104 Western Civilization. (3)
fall and spring
Origins and development of Western societies and institutions from the French Revolution to the present.
General Studies: SB, G, H

HST 105 Slavic Civilization. (3)
fall, spring, summer
Development of Slavic cultures and societies from medieval Byzantium to the present; introduction to modern Eurasia. Lecture, discussion, electronic forum.
General Studies: SB, H

HST 106 Asian Civilizations. (3)
once a year
Civilizations of China, Japan, and India from antiquity to the 17th century.
General Studies: SB, G, H

HST 107 Asian Civilizations. (3)
once a year
Civilizations of China, Japan, India, and Southeast Asia from the 17th century to the present.
General Studies: SB, G, H

HST 108 Introduction to Japan. (3)
fall
Historical survey of the people, culture, politics, and economy of Japan, supplemented by audiovisual presentations. Intended for nonmajors.
General Studies: SB, G, H

HST 109 The United States to 1865. (3)
fall and spring
Growth of the Republic from the colonial period through the Civil War.
General Studies: SB, H

HST 110 The United States Since 1865. (3)
fall and spring
Growth of the Republic from the Civil War to the present.
General Studies: SB, H

HST 200 Historical Themes. (3)
once a year
General introduction to selected themes in history. May be repeated for credit when topics vary.
General Studies: SB, H

HST 201 Historical Themes in Asia. (3)
once a year
General introduction to selected themes in Asian history. May be repeated for credit when topics vary.
General Studies: SB, H

HST 202 Historical Themes in Europe. (3)
once a year
General introduction to selected themes in European history. May be repeated for credit when topics vary.
General Studies: SB, H

HST 203 Historical Themes in Latin America. (3)
once a year
General introduction to selected themes in Latin American history. May be repeated for credit when topics vary.
General Studies: SB, H

HST 204 Historical Themes in the United States. (3)
once a year
General introduction to selected themes in United States history. May be repeated for credit when topics vary.
General Studies: SB, H

HST 205 Historical Themes in Africa. (3)
fall and spring
General introduction to selected themes in African history. May be repeated for credit when topics vary.

HST 210 American Social History. (3)
once a year
American society from the colonial period to the present. Ethnicity, race, age, and sex as factors in historical experience. Prerequisite: ENG 101 or 105.
General Studies: L/SB, H

HST 211 American Jewish History. (3)
selected semesters
Chronological analysis of Jews and Judaism in American history and letters.
General Studies: SB, H

HST 212 American Military History. (3)
selected semesters
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

HST 240 Introduction to Southeast Asia. (3)
fall and spring
Interdisciplinary introduction to the cultures, religions, 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 HST 240 or POS 240 or REL 240.
General Studies: HU/SB, G

HST 294 ST: Selected Topics in History. (3)
selected semesters
Full description of topics for any semester is available in the Department of History office. May be repeated for credit.

HST 300 Historical Inquiry. (3)
fall and spring
Historical methods and critical inquiry related to particular events and processes. May be repeated for credit when topics vary. Required course for majors. Prerequisite for HST 498. Discussion, seminar, lecture. Prerequisites: ENG 102; History major.
General Studies: L/SB, H

HST 302 Studies in History. (3)
once a year
Specialized topics in history. Explores countries, cultures, and issues in history, and their interpretation in historical scholarship. May be repeated for credit when topics vary.
General Studies: SB, H

HST 303 Studies in Asian History. (3)
once a year
Specialized topics in Asian history. Explores countries, cultures, and issues in history, and their interpretation in historical scholarship. May be repeated for credit when topics vary.
General Studies: SB, H

HST 304 Studies in European History. (3)
once a year
Specialized topics in European history. Explores countries, cultures, and issues in history, and their interpretation in historical scholarship. May be repeated for credit when topics vary.
General Studies: SB, H

HST 305 Studies in Latin American History. (3)
once a year
Specialized topics in Latin American history. Explores countries, cultures, and issues in history, and their interpretation in historical scholarship. May be repeated for credit when topics vary.
General Studies: SB, H

HST 306 Studies in United States History. (3)
once a year
Specialized topics in United States history. Explores regions, cultures, and issues in history, and their interpretation in historical scholarship. May be repeated for credit when topics vary.
General Studies: SB, H

HST 307 Studies in African History. (3)
fall and spring
Specialized topics in African history. Explores countries, cultures, and issues in history, and their interpretation in historical scholarship. May be repeated for credit when topics vary.

HST 309 Exploration and Empire. (3)
once a year
Survey of European discovery, exploration, and imperialism in the early modern and modern periods.
General Studies: L, H

HST 310 Film as History. (3)
once a year
Survey of moving image media as recorder, object, and writer of history.
General Studies: HU

HST 313 American Cultural History to 1865. (3)
fall and spring
Culture, including ideas, ideals, the arts, and social and economic standards, from the nation's colonial and early national periods.
General Studies: SB, H

HST 314 American Cultural History Since 1865. (3)
fall and spring
Culture, including ideas, ideals, the arts, and social and economic standards, from the age of industrialism to modern U.S.
General Studies: SB, H

HST 315 Political History of the United States. (3)
once a year
American political history since independence, focusing post-1865. Evaluates major trends in issues, presidential leadership, elections, and state politics. Lecture, discussion.
General Studies: SB, H

HST 316 20th-Century U.S. Foreign Relations. (3)
once a year
U.S. relations with foreign powers from the late 19th century to the present.
General Studies: SB, G, H

HST 319 U.S. Urban History to 1850. (3)
once a year
History of the city in American life from the colonial period to the mid-19th century.
General Studies: SB, H

HST 320 U.S. Urban History Since 1850. (3)
once a year
History of the city in American life from the mid-19th century to the present.
General Studies: SB, H

HST 321 Constitutional History of the United States to 1865. (3)
fall
Origin and development of the American constitutional system from colonial period through the Civil War.
General Studies: SB, H

HST 322 Constitutional History of the United States Since 1865. (3)
spring
Development of the U.S. constitutional system from Reconstruction to the present.
General Studies: SB, H

HST 325 Immigration and Ethnicity in the United States. (3)
fall and spring
Origins, historical development, and future of a multiethnic society, 1492 to 2050. Prerequisite: HST 109 or 110.
General Studies: SB, C, H

HST 327 Women in U.S. History, 1600–1880. (3)
fall and spring
Examines American women of diverse racial, religious, and ethnic groups and classes; focuses on changing definitions of women's roles.
General Studies: SB, C, H

HST 328 Women in U.S. History, 1880–1980. (3)
fall and spring
Examines American women of diverse racial, religious, and ethnic groups and classes; focuses on changing definitions of women's roles.
General Studies: SB, C, H

HST 329 Women in 20th-Century U.S. West. (3)
once a year
Examines how women of various cultures have contended for and shaped the U.S. West, including the West of imagination. Lecture, discussion.
General Studies: C, H

HST 330 Mexican Women in the United States: Conquests and Migrations. (3)
once a year
Overview of Chicana history from Mesoamerican origins to the present, focusing on Mexican women in the western U.S. Lecture, discussion.
General Studies: L/SB, C, H

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

HST 331 Mexican American History to 1900. (3)
once a year
Mexican American history from pre-Hispanic origins to frontier journeys north through 19th-century life in the U.S. Southwest.
General Studies: SB, C, H

HST 332 Mexican American History Since 1900. (3)
once a year
Traces the formation of Mexican American communities across the rural and urban U.S. and examines 20th-century immigration from Mexico.
General Studies: SB, C, H

HST 333 African American History to 1865. (3)
once a year
The African American in American history, thought, and culture from slavery to 1865. Cross-listed as AFS 363. Credit is allowed for only AFS 363 or HST 333.
General Studies: SB, C, H

HST 334 African American History Since 1865. (3)
once a year
The African American in American history, thought, and culture from 1865 to the present. Cross-listed as AFS 364. Credit is allowed for only AFS 364 or HST 334.
General Studies: SB, C, H

HST 337 American Indian History to 1900. (3)
fall and spring
Cultural, economic, political, and social continuity and change of American Indian communities to 1900.
General Studies: SB, C, H

HST 338 American Indian History Since 1900. (3)
fall and spring
Cultural, economic, political, and social continuity and change of American Indian communities from 1900 to the present.
General Studies: SB, C, H

HST 341 The U.S. West in the 19th Century. (3)
once a year
Social, political, and economic development of the trans-Mississippi West, beginning with the Louisiana Purchase and ending in 1900.
General Studies: SB, H

HST 342 The U.S. West in the 20th Century. (3)
fall and spring
Role of the western states in U.S. history since 1890 emphasizing politics, the environment, industry and labor, and ethnic minorities.
General Studies: SB, H

HST 343 The American Southwest. (3)
once a year
Development of the region from 1848 to the present.
General Studies: L/SB, H

HST 344 Arizona. (3)
fall and spring
Emergence of the state from early times to the present.
General Studies: SB, H

HST 347 Ancient Greece. (3)
fall
History and civilization of the Greek world from 650 BCE to the death of Alexander the Great.
General Studies: SB, H

HST 348 Rome. (3)
spring
History and civilization of Rome from the beginning of the Republic to the end of the Empire.
General Studies: SB, H

HST 349 The Early Middle Ages. (3)
fall
Political, socioeconomic, and cultural developments of Western Europe from the 5th through 10th centuries.
General Studies: SB, H

HST 350 The Later Middle Ages. (3)
spring
Political, socioeconomic, and cultural developments of Western Europe from the 11th through 15th centuries.
General Studies: SB, H

HST 351 Renaissance Europe. (3)
fall
Culture of the Renaissance in Italy and Northern Europe from the 14th to the early 16th centuries.
General Studies: L/SB, H

HST 352 Europe's Reformations. (3)
spring
Causes and implications of the major Protestant, Catholic, and Radical religious reformations in 16th- and 17th-century Europe.
General Studies: L/SB, H

HST 353 The Old Regime in Europe. (3)
fall
Society and culture of Europe during the 17th and 18th centuries.
General Studies: SB, H

HST 354 Revolutionary Europe. (3)
spring
Political, social, economic, and intellectual currents in Europe from the French through the Russian Revolutions.
General Studies: SB, H

HST 355 Total War and the Crisis of Modernity. (3)
fall
Forces of change and instability in early 20th-century Europe.
General Studies: SB, G, H

HST 356 Europe Since 1945. (3)
selected semesters
Europe in its world setting since World War II, emphasizing major political and social issues from 1945 to the present.
General Studies: SB, G, H

HST 358 Jewish History from the Bible to 1492. (3)
fall
Continuity and change in political, legal, economic, and sociocultural history of the Jews from biblical through medieval times. Lecture, discussion.
General Studies: SB, H

HST 359 Jewish History from 1492 to 1948. (3)
spring
Jewish history from early modern through modern times, highlighting emancipation, enlightenment, and Jewish responses to modernity. Lecture, discussion.
General Studies: SB, G, H

HST 361 Witchcraft and Heresy in Europe. (3)
selected semesters
Background, origins, and development of the Inquisition; persecution of women and marginal groups. Cross-listed as REL 374. Credit is allowed for only HST 361 or REL 374. Prerequisite: upper-division standing or instructor approval.
General Studies: L/HU, H

HST 362 Sex and Society in Classical and Medieval Europe. (3)
fall
Family life, sex roles, and marriage, and their relationship to political, economic, and religious change in classical and medieval Europe. Lecture, discussion. Prerequisite: upper-division standing or instructor approval.
General Studies: SB, H

HST 363 Sex and Society in Early Modern Europe. (3)
spring
Family life, sex roles, and marriage and their relationship to political, economic, and religious change in early modern Europe. Lecture, discussion. Prerequisite: upper-division standing or instructor approval.
General Studies: SB, H

HST 364 Sex and Society in Modern Europe. (3)
selected semesters
Family life, sex roles, and marriage, and their relationship to political, economic, and social changes in modern Europe. Lecture, discussion. Prerequisite: upper-division standing or instructor approval.
General Studies: L/SB, H

HST 365 Women in Europe. (3)
once a year
European women's diverse religious, ethnic, national, and economic roles in society, culture, and politics, 1750 to the present.
General Studies: L/HU/SB, H

HST 366 England to 1689. (3)
once a year
Political, economic, and social development of the English people to the late 17th century.
General Studies: SB, H

HST 367 Modern Britain. (3)
once a year
Political, economic, and social development in Britain from 17th century to the present.
General Studies: SB, H

HST 368 Culture and Imagination in European History. (3)
once a year
Topics in European cultural and intellectual history. May be repeated for credit.
General Studies: HU, H

HST 370 Eastern Europe in Transition. (3)
once a year
Democratization, privatization, and identity transformations since the fall of communism in contemporary Eastern Europe and the former Soviet Union. Lecture, discussion.
General Studies: SB, G, H

HST 372 The Modern Middle East. (3)
selected semesters
Impact of the West and modernization upon Middle Eastern governments, religion, and society in the 19th and 20th centuries.
General Studies: SB, G, H

HST 375 Colonial Latin America. (3)
fall and spring
Ancient civilization, exploration and conquerors, and colonial institutions.
General Studies: SB, H

HST 376 Modern Latin America. (3)
fall and spring
Nationalistic development of the independent republics since 1821.
General Studies: SB, H

HST 377 Women in Colonial Latin America. (3)
fall
History of women in colonial Latin America, cross-examining class, race, and gender relations in depth. Lecture, discussion.
General Studies: H

HST 378 Latin American Women: The National Period. (3)
spring
Surveys the history of women, gender relations, and state policies in a broad continental setting, from independence to the present. Lecture, media, discussion.
General Studies: SB, G, H

HST 379 Rebellion and Revolution in South America. (3)
fall and spring
Political, economic, and social development of Spanish-speaking nations in South America.
General Studies: SB, H

HST 380 Cultural History of Latin America. (3)
selected semesters
Main currents of thought, the outstanding thinkers, and their impact on 19th- and 20th-century Latin America. Cultural and institutional basis of Latin American life.
General Studies: SB, H

HST 383 China. (3)
fall
Political, economic, social, and cultural history of the Chinese people from early times to the 17th century.
General Studies: SB, H

HST 384 China. (3)
spring
Political, economic, social, and cultural history of the Chinese people from the 17th century to the present.
General Studies: SB, G, H

HST 385 Chinese Science and Medicine. (3)
selected semesters
Explores developments of Chinese traditions dealing with the natural world, science, and medicine. Lecture, discussion. Cross-listed as HPS 325. Credit is allowed for only HPS 325 or HST 385.
General Studies: HU, G, H

HST 386 Interpreting China's Classics. (3)
selected semesters
Study of selected Confucian and/or Taoist classics and ways they have been read in both Asian and Western scholarship. Cross-listed as HUM 312. Credit is allowed for only HST 386 or HUM 312.
General Studies: L/HU, H

HST 387 Japan. (3)
once a year
Political, economic, social, and cultural history of the Japanese people from early times to the 17th century.
General Studies: L/SB, H

HST 388 Japan. (3)
once a year
Political, economic, social, and cultural history of the Japanese people from the 17th century to the present.
General Studies: SB, G, H

HST 389 Japanese Society and Values: Premodern. (3)
selected semesters
Effects of economic and social transitions on personal and social values as reflected in the dramatizations of contemporary events.

HST 391 Modern Southeast Asia. (3)
spring
Vietnam, Laos, Cambodia, Thailand, Burma, Malaysia, Singapore, Brunei, Indonesia, and Philippines since 1750: imperialism, revolution, and independence. Lecture, discussion.
General Studies: SB, G, H

HST 394 ST: Selected Topics in History. (3)
fall and spring
Full description of topics for any semester is available in the Department of History office. May be repeated for credit.

HST 405 Colonial American History to 1763. (3)
once a year
Political, economic, social, and cultural history of the colonial era. Concentrates on English colonies, with some consideration of Spanish, French, and other colonial regions in North America.
General Studies: SB, H

HST 406 The American Revolution, 1763–1789. (3)
once a year
Causes, course, and consequences of the American Revolution culminating in the ratification of the Constitution.
General Studies: SB, H

HST 407 The Early U.S. Republic, 1789–1850. (3)
once a year
Political, social, economic, and cultural development of the United States from the Revolution to 1850.
General Studies: L/SB, H

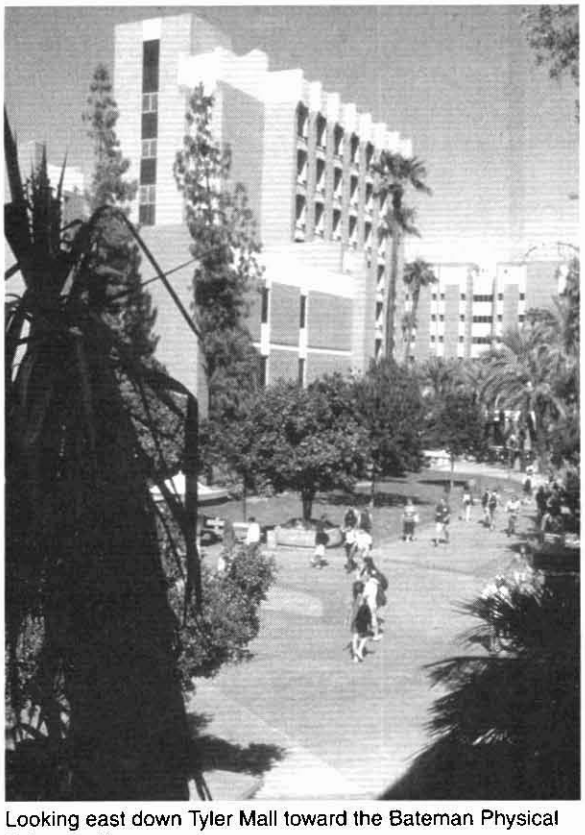
HST 408 Civil War and Reconstruction. (3)
once a year
Explores the causes, conduct, and consequences of the American Civil War, concentrating on the years 1848 to 1877.
General Studies: L/SB, H

HST 409 The Emergence of the Modern United States, 1877 to 1918. (3)
once a year
Triumph of modern political, social, and economic structures and values, 1877–1918; role of region, religion, race, and ethnicity.
General Studies: SB, H

HST 410 The Modern United States, 1918 to 1945. (3)
once a year
1920s boom and the crash, the Depression and the New Deal response. The Second World War at home and abroad.
General Studies: SB, H

HST 411 The Postwar United States, 1945 to 1973. (3)
once a year
Cold War, prosperity, reform, and immense social and political change in the U.S.
General Studies: SB, H

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.



Looking east down Tyler Mall toward the Bateman Physical Sciences Center Tim Trumble photo

HST 412 The Contemporary United States, 1973 to the Present. (3)
once a year
End of the Cold War, political crises, and cultural transformations in the U.S.
General Studies: SB, H

HST 414 The Modern U.S. Economy. (3)
selected semesters
Origins of 19th-century slavery and industrialization; 20th-century crisis and regulation: political economy of an advanced capitalist democracy. Prerequisite: ECN 111 (or 112) or HST 109 (or 110).
General Studies: SB, H

HST 415 Unequal Sisters: Women and Political and Cultural Change. (3)
once a year
Examines race, ethnic, and class differences among women, focusing on the political and cultural experiences of women in the U.S.
General Studies: L/SB, C, H

HST 416 Indian History of the Southwest. (3)
once a year
Reviews historical events from prehistoric peoples, the Spanish and Mexican periods, and the U.S. period from 1846 to present.
General Studies: SB, C, H

HST 417 Topics in Mexican American History. (3)
once a year
Focuses on specific topics in Mexican American history, including immigration, civil rights, the Chicano Movement, union activism, and regional and generational differences.
General Studies: SB, C, H

HST 423 The Tudor Monarchy. (3)
once a year
Political, cultural, and social foundations of 16th-century England.
General Studies: SB, H

HST 424 The Stuart Transformation of England. (3)
once a year
Political, social, economic, and cultural developments in 17th-century England.
General Studies: SB, H

HST 426 The British Empire. (3)
once a year
British imperialism and colonialism in Africa, the Americas, Asia, and the South Pacific. Prerequisite: upper-division standing or instructor approval.
General Studies: SB, H

HST 427 The French Revolution and the Napoleonic Era. (3)
once a year
Conditions in Pre-Revolutionary and Revolutionary France; organization of France under Napoleon and impact of French changes upon Europe.
General Studies: SB, H

HST 428 Modern France. (3)
selected semesters
Social, political, economic, and cultural transformations of French society, 1815–present. Impact of industrialization, war, and revolution on people's lives. Prerequisite: upper-division standing or instructor approval.
General Studies: SB, G, H

HST 429 Modern Germany. (3)
once a year
Germany since 1871.
General Studies: SB, G, H

HST 430 Hitler: Man and Legend. (3)
once a year
Biographical approach to the German Third Reich emphasizing nature of Nazi regime, sociocultural issues, World War II, and historiography.
General Studies: SB, H

HST 431 Eastern Europe and the Balkans Before 1914. (3)
selected semesters
Empire and nation in Eastern Europe and the Balkans before World War I, emphasizing Hapsburg and Ottoman lands.
General Studies: SB, H

HST 432 Eastern Europe and the Balkans in the 20th Century. (3)
selected semesters
Politics and culture in Eastern Europe and the Balkans from World War I to the present.
General Studies: SB, G, H

HST 435 The Russian Empire. (3)
fall
Development of Russian imperial institutions and civil society from the 17th to the early 20th centuries. Lecture, discussion.
General Studies: SB, H

HST 436 The Soviet Experiment. (3)
spring
Communist revolutionaries' rule of Russia, focusing on utopian culture, Stalinist terror, heroism in war, and the breakup of the former USSR.
General Studies: SB, G, H

HST 437 Spain Through the Golden Age. (3)
selected semesters
Cultural, economic, political, and social development of Spain from antiquity to the late 17th century.
General Studies: HU/SB, H

HST 438 Modern Spain. (3)
selected semesters
Cultural, economic, political, and social development of modern Spain.
General Studies: HU/SB, G, H

HST 443 The United States and Latin America. (3)
once a year
Latin American struggle for diplomatic recognition, attempts at political union, participation in international organizations since 1810, and relations between the United States and Latin America.
General Studies: SB, G, H

HST 445 20th-Century Cuba. (3)
once a year
History of Cuba from colonial era to formation of the early republic; political, economic, social development in late 20th century. Lecture, discussion.
General Studies: SB, G, H

HST 446 Colonial Mexico. (3)
once a year
Political, economic, social, and cultural developments from pre-Columbian times to 1810.
General Studies: SB, H

HST 447 Modern Mexico. (3)
once a year
Political, economic, social, and cultural developments from 1810 to the present.
General Studies: SB, H

HST 451 Chinese Cultural History. (3)
selected semesters
China's classics in translation studied both for their intrinsic ideas and for the origins of Chinese thought.
General Studies: SB, H

HST 452 Chinese Cultural History. (3)
selected semesters
Evolution of Confucian thought, its synthesis with Taoism and Buddhism, and modern reactions against, and uses of, Confucian traditions.
General Studies: SB, G, H

HST 453 The People's Republic of China. (3)
selected semesters
Analyzes major political, social, economic, and intellectual trends in China since the founding of the People's Republic in 1949.
General Studies: SB, G, H

HST 455 The United States and Japan. (3)
fall
Cultural, political, and economic relations in the 19th and 20th centuries. Emphasizes post-World War II period.
General Studies: SB, G, H

HST 456 The Vietnam War. (3)
once a year
Intersection of American and Asian histories in Vietnam, viewed from as many sides as possible.
General Studies: SB, G, H

HST 460 History of Fire. (3)
fall
Global survey of the natural and cultural history of fire. Lecture, discussion.
General Studies: L, H

HST 480 Methods of Teaching History: Classroom Resources. (3)
fall
Methods in instruction, organization, and presentation of the subject matter of history and closely allied fields. Prerequisites: HST 300; ITC admission. Pre- or corequisites: SED 403, 598.

HST 481 Methods of Teaching History: Community Resources. (3)
spring
Identify community-based resources for teaching history, work with resources, and learn how to integrate them into the secondary classroom. Lecture, lab. Prerequisite: HST 480.

HST 484 Internship. (1–6)
selected semesters

HST 492 Honors Directed Study. (1–6)
selected semesters

HST 493 Honors Thesis. (3)
selected semesters
General Studies: L

HST 494 Special Topics. (1–4)
selected semesters

HST 498 History Pro-Seminar. (3)
fall and spring
Required course for majors on topic selected by instructor; writing-intensive course related to the development of research skills and writing tools used by historians. Prerequisites: HST 300; History major.
General Studies: L

HST 499 Individualized Instruction. (1–3)
selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

SCHOLARLY PUBLISHING (PUB)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Hugh Downs School of Human Communication

com.pp.asu.edu
480/965-5095
STAUF A412

H. L. "Bud" Goodall Jr., Director

Professors: Alberts, Broome, Canary, Carlson, Corman, Goodall, Guerrero, Jain, Martin, McPhee, Mongeau, Nakayama

Associate Professors: Buley, Corey, Davey, Davis, De la Garza, Floyd, Martinez, Mayer, Trethewey

Assistant Professors: Brouwer, Messman, Park-Fuller, Tracy

Instructional Professional: Olson

Assistant Instructional Professional: McDonald

PURPOSE

The Hugh Downs School of Human Communication exists to advance the understanding of message-related human behavior for the purpose of improving communicative interactions. Teaching, research, and service are directed to the continued development of knowledge and application of principles of communication. Employers have ranked interpersonal, analytical, teamwork, computer, and verbal communication skills as the top five skills desired for new hires. The curriculum is designed so that majors are proficient in each of these areas upon graduation. Courses are not offered in broadcasting or journalism.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

GENERAL INFORMATION

A minimum cumulative GPA of 2.50 is required for enrollment in all upper-division courses and COM 207. A minimum cumulative GPA of 2.25 is required for enrollment in COM 110, 241, 250, and 263. An exception to the GPA requirement exists only when newly admitted students enroll in COM 110, 241, 250, or 263.

DEGREE REQUIREMENTS

BA and BS Degrees

Students may choose to complete either a Bachelor of Arts or Bachelor of Science degree in Communication. The BA degree requires a minimum of 30 semester hours and 15 hours of related area courses. The BS degree requires a minimum of 30 semester hours, including a General Studies CS (statistics) course, COM 408, or COM 404 or 407 and one pair of the following courses:

COM 110 Elements of Interpersonal Communication *SB*	3
or COM 310 Relational Communication (3)	
COM 410 Interpersonal Communication Theory and Research *SB*	3
Total	6
or	
COM 250 Introduction to Organizational Communication *SB*	3
COM 450 Theory and Research in Organizational Communication *SB*	3
Total	6
or	
COM 241 Introduction to Oral Interpretation *L/HU*	3
COM 441 Performance Studies *HU*	3
Total	6
or	
COM 321 Rhetorical Theory and Research *L/HU, H*	3
or COM 323 Communication Approaches to Popular Culture *C* (3)	
COM 421 Rhetoric of Social Issues *HU*	3
Total	6
or	
COM 263 Elements of Intercultural Communication *SB, C, G*	3
COM 463 Intercultural Communication Theory and Research *SB, G*	3
Total	6

Both degree options require students to take three core courses (COM 207, 225, and 308) plus 21 semester hours, 18 of which must be upper-division.

To assure the breadth and depth of their education, all Communication undergraduates must complete the requirements of the university General Studies, the College of Liberal Arts and Sciences, and the Hugh Downs School of Human Communication. For descriptive information on university requirements, refer to "General Studies," page 92, and "University Graduation Requirements," page 88. See "CLAS Graduation Requirements," page 331.

Students should consult the school for current information concerning College of Liberal Arts and Sciences and Hugh Downs School of Human Communication requirements.

Communication Internships

Internships (COM 484) consist of supervised field experiences and are available to undergraduate students with a minimum ASU GPA of 2.50. Students must also complete COM 207, 225, and 308 with a grade of "C" or higher and 56 semester hours of credit to be eligible for an internship. An application for internship must be completed in the semester before the intended term for an internship. Contact the school for specific deadline dates. Internships must receive prior approval from the internship programs coordinator *before* student registration for the course. Internships may be taken for up to six semester hours.

MINOR IN COMMUNICATION

The minor in Communication consists of 15 semester hours of courses, including COM 100 plus COM 225 or 259, and nine additional semester hours, at least six of which must be in the upper division. Nine of the total 15 semester hours must be Tempe campus resident credits, including six semester hours of upper-division credit. No pass/fail, "Y" credit, or credit/no-credit courses are allowed. Communication courses required for one's major may not also count for the minor. All prerequisite and GPA requirements must be met. The "C" (2.00) minimum requirement must be met for each class.

BIS CONCENTRATION

A concentration in communication is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

GRADUATE PROGRAMS

In addition to offering an MA degree program, the Hugh Downs School of Human Communication also offers an interdisciplinary PhD degree program in Communication. See the *Graduate Catalog* for the requirements and areas of concentration.

HUGH DOWNS SCHOOL OF HUMAN COMMUNICATION (COM)

COM 100 Introduction to Human Communication. (3)
fall, spring, summer
Topics-oriented introduction to basic theories, dimensions, and concepts of human communicative interaction and behavior.
General Studies: SB

COM 110 Elements of Interpersonal Communication. (3)
fall, spring, summer
Demonstration and practice of communicative techniques in establishing and maintaining interpersonal relationships. Prerequisite: 2.25 GPA.
General Studies: SB

COM 207 Introduction to Communication Inquiry. (3)
fall, spring, summer
Bases of inquiry into human communication, including introduction to notions of theory, philosophy, problems, and approaches to the study of communication. Prerequisites: COM 100; minimum ASU cumulative GPA of 2.50.

COM 222 Argumentation. (3)
fall and spring
Philosophical and theoretical foundations of argumentation, including a comparison of models of advocacy and evidence. Prerequisite: ENG 101 or 105.
General Studies: L

COM 225 Public Speaking. (3)
fall, spring, summer
Verbal and nonverbal communication in platform speaking. Discussion and practice in vocal and physical delivery and in purposeful organization and development of public communication. Prerequisite: ENG 101 or 105.
General Studies: L

COM 230 Small Group Communication. (3)
fall, spring, summer
Principles and processes of small group communication, attitudes, and skills for effective participation and leadership in small groups, small group problem solving, and decision making.
General Studies: SB

COM 241 Introduction to Oral Interpretation. (3)
fall, spring, summer
Communication of literary materials through the mode of performance. Verbal and nonverbal behavior, interface of interpreter with literature and audience, and rhetorical and dramatic analysis of literary modes. Prerequisites: ENG 101 (or 105); 2.25 GPA.
General Studies: L/HU

COM 250 Introduction to Organizational Communication. (3)
fall, spring, summer
Introduces the study of communication in organizations, including identification of variables, roles, and patterns influencing communication in organizations. Prerequisite: 2.25 GPA.
General Studies: SB

COM 259 Communication in Business and the Professions. (3)
fall, spring, summer
Interpersonal, group, and public communication in business and professional organizations. Not open to freshmen and not available for credit toward the major.

COM 263 Elements of Intercultural Communication. (3)
fall, spring, summer
Basic concepts, principles, and skills for improving communication between persons from different minority, racial, ethnic, and cultural backgrounds. Lecture, discussion. Prerequisite: 2.25 GPA.
General Studies: SB, C, G

COM 271 Voice Improvement. (3)
selected semesters
Intensive personal and group experience to improve normal vocal usage, including articulation and pronunciation.

COM 281 Communication Activities. (1–3)
fall, spring, summer
Nongraded participation in forensics or interpretation cocurricular activities. Maximum 3 semester hours each semester. Prerequisite: instructor approval.

COM 294 Special Topics. (3)
fall, spring, summer
Topics may include the following:
- Beyond Words

COM 300 CIS: Communication in Interdisciplinary Studies. (3)
fall, spring, summer
Examines and analyzes communication in the context of other academic disciplines. May be repeated for credit. Open to BIS majors only. Prerequisites: both COM 100 and 225 or only COM 259; minimum ASU cumulative GPA of 2.00.

COM 301 Introductory Theories and Principles of Communication: Communication in Relationships, Organizations, and Public Contexts. (3–9)
once a year
Integrated introduction to the theories and principles of communication in public, interpersonal, and organizational contexts. Lecture, discussion, online component.

COM 308 Advanced Research Methods in Communication. (3)
fall, spring, summer
Advanced communication research methods, including quantitative, qualitative, and critical approaches. Prerequisite: minimum ASU cumulative GPA of 2.50. Prerequisites with a grade of "C" (2.00) or higher: COM 207; MAT 142 (or higher-level MAT course).
General Studies: L

COM 310 Relational Communication. (3)
fall and spring
Explores communication issues in the development of personal relationships. Current topics concerning communication in friendship, romantic, and work relationships. Prerequisites: COM 100; minimum ASU cumulative GPA of 2.50.

COM 312 Communication, Conflict, and Negotiation. (3)
fall and spring
Theories and strategies of communication relevant to the management of conflicts and the conduct of negotiations. Prerequisites: COM 100; minimum ASU cumulative GPA of 2.50.

COM 316 Gender and Communication. (3)
fall and spring
Introduces gender-related communication. Examines verbal, nonverbal, and paralinguistic differences and similarities within social, psychological, and historic perspectives. Prerequisite: minimum ASU cumulative GPA of 2.50.
General Studies: SB, C

COM 317 Nonverbal Communication. (3)
fall and spring
Study of communication using space, time, movement, facial expression, touch, appearance, smell, environment, objects, voice, and gender/cultural variables. Not open to students with credit for COM 294 ST: Beyond Words. Prerequisite: minimum ASU cumulative GPA of 2.50.

COM 319 Persuasion and Social Influence. (3)
fall, spring, summer
Variables that influence and modify attitudes and behaviors of message senders and receivers, including analysis of theories, research, and current problems. Prerequisites: COM 207 (or its equivalent); minimum ASU cumulative GPA of 2.50. Prerequisite for nonmajors: POS 401 or PSY 230 or QBA 221 or SOC 390 or STP 226.
General Studies: SB

COM 320 Communication and Consumerism. (3)
once a year
Critical evaluation of messages designed for public consumption. Perceiving, evaluating, and responding to political, social, and commercial communication. Prerequisite: minimum ASU cumulative GPA of 2.50.
General Studies: SB

COM 321 Rhetorical Theory and Research. (3)
fall and spring
Historical development of rhetorical theory and research in communication, from classical antiquity to the present. Prerequisites: COM 100; minimum ASU cumulative GPA of 2.50.
General Studies: L/HU, H

COM 323 Communication Approaches to Popular Culture. (3)
fall, spring, summer
Critical analysis of popular culture within social and political contexts; emphasizes multicultural influences and representations in everyday life. Lecture, discussion. Prerequisites: COM 100; minimum ASU cumulative GPA of 2.50.
General Studies: C

COM 325 Advanced Public Speaking. (3)
fall and spring
Social and pragmatic aspects of public speaking as a communicative system; strategies of rhetorical theory and the presentation of forms of public communication. Prerequisites: COM 225; minimum ASU cumulative GPA of 2.50.
General Studies: L

COM 326 Court Room Oratory. (3)
fall in even years
Increases knowledge and appreciation of the role of communication in the development of legal and public policies.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/ quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

COM 341 Social Contexts for Performance. (3)
selected semesters
Adaptation and performance of literature for the community outside the university. Research into the practical uses of performed literature. Prerequisite: minimum ASU cumulative GPA of 2.50.

COM 344 Performance of Oral Traditions. (3)
selected semesters
Cultural beliefs and values studied through ethnographic research and performance of personal narratives, folklore, myths, legends, and other oral traditions. Lecture, fieldwork, research paper. Prerequisite: minimum ASU cumulative GPA of 2.50.
General Studies: HU, C

COM 357 Communication Technology and Information Diffusion. (3)
fall
Studies effects of new communication technology on society, organizations, and individuals. Hands-on experience plus critical analysis of theory and research. Prerequisites: both COM 250 (or MGT 300 or PGS 430 or SOC 301) and CSE 180 (or its equivalent) or only instructor approval; minimum ASU cumulative GPA of 2.50.
General Studies: SB

COM 371 Language, Culture, and Communication. (3)
fall and spring
Cultural influences of language on communication, including social functions of language, bilingualism, biculturalism, and bidialectism. Lecture, discussion. Prerequisites: COM 263; minimum ASU cumulative GPA of 2.50.
General Studies: SB, C, G

COM 382 Classroom Apprenticeship. (1–3)
fall, spring, summer
Nongraded credit for students extending their experience with a content area by assisting with classroom supervision in other COM courses (maximum 3 semester hours each semester). Prerequisites: 2.50 ASU cumulative GPA; written instructor approval.

COM 394 Special Topics. (1–4)
fall, spring, summer
Prerequisite: minimum ASU cumulative GPA of 2.50.

COM 400 CIP: Communication in Professions. (3)
fall, spring, summer
Specialized study of communication processes in professional and organizational settings. Open to BIS majors only. May be repeated for credit. Lecture, discussion. Prerequisites: both COM 100 and 225 or only COM 259; minimum ASU cumulative GPA of 2.00.
General Studies: HU, C

COM 404 Research Apprenticeship. (3)
fall and spring
Direct research experience on faculty projects. Student/faculty match based on interests. Lecture, apprenticeship. Prerequisites: COM 308 (or instructor approval); minimum ASU cumulative GPA of 2.50; application required.

COM 407 Advanced Critical Methods in Communication. (3)
fall, spring, summer
Examines critical approaches relevant to communication, including textuality, social theory, cultural studies, and ethnography. Lecture, discussion. Prerequisites: COM 308; minimum ASU cumulative GPA of 2.50.

COM 408 Quantitative Research Methods in Communication. (3)
fall and spring
Advanced designs, measurement techniques, and methods of data analysis of communication research. Prerequisites: COM 308 and a course in generic statistics (EDP 454 or POS 401 or PSY 230 or QBA 221 or SOC 390 or STP 226); minimum ASU cumulative GPA of 2.50.

COM 410 Interpersonal Communication Theory and Research. (3)
fall, spring, summer
Survey and analysis of major research topics, paradigms, and theories dealing with message exchanges between and among social peers. Prerequisites: COM 110 (or 310), 308; minimum ASU cumulative GPA of 2.50.
General Studies: SB

COM 411 Communication in the Family. (3)
once a year
Broad overview of communication issues found in marriage and family life, focusing on current topics concerning communication in the family. Prerequisites: COM 110 (or 310), 207; minimum ASU cumulative GPA of 2.50.
General Studies: SB

COM 414 Crisis Communication. (3)
selected semesters
Role of communication in crisis development and intervention. Prerequisite: minimum ASU cumulative GPA of 2.50.

COM 421 Rhetoric of Social Issues. (3)
fall and spring
Critical rhetorical study of significant speakers and speeches on social issues of the past and present. Prerequisites: COM 308, 321 (or 323).
General Studies: HU

COM 422 Advanced Argumentation. (3)
selected semesters
Advanced study of argumentation theories and research as applied to public forum, adversary, scholarly, and legal settings. Prerequisites: COM 222; minimum ASU cumulative GPA of 2.50.

COM 426 Political Communication. (3)
fall
Theories and criticism of political communication, including campaigns, mass persuasion, propaganda, and speeches. Emphasis on rhetorical approaches. Prerequisite: minimum ASU cumulative GPA of 2.50.
General Studies: SB

COM 430 Leadership in Group Communication. (3)
selected semesters
Theory and process of leadership in group communication, emphasizing philosophical foundations, contemporary research, and applications to group situations. Prerequisites: COM 230; minimum ASU cumulative GPA of 2.50.

COM 441 Performance Studies. (3)
fall, spring, summer
Theory, practice, and criticism of texts in performance. Emphasis on the interaction between performer, text, audience, and context. Prerequisites: COM 241, 308; minimum ASU cumulative GPA of 2.50.
General Studies: HU

COM 442 Identity, Performance, and Human Communication. (3)
selected semesters
Explores communication dimensions of self and others as performance. Examines topics that include gender, race, sexuality, age, and ethnicity through performance. Lecture, workshops. Prerequisites: COM 225 (or 241); minimum ASU cumulative GPA of 2.50.

COM 445 Narrative Performance. (3)
selected semesters
Theory and practice of performing narrative texts (e.g., prose fiction, oral histories, diaries, essays, letters). Includes scripting, directing, and the rhetorical analysis of storytelling. Prerequisites: COM 241; minimum ASU cumulative GPA of 2.50.
General Studies: HU

COM 446 Performance of Literature Written by Women. (3)
selected semesters
Explores, through performance and critical writing, literature written by women. Prerequisite: minimum ASU cumulative GPA of 2.50.
General Studies: HU, C

COM 450 Theory and Research in Organizational Communication. (3)
fall, spring, summer
Critical review and analysis of the dominant theories of organizational communication and their corollary research strategies. Prerequisites: COM 250, 308; minimum ASU cumulative GPA of 2.50.
General Studies: SB

COM 453 Communication Training and Development. (3)
once a year
Examines the procedures and types of communication training and development in business, industry, and government. Prerequisites: COM 250; minimum ASU cumulative GPA of 2.50.

COM 463 Intercultural Communication Theory and Research. (3)
fall, spring, summer
Surveys and analyzes major theories and research dealing with communication between people of different cultural backgrounds, primarily in international settings. Lecture, discussion, small group

work. Prerequisites: COM 263, 308; minimum ASU cumulative GPA of 2.50.
General Studies: SB, G

COM 465 Intercultural Communication Workshop. (3)
selected semesters
Experientially based study of communication between members of different cultures designed to help improve intercultural communication skills. Prerequisites: minimum ASU cumulative GPA of 2.50; instructor approval.

COM 484 Communication Internship. (1–6)
fall, spring, summer
Fee. Prerequisites: COM 225, 308; minimum ASU cumulative GPA of 2.50; application required. Pre- or corequisite: COM 410 or 421 or 441 or 450 or 463.

COM 494 Special Topics. (1–3)
fall, spring, summer
Prerequisite: minimum ASU cumulative GPA of 2.50.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 63.

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

School of Justice and Social Inquiry

www.asu.edu/clas/justice
480/965-7682
WILSN 331

Doris Marie Provine, Director

Regents' Professor: Altheide

Professors: Cavender, Haynes, Hepburn, Johnson, Jurik, Lauderdale, Provine, Romero, Schneider, Walker, Zatz

Associate Professors: Adelman, Bortner, Lujan, Menjivar

Assistant Professors: Hanson, Kupchik, Lopez, Milun, Monahan

MISSION

Students pursuing the BS degree in Justice Studies find an interdisciplinary classroom experience emphasizing ideas from the social sciences, philosophy, and legal studies. The degree is designed for students interested in studying issues of justice and those desiring justice-related careers, including law. Students develop an understanding of the meaning of justice and injustice, both descriptive and normative, and analyze often controversial issues through critical inquiry and social science investigation. The faculty focus on theories of justice and injustice in three principal areas:

1. social justice and inequality;
2. economic justice and globalization; and
3. law, deviance, and social control.

Courses are designed to provide students with a comprehensive understanding of the substantive issues within each of these three areas and of the interrelationship and continuity among them. Students accordingly may learn about conflict and its negotiation; crime and violence; adolescents and delinquency; punishment and alternatives to punishment; globalization and inequality; and differential institutional and socioeconomic treatment of populations based on gender and sexuality, race and ethnicity, social class, and nationality.

The heart of any university program is its faculty. The School of Justice and Social Inquiry boasts a faculty with strong scholarly credentials. Faculty members include national, international, and local award recipients in research, teaching, and public service. Faculty members are committed to challenging students to develop their own understandings of justice; to analyze critically; and to propose possible solutions to a wide variety of contemporary issues concerning just distribution of resources, fair treatment for individuals and groups in local communities, the nation, and the world.

While completing the Justice Studies curriculum, students encounter opportunities to develop transferable skills, including critical thinking, oral and written discourse, computer literacy, and problem solving. Faculty encourage students to practice justice through various experiential approaches, including volunteer work, service learning, and internships. Students actively engage in their education via discussion, cooperative learning, field trips, and case-based classroom formats.

PROFESSIONAL STATUS

Upon admission to the university, Justice Studies students are classified as preprofessional. Justice Studies students must earn professional status before taking 400-level JUS resident credit courses.

Justice Studies students may achieve professional status by

1. earning a minimum of 56 semester hours;
2. earning a minimum cumulative GPA of 2.50 (calculated on a minimum of nine semester hours earned at ASU);
3. completing the university General Studies mathematics requirement (MA);
4. completing the school's computer science requirement (CS computer course);
5. completing the school's communication requirement; and
6. completing the following classes with a minimum 2.50 GPA and a minimum grade of "C" in each of the following courses:

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

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

—*or*—

ENG 105 Advanced First-Year Composition (3)

JUS 105 Introduction to Justice Studies *SB* 3
or JUS 305 Principles of Justice Studies *SB* (3)

JUS 301 Research in Justice Studies *SB* 3

JUS 302 Basic Statistical Analysis in Justice Studies *CS* 3

JUS 303 Justice Theory 3

School's writing competence requirement *L* 3

ADVISING

Students admitted as preprofessional are advised by one of the school's academic advisors. All students are encouraged to seek advising to formulate an appropriate educational plan.

Upon admission to the university, every Justice and Social Inquiry undergraduate may receive the *Undergraduate Advisement Guide* and an evaluation of any transfer work. For more information, call the school at 480/965-7682.

DEGREES

Justice Studies—BS

The curriculum for the BS degree in Justice Studies provides interdisciplinary social science courses relevant to law and justice for students working in the justice field, students anticipating justice-related careers (including the legal profession), and interested non-Justice Studies students.

MINOR IN JUSTICE STUDIES

The minor in Justice Studies is designed for students interested in developing an understanding of meanings of justice and injustice and analyzing often controversial issues through critical inquiry and social science investigation.

Eighteen hours of graded classroom JUS course work are required, including JUS 105 or 305 and JUS 303. No pass/fail or credit/noncredit course work may be applied to the minor. A minimum of nine semester hours must be resident credit at Tempe campus, and at least 12 hours must be upper-division credit. Students must receive a minimum grade of "C" (2.00) for all courses in the minor and meet all course eligibility requirements, including prerequisites.

BIS CONCENTRATION

A concentration in Justice Studies is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

DEGREE REQUIREMENTS

The faculty in the School of Justice and Social Inquiry award a BS degree upon the successful completion of a curriculum consisting of a minimum of 120 semester hours, including the university General Studies requirement, college graduation requirements, justice requirements, and electives. Additionally, the student must

1. earn professional status;
2. earn a minimum of 45 semester hours of upper-division credits;
3. complete the school's minimum residency requirement of 24 semester hours (see the *Undergraduate Advisement Guide*);
4. earn a grade of "C" (2.00) or higher in all justice studies courses taken at ASU that apply to the justice studies component of the curriculum (i.e., nonelectives); and
5. meet the university's residency and scholarship requirements.

GENERAL STUDIES REQUIREMENTS

To assure the breadth and depth of their education, all Justice Studies undergraduates must complete the university General Studies requirement and additional fundamental requirements prescribed by the College of Liberal Arts and Sciences and the School of Justice and Social Inquiry. For descriptive information on these requirements, see "General Studies," page 92 and "CLAS Graduation Requirements," page 331. Note that all three General Studies awareness areas are required. Consult "General Studies Requirements" in the *Schedule of Classes* for an approved list of courses. The school implements the ASU continuous enrollment policy for First-Year Composition and the university mathematics (MA) requirement.

MAJOR REQUIREMENTS

The required justice studies component consists of 36 semester hours. The following courses are required for all degree candidates. Equivalent courses may be substituted when appropriate.

JUS 105 Introduction to Justice Studies *SB* 3
or JUS 305 Principles of Justice Studies *SB* (3)

JUS 301 Research in Justice Studies *SB* 3

JUS 302 Basic Statistical Analysis in Justice Studies *CS* 3

JUS 303 Justice Theory 3

Total 12

Through advising, a group of Justice and Social Inquiry courses may be recommended to ensure a comprehensive exposure appropriate to the student's interests.

Electives. The faculty encourage students to utilize the unique opportunities afforded by the university to pursue personal and educational interests, whether in the form of a broad sampling of other disciplines or the deeper probing of a single field. Specifically, the faculty suggest that students take a minimum of one course in American government, behavioral psychology, and sociology.

Transfer of Community College Credits. Credits transferred from accredited community colleges are accepted as lower-division credits up to a maximum of 64 semester hours. The acceptance of credits is determined by the director of Undergraduate Admissions, and the utilization of credits toward degree requirements is determined by the faculty of the School of Justice and Social Inquiry.

GRADUATE PROGRAMS

The faculty in the School of Justice and Social Inquiry offer the following: an MS degree in Justice Studies, a

concurrent MS in JSI/MA in Anthropology, and an Interdisciplinary PhD program in Justice Studies. For more information, see the *Graduate Catalog*, or access the Web site at www.asu.edu/clas/justice.

JUSTICE STUDIES (JUS)

JUS Note 1. For Justice Studies students to take a nonrequired 300-level JUS course, they must have at least a "C" (2.00) in each of the required JUS courses—JUS 105 (or 305), 301, 302, and 303—and a minimum GPA of 2.50 for these four classes. For non-Justice Studies students to take a 300-level JUS course, they must have a minimum of 56 earned semester hours (junior standing) and a minimum cumulative GPA of 2.00. Non-Justice Studies students may take JUS 301, 302, and 303 with school approval.

JUS Note 2. For non-Justice Studies students to take a 400-level JUS course, they must have a minimum of 56 earned semester hours (junior standing) and a minimum cumulative GPA of 2.50. Justice Studies students must earn professional status before taking 400-level JUS resident credit courses. Justice Studies courses at the 300 and 400 level are unavailable to non-Justice Studies students during preregistration.

JUS 100 The Justice System. (3)
fall, spring, summer
Overview of the justice system. Roles of law enforcement personnel, the courts, and correctional agencies. Philosophical and theoretical views in historical perspective.
General Studies: SB

JUS 105 Introduction to Justice Studies. (3)
fall, spring, summer
Introductory overview to the study of justice from a social science perspective. Primary topics include justice theories and justice research. Credit is allowed for only JUS 105 or 305. Appropriate for freshmen and sophomores. Lecture, discussion.
General Studies: SB

JUS 200 Topics in Concepts and Issues of Justice. (3)
once a year
Uses critical thinking skills to analyze and comprehend controversial social issues (e.g., abortion, affirmative action, capital punishment, the flat tax, and immigration). May be repeated for credit when topics vary. Lecture, discussion.
General Studies: SB

JUS 294 Special Topics. (1–3)
fall, spring, summer
Topics chosen from various fields of justice studies.

JUS 301 Research in Justice Studies. (3)
fall, spring, summer
Focuses on developing and evaluating research designs, data collection, and the relationship between validity and reliability. Stresses methods for conducting research. Prerequisite: Justice Studies student.
General Studies: SB

JUS 302 Basic Statistical Analysis in Justice Studies. (3)
fall, spring, summer
Introduces the fundamentals and application of descriptive and inferential statistics, with emphasis on the justice area. Prerequisite: intermediate algebra or higher.
General Studies: CS

JUS 303 Justice Theory. (3)
fall, spring, summer
Examines classic and contemporary philosophies and theories of justice, including legal, social, and criminal justice. See JUS Note 1.

JUS 305 Principles of Justice Studies. (3)
fall, spring, summer
Introductory overview to the study of justice from a social science perspective. Primary topics include justice theories and justice research. Credit is allowed for only JUS 305 or 105. Appropriate for juniors and seniors. Lecture, discussion. See JUS Note 1.
General Studies: SB

JUS 306 Police and Society. (3)
once a year
Focuses on community policing; critical inquiry of administrative decision making; perspectives on police-citizen violence; street practices; urban policing. Lecture, discussion. See JUS Note 1.

JUS 308 Courts and Society. (3)
once a year
History and development of courts. Relationship between dispute resolution mechanisms and cultural/social structure/processes in which they are embedded. Lecture, discussion, cooperative learning, case analysis. See JUS Note 1.

JUS 310 Corrections and Justice. (3)
once a year
Examines the United States prison condition; types of offenders; issues, including drugs, gangs, drunk driving, racial discrimination, and "intermediate" punishments. Lecture, discussion. See JUS Note 1.

JUS 311 Crime, Prevention, and Control. (3)
once a year
Examines prevention and control of crime by a review of contemporary theories, justice agency procedures, and social policies. Lecture, discussion. See JUS Note 1.

JUS 320 Community and Social Justice. (3)
once a year
Discusses and analyzes definitions of community; impact of environment on behavior; promises of community organization for local empowerment. Lecture, discussion. See JUS Note 1.
General Studies: SB, C

JUS 321 Wealth Distribution and Poverty. (3)
once a year
Examines wealth and income distribution in the United States and analyzes ideological and political forces producing an increasingly unequal society. Lecture, discussion. See JUS Note 1.
General Studies: SB, C

JUS 329 Domestic Violence. (3)
once a year
Legal, historical, theoretical, and treatment aspects of domestic violence, including child abuse, woman battering, incest, and marital rape. Lecture, discussion. See JUS Note 1.
General Studies: SB

JUS 335 Organized Crime. (3)
once a year
Nature of organized crime and its illegal activities, theories of containment, and efforts by justice agencies to counter its dominance in society. Lecture, discussion. See JUS Note 1.

JUS 345 White Collar Crime. (3)
once a year
Basic white collar concepts and categories; causes and effects; mechanisms and contexts of operation; social and criminological responses. Lecture, discussion. See JUS Note 1.

JUS 350 Immigration and Justice. (3)
fall, spring, summer
Examines immigration policy, history of immigration, refugee issues, labor force participation, gender, family, children, social networks, and transnationalism. Lecture, discussion. See JUS Note 1.
General Studies: SB, C

JUS 360 Law and Social Control. (3)
once a year
Resolution of social issues through the application of law as an agent of social control. Nature, sanctions, and limits of law. Categories of law and schools of jurisprudence. Lecture, discussion. See JUS Note 1.
General Studies: SB

JUS 365 Substantive Criminal Law. (3)
once a year
Crimes against persons, property, and society; legislative analysis; primary appellate judicial opinions; substantive criminal law issues; trial court determinations. Lecture, discussion. See JUS Note 1.

L literacy and critical inquiry / **MA** mathematics / **CS** computer/statistics/quantitative applications / **HU** humanities and fine arts / **SB** social and behavioral sciences / **SG** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

JUS 368 Procedural Criminal Law. (3)
once a year
Due process with respect to individual liberty; privacy and government power; emphasizes broad ideas of political and social theory. Lecture, discussion. See JUS Note 1.

JUS 375 Crime and the Mass Media. (3)
once a year
Surveys the impact of mass media and popular culture on crime, police actions, and social policy. Lecture, discussion. See JUS Note 1.
General Studies: SB

JUS 385 Justice and Everyday Life. (3)
once a year
Justice and injustice in everyday life and how small things can become legal issues. Role of language and interaction in social order. Lecture, group work. See JUS Note 1.
General Studies: SB

JUS 394 Special Topics. (1–3)
once a year
Topics chosen from various fields of justice studies. Lecture, discussion. See JUS Note 1.

JUS 404 Imperatives of Proof. (3)
once a year
Issues of evidence, rules of proof, establishing fact and identity in the justice system. Lecture, case analysis, cooperative learning, discussion. See JUS Note 2.
General Studies: L

JUS 405 Economic Justice. (3)
fall and spring
Addresses economic issues and justice implications, including the interplay among economic conditions, race-ethnicity, class, and gender worldwide. Lecture, discussion. See JUS Note 2.
General Studies: L/SB, G

JUS 410 Punishment: Logic and Approach. (3)
once a year
Analyzes forms of punishment, how and why they have changed. Areas include philosophy, history, and social structure of punishment. Lecture, discussion. See JUS Note 2.

JUS 415 Gender and International Development. (3)
once a year
Examines the ways in which international development is gendered as well as women's rights as human rights in both national and international arenas. Lecture, seminar. See JUS Note 2.
General Studies: L, G

JUS 420 Women, Work, and Justice. (3)
once a year
Examines gender inequality in the workplace, including the nature of women's work, theoretical issues, and models for promoting gender justice at work. Lecture, discussion. See JUS Note 2.
General Studies: SB, C

JUS 422 Women, Law, and Social Control. (3)
once a year
Examines social, economic, and legal factors that are relevant to mechanisms of social control of women, including formal legal control and informal control through violence. See JUS Note 2.

JUS 425 Race, Gender, and Crime. (3)
once a year
Critically examines major theories, research findings, policies, and controversies concerning race, ethnicity, gender, and crime. Lecture, discussion, cooperative learning. See JUS Note 2.
General Studies: L/SB, C

JUS 430 Social Protest, Conflict, and Change. (3)
fall, spring, summer
Analyzes historical and contemporary protest movements advocating equality based on race, gender, and sexual orientation. Lecture, discussion. See JUS Note 2.
General Studies: L/SB, C

JUS 440 Administration and Justice. (3)
once a year
Diversity issues; procedural justice and service delivery; relationships between state and economic forces, including processes of regulation; state administrative apparatuses. Lecture, case analysis, cooperative learning, discussion. See JUS Note 2.
General Studies: L

JUS 444 Environment and Justice. (3)
fall
Explores issues of environment and justice. Topics include justice and environmental racism, future generations, nonhuman life, global/non-Western societies. Lecture, discussion. See JUS Note 2.
General Studies: L, C

JUS 450 Alternatives to Incarceration. (3)
once a year
Investigates various alternatives to incarceration; advantages/disadvantages; major issues, including net widening, cost effectiveness, risk assessment, community crime prevention. Lecture, research. See JUS Note 2.
General Studies: L

JUS 460 Feminism and Justice. (3)
once a year
Explores feminist thought and critiques traditional political theories. Examines issues of racism, sexuality, and the law. Lecture, discussion. See JUS Note 2.
General Studies: C

JUS 463 Discretionary Justice. (3)
once a year
Use/abuse, key issues/manifestations of discretion in legal system and other societal institutions. Theoretical/empirical linkages between discretion and discrimination, based on race, ethnicity, and gender. Lecture, discussion. See JUS Note 2.
General Studies: SB

JUS 465 Death Penalty in the United States. (3)
fall, spring, summer
Focuses on capital punishment in the United States; explores negotiation of law, politics, morality, public policy, and culture. Lecture, discussion, case study. See JUS Note 2.
General Studies: L

JUS 469 Political Deviance and the Law. (3)
once a year
Examines the controversies created by political and deviant behavior, including a critical view of law as an agent of social control. Lecture, discussion. See JUS Note 2.
General Studies: L/SB, C

JUS 470 Alternative Dispute Resolution. (3)
once a year
Critical examination of the tenets of alternative dispute resolution movement; exposure to the programs of ADR, including community and court based. Lecture, cooperative learning, field research. See JUS Note 2.
General Studies: L/SB, C

JUS 474 Legislation of Morality. (3)
once a year
Addresses historical and contemporary issues related to social justice movements, law, and morality in a pluralistic society. Issues include AIDS, burial rights, homosexuality, poverty, prostitution, and racial discrimination. See JUS Note 2.
General Studies: L/SB, C

JUS 477 Youth and Justice. (3)
once a year
Critical examination of youth-related justice issues, including economic justice, violence against youth, delinquency, and the juvenile justice system. Lecture, group work, film. See JUS Note 2.
General Studies: L/SB

JUS 479 Law and Disputing. (3)
fall and spring
Critical analysis of the controversies created by disputes, law, and other forms of social control. Lecture, discussion. See JUS Note 2.
General Studies: L/SB

JUS 484 Internship. (3–6)
fall, spring, summer
Assignments in a justice-related placement designed to further the integration of theory and practice. Internships are arranged through consultation of students with placements. Students must consult with the school for appropriate application and registration procedures. May be repeated for credit for a total of 12 semester hours, of which a maximum of 6 are applied to the major. Fee. See JUS Note 2. Prerequisites: major status; Justice Studies student.