Council on Aviation Accreditation. For more information, call 334/844-2431, send e-mail to caa@auburn.edu, or write

COUNCIL ON AVIATION ACCREDITATION
3410 SKYWAY DRIVE
AUBURN AL 36830

The Bachelor of Science degrees in the Department of Technology Management are fully accredited by the National Association of Industrial Technology (NAIT). For more information, call 734/677-0720, or write

NATIONAL ASSOCIATION OF INDUSTRIAL TECHNOLOGY
3300 WASHTENAW AVE SUITE 220
ANN ARBOR MI 48104-4200

The BS degree in Nutrition with a concentration in dietetics is accredited as a didactic program in dietetics (DPD) by the Commission on Accreditation for Dietetics Education of the American Dietetic Association. For more information, call 312/899-0040, or write

COMMISSION ON ACCREDITATION FOR DIETETICS EDUCATION
AMERICAN DIETETIC ASSOCIATION
120 S RIVERSIDE PLAZA SUITE 2000
CHICAGO IL 60606-6995

The BS degree in Agribusiness with a concentration in professional golf management is accredited by the Professional Golfer's Association of America. For more information, write

PGA EDUCATION DEPARTMENT
100 AVENUE OF THE CHAMPIONS
PO BOX 109601
PALM BEACH GARDENS FL 33410

ADMISSION

Nondegree Students. Nondegree students may take courses at the Polytechnic campus according to the special provisions under "Undergraduate Enrollment," page 65.

Degree-Seeking Students. Degree-seeking students must meet the university admissions standards set by the Arizona Board of Regents (ABOR). Any student admitted to ASU may take courses at the Polytechnic campus. To be admitted to a Polytechnic campus degree program, the student must meet undergraduate admissions requirements and the specific admission requirements of the Polytechnic campus program. A student who is admitted to a Polytechnic campus degree program is defined as a Polytechnic campus student.

For more admissions information and applications to the Polytechnic campus degree programs, call 480/727-3278 or write

UNDERGRADUATE ADMISSIONS
ARIZONA STATE UNIVERSITY
PO BOX 870112
TEMPE AZ 85287-0112

Transfer Among ASU Campuses

Degree-seeking students currently enrolled at either the Tempe campus or the West campus who want to relocate to a Polytechnic campus degree program should contact Student Enrollment Services at the Polytechnic campus, the Office of the Registrar at the Tempe campus, or the Admissions and Records Office at the West campus for appropriate procedures. All credit earned at any ASU campus automatically transfers to the Polytechnic campus. Students should consult with their Polytechnic campus major advisor to determine how this credit applies to their major and graduation requirements. Students should be aware that certain requirements (e.g., the minimum number of upper-division semester hours to graduate) may differ among campuses.

TRANSFER CREDIT

Courses taken from Chandler-Gilbert Community College through the Partnership in Baccalaureate Education are automatically transferred to the Polytechnic campus each semester. These courses and courses taken at other Arizona public community colleges transfer according to equivalencies established in the current Arizona Higher Education Course Equivalence Guide. (Transfer guides are available at www.asu.edu/provost/articulation.) The acceptability and applicability of courses transferred from other universities and community colleges is determined by the ASU Undergraduate Admissions in consultation with the faculty or academic advisor of the student's choice of major.

PARTNERSHIP WITH CHANDLER-GILBERT COMMUNITY COLLEGE

ASU, Chandler-Gilbert Community College (CGCC), and several other educational and research facilities share the Williams Campus in southeast Mesa. Located side by side on campus, ASU and CGCC have an innovative academic partnership that combines the strengths of the two institutions. ASU students may receive instruction from both institutions. Chandler-Gilbert faculty teach a selection of lower-division General Studies, general interest, and prerequisite courses for ASU majors. They deliver learner-centered instruction in small interactive courses that are developed in cooperation with ASU faculty and are 100 percent equivalent to parallel ASU courses.

ASU faculty teach all courses in the majors as well as General Studies and general interest courses. ASU students may be enrolled concurrently in both institutions. All transactions are handled through ASU. Students pay combined tuition or ASU tuition, whichever is less.

ADVISING

Academic advisors assist students in developing meaningful educational plans that are compatible with their goals. Advisors assist students in implementing their plans, overcoming obstacles, and achieving their educational objectives. Advisors work with students to achieve the following:

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 93.

Academic Advising at the Polytechnic Campus

Unit	Location	Telephone	Days	Hours*
Agribusiness and Resource Management, Morrison School of	WANER	480/727-1585	Mon.–Fri.	8 A.M.–5 P.M.
Barrett Honors College	CNTR 001	480/727-1452	Mon.–Fri.	8 A.M.–5 P.M.
East College	SUTON	480/727-1333	Mon.–Fri.	8 A.M.–5 P.M.
Applied Biological Sciences, Department of	WANER	480/727-1444	Mon.–Fri.	8 A.M.–5 P.M.
Applied Psychology, Faculty of	SUTON	480/727-1333	Mon.–Fri.	8 A.M.–5 P.M.
Business Administration, Faculty of	SUTON	480/727-1333	Mon.–Fri.	8 A.M.–5 P.M.
Education, Faculty of	SUTON	480/727-1103	Mon.–Fri.	8 A.M.–5 P.M.
Exercise and Wellness, Department of	EAW	480/727-1945	Mon.–Fri.	8 A.M.–5 P.M.
Human Health Studies, Faculty of	SUTON	480/727-1333	Mon.–Fri.	8 A.M.–5 P.M.
Multimedia Writing and Technical Communication, Faculty of	SUTON	480/727-1333	Mon.–Fri.	8 A.M.–5 P.M.
Nutrition, Department of	HSC 1345	480/727-1728	Mon.–Fri.	8 A.M.–5 P.M.
Technology and Applied Sciences, College of	CTDO	480/727-1874	Mon.–Fri.	8 A.M.–5 P.M.
University College	CNTR 001	480/727-1452	Mon.–Fri.	8 A.M.–5 P.M.

* Walk-ins are welcome; appointments are recommended.

1. development of suitable educational plans;
2. clarification of career and life goals;
3. selection of appropriate courses and other educational experiences;
4. accurate interpretation of institutional and program requirements;
5. greater student awareness of available educational resources and opportunities;
6. development of students' decision-making, information-seeking, planning, and problem-solving skills;
7. development of students' ability to accurately evaluate their progress toward educational goals;
8. reinforcement of student self-direction; and
9. increased student awareness of appropriate university and community support services that assist students in overcoming educational and personal problems as well as skill deficiencies.

Students are encouraged to take advantage of the skill and knowledge of the academic advisors available to them in the academic units and to seek academic advising early.

For more information or to schedule an advising session, call an academic advisor (see the "Academic Advising at the Polytechnic Campus" table, on this page), or access the Web site at www.poly.asu.edu/academics/advising.

Library Services

Strong resources and personal service define the Library at the Polytechnic campus. As a primarily electronic research library, it is designed to take maximum advantage of new technology. Electronic indexes, catalogs, and journals support study and research in many fields, with an emphasis on the majors offered at the Polytechnic campus. While the library acquires materials in all formats, by intention it prefers electronic text. Thousands of periodicals are available digitally in all subjects, while those available only in print form can be obtained quickly by the library. Documents in electronic form can be delivered directly to students' computers. Librarians and staff pursue service customized to individual students' needs, cultivating a small college atmosphere. The library's Web address is eastlib.poly.asu.edu.

Computing Services

Information Technology (IT) at the Polytechnic campus provides computing services to support academic programs. The IT department provides specialized software and systems to meet the particular needs of Polytechnic campus programs in support of e-learning initiatives. All classrooms are fully mediated (which includes computer equipped instructor lectern, DVD and CD for data and multimedia, and other audiovisual equipment). Multiple classrooms are equipped with computers, allowing students the ability to work on computing applications along with the instructor. IT maintains computing sites around campus, including the Computing Commons in the Academic Center, offering students computing and printing facilities. IT has a staff of support personnel to aid the campus community's diverse computing needs, including Web development, academic computing, and administrative computing.

SCHOOL OF EXTENDED EDUCATION

The university-wide School of Extended Education provides an interactive link between ASU and the diverse communities it serves. The school 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 "School of Extended Education," page 134, or access the Web site at www.asu.edu/xed.

UNIVERSITY COLLEGE SERVICES

University College is a primary source of academic support for students, faculty, and staff. The college coordinates and offers academic programs and services designed to enhance the academic experience of all ASU students. The goals of University College are to play a major role in student retention, provide students the support necessary for successful completion of their first year and beyond, and

offer student-learning experiences that compliment those provided by other academic services. University College services are available on all four ASU campuses. University College at the Polytechnic campus includes the following offices:

Academic Resource Center
Academic Success and Engagement Programs
Barrett Honors College
Center for Academic Advising
Division of Graduate Studies
International Programs Office

Academic Resource Center

Undergraduate and graduate students can study, use computers for research and writing, and access tutoring services in the Academic Resource Center. Qualified undergraduate and graduate students provide tutoring to individual students or study groups, by appointment or on a drop-in basis. Assistance is offered face-to-face and online through the Web site to students seeking help with any written assignment. The Barrett Honors College, the Division of Graduate Studies, and the International Programs Office also have staff members in this area who are available to work with students on an appointment basis. The Academic Resource Center is located on the lower level of the Academic Center Building.

For more information, or to make an appointment, call 480/727-1452, or access the Web site at www.poly.asu.edu/learningcenter.

Office of Academic Success and Engagement Programs

The Office of Academic Success and Engagement Programs offers experiential learning and academic success course work. It is the goal of this office to help students develop the skills required for academic success and to provide opportunities for the hands-on application of those skills. Programs offered include service learning, university success courses, Voices of Discovery, academic success workshops, student leadership programs, and the National Society of Collegiate Scholars.

For more information, call 480/727-1452, or access the Web site at www.poly.asu.edu/learningcenter.

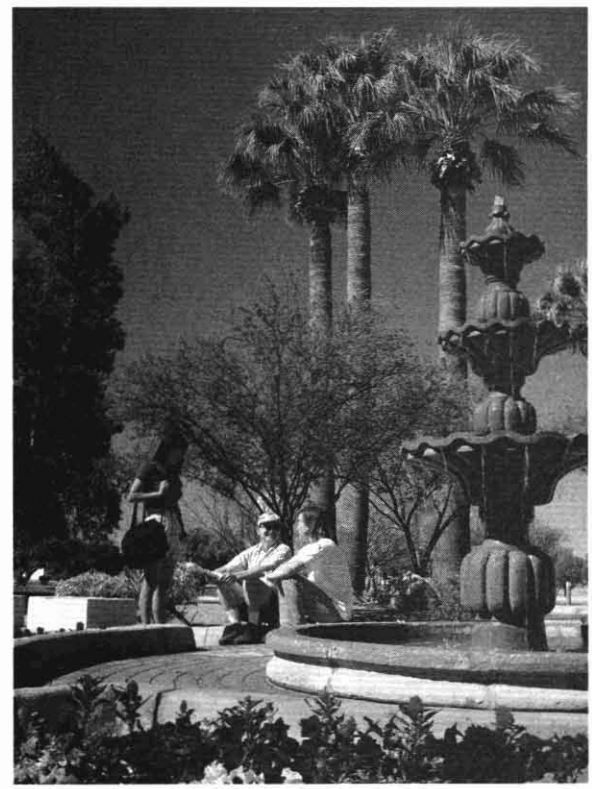
Barrett Honors College

The Barrett Honors College (BHC) offers courses and provides advising to all BHC eligible and admitted students enrolled at the Polytechnic campus. Students are able to complete the Barrett Honors College curriculum through courses taken at the Chandler-Gilbert Community College (Williams campus) and ASU at the Polytechnic campus.

For more information, or to make an appointment with the BHC advisor, call 480/727-1452, or access the Web site at www.poly.asu.edu/learningcenter.

Center for Academic Advising

The University College Center for Academic Advising at the Polytechnic campus offers developmental academic advising for a diverse group of students including all exploratory students, BIS and pre-BIS majors, and students in transition who may be changing majors or transferring to ASU. Academic advising is a partnership between the student and the advisor. Each has a mutual investment in the advising and its outcome. Effective academic advising is the foundation for successful completion of a bachelor's degree.



Polytechnic campus Student Union fountain Dave Tevis photo

Academic advisors assist students in selecting a major by suggesting complementary choices among the offerings in the General Studies curriculum. Advisors also encourage students to explore and identify majors consistent with the students' interests, values, and goals. Advisors help students understand university academic requirements, as well as policies and procedures. To schedule an appointment with a University College academic advisor at the Polytechnic campus, call 480/727-1452.

Division of Graduate Studies

The Division of Graduate Studies (DGS) has a satellite office located on the lower level of the CNTR. To schedule an appointment with the DGS representative, call 480/965-3521. For more information, access the Web site at www.asu.edu/graduate.

International Programs Office

The International Programs Office (IPO) has a satellite office located on the lower level of CNTR. To schedule an appointment with the IPO representative, call 480/965-0877. For more information, access the Web site at ipo.asu.edu.

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 93.

Polytechnic Campus Student Services

The Polytechnic campus is a student-centered campus that offers many of the features of a small residential college in a suburban area while providing access to the resources of a major research university and the amenities of a large metropolitan area. The campus includes excellent educational facilities: mediated classrooms and modern laboratories, a 21st-century electronic library, and state-of-the-art computer equipment. Other amenities include an academic resource center, child care services, student union, bookstore, and copy center. A shuttle service provides transportation between the Polytechnic campus, Mesa Community College, and the Tempe campus. An additional shuttle is available for transportation from the Tempe campus to the West campus.

Enrollment Services

Enrollment Services provides services for admission, financial aid, business services, and registration. Conveniently located in the Student Affairs Complex, students find personnel ready to assist them with registration processes, tuition payment, financial assistance information, student employment, and parking decals. For more information, call 480/727-3278.

Food Services

The Polytechnic campus has a variety of food service options on campus to serve student, faculty, staff, and visitor needs. Services include a coffee bar, a sub shop, and a full-service dining facility in the Student Union. Catering services are also available. Food can be purchased on a cash basis; a meal plan can be selected to suit individual preferences. For more information about food service, call 480/727-1443.

Student Health Center

The Polytechnic campus Student Health Center provides confidential, primary health care services for all full- and part-time Polytechnic campus students at a nominal fee. The clinic offers primary care services. The center is staffed by a full-time nurse practitioner and a part-time doctor. Services include physical examinations and immunizations; treatment for health problems and injuries; health screenings, education, and counseling; diagnostic and laboratory tests; women's health care; and referrals to campus and community resources. The center is located at 7153 E. Thistle on the Polytechnic campus.

For more information, call 480/727-1500, or access the Web site at www.poly.asu.edu/students/health.

Student Counseling

Confidential professional counseling services are available to help ASU students achieve their academic goals by addressing a variety of problems and issues often faced in college. Professional help is offered in the following areas: psychological issues, personal concerns, relationship issues, career/life decision making, and crisis intervention. Individual, couples, and group sessions are available at no cost. Students may schedule an appointment by calling 480/727-1255, or in person at Student Counseling Services in QUAD 4.

Career Preparation Center

Professional career counselors and trained career peer advisors are available to meet with ASU students. They provide individual career advising, group workshops, assistance in researching job and internship possibilities, résumé and cover letter critiques, preparation for employment interviews, and career resources in print and online. Appointments may be made in person in QUAD 4.

For more information, call 480/727-1411, or access the Web site at www.poly.asu.edu/students/career.

Student Union

The Student Union is in the center of campus and serves as a common gathering place for students, faculty, staff, and guests. The union has dining facilities, a game room, a bookstore, a ballroom, meeting spaces, a lounge, and study areas. Programs and services that complement the academic experience and enhance campus life include a film series, dances, live performances, resources for student organizations, student government, cultural awareness activities, leadership workshops, community service information, and holiday celebrations. The union is staffed primarily by students, providing them the opportunity to develop valuable leadership skills and work experience.

For more information, call 480/727-1098, or access the Web site at www.poly.asu.edu/union.

Recreational Facilities and Services

ASU and Chandler-Gilbert Community College (CGCC) are partners in providing recreation, intramural, and group fitness opportunities on the Williams Campus. An optional $30 per semester fitness membership provides access to the Physical Activity Center (PAC) and the Chandler-Gilbert Fitness Center. Facilities include

1. a fitness center with state-of-the-art strength training and cardiovascular equipment;
2. two aerobic studios and equipment for step aerobics, fitness cycling, and kickboxing;
3. a martial arts, mat exercise, and yoga studio featuring a fully padded floor;
4. racquetball courts;
5. a gymnasium for intramural and open recreation;
6. an all-weather quarter mile track with an infield for soccer, Ultimate Frisbee, and flag football;
7. four tennis courts with lights for evening play; and
8. a seasonal swimming pool (May–September) with lights.

At the CGCC fitness center, trained exercise and wellness professionals are available to perform assessments, develop programs, and provide expert advice and training assistance.

In addition to the facilities, Campus Recreation operates group fitness programs that are free of charge with the paid fitness membership. Classes are offered Monday through Thursday and include fitness cycling, yoga, aerobic fitstep, aerobic kickboxing, water aerobics (in season), strength and conditioning, and pilates. A full schedule of intramural programs and special events are also offered through Campus Recreation. Times for open recreation are scheduled at Campus Recreation and the Chandler-Gilbert Fitness Center.

ASU students have developed clubs that work closely with the recreation programs to offer unique recreation experiences, including hiking, West African dance, flamenco dancing, and sunrise yoga. If you are interested in starting a club, send e-mail to Campus Recreation at campusrec@asu.edu.

For more information, access the Campus Recreation Web site at www.poly.asu.edu/campusrec, or call 480/727-1972. The Chandler-Gilbert Fitness Center can be reached at 480/988-8400.

Child Care

Child care programs on campus are offered through Head Start and Early Head Start and the Boys & Girls Club of the East Valley, Williams Campus Branch. Head Start and Early Head Start offer child care programs on campus for individuals who meet certain income criteria. The Boys & Girls Club offers after-school programs for children ages 6 to 18.

For more information, call the Williams Campus Child Development Center at 480/988-3644, the Boys & Girls Club at 480/279-1406, or Head Start at 480/988-9389.

Williams Campus Housing and Residential Life

Living on the Polytechnic campus provides students with an excellent opportunity to make the most of their college experience. No matter which housing option a student chooses, the residential life program offers social, academic, and recreational activities that are designed to support and enrich the student's campus life experience. Residential students benefit from easy access to campus resources such as the library, learning center, fitness center, and student union. Residents can select a meal plan from several options offered by Campus Dining Services.

The Polytechnic campus's unique residential environment offers housing options for Williams Campus students throughout their undergraduate and graduate education. These include residence halls, houses, and special residential communities. Residential students can also take advantage of such amenities as outdoor swimming, sand volleyball, tennis, and picnic areas.

For more information, call the Williams Campus Housing Office at 480/727-1700, access the Web site at www.poly.asu.edu/housing, or send e-mail to williams.reslife@asu.edu.

Residence Halls. Undergraduate and graduate students are eligible for residence halls with a large private room, featuring a private bath and a shared kitchenette. Each room includes basic furnishings as well as cable TV, local phone service, and high-speed Internet service; the kitchenette includes a refrigerator, microwave, and, in some cases, a stove.

Houses. A large number of two- to four-bedroom houses are available for students with families or for groups of single undergraduate or graduate students. Each house includes basic appliances; cable TV, high-speed Internet service; and water, sewer, and trash service.

Freshman Year Experience. Freshmen begin their residential experience on campus in one of three dedicated freshman residence halls that are part of the Freshman Year Experience (FYE) program. The FYE program helps freshmen achieve scholastic and personal success by providing academic support services and enhanced opportunities for learning, campus involvement, and out of class interaction with faculty. Research has consistently shown that freshmen participating in living-learning communities, such as FYE, achieve greater academic success. For more information about the FYE program, access the Web site at www.poly.asu.edu/students/fye.

The FYE hall offers two-bedroom suites with a shared bath, to house two to four students. Each room is furnished with local phone service, cable TV, and high speed internet service. The FYE hall features a computer lab, quiet study room, group study/tutoring room, and community lounge. Dean and Bell halls offer freshmen a pod style living environment. Each pod houses six residents and consists of four single bedrooms, one double occupancy bedroom, a limited kitchen, a bathroom, and a living room. Each room is furnished and is equipped with local phone service, cable TV, and high speed internet service. For more information, access the Web site at www.poly.asu.edu/housing.

Residents in the Freshman residence halls are required to purchase a meal plan through Campus Dining Services. For more information, access the Web site at www.poly.asu.edu/dining.

Morrison School of Agribusiness and Resource Management

www.poly.asu.edu/msabr

PURPOSE

Located at the Polytechnic campus, the Morrison School of Agribusiness and Resource Management provides a variety of academic programs in Agribusiness. Agribusiness is the business of food and fiber production and the technology necessary to change a raw material (a commodity) or an idea into a new product or business for the world's consumers. Producing, financing, marketing, and providing food and fiber for the world amounts to more than one-half of the earth's global economy.

Agribusiness courses in the Morrison School are designed to prepare students for a wide range of employment opportunities in agribusiness and business. More than 20 percent of all jobs in the United States are agribusiness-related, and the industry is even more important internationally, with more than half of all jobs in developing countries related to food and fiber products. Population increases worldwide have led forecasters to predict that more than nine billion food and fiber consumers will be part of the global agribusiness system by the year 2050. Forecasts also estimate that, at that time, more than 20,000 agribusiness jobs will go unfilled due to a lack of skilled professionals.

The academic programs in Agribusiness are especially designed to meet the needs of the urban student who has little or no previous agriculture experience. An interest in plants, animals, or food can be the starting point for career development in agricultural industries or resource management. The undergraduate programs also provide the necessary training for students preparing to enter graduate degree programs.

The Morrison School is strategically positioned to offer some unique programs. The concentration in professional golf management provides a student with the opportunity to qualify for the Professional Golfers' Association certification program in addition to majoring in Agribusiness. Similarly, for individuals more interested in the development and management of golf and other turf facilities, the golf and facilities management concentration is well suited.

Food, its marketing and safety, is of paramount importance today and in the future. The Morrison School offers specific concentrations in both of these areas. Food and agribusiness marketing is one of the signature academic concentrations in the school. Food science and safety are emphases stressed in the food, agribusiness and consumer products marketing concentration.

The BS degree in Agribusiness with a concentration in professional golf management is accredited by the Professional Golfer's Association of America. For more information, write

PGA EDUCATION DEPARTMENT
100 AVENUE OF THE CHAMPIONS
PO BOX 109601
PALM BEACH GARDENS FL 33410

NATIONAL FOOD AND AGRICULTURAL POLICY PROJECT

The National Food and Agricultural Policy Project (NFAPP) constructs a 10-year baseline forecast for the fruit and vegetable produce industry and specific commodities, responds to congressional inquiries concerning policies affecting the fruit and vegetable industry, and publishes a monthly newsletter highlighting research efforts. Areas of study include domestic and international promotion of fruits and vegetables, trade and the impact of trade agreements, and crop insurance and risk management. For more information, call the director at 480/727-1124.

DEGREE PROGRAMS

The Morrison School offers a BS degree in Agribusiness with the following concentrations: agribusiness finance; food, agribusiness and consumer products marketing; food science; general agribusiness; golf and facilities management; international agribusiness; management of agribusiness; professional golf management; and preveterinary medicine.

For students holding an AAS degree, the school offers the Bachelor of Applied Science degree with concentrations in consumer products technology and food retail management. See the "Morrison School of Agribusiness and Resource Management Baccalaureate Degrees and Majors" table, page 207.

The school also offers the MS degree in Agribusiness with concentrations in agribusiness management and marketing, and food quality assurance. Students may select either a research-oriented program, which leads to the completion of a supervised thesis, or a program consisting of course work only (nonthesis option). All MS candidates in Agribusiness must complete a minimum of 36 semester hours.

The Morrison School and the W. P. Carey School of Business offer an interdisciplinary PhD in Business Administration with a concentration in agribusiness. See the *Graduate Catalog* for requirements.

ADMISSION

The Morrison School admits students to the BS degree programs who meet the undergraduate admission requirements of Arizona State University; see

Morrison School of Agribusiness and Resource Management Baccalaureate Degrees and Majors

Major	Degree	Concentration*	Administered By
Agribusiness	BS	Agribusiness finance; food, agribusiness, and consumer products marketing; food science; general agribusiness; golf and facilities management; international agribusiness; management of agribusiness; preveterinary medicine; or professional golf management	Morrison School of Agribusiness and Resource Management
Applied Science	BAS	Consumer products technology or food retail management	Morrison School of Agribusiness and Resource Management

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

"Undergraduate Admission," page 66. Admission to the BAS degree program is restricted to students holding an AAS degree from a regionally accredited U.S. postsecondary educational institution. A GPA of 2.00 or higher is required for all resident applicants and 2.50 for nonresident applicants.

GRADUATION REQUIREMENTS

Agribusiness—BS

The completion of a minimum of 120 semester hours—including First-Year Composition, General Studies (see "General Studies," page 93), and the school and concentration requirements—leads to the BS degree. Note that all three General Studies awareness areas are required. A minimum overall GPA of 2.00 is required for graduation and students must have completed a minimum of 45 semester hours of upper-division credit. Also see special graduation requirements under "Preveterinary Medicine," page 209.

Prerequisite Courses. Students who select the concentrations in agribusiness finance; food, agribusiness and consumer products marketing; food science; general agribusiness; golf and facilities management; international agribusiness; management of agribusiness; or professional golf management, must complete the following courses, some of which can also be used to meet university General Studies requirements:

ACC	230	Uses of Accounting Information I 3
ACC	240	Uses of Accounting Information II[1] 3
BIO	100	The Living World *SQ* 4
CHM	101	Introductory Chemistry *SQ*[2] 4
ECN	211	Macroeconomic Principles *SB*[3] 3
ECN	212	Microeconomic Principles *SB* 3
ENG	301	Writing for the Professions *L* 3
MAT	210	Brief Calculus *MA*[1] 3
Total		 26

[1] This course is not required for the golf and facilities management concentration.

[2] This course is not required for the professional golf management concentration.

[3] This course is not required for the golf and facilities management or professional golf management concentration.

Core Requirements. Agribusiness employers require their employees to possess a wide range of skills and competencies. Rapid changes in information technology and the increasingly competitive food production and distribution sector mean that agribusiness needs graduates equipped to deal with these changes. The agribusiness core, required of all the concentrations, is designed to give students these skills. The core consists of courses in business principles—management, marketing, and finance—as well as in the fundamentals of agribusiness operations management.

AGB	100	Introduction to Agribusiness 3
AGB	161	Computer Applications for Agribusiness Industries *CS* 3
AGB	310	Agribusiness Management I 3
AGB	320	Agribusiness Marketing I 3
AGB	321	Agribusiness Marketing II[1] 3
AGB	332	Agribusiness Finance I 3
AGB	333	Agribusiness Finance II[2] 3
AGB	360	Agribusiness Statistics *CS* 3
AGB	364	Agribusiness Technologies I 3
AGB	365	Agribusiness Technologies II[1] 3
AGB	410	Agribusiness Management II 3
AGB	414	Agribusiness Analysis *L* 3
Core total		 36

[1] This course is not required for the professional golf management or golf and facilities management concentrations.

[2] This course is not required for the golf and facilities management concentration.

Concentrations

After completing the required agribusiness core, students select a concentration in their area of interest. A concentration allows a student to select a series of courses that complement the agribusiness core, supplement the student's desire to master another area of interest, and broaden career opportunities.

Note: Omnibus hours will not exceed six hours.

Agribusiness Finance Concentration. Agribusiness finance concentration graduates are expected to possess a broad knowledge of financial theory and practice as it pertains to the agribusiness sector. This will involve applying quantitative and computer-based analytical techniques to real-world agribusiness problems. Specific course content includes topics in financial management, financial markets, risk management, and the evaluation of financial assets and business alternatives.

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 93.

Agribusiness Finance

AGB 431 Intermediate Agribusiness Financial Management	3
AGB 434 Agricultural Risk Management and Insurance	3
AGB 435 Agricultural Commodities	3
AGB electives	8
Agribusiness core	36
Agribusiness prerequisite courses	26
Total	79

Management of Agribusiness Concentration. Agribusiness managers encounter many problems and opportunities on a daily basis that are unique to the agribusiness sector. Students choosing this concentration develop skills in managing people, internal resources, and external relationships in an increasingly dynamic environment.

Management of Agribusiness

AGB 411 Agricultural Cooperatives	3
or AGB 480 Agribusiness Policy and Government Regulations (3)	
AGB 451 Management Science *CS*	3
AGB 481 Applied Microeconomics	3
AGB electives	8
Agribusiness core	36
Agribusiness prerequisite courses	26
Total	79

Food, Agribusiness, and Consumer Products Marketing Concentration. Students in the food, agribusiness and consumer products marketing concentration develop critical skills relevant to dealing with firms involved in food, fiber, consumer products, and pharmaceutical manufacturing; distribution; and retailing. Students also learn about the relationship between input suppliers, commodity associations, and primary producers. To this end, food, agribusiness and consumer products marketing students are required to complete a series of courses that analyze the behavior and performance of both commodity and consumer food markets.

Food, Agribusiness and Consumer Products Marketing

AGB 422 Consumer Behavior	3
AGB 429 Marketing Research	3
AGB 435 Agricultural Commodities	3
or AGB 420 Food Marketing (3)	
AGB electives	8
Agribusiness core	36
Agribusiness prerequisite courses	26
Total	79

Food Science Concentration. The food science concentration focuses on both scientific and technical competency skills with an emphasis on food microbiology, food chemistry, biotechnology, mathematics, and statistics. This unique program prepares graduates for employment opportunities in the food, beverage, and dairy industries; regulatory agencies such as the FDA and USDA; international organizations such as FAO and WHO; and consumer organizations. In addition, graduates may choose to pursue advanced degrees.

Food Science

AGB 340 Food Processing	3
AGB 440 Food Safety	3
AGB 442 Food and Industrial Microbiology	4
AGB upper-division electives	7
Agribusiness core	36
Agribusiness prerequisite courses	26
Total	79

General Agribusiness Concentration. The general agribusiness concentration offers students a chance to build a broad perspective in the field of agribusiness. In an age of specialization, there remains a growing need for generalists. These individuals have mastered finance, marketing, management, and technologies such as computers and statistics and are capable of demonstrating this mastery.

General Agribusiness

AGB 435 Agricultural Commodities	3
AGB electives	14
Agribusiness core	36
Agribusiness prerequisite courses	26
Total	79

International Agribusiness Concentration. A student studying international agribusiness is typically preparing for a career with government agencies oriented toward international issues; programs of agribusiness for or in developing countries; U.S. agribusiness firms affected significantly by trade; or U.S.-based international agribusiness firms. This concentration requires a mastery of subjects in international trade, agricultural development, international policy, and global marketing practices and institutions.

International Agribusiness

AGB 450 International Agricultural Development *G*	3
AGB 452 International Agricultural Policy	3
AGB 454 International Trade	3
AGB electives	8
Agribusiness core	36
Agribusiness prerequisite courses	26
Total	79

Professional Golf Management Concentration. The Professional Golf Management (PGM) concentration, accredited by the Professional Golfer's Association (PGA) of America, is specifically designed for students who aspire to become Class A PGA Professionals and work in management careers in the golf industry. Any student admitted to this program should be aware that membership in the PGA of America is restricted to U.S. citizens and resident aliens. PGM students complete the agribusiness core, which helps them develop the critical skills needed to manage complex organizations. In addition, the PGM concentration requires a minimum of 23 semester hours of golf-related curriculum, of which nine hours consist of hands-on internship experience at golf facilities. The remaining 14 semester hours include courses selected from the following areas: golf course operations, turf grass management, club fitting and repair, pro shop merchandising, movement analysis, sports psychology and equipment, mechanics and shop maintenance and repair. Students must complete all PGA membership requirements, including the PGA Playing Ability Test. All golf-related courses and internships are selected with the assistance of the PGM program director.

Note: Omnibus hours will not exceed nine hours.

Special class fees are in place to cover the cost of PGA books, seminars, and testing. The PGM program fee ensures

all students have access to the ASU/PGM Practice Facility, the PING Swing Analysis Lab, and a club repair room.

PGM Admission. To be admitted to the PGM program, students must meet a playing ability test. Call the PGM director at 480/727-1912 for more information.

Professional Golf Management

Agribusiness core	30
Agribusiness prerequisite courses	19
Professional golf management courses	14
Professional golf management internship	9
Total	72

Golf and Facilities Management Concentration. The Golf and Facilities Management (GFM) concentration is designed to prepare students for careers as golf course superintendents. Through the agribusiness core, students develop the critical skills needed to manage complex organizations. In addition, the GFM concentration requires a minimum of 25 semester hours of golf and facilities management-related curriculum, of which six hours consist of hands-on internship experience at golf courses. The remaining 19 semester hours include courses selected from the following areas: golf course operations; plants and landscaping; soils, irrigation, and water management; fertilizers; pest control; turf grass management; mechanics; and shop maintenance and repair. For more information, call the GFM program coordinator at 480/727-1256.

Golf and Facilities Management

Agribusiness core	27
Agribusiness prerequisite courses	17
Golf and facilities management courses	19
Internship	6
Total	69

Prerequisite Courses for Preveterinary Medicine. Students who select the preveterinary medicine concentration must take the following courses, some of which can also be used to meet the General Studies requirement.

ACC 230 Uses of Accounting Information I	3
BCH 361 Principles of Biochemistry	3
BIO 187 General Biology I *SG*	4
BIO 188 General Biology II *SQ*	4
BIO 340 General Genetics	4
CHM 113 General Chemistry I *SQ*	4
CHM 115 General Chemistry with Qualitative Analysis *SQ*	5
or CHM 116 General Chemistry II *SQ* (4)	
Choose between the course combinations below	4–8
CHM 231 Elementary Organic Chemistry *SQ* (3)[1]	
CHM 235 Elementary Organic Chemistry Laboratory *SQ* (1)[1]	
—or—	
CHM 233 General Organic Chemistry I (3)	
CHM 234 General Organic Chemistry II (3)	
CHM 237 General Organic Chemistry Laboratory I (1)	
CHM 238 General Organic Chemistry Laboratory II (1)	
ECN 211 Macroeconomic Principles *SB*	3
or ECN 212 Microeconomic Principles *SB* (3)	
ENG 301 Writing for the Professions *L*	3
MAT 210 Brief Calculus *MA*	3
MIC 205 Microbiology *SG*[2]	3
MIC 206 Microbiology Laboratory *SG*[2]	1
PHY 111 General Physics *SQ*[3]	3
PHY 113 General Physics Laboratory *SQ*[3]	1
Upper-division AGB	9
Total	57–61

[1] Both CHM 231 and 235 must be taken to secure SQ credit.
[2] Both MIC 205 and 206 must be taken to secure SG credit.
[3] Both PHY 111 and 113 must be taken to secure SQ credit.

Preveterinary Medicine. A student studying agribusiness can also be preparing for admission to a professional veterinary school. While completing the courses needed for acceptance into veterinary school, the student is broadening his or her career potential with agribusiness courses. The Agribusiness major provides knowledge of how to run a business or practice. In addition, should a preveterinary student decide not to apply to a veterinary school, this major provides alternative career paths into human or veterinary pharmaceutical industries or the food industry. This concentration permits students to complete the preveterinary requirements for entrance to professional veterinary school.

Preveterinary Medicine

Agribusiness core	24
AGB 100 Introduction to Agribusiness (3)	
AGB 310 Agribusiness Management I (3)	
AGB 320 Agribusiness Marketing I (3)	
AGB 332 Agribusiness Finance I (3)	
AGB 360 Agribusiness Statistics *CS* (3)	
AGB 364 Agribusiness Technologies I (3)	
AGB 365 Agribusiness Technologies II (3)	
AGB 414 Agribusiness Analysis *L* (3)	
Preveterinary medicine prerequisites	57–61
Total	81–85

Veterinary College Acceptance. A student who has been accepted to a school of veterinary medicine before he or she has earned a BS degree in the Morrison School may do so by completing a minimum of 30 semester hours at ASU and the General Studies requirement. Students must receive a written statement from the dean of the Morrison School giving senior-in-absentia privileges. A student is eligible to receive the BS degree after the ASU Office of the Registrar receives a recommendation from the dean of the veterinary professional school and a transcript indicating the student has completed the necessary semester hours commensurate with ASU graduation requirements.

Veterinary Medical Schools. There are 27 schools of veterinary medicine in the United States. Each school establishes specific prerequisites that are required for admission. Advisors in the Morrison School assist students in designing their class schedules to meet the requirements of the veterinary schools to which they plan to apply. Each school generally looks for courses in biology, chemistry, genetics, microbiology, organic chemistry, and physics. In addition to a science foundation, all students must meet the University General Studies requirement, and complete 45 semester hours of upper-division 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 93.

A graduate student in the Environmental Resources program shucks leaves as part of a research project designed to help determine how urban development affects the ecosystem in the desert Southwest. Christine Lambrakis photo

APPLIED SCIENCE—BAS

The Bachelor of Applied Science degree is a capstone degree for the Associate of Applied Science degree. The BAS degree exposes students to advanced concepts and diverse critical thinking skills to prepare them for future career opportunities and professional advancement.

Admission

Admission to the BAS degree program is restricted to students holding an AAS degree from a regionally accredited U.S. postsecondary educational institution. A GPA of 2.00 or higher is required for all resident applicants and 2.50 for nonresident applicants.

BAS Degree Graduation Requirements

The BAS degree program consists of 60 semester hours of upper-division courses, with 30 semester hours in residence. An overall GPA of 2.00 or higher is required.

AAS degree	60
Assignable credit	6
BAS core	16
Concentration	19
General Studies	19
Total	120

General Studies Curriculum. The BAS curriculum builds on the general education content of the AAS degree. Additional General Studies courses are taken in the core or concentration. General Studies courses focus on contextual learning.

L	3
MA	3
HU	3
HU or SB	3
SB	3
SG	4
Total	19

Assignable Credit. Assignable credit allows space in the curriculum for prerequisite courses. The courses are determined by the student and advisor.

BAS Core

AGB 310 Agribusiness Management I	3
AGB 320 Agribusiness Marketing I	3
AGB 360 Agribusiness Statistics *CS*	3
AGB 414 Agribusiness Analysis *L*	3
AGB 460 Agribusiness Management Systems	3
Total	15

Consumer Products Technology Concentration. Students in this concentration prepare for a career in the food and consumer products industries. Students learn to develop food, drug, cosmetic, and other consumer products and to ensure product safety and marketability by obtaining a thorough mastery of courses in product and package design, manufacturing, processing, and safety.

Consumer Products Technology

AGB 340 Food Processing	3
AGB 364 Agribusiness Technologies I	3
AGB 440 Food Safety	3
MET 341 Manufacturing Analysis	3
MET 494 ST: Consumer Manufacturing	3
MET 494 ST: Packaging Design	3
AGB elective	1
Total	19

Food Retail Management Concentration. A student studying food retail management prepares for a career in the food marketing and distribution industries. Potential employers are food manufacturing and processing companies, distribution centers, wholesalers, and all types of food retailers, e.g., supermarkets, mass merchandisers, fast food outlets, restaurants, and direct marketers of food.

Food Retail Management

AGB 332 Agribusiness Finance I	3
AGB 340 Food Processing	3
AGB 420 Food Marketing	3
AGB 440 Food Safety	3
AGB 445 Food Retailing	3
AGB 484 Internship	1
AGB elective	3
Total	19

Morrison School of Agribusiness and Resource Management

www.poly.asu.edu/msabr
480/727-1585
WANER 101

Professors: Daneke, Edwards, Kagan, Marquardt, Richards, Seperich, Shultz, Thor

Associate Professors: Manfredo, Patterson, Raccach, Schmitz

Assistant Professor: Hughner

Senior Lecturers: Hudek, Lindley

AGRIBUSINESS (AGB)

E AGB 100 Introduction to Agribusiness. (3)
fall
Overview of agribusiness industries and career opportunities.

E AGB 161 Computer Applications for Agribusiness Industries. (3)
spring
Uses and integrates word processing, spreadsheets, and databases as tools for managing an agribusiness firm. Integrated lecture/lab.
General Studies: CS

E AGB 171 Animal Science. (3)
spring
Comparative growth, development, and propagation of domestic animals.

E AGB 191 First-Year Seminar. (1–3)
selected semesters

E AGB 194 Special Topics. (1–4)
selected semesters

E AGB 258 International Agribusiness. (3)
fall
Identifies and analyzes methods, problems, and future of international agribusiness operations. Emphasizes special problems associated with international agribusiness systems.
General Studies: G

E AGB 271 Veterinary Medicine Today. (3)
spring
Introduces the role of the veterinarian as related to the fields of food supply and veterinary medicine.

E AGB 294 Special Topics. (1–4)
selected semesters

E AGB 310 Agribusiness Management I. (3)
fall
Principles of management, including planning, organizing, integrating, measuring, and developing people in agribusiness organizations.

E AGB 311 Establishing an Agribusiness. (3)
fall
Opportunities and problems associated with new firm development in agribusiness. Business plan is written and presented orally.

E AGB 320 Agribusiness Marketing I. (3)
fall and spring
Examines marketing strategy, focusing on the marketing mix (product, price, promotion, and place) in a dynamic socioeconomic environment. Prerequisites: ACC 230, 240; AGB 360; ECN 212.

E AGB 321 Agribusiness Marketing II. (3)
fall and spring
Examines the food marketing system with emphasis on the marketing institutions, arrangements, and methods for basic commodities. Prerequisites: ACC 230, 240; AGB 360; ECN 212.

E AGB 332 Agribusiness Finance I. (3)
fall and spring
Introduces concepts in agribusiness financial management: time value of money, risk and return, capital budgeting, and cost of capital. Prerequisites: ECN 211 and 212 (or their equivalents); introductory accounting.

E AGB 333 Agribusiness Finance II. (3)
spring
Introduces financial markets and institutions. Interest rate determination, money and banking, equity markets, farm credit system, vendor financing. Prerequisites: ECN 211 and 212 (or their equivalents); introductory accounting.

E AGB 340 Food Processing. (3)
fall
Introduces processed food quality assurance, statistical sampling, and inspection procedures. Prerequisite: AGB 364.

E AGB 341 Food Analysis. (3)
selected semesters
Processing control and scientific instrumentation used in food quality assurance laboratories. Prerequisites: AGB 364; CHM 101.

E AGB 355 Sustainable Agriculture Systems. (3)
fall and spring
Innovative developments in precision farming, irrigation, soils, tillage methods, machinery, and biotechnology in crop production.

E AGB 360 Agribusiness Statistics. (3)
fall and spring
Statistical methods with applications in agribusiness and resource management. Prerequisite: college algebra.
General Studies: CS

E AGB 364 Agribusiness Technologies I. (3)
fall
Examines methods of managing diverse crop and livestock enterprises with emphasis on growth, development, marketing, and loss prevention. Prerequisite: BIO 100.

E AGB 365 Agribusiness Technologies II. (3)
fall
Biotechnology and other methods used in the production, processing, and distribution of food. Prerequisite: BIO 100.

E AGB 370 Wildlife and Domestic Animal Nutrition. (3)
spring
Survey of nutritional needs of domestic and wild animals. Prerequisite: a General Studies SQ course.

E AGB 371 Animal Genetics. (3)
fall
Principles of animal genetics, including heritable traits, chromosomal aberrations, population genetics, molecular genetics, and gene regulation. Prerequisites: BIO 187, 188.

E AGB 394 Special Topics. (1–4)
selected semesters

E AGB 410 Agribusiness Management II. (3)
spring
Principles of human resource management in agribusiness firms. Prerequisite: AGB 310.

E AGB 411 Agricultural Cooperatives. (3)
spring
Organization, operation, and management of agricultural cooperatives.

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 93.

E AGB 414 Agribusiness Analysis. (3)
fall and spring
Analysis of agribusiness firm decisions in the ecological, economic, social, and political environments. Special emphasis on ethical issues surrounding food production and consumption.
General Studies: L

E AGB 420 Food Marketing. (3)
spring
Food processing, packaging, distribution, market research, new food research and development, and social implications. Prerequisite: AGB 320.

E AGB 422 Consumer Behavior. (3)
fall
Applies behavioral concepts in analyzing consumer food purchases and their implications for marketing strategies. Fee. Prerequisite: completion of Agribusiness core (or its equivalent).

E AGB 424 Sales and Merchandising in Agribusiness. (3)
summer
Principles and techniques of selling and merchandising in the agricultural and food industries.

E AGB 425 Agricultural Marketing Channels. (3)
fall
Operational stages of agricultural commodities in normal distribution systems and implementation of marketing strategies. Prerequisite: AGB 320.

E AGB 429 Marketing Research. (3)
fall
Examines the marketing research process and its role in facilitating agribusiness decisions. Emphasizes problem identification, survey design, and data analysis. Fee. Prerequisite: completion of Agribusiness core (or its equivalent).

E AGB 431 Intermediate Agribusiness Financial Management. (3)
spring
Comprehensive treatment of topics in financial management of agribusiness: capital structure, dividend policy, asset valuation, mergers and acquisitions, risk management. Prerequisites: AGB 332, 333.

E AGB 433 Intermediate Agribusiness Financial Markets. (3)
spring
Role and function of agribusiness in U.S. financial system. Topics include rural banking, farm credit system, monetary policy, and federal reserve. Prerequisite: completion of Agribusiness core (or its equivalent).

E AGB 434 Agricultural Risk Management and Insurance. (3)
fall
Strategies to manage agricultural price and business risk: derivatives, insurance, self-insurance, and public policy. Prerequisite: completion of Agribusiness core (or its equivalent).

E AGB 435 Agricultural Commodities. (3)
fall and spring
Trading on futures markets. Emphasis on the hedging practices with grains and meats. Fee. Prerequisite: AGB 320.

E AGB 436 Entrepreneurship and Financial Management of E-commerce. (3)
fall
Uses lectures, case studies, and business plans to highlight challenges of starting and running a small business. Lecture, seminar, case studies, computer labs.

E AGB 440 Food Safety. (3)
spring
Control, prevention, and prediction of microbial and chemical food-borne diseases. Prerequisite: AGB 442 or instructor approval.

E AGB 441 Food Chemistry. (3)
spring
Biochemical and chemical interactions that occur in raw and processed foods. Prerequisites: CHM 115, 231.

E AGB 442 Food and Industrial Microbiology. (4)
selected semesters
Food- and industrial-related microorganisms; deterioration and preservation of industrial commodities. Lecture, lab. Prerequisite: a course in microbiology with lecture and lab.

E AGB 445 Food Retailing. (3)
fall
Food retail management. Discusses trends, problems, and functions of food retail managers within various retail institutions. Lecture, case studies.

E AGB 450 International Agricultural Development. (3)
fall
Transition of developing countries from subsistence to modern agriculture. Emphasis placed on implications for U.S. agribusiness working abroad.
General Studies: G

E AGB 451 Management Science. (3)
fall
Focus on the construction, solution, and interpretation of quantitative models used for management decision making in agribusiness firms. Prerequisites: AGB 320, 360; ECN 212; MAT 117.
General Studies: CS

E AGB 452 International Agricultural Policy. (3)
fall
Use of international trade theory to analyze the effects of government policies, trade agreements, and exchange rates on agribusiness. Prerequisite: ECN 212.

E AGB 454 International Trade. (3)
spring
International practices in trading of agribusiness, technology, and resource products and services.

E AGB 455 Resource Management. (3)
spring
Explores differences between societal and individual valuations of natural resources and considers public policy versus market-based solutions to environmental concerns. Prerequisite: ECN 212.
General Studies: SB

E AGB 460 Agribusiness Management Systems. (3)
spring
Development and use of decision support systems for agribusiness management and marketing.

E AGB 465 Organic Farming Technologies. (3)
fall and spring
Organic farming methods, including certification, soil fertility, planting, integrated pest management, irrigation, cover crops, rotations, and marketing farm products.

E AGB 470 Comparative Nutrition. (3)
selected semesters
Effects of nutrition on animal systems and metabolic functions. Prerequisite: CHM 231.

E AGB 471 Diseases of Domestic Animals. (3)
spring
Discusses animal welfare, mechanisms of disease development, causes and classification of diseases, disease resistance, and common zoonoses. Prerequisite: BIO 188.

E AGB 479 Veterinary Practices. (3)
fall and spring
Observation of and participation in veterinary medicine and surgery supervised by local veterinarians. Prerequisite: advanced preveterinary student.

E AGB 480 Agribusiness Policy and Government Regulations. (3)
spring
Development and implementation of government food, drug, pesticide, and farm policies and regulations that affect the management of agribusiness.

E AGB 481 Applied Microeconomics. (3)
fall and spring
Emphasizes application of the theory of the firm, theory of exchange, and consumer theory.

E AGB 484 Internship. (1–12)
fall and spring

E AGB 492 Honors Directed Study. (1–6)
selected semesters
Topics may include the following:
- Recent Advances in Food Science. (1)

E AGB 493 Honors Thesis. (1–6)
selected semesters

E AGB 494 Special Topics. (1–4)
selected semesters

E AGB 498 Pro-Seminar. (1–7)
selected semesters
Topics may include the following:
- Effective Consumer Response
  Fee.
- Selling Today
  Fee.

E AGB 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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

PROFESSIONAL GOLF MANAGEMENT (PGM)

E PGM 100 PGA/PGM Introduction. (2)
fall
Introduces the golf professional training program. Career enhancement, rules of golf, tournament operations, and playing professional development programs. Fee. Prerequisite: admission to PGM program.

E PGM 110 Player Development I. (1)
fall and spring
Introductory instruction on golf game improvement to assist PGM students in preparation for Players Ability Test. Evaluation. Fee. Prerequisite: admission to PGM program.

E PGM 111 Player Development II. (1)
fall and spring
Instruction to assist PGM students in preparation for Players Ability Test with emphasis on full swing mechanics and practice plan development. Evaluation. Fee. Prerequisite: admission to PGM program.

E PGM 112 Player Development III. (1)
fall and spring
Emphasizes classroom and "hands-on" applications of full swing analysis and short game strategies. Special focus on golf course management. Evaluation. Fee. Prerequisite: admission to PGM program.

E PGM 113 Player Development IV. (1)
fall and spring
Emphasizes classroom and "hands-on" applications of full swing analysis and short game strategies. Special focus on golf course management. Evaluation. Fee. Prerequisite: admission to PGM program.

E PGM 114 Player Development V. (1)
summer
Introductory instruction on golf game improvement to assist PGM students in preparation for Player Ability Test. Evaluation. Prerequisite: admission to PGM program.

E PGM 120 Golf for Business and Life. (1)
fall and spring
Introduces nongolfing students to the game of golf. For beginners. Integrated lecture/lab.

E PGM 130 PGA/PGM Level 1. (2)
fall
Focuses on golf professional training program and the completion of the PGA Level One experience kit. Fee. Prerequisite: PGM 100.

E PGM 150 Teaching Golf I. (2)
fall and spring
Introduces golf instruction. Focus on fundamentals of golf swing and teaching techniques. Fee. Prerequisite: admission to PGM program.

E PGM 166 Turf Equipment Management. (3)
spring
Introduces turf equipment used on golf courses. Instruction in maintenance, adjustment, and safety issues. Integrated lecture/lab.

E PGM 194 Special Topics. (1–4)
selected semesters

E PGM 200 PGA/PGM Level 2. (2)
fall
Focuses on golf professional training program and the completion of the PGA Level Two experience kit. Fee. Prerequisite: admission to PGM program.

E PGM 250 Teaching Golf II. (1)
fall and spring
Communicating with student golfers, swing evaluation, key factors club fitting, developing a successful teaching practice. Prerequisite: admission to PGM program.

E PGM 300 PGA/PGM Level 3. (1)
fall
Business planning and operations, business communications related to business of golf. Completion of the PGA Level Three experience kit. Fee. Prerequisite: admission to PGM program.

E PGM 350 Teaching Golf III. (1)
fall and spring
Teaching swing concepts. Developing a teaching philosophy, analyzing flawed swing mechanics through video and swing analysis software. Prerequisite: admission to PGM program.

E PGM 363 Landscape and Turf Irrigation. (4)
fall
Design, management, and maintenance of landscape and turf irrigation systems. Lecture, lab. Cross-listed as ABS 363. Credit is allowed for only ABS 363 or PGM 363. Fee. Prerequisite: ABS 260 (or its equivalent).

E PGM 367 Landscape Plants and Design. (3)
spring
Identification, design, and use of plants in urban landscapes. Lecture, lab. Cross-listed as ABS 362. Credit is allowed for only ABS 362 or PGM 367. Fee. Prerequisite: ABS 260 (or its equivalent).

E PGM 400 GPTP IV. (1)
fall
Food and beverage control, supervision and delegation of golf facilities. Completion of the PGA Level Three experience kit. Prerequisite: admission to PGM program.

E PGM 463 Golf and Sports Turf Management. (3)
fall
Selection, establishment, and maintenance of turf grasses bred specifically for golf and sports facilities. Integrated lecture/lab. Cross-listed as ABS 463. Credit is allowed for only ABS 463 or PGM 463.

E PGM 466 Integrated Pest Control. (2)
fall and spring
Management of pests affecting golf turf and landscape plants. Structural Pest Control Board sprayer certification preparation offered during the semester.

E PGM 484 Internship. (1–12)
selected semesters

E PGM 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Food and Beverage
  Fee.

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 93.

East College

www.poly.asu.edu/ecollege **Glenn W. Irvin, PhD, Dean**

Applied Biological Sciences, Department of . . .219
Applied Psychology, Faculty of 224
Business Administration, Faculty of 225
Education, Faculty of 227
Exercise and Wellness, Department of. 233
Human Health Studies, Faculty of 237
Multimedia Writing and Technical Communication, Faculty of 238
Nutrition, Department of 240

PURPOSE

East College offers a variety of liberal studies and professional programs. Baccalaureate programs are offered in applied biological sciences, applied psychology, business administration, education, exercise and wellness, human health studies, interdisciplinary studies, multimedia writing and technical communication, and nutrition. Minors, certificates, and graduate programs are available in some areas.

East College provides advising for students who wish to begin their college careers at the Polytechnic campus but who are uncertain about a major. Exploratory/undeclared majors can complete portions of the General Studies requirement while taking advantage of the small, polytechnic-focused, residential campus environment.

East College offers a selection of ASU General Studies and general interest courses. The Humanities and Arts unit offers a selection of courses in art, communication, dance, English, history, music, philosophy, religious studies, and Spanish. The Social and Behavioral Sciences unit offers courses in anthropology, family and human development, political science, sociology, and women's studies. Mathematics and science courses are available through the Department of Applied Biological Sciences. Students should refer to the *Schedule of Classes* for specific courses offered each semester.

East College also offers statistics courses (APM) to meet requirements for a range of majors and support courses for the Bachelor of Applied Science (BAS) degree. The applied science core (ASC) courses are upper division and designed to build upon the mathematics and science base acquired in the Associate of Applied Science (AAS) degree.

Partnership in Baccalaureate Education. The Partnership in Baccalaureate Education, an agreement between Chandler-Gilbert Community College and Polytechnic campus, is coordinated through East College. Through this partnership, students take first-year composition courses and courses that meet lower-division ASU General Studies requirements. They are listed in "General Studies," page 93. These courses, combined with introductory courses within the major, are available in an innovative and integrated first-year curriculum designed to foster academic success. Students can also take major prerequisite courses, introductory language courses, and other lower-division courses of general interest through the partnership. These courses automatically transfer to ASU each semester.

DEGREE PROGRAMS

See the "East College Baccalaureate Degrees and Majors" table, page 215. For graduate degrees, see the "East College Graduate Degrees and Majors" table, page 216.

East College also offers certificate programs in Multimedia Writing and Technical Communication and in Spa Management; minors in Applied Biological Sciences, Applied Psychology, Food and Nutrition Management, Human Nutrition, Small Business, and Wellness Foundations; and concentrations for the BAS. See the *Graduate Catalog* for more information about graduate programs.

INTERDISCIPLINARY STUDIES—BIS

The Bachelor of Interdisciplinary Studies (BIS) program is intended for the student who has academic interests that might not be satisfied with existing majors. Building on academic concentrations and an interdisciplinary core, students in the BIS program take an active role in creating their educational plans and defining their career goals. The BIS program emphasizes written communication, versatility, and critical thinking, skills desired in the 21st-century workplace. Self-assessment and appraisal of opportunities to support academic and career goals are key elements in the core courses. The concentrations are generally based on approved academic minors, certificate programs, or special coherent clusters of course work. The student should be able to integrate these into a meaningful program.

The combination of areas of concentration gives students flexibility in creating unique programs to accomplish individual academic goals. Students who declare the BIS as their major in East College at Polytechnic campus take their core courses and at least one concentration through Polytechnic campus. The second concentration may be taken at the Polytechnic or Tempe campus. The BIS core courses are offered by East College. Concentrations at Polytechnic campus are offered by East College, the College of Technology and Applied Sciences, and the Morrison School of Agribusiness and Resource Management. Students interested in the BIS program should arrange an appointment

East College Baccalaureate Degrees and Majors

Major	Degree	Concentration*	Administered By
Applied Biological Sciences	BS	Applied biological sciences, applied biological sciences/secondary education, urban horticulture, or wildlife and restoration ecology	Department of Applied Biological Sciences
Applied Psychology	BS	—	East College
Applied Science	BAS	Food service management, multimedia writing and technical communication, or wellness	East College
Business Administration	BS	—	East College
Elementary Education	BAE	—	East College
Exercise and Wellness	BS	Exercise and wellness or health promotion	Department of Exercise and Wellness
Human Health Studies	BA, BS	—	East College
Interdisciplinary Studies	BIS	See the "BIS Concentrations" table, page 142.	Bachelor of Interdisciplinary Studies Advisory Committee
Multimedia Writing and Technical Communication	BS	—	East College
Nursing	BSN	—	College of Nursing (Downtown Phoenix campus)
Nutrition	BS	Dietetics, food and nutrition management, human nutrition, or nutrition communication	Department of Nutrition
Real Estate	BS	—	East College
Secondary Education	BAE	Academic specialization: physical education	East College

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

with a University College advisor at 480/727-1452 before declaring the BIS major.

Basic Requirements

The BIS major requires 120 semester hours. The major is composed of a 12 hour core and a minimum of 36 hours in two or three concentration areas (18 hours or more each). Throughout the core sequence, the student assembles a portfolio, including self-assessment of progress toward career goals and an evaluation of key educational and personal activities that may apply. The core courses must be taken in sequence. These courses may not be transferred from other institutions. BIS 401 may be taken as a corequisite or prerequisite for BIS 402. All core courses must be completed with a grade of "C" (2.00) or higher.

Core Courses

BIS	301 Foundations of Interdisciplinary Studies *L*	3
BIS	302 Interdisciplinary Inquiry	3
BIS	401 Applied Interdisciplinary Studies	3
BIS	402 Senior Seminar *L*	3
Total		12

For course descriptions, see "School of Interdisciplinary Studies," page 139.

Other Requirements

In addition to the basic requirements, students must complete all university requirements, including First-Year Composition and General Studies. Early advising is recommended to ensure that students meet requirements efficiently and optimize their choices.

Declaring the BIS Major

Students must receive approval from an East College advisor before declaring the BIS major. In addition, the student must

1. complete at least 45 semester hours of university credit;
2. earn a cumulative GPA of at least 2.00;
3. complete two courses in each concentration with a minimum grade of "C" (2.00) before enrolling in BIS 301; and
4. complete the university mathematics and First-Year Composition requirements.

All incoming students and continuing students with a minimum GPA of 2.00 who do not meet the above requirements are placed in a pre-BIS major until the requirements have been met.

APPROVED CONCENTRATIONS

Each concentration requires 18 or more semester hours, with each course completed with a grade of "C" (2.00) 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 93.

East College Graduate Degrees and Majors

Major	Degree	Concentration[1]	Administered By
Applied Biological Sciences	MS	GIS/remote sensing, natural resource management, or range ecology	Department of Applied Biological Sciences
Applied Psychology	MS	—	Faculty of Applied Psychology
Curriculum and Instruction	MEd	English as a second language, instructional media in K–12 schools, or professional studies	Faculty of Education
	PhD[2]	Exercise and wellness education, physical education	Division of Curriculum and Instruction (Tempe campus)
Environmental Design and Planning[2]	PhD	Design; history, theory, and criticism; or planning	Committee on Environmental Design and Planning
Exercise and Wellness	MS	—	Department of Exercise and Wellness
Nutrition	MS	—	Department of Nutrition
Physical Activity, Nutrition, and Wellness	PhD	—	Department of Exercise and Wellness and Department of Nutrition
Physical Education	MPE	—	Faculty of Education
Plant Biology[2]	PhD	—	School of Life Sciences (Tempe campus)

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

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

higher. Twelve or more of the semester hours must be in upper-division courses. Students should check for new information about concentrations on the Web at www.poly.asu.edu/ecollege or contact an East College advisor at 480/727-1333.

ANTHROPOLOGY (ANT)

E ANT 194 Special Topics. (1–4)
selected semesters

E ANT 294 Special Topics. (1–4)
selected semesters

E ANT 394 Special Topics. (1–4)
selected semesters

E ANT 484 Internship. (1–12)
selected semesters

E ANT 494 Special Topics. (1–4)
selected semesters

E ANT 498 Pro-Seminar. (1–7)
selected semesters

E ANT 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.

APPLIED MATHEMATICS (APM)

E APM 301 Introductory Statistics. (3)
selected semesters
Probability, distributions, statistical hypothesis testing, t-tests, basic correlation, and regression. Prerequisite: MAT 117 or instructor approval.
General Studies: CS

E APM 401 Intermediate Statistics. (3)
selected semesters
Analysis of variance, multiple comparisons, multiple regression. Prerequisite: APM 301 (or its equivalent) or instructor approval.

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

ART (ARD)

E ARD 194 Special Topics. (1–4)
selected semesters

E ARD 294 Special Topics. (1–4)
selected semesters

E ARD 394 Special Topics. (1–4)
selected semesters

E ARD 484 Internship. (1–12)
selected semesters

E ARD 494 Special Topics. (1–4)
selected semesters

E ARD 498 Pro-Seminar. (1–7)
selected semesters

E ARD 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.

APPLIED SCIENCE CORE (ASC)

E ASC 301 Contextual Uses of Algebra in Technology. (1)
fall and spring
Uses algebra to solve real-world technological problems using currently available computer software. Prerequisite: BAS major.

E ASC 302 Contextual Uses of Geometry in Technology. (1)
fall and spring
Uses geometrical concepts to solve real-world technological problems using currently available computer software. Prerequisite: BAS major.

E ASC 303 Contextual Uses of Trigonometry in Technology. (1)
fall and spring
Uses trigonometry to solve real-world technological problems using currently available computer software. Prerequisite: BAS major.

E ASC 315 Numeracy in Technology. (3)
fall and spring
Contextual uses of mathematics in applied sciences. Emphasizes using mathematical methodologies to solve technology-related problems. Prerequisite: BAS major.
General Studies: MA

E ASC 325 Physical Sciences in Technology. (4)
fall and spring
Physical systems and their interrelationships on technology systems. Real-world applications of physical systems. Lecture, lab.
Prerequisite: BAS major.
General Studies: SQ

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

COMMUNICATION (CMA)

E CMA 194 Special Topics. (1–4)
selected semesters

E CMA 294 Special Topics. (1–4)
selected semesters

E CMA 394 Special Topics. (1–4)
selected semesters

E CMA 484 Internship. (1–12)
selected semesters

E CMA 494 Special Topics. (1–4)
selected semesters

E CMA 498 Pro-Seminar. (1–7)
selected semesters

E CMA 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.

DANCE (DNC)

E DNC 194 Special Topics. (1–4)
selected semesters

E DNC 294 Special Topics. (1–4)
selected semesters

E DNC 394 Special Topics. (1–4)
selected semesters

E DNC 484 Internship. (1–12)
selected semesters

E DNC 494 Special Topics. (1–4)
selected semesters

E DNC 498 Pro-Seminar. (1–7)
selected semesters

E DNC 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.

ENGLISH/HUMANITIES (ENH)

E ENH 194 Special Topics. (1–4)
selected semesters

E ENH 294 Special Topics. (1–4)
selected semesters

E ENH 394 Special Topics. (1–4)
selected semesters

E ENH 484 Internship. (1–12)
selected semesters

E ENH 494 Special Topics. (1–4)
selected semesters

E ENH 498 Pro-Seminar. (1–7)
selected semesters

E ENH 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.

FAMILY AND HUMAN DEVELOPMENT (FAM)

E FAM 194 Special Topics. (1–4)
selected semesters

E FAM 294 Special Topics. (1–4)
selected semesters

E FAM 394 Special Topics. (1–4)
selected semesters

E FAM 484 Internship. (1–12)
selected semesters

E FAM 494 Special Topics. (1–4)
selected semesters

E FAM 498 Pro-Seminar. (1–7)
selected semesters

E FAM 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.

HISTORY (HTY)

E HTY 194 Special Topics. (1–4)
selected semesters

E HTY 294 Special Topics. (1–4)
selected semesters

E HTY 394 Special Topics. (1–4)
selected semesters

E HTY 484 Internship. (1–12)
selected semesters

E HTY 494 Special Topics. (1–4)
selected semesters

E HTY 498 Pro-Seminar. (1–7)
selected semesters

E HTY 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.

MASS COMMUNICATION (MCN)

E MCN 194 Special Topics. (1–4)
selected semesters

E MCN 294 Special Topics. (1–4)
selected semesters

E MCN 394 Special Topics. (1–4)
selected semesters

E MCN 484 Internship. (1–12)
selected semesters

E MCN 494 Special Topics. (1–4)
selected semesters

E MCN 498 Pro-Seminar. (1–7)
selected semesters

E MCN 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.

MUSIC (MSC)

E MSC 194 Special Topics. (1–4)
selected semesters

E MSC 294 Special Topics. (1–4)
selected semesters

E MSC 394 Special Topics. (1–4)
selected semesters

E MSC 484 Internship. (1–12)
selected semesters

E MSC 494 Special Topics. (1–4)
selected semesters

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 93.

E MSC 498 Pro-Seminar. (1–7)
selected semesters

E MSC 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.

PHILOSOPHY (PHL)

E PHL 194 Special Topics. (1–4)
selected semesters

E PHL 294 Special Topics. (1–4)
selected semesters

E PHL 394 Special Topics. (1–4)
selected semesters

E PHL 484 Internship. (1–12)
selected semesters

E PHL 494 Special Topics. (1–4)
selected semesters

E PHL 498 Pro-Seminar. (1–7)
selected semesters

E PHL 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.

POLITICAL SCIENCE (PLS)

E PLS 194 Special Topics. (1–4)
selected semesters

E PLS 294 Special Topics. (1–4)
selected semesters

E PLS 394 Special Topics. (1–4)
selected semesters

E PLS 484 Internship. (1–12)
selected semesters

E PLS 494 Special Topics. (1–4)
selected semesters

E PLS 498 Pro-Seminar. (1–7)
selected semesters

E PLS 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.

SOCIOLOGY (SCL)

E SCL 194 Special Topics. (1–4)
selected semesters

E SCL 294 Special Topics. (1–4)
selected semesters

E SCL 394 Special Topics. (1–4)
selected semesters

E SCL 484 Internship. (1–12)
selected semesters

E SCL 494 Special Topics. (1–4)
selected semesters

E SCL 498 Pro-Seminar. (1–7)
selected semesters

E SCL 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.

SPANISH (SPN)

E SPN 194 Special Topics. (1–4)
selected semesters

E SPN 294 Special Topics. (1–4)
selected semesters

E SPN 394 Special Topics. (1–4)
selected semesters

E SPN 484 Internship. (1–12)
selected semesters

E SPN 494 Special Topics. (1–4)
selected semesters

E SPN 498 Pro-Seminar. (1–7)
selected semesters

E SPN 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.

THEATRE (THR)

E THR 194 Special Topics. (1–4)
selected semesters

E THR 294 Special Topics. (1–4)
selected semesters

E THR 394 Special Topics. (1–4)
selected semesters

E THR 484 Internship. (1–12)
selected semesters

E THR 494 Special Topics. (1–4)
selected semesters

E THR 498 Pro-Seminar. (1–7)
selected semesters

E THR 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.

WOMEN'S STUDIES (WNS)

E WNS 194 Special Topics. (1–4)
selected semesters

E WNS 294 Special Topics. (1–4)
selected semesters

E WNS 394 Special Topics. (1–4)
selected semesters

E WNS 484 Internship. (1–12)
selected semesters

E WNS 494 Special Topics. (1–4)
selected semesters

E WNS 498 Pro-Seminar. (1–7)
selected semesters

E WNS 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 Applied Biological Sciences

www.poly.asu.edu/ecollege/appliedbiologicalsciences

480/727-1444

WANER Third Floor

Ward W. Brady, Chair

Professors: Brady, Brock, Mushkatel, Sommerfeld, Stutz

Associate Professors: Green, Martin, Miller, Steele, Whysong

Assistant Professors: Hu, Marcum

Lecturer: Huffman

APPLIED BIOLOGICAL SCIENCES—BS

The Department of Applied Biological Sciences offers rigorous and practical programs in applications of the biological sciences. Consistent with a polytechnic vision, programs involve extensive student interaction with faculty through experience-based learning activities, including laboratories, field trips, internships, and faculty-guided research and service-learning projects. Mastery of fundamental biological principles is emphasized through quality learning in the classroom and hands-on activities in laboratories and in the living laboratories of the Sonoran desert and surrounding ecosystems.

Graduates can pursue entry-level careers in wildlife and restoration ecology, urban horticulture, and secondary education. The general program in Applied Biological Sciences also prepares graduates to succeed in graduate and professional schools in disciplines such as animal health, environmental biotechnology, medicine, dentistry, physical therapy, ecology, horticulture, and wildlife biology.

Mission

The mission of the department is to provide excellence by way of

1. academic programs that are rigorous and experience-based and involve extensive student-faculty interaction;
2. research, scholarship, and practice that advance knowledge, address practical problems, and explore emerging opportunities; and
3. service and outreach to the local and global communities.

Goal

The goal of the department's academic programs is to prepare practitioners, managers, and research scholars in fields related to the applied biological sciences who

1. are problem solvers, comfortable with interdisciplinary work and aware that many breakthroughs occur where fields overlap and multiple disciplines work together;
2. are technically proficient whether they work in the field or at the laboratory bench, understand why and how equipment and procedures work, and are capable of designing new protocols and techniques to meet new challenges;
3. constantly stay abreast of scientific advances, actively reading broadly and deeply, understanding not only the critical nature of the primary literature in their chosen field, but also the importance of keeping step with emerging data and technology and incorporating new ideas and technologies into their discipline;
4. understand ethical and policy implications of their work and are capable of debating science in a context beyond the technical details of their discipline;
5. are articulate in oral and written communication, forming cogent arguments and communicating them clearly; and
6. understand that groundbreaking science requires knowledge and creativity and that creativity is central to discovery.

For the latest information about program requirements and courses, access the Web site at www.asu.edu/ecollege/appliedbiologicalsciences, or call 480/727-1444.

Graduation Requirements

A total of 120 semester hours, with a minimum of 45 semester hours of upper-division credit, is required for graduation. As part of the undergraduate degree program, students complete the ASU General Studies requirement. For courses that meet ASU General Studies requirement, see "General Studies," page 93. It is strongly recommended that students work with an East College academic advisor when selecting courses to meet the General Studies requirement since otherwise required courses can often be used to meet the General Studies requirement.

Applied Biological Sciences Core. All Applied Biological Sciences students are required to complete the following courses:

Applied Biological Sciences Core		
ABS	300 Environmental Biology	3
ABS	302 Ethical and Policy Issues in Biology	2
ABS	350 Applied Statistics *CS*	3
BIO	187 General Biology I *SG*	4
BIO	188 General Biology II *SQ*	4
BIO	340 General Genetics	4
BIO	360 Animal Physiology	3
	or PLB 308 Plant Physiology (4)	
	or ABS 311 Applied Cellular Biology (3)	
CHM	113 General Chemistry I *SQ*	4
MAT	210 Brief Calculus *MA*	3
Total		30–31

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 93.

Students majoring in Applied Biological Sciences must select one of the concentrations listed below.

Applied Biological Sciences Concentration

This concentration offers students the opportunity to acquire a rigorous education in the biological and related sciences while providing flexibility to meet specific student interests. Students who plan to pursue research careers and postgraduate studies in biology, environmental biotechnology, and ecology may find this concentration appropriate. In addition, the concentration is designed for students planning to enter the health professions, including animal health, medicine, medical technology, epidemiology, dentistry, physical therapy, public health, and physician's assistant programs.

Students planning to enter professional programs need to include two semester sequences in physics and organic chemistry in their programs of study. BCH 361 Principles of Biochemistry is also suggested.

Applied Biological Sciences Concentration

ABS 355 Vertebrate Zoology 4
ABS 370 Ecology 3
ABS 490 Applied Biological Sciences Seminar 1
CHM 116 General Chemistry *SQ* 4
Choose between the organic chemistry course combinations below ..... 4 or 8
- CHM 231 Elementary Organic Chemistry *SQ*[1] (3)
- CHM 235 Elementary Organic Chemistry Lab *SQ*[1] (1)

— *or* —

- CHM 233 General Organic Chemistry I (3)
- CHM 234 General Organic Chemistry II (3)
- CHM 237 General Organic Chemistry Laboratory I (1)
- CHM 238 General Organic Chemistry Laboratory II (1)

Choose between the physics course combinations below ..... 4 or 8
- PHY 101 Introduction to Physics *SQ* (4)

— *or* —

- 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)

Approved electives in Applied Biological Sciences 12

Total 32–40

[1] Both CHM 231 and 235 must be taken to secure SQ credit.
[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.

Applied Biological Sciences/Secondary Education Concentration

The applied biological sciences/secondary education concentration qualifies students for the State of Arizona Certification in Secondary Biology Education. Students interested in pursuing this concentration need to complete the science content courses related to biology and the courses specific to the secondary education curriculum. The program concludes with full-time student teaching in a secondary science classroom. Students interested in pursuing the concentration need to be admitted into the Teacher Education unit before taking the secondary methods courses (approximately during the junior year). See "Applied Biological Sciences–BS Secondary Education Concentration," page 229, for application requirements.

Secondary Education Concentration General Studies Requirement. For students choosing the secondary education concentration, the following courses must be used as General Studies courses in order to graduate in 120 hours:

ABS 350 Applied Statistics or equivalent *CS* 3
BIO 187 General Biology I *SG* 4
BIO 188 General Biology II *SQ* 4
MAT 210 Brief Calculus *MA* 3

Applied Biological Sciences/Secondary Education Concentration

ABS 355 Vertebrate Zoology 4
or ABS 207 Applied Plant Taxonomy (3)
ABS 370 Ecology 3
ABS 490 Applied Biological Sciences Seminar 1
CHM 116 General Chemistry *SQ* 4
MIC 205 Microbiology *SG** 3
MIC 206 Microbiology Laboratory *SG** 1
PHY 101 Introduction to Physics *SQ* 4
Upper-division electives 3

Total 22–23

* Both MIC 205 and 206 must be taken to secure SG credit.

Secondary Education Curricula

BIO 480 Methods of Teaching Biology 3
BIO 482 Advanced Methods of Teaching Biology 3
EDC 350 Educational Technology I: Applications 1
EDC 351 Educational Technology II: Instruction and Evaluation 1
EDC 352 Educational Technology III: Design 1
EDC 494 ST: Professional Knowledge 2
EDP 303 Human Development *L/SB* 3
EDP 310 Educational Psychology *SB* 3
RDG 301 Literacy and Instruction in the Content Areas 3
SED 403 Middle and Secondary School Principles, Curricula, and Methods 3
SED 478 Student Teaching in Secondary Schools 10–12
SED 496 Field Experience 0
SPE 394 ST: Inclusion Practices at the Secondary Level 3

Total 36–38

Strongly Recommended

MCE 446 Understanding the Culturally Diverse Child *C* 3
SPE 311 Orientation to Education of Exceptional Children *SB, C* 3

Urban Horticulture Concentration

Urban horticulture emphasizes the relationship of plants and people in city environments. Set in a unique southwestern desert location, Polytechnic campus's program strives to teach urban horticulture students how to practice principles and develop skills that help create aesthetically pleasing urban environments. This approach is coupled with an appreciation of environmental conservation and stewardship. To achieve this goal, the program specializes in teaching students about the unique aspects of desert horticulture. Through course offerings, students can gain expertise in a diverse array of topics such as landscape plant identification culture and use; creation of public and private gardens in arid climates; management practices of landscape planting and irrigation design; installation and maintenance; xeriscape and water conservation; integrated pest management; installation and management of golf, sports, and recreational turf grass; plant propagation and greenhouse/

nursery management. Graduates are qualified to identify and grow ornamental landscape trees, shrubs, ground covers, grasses, flowering potted plants, and bedding plants. They also design, install, and maintain outdoor and indoor landscape environments that enhance urban aesthetics.

Urban Horticulture Concentration

ABS	225 Soils *SQ*[1]	3
ABS	226 Soils Laboratory *SQ*[1]	1
ABS	260 Fundamentals of Urban Horticulture *SG*	4
ABS	362 Landscape Plants and Design	4
ABS	363 Landscape and Turf Irrigation	4
ABS	364 Urban Forestry	3
ABS	462 Greenhouse/Nursery Management	4
	or ABS 463 Golf and Sports Turf Management (3)	
Choose one of the three courses below		3
ABS	465 Senior Enterprise Project (3)	
ABS	484 Internship (3)	
ABS	492 Honors Directed Study (3)	
CHM	231 Elementary Organic Chemistry *SQ*[2]	3
PLB	414 Plant Pathology *L*	3
	or PGM 466 Integrated Pest Control (2)	
Approved upper-division electives		6
Total		36–38

[1] Both ABS 225 and 226 must be taken to secure SQ credit.

[2] Both CHM 231 and 235 must be taken to secure SQ credit.

Wildlife and Restoration Ecology

Applied ecology is the focus of the wildlife and restoration ecology concentration. Introductory course work emphasizes a core understanding of biological science, principles of plant and animal ecology, and the techniques and principles of ecosystem management. Students can choose to focus their course work on wildlife ecology or restoration ecology.

The discipline of ecological restoration provides a scientific basis for the reconstruction of degraded ecosystems and focuses on practices designed to improve the ecological structure and function, and on meeting societal needs for sustainable and functional ecosystems. The restoration process includes identifying the causes of degradation, devising methods and goals for the restoration effort, developing management strategies for the restored sites, monitoring changes on the site and assessing restoration success. Restoration practices may include improving wildlife habitat, reintroducing missing plants or animals, removal of invasive species, rebuilding of soils, and returning natural processes such as fire and flooding to ecosystems that historically experienced these disturbance regimes. Successful restoration projects require community involvement and demand consideration of the economic and social context in which restoration is carried out

The wildlife ecology course work is distinguished by its strong emphasis on habitat management. While students are expected to master the material found in traditional wildlife biology curricula, students are also expected to develop a strong expertise in habitat management. This background in habitat management requires proficiency in the botanical sciences, including plant ecology and provides a synergistic link with the ecological restoration concentration. The applied nature of the concentration is emphasized by the requirement for mastery of the analytic technologies (ranging from quantitative ecology and ecological modeling to the use of geographic information systems) as well as a comprehensive understanding of the economic and policy contexts in which wildlife habitat management occurs.

Wildlife and Restoration Ecology Concentration General Studies Requirements. For students choosing the wildlife and restoration ecology concentration, the following courses must be used as General Studies courses in order to graduate in 120 hours:

ABS	350 Applied Statistics or equivalent *CS*	3
ABS	480 Ecosystem Management and Planning *L*	3
BIO	187 General Biology I *SG*	4
BIO	188 General Biology II *SQ*	4
MAT	210 Brief Calculus *MA*	3

Wildlife and Restoration Ecology Concentration

ABS	207 Applied Plant Taxonomy	3
ABS	370 Ecology	3
ABS	374 Introduction to Wildlife Management	4
ABS	381 Natural Resources Policy	3
ABS	402 Vegetation and Wildlife Measurements	3
ABS	440 Ecological Restoration Techniques	3
ABS	480 Ecosystem Management and Planning *L*	3
ABS	485 GIS in Natural Resources	3
CHM	231 Elementary Organic Chemistry *SQ*[1]	3

Choose one of the following course groupings:

ABS	225 Soils *SQ*[2]	3
ABS	226 Soils Laboratory *SQ*[2]	1
ABS	433 Riparian and Wetland Ecology	3
ABS	441 Ecological Restoration Practicum	1
ABS	482 Ecology and Planning for Restoration	3
ABS	483 Restoration Planning Practicum	2
Approved supporting courses		15

— or —

ABS	355 Vertebrate Zoology	4
ABS	376 Wildlife Ecology	3
ABS	475 Habitat Management for Small Wildlife	4
ABS	476 Big Game Habitat Management	3
Approved supporting courses		15

[1] Both CHM 231 and 235 must be taken to secure SQ credit

[2] Both ABS 225 and 226 must be taken to secure SQ credit.

Biology and plant biology courses regularly offered on the Polytechnic campus include BIO 100, BIO 187, BIO 188, BIO 201, BIO 202, BIO 340, BIO 360, PLB 308, and PLB 414. For courses, see "School of Life Sciences," page 597.

BIS CONCENTRATION

A concentration in applied biological 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 interdisciplinary core, students in the BIS program take active roles creating their educational

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 93.

plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 139.

MINOR

The Applied Biological Sciences minor consists of 24 semester hours, including BIO 187 General Biology I, BIO 188 General Biology II, and at least 15 hours selected with the approval of an advisor; at least nine hours must be in the upper-division courses offered by the Department of Applied Biological Sciences.

GRADUATE PROGRAMS

Faculty associated with the Applied Biological Sciences program also offer a program leading to an MS degree in Applied Biological Sciences. Selected faculty also participate with the Division of Graduate Studies and the Colleges of Architecture and Environmental Design and Liberal Arts and Sciences in programs leading to PhD degrees in Environmental Design and Planning, with a concentration in Planning, and a PhD degree in Plant Biology. See the *Graduate Catalog* for requirements.

APPLIED BIOLOGICAL SCIENCES (ABS)

E ABS 130 Introduction to Environmental Science. (4)
fall
Introduces resources, their physical and chemical properties, classification, energy dynamics, and the role they play in environmental quality. Lecture, lab.
General Studies: SQ

E ABS 191 First-Year Seminar. (1–3)
selected semesters

E ABS 207 Applied Plant Taxonomy. (3)
spring
Introduces identification of vascular plants emphasizing seed plants. Surveys seed plant families. Lecture, lab, field trips. Fee. Prerequisite: BIO 187.

E ABS 225 Soils. (3)
fall
Fundamental properties of soils and their relations to plant growth, nutrition of man and animals, and environmental quality. Prerequisite: CHM 101 or 113 (or its equivalent).
General Studies: SQ (if credit also earned in ABS 226)

E ABS 226 Soils Laboratory. (1)
fall
Selected exercises to broaden the background and understanding of basic soil principles. Lab. Fee. Pre- or corequisite: ABS 225.
General Studies: SQ (if credit also earned in ABS 225)

E ABS 260 Fundamentals of Urban Horticulture. (4)
fall
Principles and practices of horticulture, emphasizing development, growth, and propagation of horticultural plants and environmental factors that affect these processes. 3 hours lecture, 3 hours lab. Fee. Prerequisite: BIO 187 or PLB 108.
General Studies: SG

E ABS 294 Special Topics. (1–4)
selected semesters

E ABS 300 Environmental Biology. (3)
spring
Ecosystem dynamics and the analysis of environmental impact from local to global scales. Introduces ecological risk assessment and life cycle analysis. Lecture, cooperative learning.

E ABS 301 Technology and Biology. (2)
spring
Demonstrations of a broad range of innovative technologies in molecular biology, cellular and organismal biology, horticulture, and wildlife and restoration ecology. Fee.

E ABS 302 Ethical and Policy Issues in Biology. (2)
spring
Policy environment and ethics in the practice of biology. Covers ethical reasoning, policy formulation, and regulatory agencies with examples from biotechnology and the environment.

E ABS 311 Applied Cellular Biology. (3)
spring
Overview of the biology of the cell, with emphasis on structure and function of biomolecules within the cell. Prerequisites: BIO 187; CHM 231 (or their equivalents).

E ABS 312 Structure and Function. (4)
spring
Surveys structural and functional attributes of plant and animals of particular importance in the applied biological sciences. Lecture, lab. Fee. Prerequisite: BIO 187.

E ABS 350 Applied Statistics. (3)
fall and spring
Statistical methods with applications in the biological sciences and natural resource management. Uses computers and the Internet. Prerequisite: MAT 117 (or its equivalent).
General Studies: CS

E ABS 355 Vertebrate Zoology. (4)
spring
Classification, anatomy, and physiology of the vertebrates. Lecture, lab. Prerequisites: BIO 188 and CHM 101 (or their equivalents).

E ABS 360 Southwest Home Gardening. (2)
fall and spring
Multimedia course for nonmajors surveying contemporary topics in Southwest home horticulture, including landscaping, flower and vegetable gardening, citriculture, interiorscaping, and others. Prerequisite: completion of General Studies SQ and SG requirements.

E ABS 362 Landscape Plants and Design. (4)
spring
Identification, design, and use of plants in urban landscapes. Lecture, lab. Cross-listed as PGM 367. Credit is allowed for only ABS 362 or PGM 367. Fee. Prerequisite: ABS 260 (or its equivalent).

E ABS 363 Landscape and Turf Irrigation. (4)
fall
Design, management, and maintenance of landscape and turf irrigation systems. Lecture, lab. Cross-listed as PGM 363. Credit is allowed for only ABS 363 or PGM 363. Fee. Prerequisite: ABS 260 (or its equivalent).

E ABS 364 Urban Forestry. (3)
fall
Care, maintenance, and valuation of the urban forest, including public and private landscape codes. Prerequisite: ABS 260 (or its equivalent).

E ABS 366 Indoor Plants. (3)
fall or spring
Identification, culture, and use of container-grown plants for interior environments. Prerequisite: ABS 260 or instructor approval.

E ABS 367 Urban Parks. (4)
spring
Overview of the management and maintenance of private and public parks, urban greenspaces, and recreational areas. Lecture, lab. Fee. Prerequisite: ABS 260 (or its equivalent).

E ABS 368 Plant Propagation. (3)
spring
Theory and application of sexual and asexual propagation techniques. Considers plant materials used both for urban horticulture and ecological restoration applications. 2 hours lecture, 3 hours lab. Fee. Prerequisite: BIO 188.

E ABS 370 Ecology. (3)
fall
Interactions between organisms and their environments; structure and dynamics of populations, communities, ecosystems, and landscapes, with emphasis on vegetation. Lecture, field trips. Prerequisite: BIO 188.

E ABS 372 Ecology: Ecosystems and Landscapes. (3)
spring
Structure and function of ecosystems, interactions of pattern and process in landscapes. Lecture, lab, field trips. Prerequisite: ABS 370.

E ABS 374 Introduction to Wildlife Management. (4)
spring
Managing wildlife in the Southwest, including life histories of small game, fur bearers, big game, and selected nongame specials. Fee. Lecture, lab, field trips. Prerequisite: completion of General Studies SQ and SG requirements.

E ABS 375 Conservation Biology. (3)
spring
Principles of conservation biology, management of threatened species and ecosystems, biodiversity patterns with emphasis on issues in the Southwest. Lecture, field trips. Fee. Prerequisite: ABS 374.

E ABS 376 Wildlife Ecology. (3)
spring
Examines ecological principles underlying wildlife population dynamics with emphasis on physiology, genetics, nutrition, and habitat factors. Lecture, lab. Prerequisite: ABS 370.

E ABS 378 Wildlife Nutrition. (3)
fall
Principles of nutrient metabolism in wildlife species, with emphasis on understanding the interaction of wildlife with their environment. Prerequisites: BIO 188; CHM 101.

E ABS 380 Restoration and Wildlife Plants. (3)
fall
Important wildland plants, including invasive and endangered species, wildlife food species, and species used for ecosystem restoration. Lecture, lab. Prerequisite: ABS 207 or 260.

E ABS 381 Natural Resources Policy. (3)
fall
Policies and regulations affecting management of natural resources, with emphases on wildlife and ecological restoration. Pre- or corequisite: ABS 300.

E ABS 402 Vegetation and Wildlife Measurement. (3)
spring
Vegetation inventory, sampling, monitoring, and evaluation. Methods of estimating wildlife populations, activity, and home ranges. Lecture, lab, 1 weekend field trip. Prerequisites: ABS 207, 350, 370.

E ABS 425 Soil Classification and Management. (3)
selected semesters
Principles of soil genesis, morphology, and classification. Presents management and conservation practices. Prerequisite: ABS 225 (or its equivalent).

E ABS 430 Watershed Management. (3)
selected semesters
Hydrologic, physical, biological, and ecological principles applied to watershed management. Impact of ecosystem manipulations on water yield and quality. Lecture, 1 weekend field trip. Prerequisite: ABS 225.

E ABS 433 Riparian and Wetland Ecology. (3)
selected semesters
Functions and components of riparian and wetland ecosystems and the management of these systems. Lecture, field trips. Prerequisite: ABS 370.

E ABS 434 Soil Ecology. (3)
selected semesters
Soils viewed in an ecosystem context, soil-plant relationships, nutrient budgets, and abiotic factors that influence soil processes. Lecture, lab, field trips. Prerequisites: ABS 225, 226, 370.

E ABS 435 Ecological Modeling. (3)
fall
Simulation modeling as a tool to study ecological processes and human impact on ecosystems and organisms. Lecture, lab. Prerequisites: ABS 350, 370.

E ABS 440 Ecological Restoration Techniques. (3)
fall
Techniques for ecological restoration, riparian and wetland restoration, and monitoring restoration success. Prerequisites: ABS 370, 380.

E ABS 441 Ecological Restoration Practicum. (1)
fall
Field experience in the evaluation and monitoring of implemented ecological restoration projects. Lab, field trips. Fee. Pre- or corequisite: ABS 440.

E ABS 460 Organic Gardening. (2)
fall
Applies principles and practices of organic gardening in the low desert, including environmental impacts of modern food production. 1 hour lecture, 3 hours lab. Fee. Prerequisite: ABS 260.

E ABS 462 Greenhouse/Nursery Management. (4)
spring
Greenhouse structures, environment, and nursery operations. Includes irrigation, nutrition, and other principles relative to production of nursery crops. 1 hour lecture, 3 hours lab. Fee. Prerequisite: ABS 260.

E ABS 463 Golf and Sports Turf Management. (3)
fall
Selection, establishment, and maintenance of turf grasses bred specifically for golf and sports facilities. Integrated lecture/lab. Cross-listed as PGM 463. Credit is allowed for only ABS 463 or PGM 463.

E ABS 465 Senior Enterprise Project. (3)
fall and spring
Selection and completion of an urban horticulture project with faculty advisor approval related to the field of study. Prerequisite: senior standing.

E ABS 470 Mammalogy. (3)
fall
Classification and biology of mammals, emphasizes North America. Pre- or corequisite: ABS 355.

E ABS 471 Ornithology. (3)
spring
Classification and biology of birds, emphasizing North America. Lecture, lab, field trips. Fee. Prerequisite: ABS 355.

E ABS 475 Habitat Management for Small Wildlife. (4)
fall
Habitat management considerations and practices for small game and nongame wildlife species in North America. Lecture, lab, field trips. Fee. Prerequisites: ABS 370, 376, 380.

E ABS 476 Big Game Habitat Management. (3)
spring
Habitat management considerations and practices for big game wildlife species in North America. 2 hours lecture, 3 hours lab. Prerequisites: ABS 370, 376. Pre- or corequisite: ABS 402.

E ABS 480 Ecosystem Management and Planning. (3)
selected semesters
Principles of ecosystem management, with emphasis on economic and policy constraints on the planning process. Risk assessment and management. Lecture, 1 weekend field trip. Prerequisites: both ABS 300 and senior standing or only instructor approval.
General Studies: L

E ABS 481 Riparian and Wetland Restoration. (3)
fall
Principles and problems in the restoration of degraded riparian and wetland ecosystems. Construction of wetlands. Prerequisites: ABS 433, 440.

E ABS 482 Ecology and Planning for Restoration. (3)
spring
Ecological principles and resource planning processes applied to the restoration of degraded landscapes. Prerequisites: ABS 225, 372, 440.

E ABS 483 Restoration Planning Practicum. (2)
spring
Field experience in ecological restoration techniques, selection of mitigation techniques, and implementation planning. Lab, extended field trip over spring break. Fee. Pre- or corequisite: ABS 482.

E ABS 484 Internship. (1–12)
selected semesters

E ABS 485 GIS in Natural Resources. (3)
fall
Principles of Geographic Information Systems (GIS) utilized in natural resource management. Use of computers for spatial analysis of

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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 93.

natural resources. Lecture, lab. Prerequisite: ABS 350 (or its equivalent).

E ABS 486 Introduction to Remote Sensing. (4)
selected semesters
Remote sensing technologies in natural resource management using computerized data from aerial photography and satellite imagery. Not for graduate credit. Lecture, lab. Prerequisite: ABS 485.

E ABS 489 Undergraduate Research. (1–3)
fall and spring
Undergraduate research under the supervision of an applied biological sciences faculty member. Prerequisite: junior or senior standing.

E ABS 490 Applied Biological Sciences Seminar. (1)
fall and spring
Current literature and significant developments related to applications of the biological sciences. May be repeated for credit. Prerequisite: junior or senior standing.

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

E ABS 493 Honors Thesis. (1–6)
selected semesters

E ABS 494 Special Topics. (1–4)
selected semesters

E ABS 498 Pro-Seminar. (1–7)
selected semesters

E ABS 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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Faculty of Applied Psychology

www.poly.asu.edu/ecollege/appliedpsych
480/727-1177
SUTON Third Floor

Roger W. Schvaneveldt, Faculty Head

Professors: Cooke, Schvaneveldt

Assistant Professors: Becker, Gray

APPLIED PSYCHOLOGY—BS

This major offers a traditional psychology core leading to graduate school preparation and/or to applications in human factors with emphasis on human-computer interaction, aviation, or manufacturing. Although most careers in psychology require graduate training, there are some employment opportunities for BS students in applied settings. For example, there is a need for individuals who can help deal with problems of usability of products and systems. The Applied Psychology program offers courses and experiences to prepare students for these positions. The rigor of the major also provides strong preparation for further graduate study in psychology. The program serves students in other Polytechnic campus programs such as manufacturing engineering technology, aeronautical management technology, industrial technology, and business administration.

Graduation Requirements

The completion of 120 semester hours—including First-Year Composition, General Studies (see "General Studies," page 93), and major requirements—leads to the BS degree. The major allows for at least 21 semester hours of electives. The major requirements for the BS degree in Applied Psychology consist of a 28-semester-hour core of psychology courses, 12 semester hours in applied psychology, and 18 semester hours of related course work.

Core Courses. Core courses provide a general background in the basic scientific areas of psychology and provide a culminating experience to integrate the varied studies.

PGS	101	Introduction to Psychology *SB*	3
PGS	350	Social Psychology *SB*	3
PSY	230	Introduction to Statistics *CS*	3
PSY	290	Research Methods *L/SG*	4
PSY	323	Sensation and Perception	3
PSY	324	Memory and Cognition	3
PSY	325	Physiological Psychology	3
PSY	330	Statistical Methods *CS*	3
PSY	477	Applied Psychology Capstone Experience*	3
		or HON 493 Honors Thesis *L* (3)	
Total			28

* This PSY course is offered only by the Polytechnic campus. All other PSY courses listed above are offered by the Polytechnic and Tempe campuses.

Applied Psychology Courses. Students work with an advisor to select courses in Applied Psychology emphasizing human-computer interaction, aviation, training, manufacturing, or methods. Course work must include a minimum of four of the following courses:

PGS	304	Effective Thinking *L*	3
PGS	471	Psychological Testing	3
PSY	320	Learning and Motivation	3
PSY	360	Cognitive Science*	3
PSY	390	Experimental Psychology *L*	3
PSY	437	Human Factors *L*	3
PSY	438	Human-Computer Interaction*	3
PSY	439	Training and Skill Acquisition*	3
PSY	440	Industrial/Organizational Psychology*	3
PSY	448	Human Factors in Transportation*	3
PSY	449	Human Factors in Sport*	3
PSY	494	Special Topics	1–4

* This PSY course is offered only by the Polytechnic campus. All other PSY courses listed above are offered by the Polytechnic and Tempe campuses.

Related Course Work

BIO course with a lab			4
MAT	210	Brief Calculus *MA*	3
		or a higher MAT course (3)	
Computer skills course			3
Writing skills course			3
Courses selected in consultation with an advisor			5
Total			18

Minor in Applied Psychology

The minor in applied psychology consists of 22 semester hours with at least 12 being upper-division courses. The following are required courses that must be completed with a grade of "C" (2.00) or higher:

PGS 101 Introduction to Psychology *SB* 3
PSY 230 Introduction to Statistics *CS* 3
or equivalent statistics course
PSY 290 Research Methods *L/SG* 4
PSY 437 Human Factors *L* 3
or PSY 438 Human-Computer Interaction* (3)
or PSY 440 Industrial/Organizational Psychology* (3)
Additional hours of upper-division PSY and/or PGS courses 9

* This PSY course is offered only by the Polytechnic campus. All other PSY courses listed above are offered by the Polytechnic and Tempe campuses.

A maximum of three semester hours from the following courses can be used to satisfy minor requirements:

PGS 399 Supervised Research 3
PGS 499 Individualized Instruction 3
or PSY 499 Individualized Instruction (3)
PSY 492 Honors Directed Study 3

Note: A minimum of three classes (two of which are in the upper division) must be taken in residence at ASU.

For more information about program requirements and courses, call an East College advisor at 480/727-1333, or access the Web site at www.poly.asu.edu/ecollege/appliedpsych.

For PGS courses and additional PSY courses, see "Department of Psychology," page 635.

PSYCHOLOGY (SCIENCE AND MATHEMATICS) (PSY)

For more PSY courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

E PSY 360 Cognitive Science. (3)
selected semesters
Examines cognition from the varied perspectives of philosophy, linguistics, psychology, computer science (artificial intelligence), and neuroscience. Lecture, discussion. Prerequisite: PSY 324.

E PSY 438 Human-Computer Interaction. (3)
once a year
Theories, methods, and findings concerning the usability of computer systems and the design of effective user interfaces. Lecture, discussion, projects. Prerequisite: PSY 437.

E PSY 439 Training and Skill Acquisition. (3)
once a year
Theories, methods, and findings concerning the acquisition of skilled performance and the design of effective training systems. Lecture, discussion, projects. Prerequisite: PSY 437.

E PSY 440 Industrial/Organizational Psychology. (3)
once a year
Examines personnel selection, performance assessment, job and workplace design, job satisfaction, organizational behavior, management systems, and industrial safety. Lecture, discussion, projects. Prerequisite: PSY 230 (or an equivalent statistics course).

E PSY 448 Human Factors in Transportation. (3)
selected semesters
Examines human performance and human-machine design issues in aviation and ground transportation. Integrated lecture/lab. Pre- or corequisite: PSY 323.

E PSY 449 Human Factors in Sport. (3)
selected semesters
Examines how psychological principles can be applied to enhance the performance of athletes and coaches. Lecture, discussion. Pre- or corequisites: PSY 320, 323.

E PSY 477 Applied Psychology Capstone Experience. (3)
fall and spring
Applied psychology from a systems perspective. Requires a report based on research and/or applied work as a culminating experience. Lecture, discussion, projects. Prerequisite: senior standing.

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.

Faculty of Business Administration

www.poly.asu.edu/ecollege/businessadmin
480/727-1287
SUTON Third Floor

Roger W. Hutt, Faculty Head

Professors: Daneke, Edwards, Kagan, Marquardt, Richards, Shultz, Thor

Associate Professors: Butler, Hutt, Manfredo, Patterson

Assistant Professor: Skilton

Lecturer: Watson

BUSINESS ADMINISTRATION—BS

The BS degree in Business Administration offers a survey of contemporary business disciplines and additional depth in at least three disciplines. The curriculum enables students to gain essential business competencies, knowledge of business disciplines and methods, and appreciation for contemporary business environments and cultures. Students prepare for careers in business, industry, or government, as well as for career advancement and entrepreneurial enterprises. This program operates under the umbrella of the AACSB International–accredited Tempe campus W. P. Carey School of Business, but it is offered through East College.

A total of 120 semester hours is required for graduation with a minimum of 51 semester hours of upper-division credit. As part of the undergraduate degree program, students complete the General Studies requirement (see "General Studies," page 93).

Requirements for the Business Administration major consist of 30 semester hours of lower-division core and skill courses, 22 semester hours of upper-division core 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 93.

one three-semester-hour capstone course, and 18 semester hours of approved electives. All of the upper-division business courses (with the exception of nine semester hours) must be taken at Polytechnic campus.

Business Administration Core

BUA	300 Career Management	1
FIN	300 Fundamentals of Finance	3
IBS	300 Principles of International Business *G*	3
LES	305 Legal, Ethical, and Regulatory Issues in Business	3
MGT	300 Organizational Management and Leadership	3
MKT	300 Principles of Marketing	3
SCM	300 Global Supply Operations	3
TWC	447 Business Reports *L*	3
Total		22

Capstone Course (Three Semester Hours)

MGT	440 Small Business and Entrepreneurship	3
	or BUA 440 Strategic Management (3)	

Approved Electives (18 Semester Hours)

Electives		18

Students select 18 semester hours of electives toward a goal of building upon and integrating prior and current course work. This set of courses, which must be approved by the Business Administration program head, allows students to study a subset of business problems or issues as well as focus on their career interests.

Approved electives include courses in Polytechnic campus industry-specific business programs (Aeronautical Management Technology, Agribusiness, and Technology Management).

For the latest information about application, admissions, program requirements, and courses, call East College at 480/727-1333, or access the Web site at www.poly.asu.edu/ecollege/businessadmin.

REAL ESTATE—BS

The Real Estate faculty offer a unique, integrated, one-year program designed for the student's last year of college. This innovative and award-winning program emphasizes student involvement with real estate executives on projects in the Phoenix metropolitan area. Students work in teams to develop their analytical, communication, technology, and team skills.

The program is organized around five aspects of real estate: brokerage/management, development, financing, investments, and market analysis. With broad interdisciplinary perspective, emphasis on team work, and involvement in projects, students may pursue careers in land development, investment analysis, appraisal, property management, brokerage, and mortgage finance.

Successful completion of the program satisfies the requirements of the major based on the following courses:

LES	411 Real Estate Law	3
REA	300 Real Estate Analysis	3
REA	331 Real Estate Finance	3
REA	401 Real Estate Appraisal	3
REA	441 Real Estate Land Development	3
REA	456 Real Estate Investments	3
Total		18

Minor in Small Business

The minor in small business is available to nonbusiness majors and consists of 18 semester hours, with five required courses and one approved elective. BUA 380 Small Business Leadership is a prerequisite or corequisite for other courses.

Requirements

BUA	380 Small Business Leadership	3
BUA	381 Small Business Accounting and Finance	3
BUA	382 Small Business Sales and Market Development	3
BUA	383 Small Business Working Relationships	3
BUA	384 Small Business Operations and Planning	3
Approved elective		3
Total		18

BIS Concentration in Small Business

The requirements for the small business concentration, for BIS students only, are identical to those for the minor in Small Business listed above. For BIS degree requirements, see "School of Interdisciplinary Studies," page 139.

BUSINESS ADMINISTRATION (BUA)

E BUA 300 Career Management. (1)
fall, spring, summer
Provides professional program business administration students with information on ASU business-related courses, business careers, interviewing, job hunting, and résumé skills.

E BUA 330 Organizational Leadership. (3)
fall and spring
Strategies, skills, and techniques that promote successful leadership within organizations. Practice leadership skills and self-discovery in preparation for leadership positions.

E BUA 380 Small Business Leadership. (3)
fall, spring, summer
Develops leadership skills needed to form, lead, and operate a small business. Emphasizes creating a vision, research, and problem solving. Lecture, team teaching, collaborative learning.

E BUA 381 Small Business Accounting and Finance. (3)
fall and spring
Accounting and finance skills needed by small business owners to acquire, allocate, and track monetary resources and evaluate performance. Lecture, team teaching, collaborative learning.

E BUA 382 Small Business Sales and Market Development. (3)
fall and spring
Building and maintaining customers, developing a market identity and a niche, and the importance of sales. Lecture, team teaching, collaborative learning.

E BUA 383 Small Business Working Relationships. (3)
fall and spring
Addresses communication and the people in a business—clients, employees, suppliers, competitors, governments, family, and self development. Lecture, team teaching, collaborative learning.

E BUA 384 Small Business Operations and Planning. (3)
fall and spring
Planning and executing plans—the what, when, where, how, and who from product/service/project idea to pay back or completion. Lecture, team teaching, collaborative learning.

E BUA 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Business Professional Development. (1)
- Professional Development. (1)

E BUA 440 Strategic Management. (3)
fall, spring, summer
Strategic formulation and administration of the total organization, including integrative analysis and strategic plan; interrelationship of business functional areas. Prerequisites: professional program business student; senior standing.

E BUA 441 Entrepreneurship and Feasibility. (3)
fall, spring, summer
Assessment of the opportunities, risks, and challenges associated with business start-up and continued operation. Prerequisites: completion of 100 hours; professional program business student. Pre- or corequisite: completion of all Business Administration core requirements.

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

REAL ESTATE (REA)

For more REA courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

E REA Note 1. In addition to individual course prerequisites, nonbusiness students must have at least a 2.50 ASU cumulative GPA, a 2.50 ASU business GPA, and 56 earned semester hours to register for any upper-division business course unless otherwise noted.

E REA 300 Real Estate Analysis. (3)
once a year
Applies economic theory and analytical techniques to real estate markets. Topics include law, finance, appraisal, market analysis, investments, development. See REA Note 1. Prerequisite: professional program business student.

E REA 331 Real Estate Finance. (3)
once a year
Legal, market, and institutional factors related to financing proposed and existing properties. Emphasizes current financing techniques and quantitative methods. See REA Note 1. Prerequisites: FIN 300; professional program business student.

E REA 401 Real Estate Appraisal. (3)
once a year
Factors affecting the value of real estate. Theory and practice of appraising and preparation of the appraisal report. Appraisal techniques. See REA Note 1. Prerequisites: REA 300; professional program business student.

E REA 441 Real Estate Land Development. (3)
once a year
Neighborhood and city growth. Municipal planning and zoning. Development of residential, commercial, industrial, and special purpose properties. See REA Note 1. Prerequisites: REA 300; professional program business student.

E REA 456 Real Estate Investments. (3)
once a year
Analyzes investment decisions for various property types. Cash flow and rate of return analysis. See REA Note 1. Prerequisites: FIN 300; professional program business student.

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

Faculty of Education

www.poly.asu.edu/ecollege/education
480/727-1103
SUTON 240E

Bette S. Bergeron, Faculty Head

Professors: Bergeron, Darst

Assistant Professors: Kulinna, Marble, Smith

Clinical Assistant Professors: Gomez, Molina-Walters, White-Taylor

Senior Lecturers: Stever, Wenhart

Lecturers: Foley, Oliver, Orlowicz, Prest, Rinkol, Rome

ELEMENTARY EDUCATION—BAE

Program Overview

The Elementary Education program at the Polytechnic campus is unique in its focus on intensive field experiences, practical application of current theory, and emphasis on technology. The curriculum is also focused on and directly aligned with Arizona's standards for teachers. Courses are arranged sequentially and taken with peer cohorts in four semester-long blocks. Each semester Elementary Education students are immersed in field experiences that directly link with course discussions and assignments. Course instructors have taught in a variety of K–8 settings and can therefore augment class experiences with practical applications. Current educational technologies are incorporated into course delivery and assignments. Additionally, students have the opportunity to choose between the daytime Elementary Education program at the Polytechnic campus or one of the campus's district-based evening cohorts.

Graduation Requirements

A total of 120 semester hours is required for graduation with a minimum of 45 semester hours of upper-division credit. As part of the undergraduate degree program, students will complete ASU General Studies (see "General Studies," page 93) requirements. In addition, Elementary Education students are required to complete 18 semester hours in an academic specialization, which is tailored to an individual student's academic strengths (e.g., math, science, social studies, English). The remaining program hours, which specifically focus on the teaching profession, are outlined below. Students must first be admitted to the Polytechnic Elementary Education program before enrolling in the Professional Preparation Program courses (Blocks I–IV).

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 93.

Foundations (15 Semester Hours)*

EDP	310	Educational Psychology *SB*	3
EDP	313	Childhood and Adolescence	3
MCE	446	Understanding the Culturally Diverse Child *C*	3
MTE	180	Theory of Elementary Mathematics	3
SPE	311	Orientation to Education of Exceptional Children *SB, C*	3

* For foundation courses, see "College of Education," page 349.

Professional Preparation Program*

Block I

EDC	320	Integrated Learning Experience I: Learning Climate	2
EDC	330	Literacy I: Emerging Literacy and Phonemic Awareness	3
EDC	354	Educational Media in the Classroom	3
EDC	355	Accommodating Instruction for Diverse Learners	3
EDC	474	Field Experience	0–1

Block II

EDC	325	Integrated Learning Experience II: Instructional Design and Implementation	2
EDC	335	Literacy II: Intermediate Literacy and Phonetic Principles	3
EDC	345	Math Methods for the Elementary Classroom	3
EDC	474	Field Experience	0–1
ELL	415	Structured English Immersion (SEI) Methods	3

Block III

EDC	420	Integrated Learning Experience III: Assessment	2
EDC	430	Literacy III: Interventions	3
EDC	440	Science Methods for the Elementary Classroom	3
EDC	450	Social Studies Methods for the Elementary Classroom	3
EDC	474	Field Experience	0–1

Block IV

EDC	425	Integrated Learning Experience IV: Professional Knowledge	2
EDC	484	Student Teaching in the Elementary School	10–12

* Block courses can only be taken upon admission to the Elementary Education program.

Postbaccalaureate Program. Individuals who hold a bachelor's degree from an accredited institution are encouraged to participate in the Elementary Education program as nondegree graduate students. Postbaccalaureate students complete the same professional preparation program courses as outlined above, which are augmented by the students' unique life and work experiences.

In addition to participation in any of the four-semester undergraduate Elementary Education programs, postbaccalaureate students also have the option of an accelerated program with a master's degree option ("TEACH ME"). For more information, call 480/727-1103.

Application. Applications for the Polytechnic Elementary Education programs are due October 15 for spring admission, and April 15 for fall admission. Students eligible for admission must meet the following criteria:

1. admission to the Polytechnic campus;
2. a minimum cumulative GPA of 2.50;
3. completion of at least 56 semester hours at the time of admission (undergraduate degree-seeking students); or, completion of a bachelor's degree from an accredited institution (postbaccalaureate students); and
4. evidence of competence in written English.

Applications must include two letters of recommendation and a résumé outlining work with school-age children and/or their families. Students seeking admission to the postbaccalaureate "TEACH ME" program must also be admitted to the Division of Graduate Studies. Students should call the Polytechnic campus Teacher Education Office at 480/727-1103 for complete admission packet information and eligibility requirements.

State Certification. Students who successfully complete the undergraduate or postbaccalaureate routes to Elementary Education teacher preparation at the Polytechnic campus are recommended for K–8 certification in the State of Arizona pending the completion of all other requirements mandated by the state. These additional requirements include, but are not limited to, successful completion of all appropriate areas of the Arizona Education Proficiency Assessment and course work in the United States and Arizona constitutions. Because of the possibility that requirements for state certification may change, students are urged to maintain close contact with their education advisor.

SECONDARY EDUCATION—BAE

Physical Education. The faculty of education offer the BAE in Secondary Education with a concentration (academic specialization) in physical education. Students interested in obtaining certification to teach physical education will major in Secondary Education with a concentration in physical education. Once all state certification requirements are met, graduates are eligible to teach physical education in grades K–12.

Graduation Requirements

A total of 120 semester hours is required for graduation, with a minimum of 45 hours of upper-division credit. As part of the undergraduate degree program, students meet the General Studies requirement (see "Meeting the General Studies Requirement," page 93). Courses specific to the physical education concentration include courses in the content core (including courses offered by Exercise and Wellness), education foundations, and in the methods of teaching physical education. The program concludes with student teaching experiences in both an elementary and junior high/high school setting.

Application. Students interested in pursuing physical education/Secondary Education need to be admitted into the Education unit before taking the methods courses (usually during the junior year). The following are requirements for admission to the physical education program:

1. completion of 56 semester hours, including core content course work in physical education/exercise and wellness (the candidate should meet directly with the advisor to determine appropriate content course work that is to be completed before formal admittance);
2. an overall 2.50 GPA within the area of concentration;

3. proficiency in written English, met in one of the following ways: (*a*) GPA of 3.00 in ENG 101 and 102 (or equivalent) or (*b*) successful completion of a writing tutorial assigned by the Education unit; and
4. formal application to the Polytechnic Education program, including two letters of recommendation and current résumé; the résumé and letters should outline the candidate's experiences with children and/or their families and show proficiency in the content (i.e., physical education).

Advising Information. Students interested in the physical education program are advised through the Education unit. Students interested in the program should contact the Polytechnic Education Office to make an appointment with an advisor. Advising is required at the time a student seeks formal admission into the methods course sequence (approximately the junior year). However, students are encouraged to seek advising from Education as soon as they decide to pursue the physical education certification program.

For the latest information about application, admissions, program requirements, and courses, access the Web site at www.poly.asu.edu/ecollege/education, or call the Polytechnic campus Teacher Education Office at 480/727-1103 or the prospective student advisor at 480/727-1745.

Physical Education. Candidates for the BAE degree are required to complete course work in foundations, exercise, and wellness (content specialization), and in teacher preparation. Students must receive a grade of "C" (2.00) or higher and maintain a cumulative GPA of at least 2.50. Specific course work includes the following:

Foundations (17 Semester Hours)*

BIO	201	Human Anatomy and Physiology I *SG* ... 4
BIO	202	Human Anatomy and Physiology II ... 4
EDP	310	Educational Psychology *SB* ... 3
EDP	313	Childhood and Adolescence ... 3
SPE	311	Orientation to Education of Exceptional Children *SB, C* ... 3

* All foundation courses must be in progress or successfully completed with a grade of "C" (2.00) or higher at the time of application to the preparation program.

Exercise and Wellness (15 Semester Hours)*

EXW	300	Foundations of Exercise and Wellness *L/SB* ... 3
EXW	310	Computer Skills and Technology for Exercise and Wellness *CS* ... 3
EXW	315	Physiological Foundations of Movement ... 3
EXW	330	Kinesiological Foundations of Movement ... 3
EXW	450	Cultural and Social Issues in Exercise and Wellness *SB, C* ... 3

* At least three EXW courses must be in progress or completed at the time of application to teacher preparation.

Teacher Preparation (42–46 Semester Hours)

Block I

PPE	210	Teaching Fitness Activities for K–12 Students* ... 2
PPE	350	Physical Education for the Elementary School ... 3
PPE	474	Field Experience in Physical Education ... 0–1

Block II

PPE	215	Teaching Team Sports* ... 2
PPE	355	Physical Education in the Secondary School ... 3
PPE	474	Field Experience in Physical Education ... 0–1
RDG	301	Literacy and Instruction in the Content Areas ... 3

Block III

PPE	294	ST: Teaching Lifetime Activities for K–12 Students* ... 2
PPE	360	Adapted and Inclusive Physical Education ... 3
PPE	480	Professional Seminar for Physical Education ... 3
PPE	484	Internship: Student Teaching in Physical Education (Elementary) ... 6
PPE	494	ST: Motor Development ... 3
Physical education elective ... 3		

Block IV

EDC	405	Classroom Management K–12 ... 3
ELL	415	Structured English Immersion (SEI) Methods ... 3
PPE	294	ST: Teaching Adventure Activities for K–12 Students* ... 2
PPE	484	Internship: Student Teaching in Physical Education (Secondary) ... 6

* A minimum of six semester hours is required for teaching activity courses; these can be substituted with EXW 212.

APPLIED BIOLOGICAL SCIENCES–BS SECONDARY EDUCATION CONCENTRATION

Program Overview

Applied Biological Sciences majors can complete requirements for state certification in Secondary Biology through a concentration in applied biological sciences/secondary education. See "Applied Biological Sciences/Secondary Education Concentration," page 220. Students complete course work in the applied biological sciences core, science content courses related to secondary biology, and courses specific to the secondary education curriculum and instruction. The program concludes with full-time student teaching in secondary science classrooms.

Graduation Requirements

A total of 120 semester hours is required for graduation with a minimum of 45 hours of upper-division credit. As part of the undergraduate degree program, students meet the General Studies requirement (see "General Studies," page 93). Courses specific to the applied biological sciences/secondary education concentration are outlined below:

Applied Biological Sciences Core

ABS	300	Environmental Biology ... 3
ABS	301	Technology and Biology ... 2
ABS	302	Ethical and Policy Issues in Biology ... 2
ABS	350	Applied Statistics or equivalent *CS* ... 3
BIO	187	General Biology I *SG* ... 4
BIO	188	General Biology II *SQ* ... 4
BIO	340	General Genetics ... 4
MAT	210	Brief Calculus *MA* ... 3
Choose one course ... 3 or 4		
ABS	311	Applied Cellular Biology (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 93.

ABS 312 Structure and Function (4)	
Choose one course	3 or 4
BIO 360 Animal Physiology (3)	
—*or*—	
PLB 308 Plant Physiology (4)	
Total	31–33

For students choosing the secondary education concentration, the following courses must be used as General Studies courses in order to graduate in 120 hours:

ABS 350 Applied Statistics *CS*[1]	3
BIO 187 General Biology I *SG*	4
BIO 188 General Biology II *SQ*	4
MAT 210 Brief Calculus *MA*	3

Applied Biological Sciences/Secondary Education Concentration

ABS 207 Applied Plant Taxonomy or ABS 355 Vertebrate Zoology (4)	3
ABS 370 Ecology	3
ABS 490 Applied Biological Sciences Seminar	1
CHM 113 General Chemistry I *SQ*	4
CHM 116 General Chemistry II *SQ*	4
MIC 205 Microbiology *SG*[2]	3
MIC 206 Microbiology Laboratory *SG*[2]	1
PHY 101 Introduction to Physics *SQ*	4
Upper-division electives	2
Total	25–26

Secondary Education Course Work

BIO 480 Methods of Teaching Biology	3
BIO 482 Advanced Methods of Teaching Biology	3
EDC 354 Educational Media in the Classroom	3
EDC 494 ST: Professional Knowledge	2
EDP 310 Educational Psychology *SB*	3
EDP 313 Childhood and Adolescence	3
RDG 301 Literacy and Instruction in the Content Areas	3
SDE 474 Field Experience	0–1
SDE 484 Student Teaching in Secondary Schools	10–12
SED 403 Middle and Secondary School Principles, Curricula, and Methods	3
SPE 394 ST: Inclusion Practices at the Secondary Level	3
Total	36–39
Concentration total	61–65

[1] An equivalent course may be taken in place of ABS 350.

[2] Both MIC 205 and 206 must be taken to secure SG credit.

Strongly Recommended

MCE 446 Understanding the Culturally Diverse Child *C*	3
SPE 311 Orientation to Education of Exceptional Children *SB, C*	3

The Arizona Department of Education requires the following courses for certification; these courses must be completed before the Education unit can submit an Institutional Recommendation for certification:

EDC 405 Classroom Management K–12	3
ELL 415 Structured English Immersion (SEI) Methods	3

Application

Students interested in pursuing the applied biological sciences/secondary education concentration need to be admitted into the Education unit before taking the secondary methods courses (usually during the junior year). The following requirements for admission to the applied biological sciences/secondary education concentration mirror those of acceptance into other education programs at the Polytechnic campus. Requirements for entry include

1. completion of 56 semester hours;
2. a 2.50 cumulative GPA;
3. a 2.50 GPA within the major (Applied Biological Sciences);
4. proficiency in written English, met in one of the following ways: (*a*) GPA of 3.00 in ENG 101 and 102 (or equivalent) or (*b*) successful completion of a written proficiency exam; and
5. formal application to the Polytechnic campus Education program, including two letters of recommendation and current résumé; the résumé and letters should outline the candidate's experiences with adolescents and/or their families and show proficiency in the content (i.e., applied biological sciences).

Advising Information

Students interested in the applied biological sciences/secondary education concentration must participate in dual advising—in applied biological sciences and in education. Education advising is required at the time a student seeks admission to the Education unit. However, students are encouraged to seek advising from Education as soon as they decide to pursue the secondary education concentration. For more information about application, admission, program requirements, and courses, visit the Polytechnic campus Education Office, SUTON 240E, call 480/727-1103, or access the Web site at www.poly.asu.edu/ecollege/education.

EARLY CHILDHOOD EAST (EAC)

E EAC 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.

EDUCATION EAST (EDC)

E EDC 320 Integrated Learning Experience I: Learning Climate. (2)
fall and spring
Explores factors contributing to a positive and productive classroom learning environment. Interactive forum.

E EDC 325 Integrated Learning Experience II: Instructional Design and Implementation. (2)
fall and spring
Design and implementation of developmentally appropriate instruction, and the alignment of instruction with district and state academic standards. Interactive forum. Prerequisite: EDC 320.

E EDC 330 Literacy I: Emerging Literacy and Phonemic Awareness. (3)
fall and spring
Development of language from birth to age 8, and appropriate strategies for promoting growth in speaking, listening, reading, and writing. Applied inquiry. Corequisite: EDC 474.

E EDC 335 Literacy II: Intermediate Literacy and Phonetic Principles. (3)
fall and spring
Strategies for teaching literacy in intermediate elementary classrooms, the application of phonetic principles to instruction, and integrating literacy across disciplines. Applied inquiry. Prerequisite: EDC 330. Corequisite: EDC 474. Pre- or corequisite: EDC 325.

E EDC 340 Writing and the Professional Educator. (3)
fall and spring
Professional writing focused on foundational issues in education, including the culture of schooling, current social contexts, and educational law.
General Studies: L

E EDC 345 Math Methods for the Elementary Classroom. (3)
fall and spring
Developmentally appropriate practices for teaching and assessing mathematics in grades K–8. Applied inquiry. Fee. Prerequisite: MTE 180. Corequisite: EDC 474. Pre- or corequisite: EDC 325.

E EDC 350 Educational Technology I: Applications. (1)
fall and spring
Module focused on basic technological skills needed for managing classroom instruction. Lab.

E EDC 351 Educational Technology II: Instruction and Evaluation. (1)
fall and spring
Module focused on technology as an instructional medium, evaluation, and effective classroom use. Lab. Prerequisite: EDC 350.

E EDC 352 Educational Technology III: Design. (1)
fall and spring
Module focused on instructional design utilizing a variety of technologies, including multimedia. Lab. Prerequisite: EDC 351.

E EDC 354 Educational Media in the Classroom. (3)
fall and spring
Designing and implementing educational media into the K–12 curriculum. Includes instructional design, evaluation of sources, and introduction to multimedia applications. Prerequisite: acceptance into teacher preparation program.

E EDC 355 Accommodating Instruction for Diverse Learners. (3)
fall and spring
Identifying and accommodating learners with special needs, including classroom adaptations in instruction and assessment. Forum, practicum. Prerequisite: SPE 311. Corequisite: EDC 474. Pre- or corequisite: EDC 325.

E EDC 405 Classroom Management K–12. (3)
fall, spring, summer
Strategies for effective classroom management in K–12 schools. Includes models, application, and evaluation of a variety of management systems. Prerequisite: admittance to a teacher education program or instructor approval.

E EDC 420 Integrated Learning Experience III: Assessment. (2)
fall and spring
Principles related to classroom assessment, including the alignment of assessment to curriculum, test interpretation, and a variety of assessment techniques. Interactive forum. Prerequisite: EDC 325.

E EDC 425 Integrated Learning Experience IV: Professional Knowledge. (2)
fall and spring
Explores issues related to professional knowledge, including interdisciplinary instruction and the impact of the community on students' learning. Interactive forum. Prerequisite: EDC 420. Corequisite: EDC 484.

E EDC 430 Literacy III: Interventions. (3)
fall and spring
Strategies for accommodating students struggling with learning, with a focus on the areas of literacy acquisition and assessment. Forum, practicum. Prerequisites: EDC 335, 355. Corequisite: EDC 474. Pre- or corequisite: EDC 420.

E EDC 440 Science Methods for the Elementary Classroom. (3)
fall and spring
Developmentally appropriate practices for teaching and assessing sciences in grades K–8. Applied inquiry. Fee. Prerequisites: EDC 325, 345. Corequisite: EDC 474. Pre- or corequisite: EDC 420.

E EDC 450 Social Studies Methods for the Elementary Classroom. (3)
fall and spring
Developmentally appropriate practices for teaching and assessing social studies in grades K–8. Applied inquiry. Prerequisites: EDC 325, 335. Corequisite: EDC 474. Pre- or corequisite: EDC 420.

E EDC 455 Diverse Learners in the K–8 Classroom. (3)
fall, spring, summer
Identifies and implements instructional practices for students with diverse needs in the elementary classroom. Laws related to special populations. Interactive forum. Prerequisite: approval of the East Education Office.

E EDC 460 Principles of Curriculum and Instruction in the K–8 Classroom. (3)
fall, spring, summer
Current research and practices related to the K–8 curriculum, including application of motivation and learning theories, lesson development, and assessment. Interactive forum. Prerequisite: approval of the East Education Office.

E EDC 465 Literacy Instruction in the K–8 Classroom. (3)
fall, spring, summer
Principles of a developmentally appropriate elementary literacy curriculum and related instructional practices. Encompasses reading, language arts, writing, and oral expression. Interactive forum. Prerequisite: approval of the East Education Office. Corequisite: EDC 474.

E EDC 474 Field Experience. (0–1)
fall and spring
Applies course content in a K–8 school. Emphasizes observation, classroom management, planning and delivery of instruction, and assessment. Practicum. Fee. Corequisite: all methods courses in the teacher preparation program must be taken with Field Experience.

E EDC 475 Social Studies Instruction in the K–8 Classroom. (3)
fall, spring, summer
Principles of a developmentally appropriate social studies curricula and related instructional practices. Emphasizes cultural diversity and implications of a global society. Interactive forum. Prerequisite: approval of the East Education Office.

E EDC 480 Theory of Mathematics and Science Instruction. (3)
fall, spring, summer
Examines theoretical and conceptual frameworks of elementary mathematics and science instruction. Emphasizes academic content standards and prerequisite knowledge. Fee. Prerequisite: approval of the East Education Office.

E EDC 484 Student Teaching in the Elementary School. (10–12)
fall and spring
Supervised teaching in the area of specialization. Capstone internship in curriculum, instruction, and classroom management. Internship. Fee. Prerequisites: 2.50 GPA; completion of professional course sequence; approval of the East Education Office. Corequisite: EDC 425.

E EDC 485 Science Instruction in the K–8 Classroom. (3)
fall, spring, summer
Principles of a developmentally appropriate science curricula and related instructional practices, with an emphasis on learner-centered methodologies. Fee. Prerequisites: EDC 480 (or instructor approval); approval of the East Education Office. Corequisite: EDC 474.

E EDC 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Professional Knowledge

E EDC 495 Mathematics Instruction in the K–8 Classroom. (3)
fall, spring, summer
Principles of a developmentally appropriate mathematics curricula and related instructional practices, including a range of learning theories and their application. Fee. Prerequisites: EDC 480 (or instructor approval); approval of the East Education Office. Corequisite: EDC 474.

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 93.

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.

ENGLISH AS A SECOND LANGUAGE (ELL)

E ELL 405 Language Minority Education. (3)
fall, spring, summer
Historical, philosophical, theoretical, pedagogical, and legal foundations of language minority education in the United States. Credit is allowed for only ELL 405 or 505.

E ELL 410 Linguistics: First - and Second-Language Acquisition and Use. (3)
fall, spring, summer
Examines current theories of first- and second-language acquisition and use and their application to ELL pedagogical contexts. Credit is allowed for only ELL 410 or 510.

E ELL 415 Structured English Immersion (SEI) Methods. (3)
fall, spring, summer
Prepares preservice teachers for linguistically diverse classrooms in which there are English Language Learners (ELLs) learning through Structured English Immersion (SEI) methodology. Focuses primarily on SEI strategies. Credit is allowed for only ELL 415 or 515.

E ELL 416 Advanced SEI Methods for ELLs. (3)
fall, spring, summer
More fully prepares teachers for linguistically diverse classrooms in which there are students learning through SEI methodology. Credit is allowed for only ELL 416 or 516. Prerequisite with a grade of "C" or higher: ELL 415.

E ELL 420 Literacy Methods for English Language Learners (ELLs). (3)
fall, spring, summer
Teaching reading and writing to English Language Learners (ELLs) with emphasis on integrated curriculum and literature-based instruction. Credit is allowed for only ELL 420 or 520.

E ELL 425 Assessment and Evaluation for English Language Learners (ELLs). (3)
fall, spring, summer
Discusses assessment methods for English Language Learners (ELLs) in the K–12 classroom through psychometric and sociocultural models of assessment. Credit is allowed for only ELL 425 or 525.

E ELL 430 Community and Parental Involvement in Language Minority Education. (3)
fall, spring, summer
Introduction to home-school collaboration using historical, educational, psychological, ethnic-social diversity, and sociological perspectives.

E ELL 445 Practicum with English Language Learners (ELLs). (3)
fall, spring, summer
Pairs students seeking a full ESL endorsement with full ESL-endorsed classroom teachers. Addresses areas including second language acquisition and development, assessment, and pedagogy. Practicum.

E ELL 484 Internship. (1–12)
selected semesters

E ELL 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.

INSTRUCTIONAL MEDIA (IMD)

E IMD 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.

PHYSICAL EDUCATION EAST (PPE)

E PPE 210 Teaching Fitness Activities for K–12 Students. (2)
fall, spring, summer
Practical application of biomechanical, physiological, psychological, and learning principles in the analysis of skill acquisition and performance. Integrated lecture/lab. Fee.

E PPE 215 Teaching Team Sports. (2)
fall, spring, summer
Practical application of biomechanical, physiological, psychological, and learning principles in the analysis of skill acquisition and performance. Integrated lecture/lab. Fee.

E PPE 294 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Teaching Adventure Activities for K–12 Students
- Teaching Lifetime Activities for K–12 Students

E PPE 350 Physical Education for the Elementary School. (3)
fall and spring
Scope and values of physical in elementary schools. Methods, materials, and practices in teaching for primary through upper grades. Integrated lecture/lab. Fee. Credit is allowed for only PPE 350 or 550. Prerequisite: field experience or instructor approval.

E PPE 355 Physical Education in the Secondary School. (3)
fall and spring
Current trends and theories such as elective programs, coed classes, legal issues, contract teaching, curriculum, and administration. Integrated lecture/lab. Fee. Credit is allowed for only PPE 355 or 555. Prerequisite: field experience or instructor approval.

E PPE 360 Adapted and Inclusive Physical Education. (3)
fall, spring, summer
Teaching individuals with disabilities physical skills and activities. Integrated lecture/lab. Credit is allowed for only PPE 360 or 560. Prerequisite: SPE 311 (or its equivalent).

E PPE 365 Teaching Physical Activity Concepts. (3)
fall, spring, summer
Teaching physical activity concepts in PE settings. Analyzes and critiques state and national physical education standards. Integrated lecture/lab. Credit is allowed for only PPE 365 or 565. Prerequisites: ENG 101, 102; EXW 300 (or its equivalent).

E PPE 370 Research on Teacher Education in Physical Education. (3)
fall, spring, summer
Discusses current research on teacher education across fields, with an emphasis on physical education pedagogy. Integrated lecture/lab. Credit is allowed for only PPE 370 or 570. Prerequisites: ENG 101, 102; EXW 300 (or its equivalent).

E PPE 375 Coaching Methods for Youth Sports. (3)
fall, spring, summer
Scope and values of coaching K–12. Methods, materials, and practice in coaching philosophy. Best practices and activities for grades K–12. Integrated lecture/lab. Credit is allowed for only PPE 375 or 575. Prerequisite: instructor approval.

E PPE 474 Field Experience in Physical Education. (0–1)
fall and spring
Analyzes course content in an elementary/secondary school setting. Emphasizes observation, pupil management, planning and delivering instruction and assessment. Practicum. Fee. Corequisite: PPE 350 or 355 or instructor approval.

E PPE 480 Professional Seminar for Physical Education. (3)
fall and spring
Methods of instruction, organization, and presentation of appropriate content in elementary and secondary physical education. Integrated lecture/lab. Prerequisites: PPE 350, 355. Corequisite: PPE 484.

E PPE 484 Internship. (1–12)
fall and spring
Practice of teaching. Relationship of practice and theory in teaching physical education. Internship. Fee. Prerequisites: PPE 350, 355. Corequisite: PPE 480.

E PPE 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Motor Development

E PPE 495 Research on Teaching in Physical Education. (3)
fall, spring, summer
Contemporary research and theory on teaching across fields with an emphasis on physical education pedagogy; provides a practical research experience. Integrated lecture/lab. Prerequisite: EXW 300 (or its equivalent).

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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

SCIENCE EDUCATION (SCI)

E SCI 294 Special Topics. (1–4)
selected semesters

E SCI 484 Internship. (1–12)
selected semesters

E SCI 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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

SECONDARY EDUCATION EAST (SDE)

E SDE 194 Special Topics. (1–4)
selected semesters

E SDE 294 Special Topics. (1–4)
selected semesters

E SDE 394 Special Topics. (1–4)
selected semesters

E SDE 484 Internship. (1–12)
selected semesters
Topics may include the following:
- Student Teaching in Secondary Schools (10–12)

E SDE 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/catalog 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 EAST (SPC)

E SPC 294 Special Topics. (1–4)
selected semesters

E SPC 484 Internship. (1–12)
selected semesters

E SPC 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/catalog 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 Exercise and Wellness

www.poly.asu.edu/ecollege/wellness
480/727-1945
EAW 109

William J. Stone, Chair

Professor: Stone

Associate Professors: Swan, Tudor-Locke

Assistant Professor: Adams

Senior Lecturer: Woodruff

Lecturer: Sebren

EXERCISE AND WELLNESS—BS

The BS degree in Exercise and Wellness offers two concentrations: (1) exercise and wellness and (2) health promotion. Exercise and Wellness students study physical activity and healthy lifestyles as they relate and contribute to optimal health and wellness. The exercise and wellness concentration is designed to prepare professionals and scholars in exercise and physical activity leadership as well as in wellness education. Areas of study include the kinesiological and physiological foundations of physical activity, exercise testing and prescription, as well as nutrition, stress management, social/cultural issues, and factors involved in health behavior change. The health promotion concentration is designed to prepare professionals and scholars in health and wellness promotion and disease prevention and management. Areas of study include epidemiology, health behavior change, prevention of chronic disease, program development and evaluation, as well as nutrition, stress management, social/cultural issues, and substance abuse. Students in both concentrations are exposed to the latest research and practice designed to enhance fitness, wellness, and healthy living, including both laboratory and field experiences. A unique aspect of both degree options in the Exercise and Wellness program is an outstanding internship program that provides preprofessional experience in all segments of fitness, wellness, health promotion, and 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 93.

allied health professions in metropolitan Phoenix or elsewhere in the country.

Career opportunities range broadly across the several sectors of the industry related to fitness, wellness, health promotion, and the health professions. Those settings include worksite/corporate, clinical/medical, community/educational, and the private/commercial sector. The degree is also ideal preparation for advanced study in health professions such as cardiopulmonary rehabilitation, physical therapy, and athletic training, as well as graduate study in exercise and wellness and public health.

Graduation Requirements

A total of 120 semester hours is required for graduation with a minimum of 45 semester hours of upper-division credit. As part of the undergraduate degree program, students complete ASU General Studies requirements. For a list of courses that meet ASU General Studies requirements, see "General Studies," page 93.

Exercise and Wellness students are required to complete the following courses:

Required Core Courses

EXW	300	Foundations of Exercise and Wellness *L/SB* ... 3
EXW	310	Computer Skills and Technology for Exercise and Wellness *CS* ... 3
EXW	320	Program Development and Leadership ... 3
EXW	342	Health Behavior Change ... 3
EXW	400	Stress Management for Wellness ... 3
EXW	450	Cultural and Social Issues in Exercise and Wellness *SB, C* ... 3
EXW	484	Exercise and Wellness Internship ... 6
NTR	241	Human Nutrition ... 3
Total		... 27

Each EXW core course has specific prerequisite courses that must be taken before taking the respective core course. These prerequisite courses include the following:

BIO	201	Human Anatomy and Physiology I *SG* ... 4
BIO	202	Human Anatomy and Physiology II ... 4
CHM	101	Introductory Chemistry *SQ* ... 4
		or any equivalent chemistry course
COM	225	Public Speaking *L* ... 3
PGS	101	Introduction to Psychology *SB* ... 3
Total		... 18

Exercise and Wellness Concentration. The following EXW courses are required of all students in the exercise and wellness concentration:

EXW	212	Instructional Competency Laboratory ... 6
EXW	315	Physiological Foundations of Movement ... 3
EXW	330	Kinesiological Foundations of Movement ... 3
EXW	420	Exercise Testing ... 3
EXW	425	Exercise Prescription ... 3
Elective*		... 3
Total		... 21

* Three semester hours must be selected from an approved list of concentration electives.

Health Promotion Concentration. The following EXW courses are required of all students in the health promotion concentration:

EXW	325	Fitness for Life ... 3
EXW	346	Health Promotion and Program Evaluation ... 3
EXW	350	Substance Abuse and Addictive Behavior ... 3
EXW	442	Physical Activity in Health and Disease *L* ... 3
EXW	444	Epidemiology ... 3
Elective*		... 6
Total		... 21

* Six semester hours must be selected from an approved list of concentration electives.

WELLNESS FOUNDATIONS MINOR

The minor in Wellness Foundations is appropriate for students in the BIS degree program. It consists of the following plus all prerequisite courses:

EXW	300	Foundations of Exercise and Wellness *L/SB* ... 3
EXW	325	Fitness for Life ... 3
EXW	342	Health Behavior Change ... 3
EXW	450	Cultural and Social Issues in Exercise and Wellness *SB, C* ... 3
EXW electives*		... 6
Total		... 18

* Six semester hours must be selected from an approved list of EXW electives. See an advisor for a list of approved electives.

BIS CONCENTRATION

A concentration in wellness foundations 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 139.

APPLIED SCIENCE—BAS

The Bachelor of Applied Science (BAS) degree is a capstone degree for the Associate of Applied Science (AAS) degree. The BAS degree exposes students to advanced concepts and diverse critical thinking skills to prepare them for future career opportunities and professional advancement.

Admission

Admission to the BAS degree program is restricted to students holding an AAS degree from a regionally accredited U.S. postsecondary educational institution. A GPA of 2.00 or higher is required for all resident applicants and 2.50 for nonresident applicants.

BAS Degree Graduation Requirements

The BAS degree program consists of 60 semester hours of upper-division courses, with 30 semester hours in residence. An overall GPA of 2.00 or higher is required.

AAS degree	60
Assignable credit	5
BAS core	15
Concentration	21

General Studies	19
Total	120

General Studies Curriculum. The BAS curriculum builds on the general education content of the AAS degree. Additional General Studies courses are taken in the core or concentration. General Studies courses focus on contextual learning.

L	3
MA	3
HU	3
HU or SB	3
SB	3
SG	4
Total	19

Assignable Credit. Assignable credit allows space in the curriculum for an internship requirement.

BAS Core

EXW	300	Foundations of Exercise and Wellness *L/SB* 3
EXW	310	Computer Skills and Technology for Exercise and Wellness *CS* 3
EXW	320	Program Development and Leadership 3
EXW	325	Fitness for Life 3
EXW	346	Health Promotion and Program Evaluation 3
Total		15

Wellness Concentration. The wellness concentration is designed to prepare professionals in the area of wellness promotion and disease prevention and management.

Wellness Concentration

EXW	342	Health Behavior Change 3
EXW	350	Substance Abuse and Addictive Behavior 3
EXW	400	Stress Management for Wellness 3
EXW	442	Physical Activity in Health and Disease *L* 3
EXW	444	Epidemiology 3
EXW	450	Cultural and Social Issues in Exercise and Wellness *SB, C* 3
EXW 300- or 400-level elective		3
Total		21

CERTIFICATE IN SPA MANAGEMENT

The Spa Management Certificate program is a nondegree, 34-semester-hour program designed to prepare students for careers in spa administration. The program was designed and implemented in response to a rapidly growing spa industry, which has identified a real need for more directors, assistant directors, and supervisors, and for management candidates with formal education and training in spa administration. The required courses meet a comprehensive list of core competencies identified by the spa industry and an advisory committee of spa directors. This certificate is recognized by the International Spa Association, and it significantly enhances a graduate's opportunity for placement and advancement within the industry.

Admission to the certificate program is based on a rubric that includes higher education credits, GPA, work experience, résumé, references, and a letter of intent.

Required Courses

BUA	330	Organizational Leadership 3
BUA	381	Small Business Accounting and Finance 3
BUA	382	Small Business Sales and Market Development 3
BUA	383	Small Business Working Relationships 3
EXW	325	Fitness for Life 3
EXW	400	Stress Management for Wellness 3
EXW	484	Exercise and Wellness Internship 6
EXW	498	Pro Seminar: Spa Management I 2
HHS	300	Overview of Complementary Health Systems 3
NTR	345	Development of Healthy Cuisines 3
WED	165	Overview of Massage Therapy* 2
Total		34

* This course is offered through Chandler-Gilbert Community College.

Students must receive a grade of "C" (2.00) or higher in every course to earn the certificate. Any course in which a student fails to earn a "C" (2.00) or higher must be repeated.

GRADUATE PROGRAMS

The faculty offer programs leading to the MS degree in Exercise and Wellness. The department also participates with the Division of Graduate Studies and College of Education in the program leading to the PhD degree in Curriculum and Instruction with a concentration in exercise and wellness. See the *Graduate Catalog* for requirements.

EXERCISE AND WELLNESS (EXW)

E EXW Note 1. A $5.00 towel and locker fee is required each semester by students using towel and locker facilities for physical activity courses.

E EXW Note 2. Physical activity instruction courses (EXW 105, 205, 305) may not be taken for audit. Excessive absences and/or tardiness are considered disruptive behavior.

E EXW 100 Introduction to Health and Wellness. (3)
fall and spring
Current concepts in health, exercise, and wellness. Emphasis placed on personal health, theories, attitudes, beliefs, and behaviors. Cross-listed as HES 100/KIN 100. Credit is allowed only for EXW 100 or HES 100 or KIN 100.
General Studies: SB

E EXW 105 Physical Activity Instruction: Beginning. (1)
fall, spring, summer
Beginning instruction in a variety of physical activities such as aerobics, aquatics, racquet sports, physical conditioning, and golf. "Y" grade only. May be repeated for credit. 2 hours per week. Activity. Fee. See EXW Notes 1, 2.

E EXW 205 Physical Activity Instruction: Intermediate. (1)
fall, spring, summer
Intermediate-level instruction in a variety of physical activities. Continuation of EXW 105. "Y" grade only. May be repeated for credit. 2 hours per week. Activity. Fee. See EXW Notes 1, 2.

E EXW 212 Instructional Competency Laboratory. (2)
fall, spring, summer
Methods of instructing and leading fitness activities, including aerobic, resistance, and flexibility activities. May be repeated for credit. Integrated lecture lab. See EXW Note 1. Prerequisite: Exercise and Wellness major.

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 93.

E EXW 215 Physical Activity and Healthy Lifestyles. (1)
fall, spring, summer
Applies principles of physical activity to personal fitness testing and program planning for people of all ages. Telecampus course. Not open to Exercise and Wellness majors or to students who have credit for EXW 325.

E EXW 300 Foundations of Exercise and Wellness. (3)
fall, spring, summer
Analyzes research in various disciplines that contribute to health promotion and wellness.
General Studies: L/SB

E EXW 301 Concepts of Fitness and Wellness. (1)
fall, spring, summer
Guidelines for achieving health benefits of physical activity and other healthy lifestyles. Telecampus course. Not open to Exercise and Wellness majors or to students who have credit for EXW 325.

E EXW 302 Fundamentals of Wellness. (3)
fall and spring
Overview of fundamental health, exercise and wellness concepts. Emphasizes personal wellness assessment and application. Prerequisites: ENG 101, 105 (or 107).

E EXW 305 Physical Activity Instruction: Advanced. (1)
fall and spring
Advanced-level instruction in a variety of physical activities. Continuation of EXW 105. May be repeated for credit. "Y" grade only. 2 hours per week. Activity. Fee. See EXW Notes 1, 2.

E EXW 310 Computer Skills and Technology for Exercise and Wellness. (3)
fall, spring, summer
Applies computer technology to principles of social marketing, tailored communication, e-heath consumerism, and statistical analysis. Integrated lecture/lab. Prerequisite: MAT 142.
General Studies: CS

E EXW 311 Special Populations in Exercise and Wellness. (3)
fall
Introduces the challenged population and surveys the agencies that work with special populations.

E EXW 315 Physiological Foundations of Movement. (3)
fall and spring
Studies human movement with emphasis on physiological function of the body in response to physical activity and fitness training. Lecture, lab. Fee. Prerequisites: BIO 201, 202.

E EXW 320 Program Development and Leadership. (3)
fall and spring
Principles of planning, organizing, promoting, and leading fitness and wellness programs. Prerequisites: COM 225; Exercise and Wellness major.

E EXW 325 Fitness for Life. (3)
fall, spring, summer
Physical fitness and benefits of exercise with emphasis on self-evaluation and personalized program planning for a lifetime. Not open to students who have credit for EXW 215 or 301.

E EXW 330 Kinesiological Foundations of Movement. (3)
fall and spring
Studies and considers human movement with emphasis on kinesiology principles and their application to movement and fitness. Lecture, lab. Prerequisites: BIO 201, 202.

E EXW 342 Health Behavior Change. (3)
fall, spring, summer
Examines major theories of health behavioral change. Develops intervention strategies and techniques employed to facilitate health behavioral change. Prerequisite: PGS 101.

E EXW 346 Health Promotion and Program Evaluation. (3)
spring
Introduces and applies theory-based concepts and methods of health promotion and program evaluation. Lecture, online study. Prerequisite: EXW 342. Pre- or corequisites: EXW 300, 310.

E EXW 350 Substance Abuse and Addictive Behavior. (3)
spring
Studies addictive substances, their pharmacology and effects. Psychosocial risk factors for, and consequences of, substance abuse. Lecture, discussion, individual and group study.

E EXW 380 Body Image and Wellness. (3)
fall and spring
Explores body image in American culture from physical, psychological, historical, and societal perspectives. Prerequisites: NTR 241; PGS 101.

E EXW 400 Stress Management for Wellness. (3)
fall, spring, summer
Examines the stress response and management from a behavioral perspective as it pertains to individuals or groups. Prerequisite: PGS 101.

E EXW 420 Exercise Testing. (3)
fall and spring
Theoretical basis and practical application of pre-exercise screening, exercise testing, estimates of energy expenditure, and interpretation of results. Lecture, lab. Fee. Prerequisites: EXW 315; current CPR certification.

E EXW 425 Exercise Prescription. (3)
fall and spring
Theoretical basis for and application of general principles of exercise prescription to various ages, fitness levels, and health states. Prerequisites: EXW 320, 330. Pre- or corequisite: EXW 420.

E EXW 442 Physical Activity in Health and Disease. (3)
spring
Examines the role of physical activity and fitness in the development of morbidity and mortality throughout the human life span. Prerequisite: EXW 315.
General Studies: L

E EXW 444 Epidemiology. (3)
fall
Introduces epidemiological concepts and research literature, including physical activity, nutrition, tobacco, alcohol, injury prevention, and safe sex. Prerequisites: EXW 300, 310, 320. Pre- or corequisites: EXW 325, 350.

E EXW 450 Cultural and Social Issues in Exercise and Wellness. (3)
fall and spring
Examines contemporary sociocultural issues and social determinants of health and physical activity. Focuses on health disparities, obesity, and social stressors. Prerequisites: EXW 300; PGS 101.
General Studies: SB, C

E EXW 460 Resistance Training Application and Theory. (3)
fall
Fosters critical thinking as it applies to resistance training theory. Pre- or corequisite: EXW 315.

E EXW 484 Exercise and Wellness Internship. (6)
fall, spring, summer
Supervised practicum experience in approved exercise and wellness/health promotion agencies. Field work. Prerequisites: EXW 315, 320, 420. Pre- or corequisite: EXW 425.

E EXW 498 Pro-Seminar. (1–7)
selected semesters
Topics may include the following:

- Spa Management I. (2)
  fall and spring
  Provides an overview of the spa industry, programs and services typically found in different types of spas, operational systems and procedures, spa equipment and facility issues, financial issues, human resource issues, marketing for spas, computer software for spa operations, and other key administrative competencies specific to the spa industry.

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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

Faculty of Human Health Studies

www.poly.asu.edu/ecollege/humanhealth
480/727-1333
WANER Third Floor

William L. Mermis, Faculty Head

HUMAN HEALTH STUDIES—BA AND BS

The baccalaureate degrees in human health studies examine the multiple dimensions of human health, including psychological, social, biological, spiritual, economic, and emotional dimensions. Different perspectives on health and health care are examined as well as how those perspectives influence changes in belief structures and behavior. Students engage in a critical examination of the alternative approaches to health care and health promotion.

The degrees in human health studies provide students with the general knowledge and intellectual competencies to pursue many different careers and graduate studies in human services or health professions. Students planning to seek admission to medical school or other postbaccalaureate practitioner training that requires an extensive background in mathematics and science benefit from the BS program.

Graduation Requirements

To graduate with either a BA or a BS in Human Health Studies, students must complete a minimum of 120 semester hours (45 upper–division hours), including the university General Studies requirements. Both the BA and BS degree programs require 45 semester hours of major requirements consisting of a 15-semester-hour core of Human Health Studies courses, a 12-semester-hour concentration, and 18 semester hours of related course work.

The difference between the BA and BS programs lies in the mathematics and science requirements. Both BA and BS students must take one semester of general biology with a lab and two semesters of human anatomy and physiology with labs. The BS program requires additional mathematics courses (through brief calculus) and the following science courses:

CHM 113 General Chemistry I *SQ* 4
CHM 116 General Chemistry II *SQ* 4
CHM 233 General Organic Chemistry I 3
CHM 234 General Organic Chemistry II 3
CHM 237 General Organic Chemistry Laboratory I 1
CHM 238 General Organic Chemistry Laboratory II 1
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

* Both PHY 111 and 113 or 112 and 114 must be taken to secure SQ credit.

HUMAN HEALTH STUDIES (HHS)

E HHS 100 Introduction to Holistic Health. (3)
selected semesters
Studies holistic health in a bio-psycho-socio-cultural context for health promotion and wellness.

E HHS 194 Special Topics. (1–4)
selected semesters

E HHS 294 Special Topics. (1–4)
selected semesters

E HHS 300 Overview of Complementary Health Systems. (3)
selected semesters
Identifies and describes major approaches to complementary health models in the context of holistic health. Prerequisite: HHS 100.

E HHS 302 Evidence-Based Complementary Health Modalities. (3)
selected semesters
Investigates complementary practices in the context of scholarly knowledge and standards for health care. Prerequisite: HHS 100.

E HHS 394 Special Topics. (1–4)
selected semesters

E HHS 400 Community-Based Complementary Health Services. (3)
selected semesters
Examines recent developments in community-based health and human services from a holistic perspective. Lecture, service learning. Prerequisite: HHS 100.

E HHS 402 Work, Health, and the Family. (3)
selected semesters
Examines issues and programs in the contemporary workplace and society. Future directions for the family and its health.

E HHS 403 Community Mental Health and Human Services. (3)
selected semesters
Examines concepts, issues, and programs in community mental health and the delivery of human services.

E HHS 405 Seminar in Holistic Health. (3)
selected semesters
Integrates concepts and issues in holistic health within philosophical, historical, political, economic, and cultural frameworks. Prerequisite: HHS 100.

E HHS 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.

Faculty of Multimedia Writing and Technical Communication

www.poly.asu.edu/ecollege/multimedia
480/727-1287
SUTON Third Floor

Barry M. Maid, Faculty Head

Professor: Maid

Associate Professor: Stone

Lecturer: D'Angelo

MULTIMEDIA WRITING AND TECHNICAL COMMUNICATION—BS

In the Multimedia Writing and Technical Communication program, students learn how to produce, design, and manage information using traditional and leading edge technologies. Students

1. learn to communicate, orally and in writing, across audiences and cultures;
2. become aware of issues of ethics in technical communications;
3. gain an awareness of the global nature of technical communication—culturally and economically—and develop the ability to evaluate print, oral, and electronic sources;
4. gain an understanding of appropriate technical genres and learn to demonstrate technical editing skills in all work; and
5. become able to incorporate appropriate visual elements and design in written documents and oral presentations and to work in appropriate media.

The program serves students who wish to pursue careers as technical writers, technical editors, Web page and intranet page designers, multimedia designers, desktop publishers, publications managers, and information designers.

GRADUATION REQUIREMENTS

To graduate with a BS degree in Multimedia Writing and Technical Communication, students must complete a minimum of 120 semester hours, including university graduation requirements and the requirements of the major.

Multimedia Writing and Technical Communication Core

TWC 301 General Principles of Multimedia Writing *L*	3
TWC 401 Principles of Technical Communication *L*	3
TWC 411 Principles of Visual Communication *L*	3
TWC 421 Principles of Writing with Technology *L*	3
TWC 431 Principles of Technical Editing *L*	3
TWC 490 Capstone	3
Total	18

Major Electives. Fifteen semester hours are considered electives in the major (TWC). At least six of which need to be in genre courses, such as TWC 443 Proposal Writing or TWC 447 Business Reports. An Internship (TWC 484) or supervised work experience is strongly recommended.

For information about program requirements and courses, access the Web at www.poly.asu.edu/ecollege, or call an East College advisor at 480/727-1333.

Related Area. Students select a related area consisting of 12 semester hours of study in one other discipline. At least nine of these 12 semester hours must be in the upper division. Suggested disciplines might be, but are not limited to, applied psychology, business administration, or computer graphics. Students, with the help of an advisor, may also develop a coherent interdisciplinary related area.

BACHELOR OF APPLIED SCIENCE—BAS

A Bachelor of Applied Science is also offered with a concentration in multimedia writing and technical communication. The BAS degree is a "capstone" degree for the Associate of Applied Science degree. The BAS degree exposes students to advanced concepts and diverse critical thinking skills that prepare them for future career opportunities and professional advancement..

Admission. Admission to the BAS degree program is restricted to students holding an AAS degree or equivalent from a regionally accredited U.S. postsecondary educational institution. A GPA of 2.00 or higher is required for all resident applicants and a 2.50 for nonresident applicants.

Degree Requirements. In addition to the AAS degree, the BAS in Applied Science through East College consists of 60 semester hours of upper-division (300-level and above) courses, with 30 semester hours in residence.

Assignable credit	6
BAS core	15
General Studies	19
MWTC concentration	20
Total	60

General Studies Curriculum. The BAS curriculum builds on the general education content of the AAS degree. Additional General Studies (L, CS, and awareness areas) are met with courses in the core or concentration. General Studies courses focus on contextual learning.

L	3
MA	3
HU	3
HU or SB	3
SB	3
SG	4
Total	19

Assignable Credit. Assignable credit offers students the flexibility within the curriculum to take the prerequisite courses needed for success. The courses (six semester hours) are determined by the student and an advisor.

BAS Core. The area core (15 semester hours) is focused on management and organization, professional communication, qualitative analysis, and computer competency.

Multimedia Writing and Technical Communication Concentration. In consultation with an advisor, students select 20 semester hours of upper-division TWC courses.

CERTIFICATE PROGRAMS

An undergraduate Multimedia Writing and Technical Communication Certificate is available and requires 18 semester hours.

For students who have already completed a baccalaureate degree, a Postbaccalaureate Certificate in Multimedia Writing and Technical Communication is available that also requires 18 semester hours.

Postbaccalaureate Certificate in Multimedia Writing and Technical Communication. The postbaccalaureate certificate in Multimedia Writing and Technical Communication requires the following courses:

TWC 501 Principles of Technical Communication	3
Two of the following courses	6
TWC 511 Principles of Visual Communication (3)	
TWC 521 Principles of Writing with Technology (3)	
TWC 531 Principles of Technical Editing (3)	
Three 500-level TWC courses at least two of which must be genre courses, such as TWC 543 Proposal Writing or TWC 547 Business Reports	9
Total	18

For more information about both certificate programs, call an East College advisor at 480/727-1333, or access the Web site at www.poly.asu.edu/ecollege/multimedia.

BIS CONCENTRATION

A concentration in multimedia writing and technical 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 139.

MULTIMEDIA WRITING AND TECHNICAL COMMUNICATION (TWC)

E TWC 194 Special Topics. (1–4)
selected semesters

E TWC 200 Impact of Communications Technology on Society. (3)
fall and spring
Organizational issues and development of technical communication. Activities include research, evaluations, and presentation of oral arguments in support of positions. Prerequisites: both ENG 101 and 102 or only ENG 105.
General Studies: L

E TWC 301 General Principles of Multimedia Writing. (3)
fall and spring
Introduces writing in a variety of media, understanding the consequences of integrating media, and effective editing techniques. Prerequisite: First-Year Composition.
General Studies: L

E TWC 351 Technical Writing and Editing. (3)
fall and spring
Effective style, format, and organization of technical material; editing principles and practices; copyediting versus substantive editing; and document management. Prerequisite: ENG 102.

E TWC 400 Technical Communications. (3)
fall, spring, summer
Planning and preparing technical publications and oral presentations based on directed library research related to current technical topics. Prerequisites: completion of first-year English requirements; a General Studies L course; senior standing with a major in College of Technology and Applied Sciences.
General Studies: L

E TWC 401 Principles of Technical Communication. (3)
fall and spring
Basic information design principles to produce effective written, oral, and electronic technical communication. Understanding of rhetorical and audience analysis. Pre- or corequisite: TWC 301.
General Studies: L

E TWC 403 Writing for Professional Publication. (3)
selected semesters
Analyzes the market and examines the publication process, including the roles of the author, editor, and reviewer. Pre- or corequisite: TWC 401.

E TWC 411 Principles of Visual Communication. (3)
fall and spring
Basic principles of visual communication in print and electronic media. Understanding graphic and document design, including typography and color. Pre- or corequisite: TWC 401.
General Studies: L

E TWC 421 Principles of Writing with Technology. (3)
fall and spring
Understanding historical and social impact of technology on writing, with emphasis on multimedia design, computer-mediated communication, and hypertext. Pre- or corequisite: TWC 401.
General Studies: L

E TWC 431 Principles of Technical Editing. (3)
fall and spring
Basic principles of technical editing (for print and electronic media), including copyediting, reviews, standards, style, and project management. Pre- or corequisite: TWC 401.
General Studies: L

E TWC 443 Proposal Writing. (3)
once a year
Develops persuasive strategies and themes for researching and writing professional proposals. Pre- or corequisite: TWC 401.

E TWC 444 Manual and Instructional Writing. (3)
once a year
Design and development of a user manual, writing instructions, improving graphics and page design, and usability testing. Pre- or corequisite: TWC 401.

E TWC 445 Computer Documentation. (3)
once a year
Introduces writing documentation for the computer industry. Pre- or corequisite: TWC 401.

E TWC 446 Technical and Scientific Reports. (3)
once a year
Introduces strategies, formats, and techniques of presenting information to technical and scientific audiences. Pre- or corequisite: TWC 401.
General Studies: L

E TWC 447 Business Reports. (3)
once a year
Introduces strategies, formats, and techniques of presenting information to business and other workplace audiences. Pre- or corequisite: TWC 401.
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 93.

E TWC 451 Copyright and Intellectual Property in the Electronic Age. (3)
fall
Explores issues related to copyright and intellectual property laws, with emphasis on electronic environment. Credit is allowed for only TWC 451 or 551. Prerequisite: TWC 301 or instructor approval.

E TWC 452 Information in the Digital Age. (3)
spring
Explores the creation, organization, dissemination, and use of information; the impact of technologies; and surrounding economic, legal, and social issues. Prerequisite: TWC 301 or instructor approval.

E TWC 453 Information and Communications Technology in American History. (3)
selected semesters
Explores the historical development of information and related technologies in the United States from colonial times to the present. Credit is allowed for only TWC 453 or 553. Lecture, Internet.

E TWC 454 Information Technology and Culture. (3)
fall, spring, selected summers
Explores the historical impact and intersection of communications technology and culture in America. Credit is allowed for only TWC 454 or 554. Lecture, Internet.
General Studies: C

E TWC 484 Internship. (3)
fall and spring
Applies classroom work in a supervised workplace environment. Pre- or corequisite: TWC 411 or 421 or 431.

E TWC 490 Capstone. (3)
fall and spring
Development of a professional portfolio, creation of a "culminating document," and synthesis of undergraduate experience. Prerequisite: instructor approval.

E TWC 494 Special Topics. (1–4)
selected semesters

E TWC 501 Principles of Technical Communication. (3)
fall and spring
Basic information design principles to produce effective written, oral, and electronic technical communication. Understanding of rhetorical and audience analysis. Pre- or corequisite: graduate standing.

E TWC 503 Writing for Professional Publication. (3)
selected semesters
Analyzes the market and examines the publication process, including the roles of the author, editor, and reviewer. Pre- or corequisite: TWC 501.

E TWC 511 Principles of Visual Communication. (3)
fall and spring
Basic principles of visual communication in print and electronic media. Understanding graphic and document design, including typography and color. Pre- or corequisite: TWC 501.

E TWC 521 Principles of Writing with Technology. (3)
fall and spring
Understanding historical and social impact of technology on writing, with emphasis on multimedia design, computer-mediated communication, and hypertext. Pre- or corequisite: TWC 501.

E TWC 531 Principles of Technical Editing. (3)
fall and spring
Basic principles of technical editing for print and electronic media, including copyediting, reviews, standards, style, and project management. Pre- or corequisite: TWC 501.

E TWC 543 Proposal Writing. (3)
once a year
Develops persuasive strategies and themes for researching and writing professional proposals. Pre- or corequisite: TWC 501.

E TWC 544 Manual and Instructional Writing. (3)
once a year
Design and development of a user manual, writing instructions, improving graphics and page design, and usability testing. Pre- or corequisite: TWC 501.

E TWC 545 Computer Documentation. (3)
once a year
Introduces writing documentation for the computer industry. Pre- or corequisite: TWC 501.

E TWC 546 Technical and Scientific Reports. (3)
once a year
Introduces strategies, formats, and techniques of presenting information to technical and scientific audiences. Pre- or corequisite: TWC 501.

E TWC 547 Business Reports. (3)
once a year
Introduces strategies, formats, and techniques of presenting information to business and other workplace audiences. Pre- or corequisite: TWC 501.

E TWC 551 Copyright and Intellectual Property in the Electronic Age. (3)
fall
Explores issues related to copyright and intellectual property laws, with emphasis on electronic environment. Credit is allowed for only TWC 551 or 451.

E TWC 552 Information in the Digital Age. (3)
spring
Explores the creation, organization, dissemination, and use of information; the impact of technologies; and surrounding economic, legal, and social issues. Credit is allowed for only TWC 552 or 452.

E TWC 553 Information and Communications Technology in American History. (3)
selected semesters
Explores the historical development of information and related technologies in the United States from colonial times to the present. Credit is allowed for only TWC 553 or 453. Lecture, Internet.

E TWC 554 Information Technology and Culture. (3)
fall, spring, selected summers
Explores the historical impact and intersection of communications technology and culture in America. Credit is allowed for only TWC 554 or 454. Lecture, Internet.

E TWC 584 Internship. (3)
fall and spring
Applies classroom work in a supervised workplace environment. Pre- or corequisites: TWC 511, 521, 531.

E TWC 598 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 Nutrition

www.poly.asu.edu/ecollege/nutrition
480/727-1728
HSC 1386

Linda A. Vaughan, Chair

Professors: Johnston, Vaughan

Associate Professor: Hampl

Assistant Professors: Hutchins, Winham, Woolf

Lecturers: Dixon, Hall, Shepard

NUTRITION—BS

The BS degree in Nutrition offers four concentrations: dietetics, food and nutrition management, human nutrition, and nutrition communication.

The dietetics concentration provides students with a comprehensive range of nutrition, foods, and science courses

that meet the academic (didactic) requirements necessary to become a registered dietitian. This concentration has been granted full accreditation as a Didactic Program in Dietetics (DPD) by the Commission on Accreditation for Dietetics Education of the American Dietetic Association. Graduates of a DPD may apply for Dietetic Internships to establish eligibility to write the Dietetic Registration examination.

The food and nutrition management concentration provides a number of nutrition, foods, and business courses and is offered to students with an interest in food production, nutrition program management, and food/nutrition marketing.

The human nutrition concentration provides a sound foundation in the basic sciences and nutrition, but no food service courses are required. This program is often used by students who, while not seeking the credential of Registered Dietitian, are working toward a career in nutrition research or completing a premedical/predental program of study.

The nutrition communication concentration provides a strong core of nutrition and communication courses in conjunction with selected science and food related courses. This program is ideal for students with an interest in freelance writing or public relations.

Accreditation. The BS degree in Nutrition with a concentration in dietetics has been granted full accreditation as a Didactic Program in Dietetics (DPD) by the Commission on Accreditation for Dietetics Education of the American Dietetic Association. For more information, call 312/899-0040, or write

COMMISSION ON ACCREDITATION FOR
DIETETICS EDUCATION
AMERICAN DIETETIC ASSOCIATION
120 S RIVERSIDE PLAZA SUITE 2000
CHICAGO IL 60606-6995

Dietetics Concentration. The following NTR courses are required of all students in the dietetics concentration:

NTR	142	Applied Food Principles ... 3
NTR	150	Introduction to the Professions in Nutrition and Dietetics ... 1
NTR	241	Human Nutrition ... 3
NTR	340	Applications in Human Nutrition ... 3
NTR	341	Introduction to Planning Therapeutic Diets ... 3
NTR	343	Food Service Purchasing ... 3
NTR	344	Nutrition Services Management *L* ... 3
NTR	350	Nutrition Counseling *SB* ... 3
NTR	400	Preprofessional Preparation in Dietetics ... 3
NTR	440	Advanced Human Nutrition I ... 3
NTR	441	Advanced Human Nutrition II ... 3
NTR	444	Medical Nutrition Therapy ... 3
NTR	445	Management of Food Service Systems ... 3
NTR	446	Human Nutrition Assessment Lecture/Laboratory ... 3
NTR	448	Community Nutrition *L* ... 3
Total		... 43

In addition to the required NTR courses, the following related courses are required to complete the academic requirements of the Didactic Program in dietetics:

BCH	361	Principles of Biochemistry ... 3
BCH	367	Elementary Biochemistry Laboratory ... 1
BIO	201	Human Anatomy and Physiology I *SG* ... 4
BIO	202	Human Anatomy and Physiology II ... 4
CHM	113	General Chemistry I *SQ* ... 4
CHM	116	General Chemistry II *SQ* ... 4
CHM	231	Elementary Organic Chemistry *SQ*[1] ... 3
CHM	235	Elementary Organic Chemistry Laboratory *SQ*[1] ... 1
MIC	205	Microbiology *SG*[2] ... 3
MIC	206	Microbiology Laboratory *SG*[2] ... 1
Statistics course		... 3
Technical writing course		... 3
Total		... 34

[1] Both CHM 231 and 235 must be taken to secure SQ credit.
[2] Both MIC 205 and 206 must be taken to secure SG credit.

Additional supporting courses in the social sciences are required for completion of the DPD and must be selected in consultation with the Nutrition academic advisor.

Food and Nutrition Management Concentration. The following NTR courses are required of all students in the food and nutrition management concentration:

NTR	100	Introductory Nutrition ... 3 or NTR 241 Human Nutrition (3)
NTR	142	Applied Food Principles ... 3
NTR	300	Computer Applications in Nutrition *CS* ... 3
NTR	343	Food Service Purchasing ... 3
NTR	344	Nutrition Services Management *L* ... 3
NTR	345	Development of Healthy Cuisines ... 3
NTR	351	Nutrition and Health Communications ... 3
NTR	401	Professional Practice in Food Service Management ... 3
NTR	445	Management of Food Service Systems ... 3
Total		... 27

Three more semester hours from the Department of Nutrition are required to complete this concentration. A maximum of three semester hours of Independent Study may be used to satisfy this requirement. Students select these courses in consultation with the Nutrition academic advisor.

In addition to the required NTR courses, the following related courses are required to complete the academic requirements of this concentration:

CHM	101	Introductory Chemistry *SQ* ... 4
MIC	205	Microbiology *SG*[1] ... 3
MIC	206	Microbiology Laboratory *SG*[1] ... 1
Business or technical writing course		... 3
Management (AGB 310; MGT 300, 380, or 394; WPC 380)		... 3
Marketing (AGB 320; MKT 300 or 394; WPC 382)		... 3
Other agribusiness or business courses[2]		... 6
Total		... 23

[1] Both MIC 205 and 206 must be taken to secure SG credit.
[2] Courses taken to fulfill the final six-credit business requirement should be taken from the following prefixes: ACC, AGB, BUS, CIS, CSE, ECN, FIN, IBS, MGT, MKT, QBA, SCM, TWC, and WPC. Students select these courses in consultation with the Nutrition academic advisor.

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 93.

Human Nutrition Concentration. The following NTR courses are required of all students in the human nutrition concentration:

NTR	142	Applied Food Principles 3
NTR	241	Human Nutrition 3
NTR	340	Applications in Human Nutrition 3
NTR	341	Introduction to Planning Therapeutic Diets 3
NTR	440	Advanced Human Nutrition I 3
NTR	441	Advanced Human Nutrition II 3
NTR	444	Medical Nutrition Therapy 3
NTR	446	Human Nutrition Assessment Lecture/Laboratory 3
Total		 24

An additional six semester hours from the Department of Nutrition are required to complete this concentration. A maximum of three semester hours of Independent Study may be used to satisfy this requirement. Students select these courses in consultation with the Nutrition academic advisor.

In addition to the required NTR courses, the following related courses are required in order to complete the academic requirements of this concentration:

BCH	361	Principles of Biochemistry 3
BCH	367	Elementary Biochemistry Laboratory 1
BIO	201	Human Anatomy and Physiology I *SG* 4
BIO	202	Human Anatomy and Physiology II 4
CHM	113	General Chemistry I *SQ* 4
CHM	116	General Chemistry II *SQ* 4
CHM	231	Elementary Organic Chemistry *SQ*[1] 3
CHM	235	Elementary Organic Chemistry Laboratory *SQ*[1] 1
MIC	205	Microbiology *SG*[2] 3
MIC	206	Microbiology Laboratory *SG*[2] 1
Total		 28

[1] Both CHM 231 and 235 must be taken to secure SQ credit.

[2] Both MIC 205 and 206 must be taken to secure SG credit.

Nutrition Communication Concentration. The following NTR courses are required of all students in the nutrition communication concentration:

NTR	100	Introductory Nutrition ..... 3 or NTR 241 Human Nutrition (3)
NTR	142	Applied Food Principles 3
NTR	300	Computer Applications in Nutrition *CS* 3
NTR	345	Development of Healthy Cuisines 3
NTR	348	Cultural Aspects of Food *SB,C* 3
NTR	351	Nutrition and Health Communications 3
NTR	400	Preprofessional Preparation in Dietetics ..... 3 or NTR 401 Professional Practice in Food Service Management (3)
NTR	448	Community Nutrition *L* 3
NTR	450	Nutrition in the Life Cycle I *SB* ..... 3 or NTR 451 Nutrition in the Life Cycle II (3)
Total		 27

In addition to the required NTR courses, the following related courses are required to complete the academic requirements of this concentration:

Mass Communication Core

18 credits required, nine must be upper-division, nine must be in residence at ASU:

MCO	110	Introduction to Mass Communication *SB* ..... 3 or MCO 120 Media and Society *SB* (3)
JMC	201	Journalism Newswriting *L* ..... 3 or JMC 202 Radio-Television Writing *L* (3)
JMC	270	Public Relations Techniques 3
Total		 9

At least three more courses must be completed from the following list for a total of nine credits:

JMC	425	Online Media 3
JMC	445	Science Writing 3
MCO	418	History of Mass Communication *SB, H* 3
MCO	430	International Mass Communication *G* 3
MCO	435	Emerging Media Technologies 3
MCO	440	Applied Media Research 3
MCO	450	Visual Communication *HU* 3
MCO	456	Political Communication *SB* 3
MCO	460	Race, Gender, and Media *C* 3
MCO	494	Special Topics 3

Additional Requirements

BIO	201	Human Anatomy and Physiology I *SG* 4
BIO	202	Human Anatomy and Physiology II 4
CHM	101	Introductory Chemistry *SQ* 4
ENG	301	Writing for the Professions *L* 4
Statistics (see advisor for a list of courses) 3		

MINORS

The faculty of the Department of Nutrition also offers minors in Food and Nutrition Management and Human Nutrition, each requiring 18 semester hours. At least 12 of the 18 must be in upper-division courses.

Food and Nutrition Management. The minor requires that students take the following courses:

NTR	100	Introductory Nutrition ..... 3 or NTR 241 Human Nutrition (3)
NTR	142	Applied Food Principles 3
NTR	300	Computer Applications in Nutrition *CS* 3
NTR	343	Food Service Purchasing 3
NTR	344	Nutrition Services Management *L* 3
NTR	445	Management of Food Service Systems 3
Total		 18

Human Nutrition. The minor requires that students take the following courses:

NTR	241	Human Nutrition 3
NTR	340	Applications in Human Nutrition 3
NTR	341	Introduction to Planning Therapeutic Diets 3
NTR	440	Advanced Human Nutrition I 3
NTR	441	Advanced Human Nutrition II 3
NTR	444	Medical Nutrition Therapy 3
Total		 18

Additional upper-division (or graduate) courses may be selected from among the following:

NTR	346	Sports Nutrition 3
NTR	348	Cultural Aspects of Food *SB, C* 3
NTR	350	Nutrition Counseling *SB* 3
NTR	351	Nutrition and Health Communications 3
NTR	446	Human Nutrition Assessment Lecture/Laboratory 3
NTR	448	Community Nutrition *L* 3
NTR	450	Nutrition in the Life Cycle I *SB* 3
NTR	451	Nutrition in the Life Cycle II 3

BIS CONCENTRATIONS

Concentrations in (1) food and nutrition management and (2) human nutrition 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 139.

APPLIED SCIENCE—BAS

Food Service Management Concentration. The BAS degree with a concentration in food service management is designed to complement and enhance the educational preparation of students holding an AAS degree from a regionally accredited U.S. postsecondary educational institution. The concentration is particularly designed for students holding an AAS degree in culinary or hospitality science. The degree prepares students for careers in food production, service, management, and marketing. With additional education and/or professional training, students may also become credentialed as certified dietary managers, school food service and nutrition specialists, or registered sanitarians.

Admission. Admission to the BAS degree program is restricted to students holding an AAS degree from a regionally accredited U.S. postsecondary educational institution. A GPA of 2.00 or higher is required for all resident applicants and a 2.50 is required for nonresident applicants.

Degree Requirements. The BAS degree consists of 60 semester hours of upper-division (300 level and above) courses, with 30 hours in residence. A total of 120 semester hours are required for graduation.

AAS degree	60
Assignable credit	6
BAS core	15
General Studies	19
Concentration	20
Total	120

General Studies Curriculum. The BAS curriculum builds on the general education content of the AAS degree. Additional General Studies (L, CS, and awareness areas) are met with courses in the core or concentration. General Studies courses focus on contextual learning.

L	3
MA	3
HU	3
HU/SB	3
SB	3
SG	4
Total	19

Required Core Courses

NTR 300 Computer Applications in Nutrition *CS*	3
NTR 343 Food Service Purchasing	3
NTR 344 Nutrition Services Management *L*	3
NTR 345 Development of Healthy Cuisines	3
NTR 348 Cultural Aspects of Food *SB, C*	3
NTR 401 Professional Practice in Food Service Management	3
NTR 445 Management of Food Service Systems	3
Marketing course	3
NTR electives	6
Statistics course	3
Technical communications course	3
Total	36

Assignable Credit. Assignable credit offers students the flexibility within the curriculum to take the prerequisite courses needed for success. It also allows students to take additional technical electives. The courses are determined by the student and the advisor.

NUTRITION (NTR)

E NTR 100 Introductory Nutrition. (3)
fall, spring, summer
Basic concepts of human nutrition. Recent controversies in nutrition and how food choices affect personal health.

E NTR 142 Applied Food Principles. (3)
fall and spring
Applied scientific principles of food preparation and production. 2 hours lecture, 3 hours lab. Fee.

E NTR 150 Introduction to the Professions in Nutrition and Dietetics. (1)
fall and spring
Introduces the professions of nutrition and dietetics; their history, practice, and future; credentials, ethics, and standards of practice.

E NTR 241 Human Nutrition. (3)
fall, spring, summer
Principles of human nutrition. Emphasizes nutrient metabolism and the relationships between diet and disease. Prerequisite: CHM 101 (or its equivalent).

E NTR 300 Computer Applications in Nutrition. (3)
spring
Introduces nutrition and food software, including dietary assessment and analysis, food inventory and control, and telecommunications. Integrated lecture/lab. Prerequisites: NTR 100 (or 241), 341 strongly recommended; basic computer literacy.
General Studies: CS

E NTR 340 Applications in Human Nutrition. (3)
spring
Applications of nutrient metabolism through case studies and product evaluations; special topics in human nutrition. Prerequisites: BIO 201; NTR 241. Corequisite: BIO 202.

E NTR 341 Introduction to Planning Therapeutic Diets. (3)
fall and spring
Cultural, health, and economic aspects of planning therapeutic diets. Assessments of food and diet composition. Reviews common therapeutic diets. Credit is allowed for only NTR 341 or 345. Fee. Prerequisite: NTR 100 or 241 (or their equivalents).

E NTR 343 Food Service Purchasing. (3)
fall
Introduces purchasing systems, bid processes, receiving and storage procedures, and regulatory agencies involved in the food service industry. Prerequisite: NTR 142.

E NTR 344 Nutrition Services Management. (3)
fall and spring
Organization, administration, and management of food and nutrition services in hospitals and other institutions. Possible field trips. Prerequisite: NTR 100 or 241 (or its equivalent).
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 93.

E NTR 345 Development of Healthy Cuisines. (3)
fall
Principles and applications of nutrition and medical nutrition therapy; development of healthy cuisines in health and disease states. Credit is allowed for only NTR 345 or 341. Prerequisite: NTR 100 or 241 or instructor approval.

E NTR 346 Sports Nutrition. (3)
fall and summer
Nutritional needs of recreational and elite athletes; energy balance; nutrient metabolism during activity; fluid-electrolyte regulation; evaluation of ergogenic supplements. Prerequisites: BIO 202; NTR 241.

E NTR 348 Cultural Aspects of Food. (3)
spring and summer
Origins, development, and diversity of food preferences and dietary habits; food patterns and attitudes of global populations and U.S. immigrants. Prerequisite: NTR 100 or 241 (or its equivalent).
General Studies: SB, C

E NTR 350 Nutrition Counseling. (3)
spring
Counseling techniques in nutrition; interpersonal and communication skills in clinical and community sites; nutrition education for individuals and populations. Integrated lecture/lab. Prerequisites: NTR 100 (or 241) and 341 (or their equivalents).
General Studies: SB

Welcome Week activities at the Polytechnic campus

Tim Trumble photo

E NTR 351 Nutrition and Health Communications. (3)
fall
Approaches of nutrition and health communications; development of nutrition and health communication materials for selected target audiences. Prerequisite: NTR 100 or 241.

E NTR 400 Preprofessional Preparation in Dietetics. (3)
fall and spring
Applies academic knowledge in field practicum; aspects of professional development. Lecture, practicum. Prerequisites: NTR 341, 440 (or 441 or 444); senior standing in dietetics or human nutrition.

E NTR 401 Professional Practice in Food Service Management. (3)
spring
Applies academic knowledge in food service management to field practicum; develops practical skills in planning, purchasing, production, management. Lecture, practicum. Prerequisites: NTR 343; senior standing in food and nutrition management. Pre- or corequisite: NTR 344.

E NTR 440 Advanced Human Nutrition I. (3)
fall
Metabolic reactions and interrelationships of vitamins, minerals, and water. Prerequisites: BIO 201; NTR 241. Corequisite: BIO 202.

E NTR 441 Advanced Human Nutrition II. (3)
spring
Metabolic reactions and interrelationships of carbohydrate, lipid, and protein. Prerequisites: BCH 361 and BIO 202 and NTR 241 (or their equivalents).

E NTR 442 Experimental Foods. (3)
selected semesters
Food product development techniques, food evaluation and testing, and investigation of current research into food composition. 2 hours lecture, 3 hours lab. Fee. Prerequisites: CHM 231; NTR 142.

E NTR 444 Medical Nutrition Therapy. (3)
spring and summer
Principles of medical nutrition therapy for prevention and treatment of disease and promotion of health. Prerequisites: BIO 201 and 202 and NTR 341 (or their equivalents). CHM 231 strongly recommended.

E NTR 445 Management of Food Service Systems. (3)
fall and spring
Standardized methods of quantity food preparation, operation of institutional equipment, institutional menu planning, quantity food experiences. Integrated lecture/lab. Fee. Prerequisites: NTR 142 and 344 (or their equivalents).

E NTR 446 Human Nutrition Assessment Lecture/Laboratory. (3)
fall and spring
Clinical and biochemical evaluation of nutritional status. 2 hours lecture, 3 hours lab. Fee. Prerequisites: BCH 361, 367; NTR 440 (or 441).

E NTR 448 Community Nutrition. (3)
fall and spring
Food-related behaviors; organization and delivery of nutrition services; program design, implementation, and evaluation strategies; nutrition assessment of populations. Prerequisite: NTR 241 (or its equivalent).
General Studies: L

E NTR 450 Nutrition in the Life Cycle I. (3)
fall
Emphasizes nutritional needs and problems during pregnancy, lactation, infancy, and childhood. Prerequisite: NTR 100 or 241 (or its equivalent).
General Studies: SB

E NTR 451 Nutrition in the Life Cycle II. (3)
spring
Nutritional needs and problems of adults, particularly the elderly. Prerequisite: NTR 100 or 241 (or its equivalent).

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/catalog 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 Technology and Applied Sciences

technology.poly.asu.edu **Albert L. McHenry, PhD, Dean**

Aeronautical Management Technology, Department of **249**

Electronics and Computer Engineering Technology, Department of **254**

Engineering, Department of **258**

Mechanical and Manufacturing Engineering Technology, Department of **259**

Technology Management, Department of **264**

Computing Studies, Division of **271**

PURPOSE

The College of Technology and Applied Sciences (CTAS) helps students develop knowledge and skill in technological fields that qualify them for career positions and leadership responsibility in industry, government, and commercial enterprise. Each student is guided to select a major that addresses short-term employment goals through state-of-the-art technological preparation. Long-term career aspirations are supported through the development of a strong base in mathematics, science, engineering, and technical principles, coupled with a solid foundation in liberal arts and a commitment to lifelong learning.

Engineering technology programs offer professional preparation through a BS degree that stresses state-of-the-art technological applications. Special emphasis is placed on the development of knowledge and skill in applied mathematics, natural sciences, and engineering principles with formal laboratory experiences. This mixed educational approach provides the basis for both employment and a long-term career evolution.

The other CTAS technology programs provide the opportunity for students to develop knowledge and skill in solving broad-scale industrial problems, operating modern technological systems, and managing personnel in the implementation of processes and production. Programs of study focus on the latest technologies in areas such as aviation flight training and management, environmental technology management, graphic information technology, fire service management, and industrial management.

Each student is encouraged to participate in creative activities through a close relationship with a faculty mentor. Learning through execution of the scientific method, using both inductive and deductive processes in applied research activities, is essential for both faculty and students.

ORGANIZATION

The College of Technology and Applied Sciences is composed of the following six academic units:

Department of Aeronautical Management Technology
Department of Electronics and Computer Engineering Technology
Department of Engineering
Department of Mechanical and Manufacturing Engineering Technology
Department of Technology Management
Division of Computing Studies

DEGREE PROGRAMS

See the "College of Technology and Applied Sciences Baccalaureate Degrees and Majors" table, page 246. For graduate degrees, see the "College of Technology and Applied Sciences Graduate Degrees and Majors" table, page 247.

The College of Technology and Applied Sciences offers programs leading to the BS degree and BAS degree. The college also offers the Master of Science in Technology (MST) degree and the Master of Computing Studies degree (MCST). For more information, see the *Graduate Catalog.*

ACCREDITATION

Undergraduate BS degree programs in Electronics Engineering Technology, Manufacturing Engineering Technology, and Mechanical Engineering Technology are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc. For additional information, call 410/347-7700, or write

TECHNOLOGY ACCREDITATION COMMISSION OF
THE ACCREDITATION BOARD FOR
ENGINEERING AND TECHNOLOGY INC
111 MARKET PLACE SUITE 1050
BALTIMORE MD 21202-7102

Both the professional flight and the air transportation management concentrations in the Department of Aeronautical Management Technology are fully accredited by the Council on Aviation Accreditation. For more information, call 334/844-2431, send e-mail to caa@auburn.edu, or write

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 93.

College of Technology and Applied Sciences Baccalaureate Degrees and Majors

Major	Degree	Concentration[1]	Administered By
Aeronautical Management Technology[2]	BS	Air transportation management or professional flight	Department of Aeronautical Management Technology
Applied Computer Science	BS	—	Division of Computing Studies
Applied Science	BAS	Aviation maintenance management technology, aviation management technology, computer systems administration, digital media management, digital publishing, emergency management, fire service management, instrumentation, Internet and Web development, law enforcement management, manufacturing technology and management, materials joining and manufacturing technology, microcomputer systems, municipal operations management, operations management, semiconductor technology, software technology applications, or technical graphics	Bachelor of Applied Science Advisory Committee
Computer Systems[2]	BS	Computer hardware technology or embedded systems technology	Division of Computing Studies
Electronics Engineering Technology[2]	BS	Electronic systems, microelectronics, or telecommunications	Department of Electronics and Computer Engineering Technology
Engineering	BSE	—	Department of Engineering
Environmental Technology Management	BS	—	Department of Technology Management
Graphic Information Technology	BS	—	Department of Technology Management
Manufacturing Engineering Technology[2]	BS	Manufacturing engineering technology or mechanical engineering technology	Department of Mechanical and Manufacturing Engineering Technology
Mechanical Engineering Technology[2]	BS	Aeronautical engineering technology, automation engineering technology, or mechanical engineering technology	Department of Mechanical and Manufacturing Engineering Technology
Operations Management Technology	BS	—	Department of Technology Management

[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.

COUNCIL ON AVIATION ACCREDITATION
3410 SKYWAY DRIVE
AUBURN AL 36830

The Bachelor of Science degrees in Environmental Technology Management, Graphic Information Technology, and Operations Management are fully accredited by the National Association of Industrial Technology (NAIT). For more information, call 734/677-0720, or write

NATIONAL ASSOCIATION OF INDUSTRIAL TECHNOLOGY
3300 WASHTENAW AVENUE SUITE 220
ANN ARBOR MI 48104-4200

ADMISSION—BS DEGREE

The College of Technology and Applied Sciences admits first-year students who meet the undergraduate admission requirements of ASU. See "Undergraduate Admission," page 66. High school precalculus, physics, and chemistry are recommended. Transfer applicants must meet the university requirements for transfer students as specified under "Transfer Credit," page 71.

First-year students (new freshmen) are admitted to CTAS with professional status if they meet the general aptitude criteria for admission. First-year students admitted upon completion of the GED may be admitted if they have also achieved the minimum ACT or SAT scores required for undergraduate admission to the university.

College of Technology and Applied Sciences Graduate Degrees and Majors

Major	Degree	Concentration*	Administered By
Computing Studies	MCST	—	Division of Computing Studies
Technology	MSTech	Aeronautical engineering technology, manufacturing engineering technology, or mechanical engineering technology	Department of Mechanical and Manufacturing Engineering Technology
		Aviation management and human factors	Department of Aeronautical Management Technology
		Computer systems	Division of Computing Studies
		Electronic systems engineering technology, instrumentation and measurement technology, or microelectronics engineering technology	Department of Electronics and Computer Engineering Technology
		Environmental technology management, fire service administration, global technology and development, graphic information technology, or management of technology	Department of Technology Management
		Security engineering technology	College of Technology and Applied Sciences

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

Students transferring from other ASU colleges may be admitted to CTAS with professional status if they meet the required GPA.

Transfer students from other institutions must meet the minimum admission requirements for college transfer students as described under "Transfer Credit," page 71.

All international students must have a minimum 500 TOEFL score to be admitted with professional status.

For those students who are admitted to the professional flight concentration, in the Department of Aeronautical Management Technology, a secondary application process is required.

Transfer Credit

Credit for courses taken at a community college or another four-year institution is awarded according to the guidelines under "Transfer Credit," page 71. Students who are transferring from an Arizona community college and have been in continuous residence may continue under the catalog in effect at the time of their entrance into the community college. Students should be aware that some course work that transfers to ASU may not be applicable toward CTAS degree requirements. Students should confer with an advisor. The College of Technology and Applied Sciences maintains a cooperative agreement with most Arizona community colleges and with selected out-of-state colleges and universities to structure programs that are directly transferable into the technology programs at Polytechnic campus. For assistance in transferring from Arizona community colleges, transfer guides are available at www.asu.edu/provost/articulation.

Courses taken more than five years before admission to a CTAS degree program 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.

ADMISSION—BAS DEGREE

Admission to the BAS degree program is restricted to students holding an AAS degree from a regionally accredited U.S. postsecondary educational institution. A GPA of 2.00 or higher is required for all resident applicants and a 2.50 for nonresident applicants.

ADVISING

New incoming and transfer students should seek initial advising from an academic advisor in the Dean's Office. CTAS students are then assigned faculty advisors who assist them with planning a program of study in the department of their major. The college requires that students consult with advisors before registering each semester. Advisors should be made aware of any employment obligations or special circumstances that may affect a student's ability to successfully handle a full course load. CTAS students may register for a maximum of 19 semester hours per semester. Any student wishing to take more than the maximum must petition the CTAS Standards Committee and have an approval on file before registering for a course overload.

GRADUATION REQUIREMENTS

Students must meet all university graduation requirements given in "University Graduation Requirements," page 89, as well as degree requirements of their major in the College of Technology and Applied Sciences. For detailed information on the degree requirements of a major in CTAS, refer to that department's individual description.

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 93.

COLLEGE STANDARDS

Pass/Fail Grades

The College of Technology and Applied Sciences does not offer pass/fail grades. Courses graded on a pass/fail basis do not count toward degree credit in CTAS. Students may request credit for pass/fail courses by petitioning the CTAS Standards Committee.

Entry Into Upper-Division Courses (BS Degree)

Before enrolling in courses at the 300 level and above, CTAS students must be in professional status within the college. Students who are not in good academic standing must petition the CTAS Standards Committee. Students enrolled in another ASU college may not register for any 300- and 400-level CTAS courses unless those courses are required in the degree program and the students have the proper course prerequisites.

ACADEMIC STANDARDS

Retention. A student is expected to make satisfactory progress toward completion of degree requirements to continue enrollment in the College of Technology and Applied Sciences. Any one of the following conditions is considered unsatisfactory progress and results in the student's being placed on probationary status:

1. a semester 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 less than 2.00.

A student on probation is subject to disqualification if (1) a semester GPA of 2.25 is not attained and the cumulative GPA is below 2.00 at the end of the probationary semester or (2) the student is placed on probation for two consecutive semesters and is unable to achieve the standard GPA stated in number one.

Students on academic probation are not allowed to register for more than 13 semester hours. Probationary students may not register for the semester following the semester in which they were declared probationary without a special permit from an advisor in the dean's office. Special permits are given only after the registrar records grades for the current semester.

Disqualification. During a semester on academic probation, a student who fails to meet the retention standards is disqualified. Students may request a review of their disqualification status by contacting the CTAS associate dean in the College of Technology Dean's Office. Any disqualified student who is accepted by another college at ASU may not register for courses in CTAS unless the courses are required in the new major. Disqualified students who register for courses in CTAS may be withdrawn from these courses any time during the semester.

Reinstatement. The college does not accept an application for reinstatement until the disqualified student has remained out of the college for at least a 12-month period. Merely having remained in 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 pertinent courses in the discipline at a community college with higher-than-average grades.

STUDENT RESPONSIBILITIES

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 their consent at any time before the final examination. The instructor, the chair of the department, or the dean of the college may initiate such withdrawals. In such cases, students do not receive monetary reimbursement.

SPECIAL PROGRAMS

Academic Recognition. Students completing baccalaureate degree requirements receive the appropriate honors designations on their diplomas consistent with the requirements specified by the university.

Students in the college are encouraged to seek information concerning entry into honor societies that enhance their professional stature. Tau Alpha Pi is the engineering technology honor society, and Alpha Eta Rho is available for aeronautical management technology students.

Barrett Honors College. The College of Technology and Applied Sciences 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. For more information, see "General Studies," page 93.

Scholarships. Information and applications for academic scholarships for continuing students may be obtained by contacting departmental offices. Other scholarships may be available through the university's Student Financial Assistance Office.

ROTC Students. Students pursuing a commission through either the Air Force or Army ROTC program must take 12 to 20 semester hours of 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 accepted for engineering technology majors.

ENGINEERING TECHNOLOGY CORE (ETC)

E ETC 100 Languages of Technology. (4)
fall and spring
Introduces computer-aided design, programming, modeling, and technical documentation. Lecture, lab.
General Studies: CS

E ETC 191 First-Year Seminar. (1–3)
selected semesters

E ETC 194 Special Topics. (1–4)
selected semesters

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

E ETC 493 Honors Thesis. (1–6)
selected semesters

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

SECURITY ENGINEERING TECHNOLOGY (SET)

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 Aeronautical Management Technology

eastair.poly.asu.edu
480/727-1381
SIM 201

William K. McCurry, Chair

Professors: Gesell, McCurry

Professor of Practice: Karp

Clinical Associate Professor: Pearson

Assistant Professor: Niemczyk

Lecturer: O'Brien

PURPOSE

Graduates are prepared for entry into the aviation and air transportation industry in productive, professional employment or, alternatively, for graduate study. Curricula emphasize principles underlying the application of technical knowledge as well as current technology, preparing the graduate to adapt to the rapid and continual changes in aviation and aerospace technology.

ADMISSION

Admission to the Bachelor of Science professional flight concentration requires an additional admission process. New and transfer students who have been admitted to ASU and who meet the requirements for admission to the College of Technology and Applied Sciences may be admitted without separate application to the Department of Aeronautical Management Technology only in the Bachelor of Applied Science concentrations, or to the Bachelor of Science air transportation management concentration. Transfer credits are reviewed by department faculty advisors. To be accepted as department credit, transfer courses must be equivalent in both content and level of offering. No flight experience or theoretical training courses beyond the Private Pilot Certificate are accepted. For more information, access the department Web page at eastair.poly.asu.edu.

DEGREES

The faculty in the Department of Aeronautical Management Technology offer a BS degree in Aeronautical Management Technology with concentrations in professional flight and air transportation management. A BAS degree in Applied Science is also offered with concentrations in aviation maintenance management technology and aviation management technology.

A Master of Science in Technology degree is offered for graduate study with a concentration in aviation management and human factors. For more information, see the *Graduate Catalog*.

ACCREDITATION

The professional flight and air transportation management concentrations in the Department of Aeronautical Management Technology are fully accredited by the Council on Aviation Accreditation. For more information, call 344/844-2431, send e-mail to caa@auburn.edu, or write

COUNCIL ON AVIATION ACCREDITATION
3410 SKYWAY DRIVE
AUBURN AL 36830

AERONAUTICAL MANAGEMENT TECHNOLOGY—BS

The Aeronautical Management Technology curricula are designed to provide a thorough technical background combined with an interdisciplinary general university education. The graduate is prepared to assume responsibilities in a wide area of managerial and technically related areas of aviation. The student gains a background in aircraft structures, reciprocating and turbine engines, aircraft performance and design, management skills, business principles, systems analysis, and a variety of course work specific to aircraft flight, airport operations, and air transportation systems. The degree offers two concentrations: professional flight and air transportation management. The concentrations are described separately on the following pages.

All degree requirements are shown on curriculum check sheets for the concentrations that are available by visiting the department or by accessing the department Web site at eastair.poly.asu.edu. Requirements include First-Year Composition, university General Studies (see "General Studies," page 93), and the Aeronautical Management Technology Core. Note that all three General Studies awareness areas are required. Consult an advisor for an approved list of courses. Refer to individual concentration degree requirements for additional required courses. Students must complete each Aeronautical Management Technology course with a grade of "C" (2.00) or higher.

Aeronautical Management Technology Core

AMT 101	Introduction to Aeronautical Management Technology	1
AMT 182	Private Pilot Ground School	3
AMT 201	Air Traffic Control	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 93.

AMT 220 Aviation Meteorology	3
AMT 280 Aerospace Structures, Materials, and Systems	4
AMT 287 Aircraft Powerplants	4
AMT 308 Air Transportation *G*	3
AMT 350 Aircraft Design and Logistics Management	3
AMT 396 Aviation Professional	1
AMT 410 Aviation Safety and Human Factors	3
AMT 442 Aviation Law/Regulations	3
Total	31

Professional Flight Concentration

Flight training is certified by the Federal Aviation Administration. An FAA Class I medical examination is required for admission. It is recommended that a medical examination be completed by an aviation medical examiner of the student's choice before application for admission.

This program is designed for students who are seriously interested in becoming professional airline pilots. Because of limited space, the program selection process is academically competitive. Only those applicants who meet the subject matter and quality requirements and who submit their applications by the appropriate deadlines will be considered for admission.

The ASU Professional Flight program is the initial phase of the qualification/application process to become an airline first officer. Individuals seeking admission to the program must participate in a secondary application process. The secondary process will assess a candidate's FAA-certified First Class medical qualification; driving record; work and/or personal references; and cognitive, psychomotor skill, and psychological test results. It may also include a personal interview. The secondary application deadlines vary. Contact the department for current deadlines.

U.S. citizens must provide proof of citizenship as part of the secondary admission process to the professional flight concentration.

International students must meet all TSA clearance requirements before being admitted to the professional flight concentration. For more information, see the department Web site at eastair.poly.asu.edu. International students should check with Undergraduate International Admissions for details concerning admission and visa requirements. A TOEFL score of 600 is required for admission into the professional flight concentration. International students should be aware that they may encounter difficulty in converting their student visa to a work permit and therefore may not be able to find employment with a U.S. air carrier following graduation. International students are also advised that all certificates and ratings are under FAA certification and may not be accepted by the aviation authority in their home country.

Total program costs, which include aircraft, flight instructor time, flight training devices, simulator time, tests, fees, and tuition, require careful financial planning. Students must make satisfactory progress throughout both the flight and academic areas to be considered for continued advancement in the program. To proceed at a satisfactory pace through the flight training program, students should expect and plan to fly during the winter intercession and the summer session to complete the program. A program fee of $275 per semester is required for the professional flight concentration. A program fee of $125 per semester is required for the air transportation management concentration.

For more information, requirements, and specific application procedures, access the AMT Department Web site at eastair.poly.asu.edu.

Flight instruction costs are not included in university tuition and fees. The estimated cost of flight training is $50,000 in addition to normal university costs.

Degree Requirements

Professional flight students are required to complete 128 semester hours with a 2.00 cumulative GPA, including a minimum of 50 semester hours of upper-division courses. Students should be aware that a higher cumulative GPA may be required for employment by an airline upon graduation. All degree requirements are shown on the student's curriculum check sheet.

Concentration Requirements

In addition to the required courses for First-Year Composition, university General Studies (see "General Studies," page 93), and the Aeronautical Management Technology core, the following additional courses are required for the professional flight management concentration:

AMT 100 Flight Safety I	2
AMT 200 Flight Safety II	1
AMT 214 Commercial/Instrument Ground School I	3
AMT 300 Flight Safety III	1
AMT 322 Commercial/Instrument Ground School II	3
AMT 382 Air Navigation	3
AMT 385 Flight Instructor Ground School	3
AMT 387 Multiengine Pilot Ground School	1
AMT 392 Flight Instructor Instrument Ground School	3
AMT 400 Flight Safety IV	1
AMT 408 National Aviation Policy	3
AMT 482 Airline Instrument Procedures	3
AMT 486 Regional Jet Aircraft Systems	3
AMT 489 Airline Administration	3
AMT 490 Regional Jet Operations Capstone	3
Technical electives or internship	19
Total	55

Suggested Course Pattern for Freshmen

First Semester	
AMT 100 Flight Safety I	2
AMT 101 Introduction to Aeronautical Management Technology	1
AMT 182 Private Pilot Ground School	3
AMT 220 Aviation Meteorology	3
ENG 101 First-Year Composition	3
MAT 270 Calculus with Analytic Geometry I *MA*	4
Total	16
Second Semester	
AMT 214 Commercial/Instrument Ground School I	3
ENG 102 First-Year Composition	3
ECN 211 Macroeconomic Principles *SB*	3
or ECN 212 Microeconomic Principles *SB* (3)	
PHY 111 General Physics *SQ**	3
PHY 113 General Physics Laboratory *SQ**	1
Total	13

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

Air Transportation Management Concentration

The air transportation management concentration is designed to prepare graduates for managerial and supervisory positions throughout the air transportation industry. An in-depth technical education is included along with broad exposure to business and management courses. This program of study is interdisciplinary in nature and prepares the aeronautical career-oriented student for positions such as air traffic control specialist, air carrier manager, airport manager, and general aviation operations manager. To facilitate career options, the student selects a focus area in either air carrier management or airport management.

Degree Requirements

Air transportation management students are required to complete 128 semester hours with a minimum 2.00 cumulative GPA, including a minimum of 50 semester hours of upper-division courses. All degree requirements are shown on the student's curriculum check sheet.

Concentration Requirements

In addition to the required courses for First-Year Composition, university General Studies (see "General Studies," page 93), and the Aeronautical Management Technology core, the following additional courses are required in the air transportation management concentration:

ACC 230 Uses of Accounting Information I	3
AMT 408 National Aviation Policy	3
AMT 444 Airport Management and Planning	3
AMT 489 Airline Administration	3
AMT 491 Aviation Management Capstone	3
OMT 343 Occupational Safety and Ergonomics	3
OMT 430 Ethical Issues in Technology	3
OMT 452 Industrial Human Resource Management	3
OMT 456 Introduction to Organized Labor	3
OMT 480 Organizational Effectiveness	3
TMC 346 Management Dynamics	3
Technical electives or internship	22
Total	55

Suggested Course Pattern for Freshmen

First Semester

AMT 101 Introduction to Aeronautical Management Technology	1
AMT 182 Private Pilot Ground School	3
AMT 220 Aviation Meteorology	3
ENG 101 First-Year Composition	3
MAT 270 Calculus with Analytic Geometry I *MA*	4
Total	14

Second Semester

ENG 102 First-Year Composition	3
ECN 211 Macroeconomic Principles *SB*	3
or ECN 212 Microeconomic Principles *SB* (3)	
PGS 101 Introduction to Psychology *SB*	3
PHY 111 General Physics *SQ**	3
PHY 113 General Physics Laboratory *SQ**	1
General Studies elective *HU*	3
Total	16

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

APPLIED SCIENCE—BAS

The Bachelor of Applied Science degree is a "capstone" degree for the Associate of Applied Science degree. The BAS degree exposes students to advanced concepts and diverse critical thinking skills that prepare students for future career opportunities and professional advancement.

Admission

Admission to the BAS degree program is restricted to students holding an AAS degree from a regionally accredited U.S. postsecondary educational institution. A GPA of 2.00 or higher is required for all resident applicants and a 2.50 for nonresident applicants.

Degree Requirements

The BAS degree in the College of Technology and Applied Sciences consists of 60 semester hours of upper-division (300 level and above) courses, with 30 hours in residence.

AAS degree	60
Assignable credit	6
BAS core	15
General Studies	19
Technical concentration	20
Total	120

General Studies Curriculum

The BAS curriculum builds on the general education content of the AAS degree. Additional General Studies (L, CS, and awareness areas) are met with courses in the core concentration. General Studies courses focus on contextual learning.

L	3
MA	3
HU	3
HU or SB	3
SB	3
SG	4
Total	19

Assignable Credit

Assignable credit allows space in the curriculum for prerequisite courses needed to succeed in the program. The courses are determined by the student and the advisor.

BAS Core

The area core is focused on management and organization, professional communication, quantitative analysis, and computer competency.

APM 301 Introductory Statistics *CS*	3
GIT 335 Computer Systems Technology	3
TMC 346 Management Dynamics	3
or OMT 344 Industrial Organization (3)	
or OMT 452 Industrial Human Resource Management (3)	
TMC 470 Project Management	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 93.

TWC 400 Technical Communications *L* 3
Total 15

Technical Concentrations

Aviation Maintenance Management Technology. This concentration is for those students who have completed an airframe and powerplant certification as part of their AAS degree. Students receive an orientation in management practices that prepares them for progressively more responsible positions in the field of aviation maintenance management.

Aviation Management Technology. This concentration is for those students who have received training and education in some aspect of the air transportation industry (other than aviation maintenance), such as flight certificates and ratings, as part of their AAS degree. Students receive an orientation in management practices that prepares them for progressively more responsible positions in the field of aviation management.

STUDENT ORGANIZATIONS

The department hosts the local chapter of Alpha Eta Rho, an international professional aviation fraternity open to all students with an interest in aviation. The American Association for Airport Executives is open to all students with an interest in airport management. The Student Advisory Council is a leadership organization that facilitates student communication with faculty, departmental leaders, and university administrative personnel. The Women in Aviation International organization is open to all students.

AERONAUTICAL MANAGEMENT TECHNOLOGY (AMT)

E AMT Note 1. Flight instruction costs are not included in university tuition and fees.

E AMT 100 Flight Safety I. (2)
fall, spring, summer
Supervised private pilot flight training and flight safety briefings. Requires continuous enrollment until completion of the FAA Private Pilot Certificate. May be repeated for credit. Integrated lecture/lab. Fee. See AMT Note 1. Pre- or corequisites: both AMT 182 and 220 (or their equivalents).

E AMT 101 Introduction to Aeronautical Management Technology. (1)
fall and spring
Facilitates entry into Aeronautical Management Technology programs. Emphasizes *General Catalog* and concentration requirements, registration, careers, and Polytechnic campus facilities.

E AMT 182 Private Pilot Ground School. (3)
fall, spring, summer
Ground school preparation for Private Pilot Certificate. Aerodynamics, navigation, performance, and regulations. Integrated lecture/lab. Corequisite: AMT 220.

E AMT 194 Special Topics. (1–4)
selected semesters

E AMT 200 Flight Safety II. (1)
fall, spring, summer
Supervised commercial instrument flight training and safety briefings. Requires continuous enrollment until completion of FAA Commercial Pilot Certificate with Instrument Rating. Integrated lecture/lab. Fee. See AMT Note 1. Prerequisites: AMT 100; Private Pilot Certificate. Pre- or corequisite: AMT 214 or 322.

E AMT 201 Air Traffic Control. (3)
fall
Ground and air operations; weather services communications and routing; flight plans, IFR operations, departures and arrivals; and airport conditions and emergencies. Prerequisite: AMT 182.

E AMT 214 Commercial/Instrument Ground School I. (3)
fall and spring
Ground school leading to FAA Instrument Pilot Rating/Commercial Pilot Certificate (part 1 of 2). 10 hours ground trainer included. Integrated lecture/lab. Fee. Pre- or corequisites: AMT 182, 220.

E AMT 220 Aviation Meteorology. (3)
fall, spring, summer
Evaluation, analysis, and interpretation of atmospheric phenomena. Low- and high-altitude weather from the pilot's viewpoint. Corequisite: AMT 182.

E AMT 280 Aerospace Structures, Materials, and Systems. (4)
fall
Basic aerodynamics, incompressible/compressible airflow, wind tunnel testing, wing theory; analysis of aircraft structures; properties and applications of materials, and aircraft systems. Lecture, lab. Fee. Prerequisites: PHY 111, 113.

E AMT 287 Aircraft Powerplants. (4)
spring
Theory and performance analysis of gas turbine and reciprocating aircraft engines. Engine accessories, systems, and environmental control. Lecture, lab. Prerequisites: PHY 111, 113.

E AMT 300 Flight Safety III. (1)
fall, spring, summer
Supervised instructor flight training and safety briefings. Requires continuous enrollment until completion of FAA Flight Instructor Certificate with Instrument Instructor Rating. Integrated lecture/lab. Fee. See AMT Note 1. Prerequisite: AMT 200. Pre- or corequisite: AMT 385.

E AMT 308 Air Transportation. (3)
fall
Studies the historical and international development of air transportation and its social, political, and economic impact upon global interrelationships. Prerequisite: junior standing.
General Studies: G

E AMT 322 Commercial/Instrument Ground School II. (3)
fall and spring
Ground school leading to FAA Instrument Pilot Rating/Commercial Pilot Certificate (part 2 of 2). 10 hours ground trainer included. Integrated lecture/lab. Fee. Prerequisite: AMT 100 or instructor approval. Pre- or corequisite: AMT 214.

E AMT 350 Aircraft Design and Logistics Management. (3)
spring
Fundamental aircraft design principles, including performance factors associated with mission profiles and the identification of basic logistical support requirements. Integrated lecture/lab. Prerequisites: AMT 280, 287.

E AMT 360 Introduction to Helicopter Technology. (3)
selected semesters
Introduces the working functions of modern rotary wing aircraft, rotary wing flight theory, aerodynamics, controls, flight, and power requirements. Prerequisites: PHY 111, 113.

E AMT 370 Air Freight Operations. (3)
selected semesters
Air freight operations in National Aviation System; ramp operations, loading, weight and balance, and administration of airside and groundside operations. Prerequisite: junior standing.

E AMT 382 Air Navigation. (3)
fall and spring
Theory and application of modern advanced navigation and flight instrument systems. Introduces crew resource management in multiplace cockpits. Lecture, lab. Prerequisites: AMT 200, 322.

E AMT 385 Flight Instructor Ground School. (3)
fall and spring
Ground school in preparation for the FAA Flight Instructor Certificate. Integrated lecture/lab. Pre- or corequisite: AMT 200.

E AMT 387 Multiengine Pilot Ground School. (1)
fall and spring
Ground school preparation for the FAA Multiengine Rating. Integrated lecture/lab. Fee. See AMT Note 1. Prerequisite: AMT 200 or instructor approval.

E AMT 391 Multiengine Instructor Ground School. (2)
selected semesters
Ground school preparation for the FAA Multiengine Flight Instructor Rating. Integrated lecture/lab. See AMT Note 1. Prerequisites: AMT 300, 387, 400.

E AMT 392 Flight Instructor Instrument Ground School. (3)
fall and spring
Ground school preparation for the FAA Instrument Flight Instructor Rating. Lecture, lab. See AMT Note 1. Prerequisites: AMT 200, 385.

E AMT 394 Special Topics. (1–4)
selected semesters

E AMT 396 Aviation Professional. (1)
fall and spring
Career focus for management and flight students, including internships, résumé writing, interviews, and employment search in aviation industry. Prerequisite: junior standing.

E AMT 400 Flight Safety IV. (1)
fall, spring, summer
Multiengine crew training and safety briefings. Requires continuous enrollment until completion of multiengine rating. Integrated lecture/lab. Fee. See AMT Note 1. Prerequisite: AMT 300. Pre- or corequisite: AMT 387.

E AMT 401 Multiengine Instructor Rating. (1)
selected semesters
Normal and emergency flight operations. Instruction techniques and procedures for light multiengine land, airplane. Requires CFIAME Rating for course completion. Integrated lecture/lab. See AMT Note 1. Prerequisites: AMT 391, 400.

E AMT 408 National Aviation Policy. (3)
fall
Examines aviation and airspace policies and policy process, including agencies involved in formulation, implementation, and evaluation of aviation policy. Prerequisites: AMT 308; senior standing.

E AMT 410 Aviation Safety and Human Factors. (3)
fall
Aviation accident prevention, human factors, life support, fire prevention, accident investigation, and crash survivability. Development and analysis of aviation safety programs. Prerequisites: junior standing; completion of 1 semester of General Studies L requirement.

E AMT 412 Air Transportation Research. (1)
fall
Surveys practical research methodology in use in the air transportation industry. Topics include planning and design considerations.

E AMT 442 Aviation Law/Regulations. (3)
fall
Aviation within context of U.S. Common Law system. Public law, administrative rule making, sovereignty, enforcement, and case law analysis. Prerequisite: junior standing.

E AMT 444 Airport Management and Planning. (3)
spring
Orientation to administration and management of modern public airports, including overview of planning, funding, and development of airport facilities. Prerequisite: junior standing.

E AMT 482 Airline Instrument Procedures. (3)
fall
Advanced instrument flight using airline instrument procedures and airline crew and cockpit resource management. Lecture, lab. Prerequisites: a combination of AMT 200 and 322 and 382 or only instructor approval.

E AMT 484 Aeronautical Internship. (1–12)
fall, spring, summer
Work experience assignment with aerospace industry commensurate with student's program. Special project guidance by industry with university supervision. Prerequisites: advisor approval; junior standing.

E AMT 486 Regional Jet Aircraft Systems. (3)
fall and spring
Regional jet airline aircraft systems and flight procedures. Includes theoretical educational education for regional jet commercial passenger aircraft. Integrated lecture/lab. Prerequisite: AMT 382. Pre- or corequisite: AMT 482.

E AMT 489 Airline Administration. (3)
spring
Administrative organizations, economics of airline administration, operational structure, and relationship with federal government agencies. Prerequisite: junior standing.

E AMT 490 Regional Jet Operations Capstone. (3)
fall and spring
Regional jet aircraft operations and flight procedures. Includes theoretical education for RJ aircraft, FTD and full-motion simulator time. Integrated lecture/lab. Prerequisites: AMT 382; professional flight major. Corequisite: AMT 482.

E AMT 491 Aviation Management Capstone. (3)
spring
Integrated group project with industry partner to address current problems in either air carrier or airport management focus area. Prerequisite: senior standing.

E AMT 494 Special Topics. (1–4)
selected semesters

E AMT 496 Airline Aircraft Systems Capstone. (3)
spring
Commercial airline aircraft systems and flight procedures. Includes theoretical education for large, commercial passenger aircraft. Integrated lecture/lab. Prerequisite: senior standing.

E AMT 498 Pro-Seminar. (1–7)
selected semesters

E AMT 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/catalog 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 93.

Department of Electronics and Computer Engineering Technology

www.poly.asu.edu/ctas/ecet
480/727-1514
TECH 101

Lakshmi V. Munukutla, Chair

Professors: McHenry, Munukutla, Robertson

Associate Professors: Darveaux, Macia, Madakannan, Petrovic, Sundararajan, Zeng

PURPOSE

The Department of Electronics and Computer Engineering Technology prepares graduates to apply scientific and engineering knowledge, methods, and techniques in support of technological applications in electronics and computer engineering activities and processes.

The engineering technology curriculum is applications oriented and builds upon a background of applied science and mathematics, including the concepts and applications of calculus. Graduates are prepared to produce practical, workable, and safe solutions to technologically challenging problems. Graduates are employed in the electronics and computer industries with responsibilities such as designing, installing, and operating technical systems; analyzing and (re) engineering systems that embed computer hardware and software for unique applications; developing and producing products, managing manufacturing processes; and providing customer support for technical products and systems.

DEGREES

The faculty in the Department of Electronics and Computer Engineering Technology offer the BS degree in Electronics Engineering Technology (BS/EET).

For students holding an AAS degree, the department offers the BAS degree with a major in Applied Science. Two concentrations are available: instrumentation and semiconductor technology.

A Master of Science in Technology degree program with concentrations in electronic systems engineering technology, instrumentation and measurement technology, and microelectronics engineering technology is available for qualified BS graduates. See the *Graduate Catalog* for more information.

Electronics Engineering Technology—BS

Students interested in the BS degree in Electronics Engineering Technology may choose to specialize in one of the following three concentrations: electronic systems, microelectronics, and telecommunications.

The *electronic systems* concentration is aimed at preparing persons for careers in control, electronics, instrumentation, and power systems applications. This concentration allows a student to develop a broad-based knowledge of electrical/electronic fundamentals with an applications perspective.

The *microelectronics (UET)* concentration combines applied electronics, monolithic and hybrid integrated circuit processing and applications, device and component fabrication, and manufacturing. The objective of this concentration is to prepare persons to assume positions in the area of microelectronics manufacturing with immediately applicable knowledge as well as to develop a strong foundation of electronic fundamentals and methods. Graduates of this concentration secure positions in processing, manufacturing operations, and application areas in industry as members of diverse scientific engineering teams.

The *telecommunications* concentration encompasses the fundamentals of information and signal processing, modern bandwidth-efficient digital radio analysis with RF and microwave circuits and systems. Applications include telephone pulse code modulation, cable TV, fiber optic links, and satellite transmission circuits and systems.

The departmental curriculum is organized into two categories, technical studies and General Studies. Technical studies consist of core areas and the concentration specialty area. General Studies consist of courses selected to meet the university General Studies requirement (see "General Studies," page 93) as well as the math/science requirement of the Technology Accreditation Commission (TAC) of the Accreditation Board for Engineering and Technology (ABET). Note that all three General Studies awareness areas are required. Consult an advisor for an approved list of courses.

A minimum of 50 upper-division semester hours is required, including at least 24 semester hours of EET, CET, or UET upper-division hours to be taken at ASU. A minimum of 128 semester hours with a 2.00 or higher cumulative GPA is required for graduation. Complete program of study guides with typical four-year patterns are available from the department.

The General Studies portion of the BS/EET curriculum has been carefully structured to meet the specific requirements of the university and to include the content required by the TAC of the ABET, the professional accrediting agency for such curricula.

ELECTRONICS ENGINEERING TECHNOLOGY—BS DEGREE REQUIREMENTS

In addition to the courses listed for First-Year Composition and university General Studies, the following courses are required.

Engineering Technology Core

The following courses are required as part of the engineering technology core:

CON	211 Applied Engineering Mechanics: Statics	3
ETC	100 Languages of Technology *CS*	4
MET	340 Applied Thermodynamics and Heat Transfer	3
Total		10

Electronics Engineering Technology Core and Major Requirements

CST	100 Object-Oriented Software Development I	3

CST	150	Digital Systems I *CS* 4
CST	350	Digital Systems II 4
CST	354	Microcomputer Architecture and Programming 4
EET	208	Electric Circuit Analysis I 4
EET	301	Electric Circuit Analysis II 4
EET	310	Electronic Circuits I 4
EET	372	Communication Systems 4
EET	396	Professional Orientation* 1
EET	407	Energy Conversion and Applications 4
EET	410	Electronic Circuits II 4
UET	331	Electronic Materials 3
UET	415	Electronic Manufacturing Engineering Principles 3
Total		 46

* Students must take EET 396 the semester in which they are enrolled in the 87th hour of credit (ASU plus transfer hours). If the 87th hour occurs in summer session, students should take EET 396 the prior spring semester.

Electronics Engineering Technology Concentrations

Electronic Systems

CST	383	Shell and Script Programming with UNIX 3
EET	406	Control System Technology 4
EET	430	Instrumentation Systems 4
EET	460	Power Electronics 4
Approved technical electives 7		
Total 22		

Microelectronics

CHM	116	General Chemistry II *SQ* 4
UET	416	Dopant Control Technology 3
UET	417	Semiconductor Technology Practice 3
UET	418	Systems on Silicon 3
UET	421	IC Device Characterization 3
UET	432	Semiconductor Packaging and Heat Transfer 3
Approved technical elective 2		
Total 21		

Telecommunications

CET	458	Digital Computer Networks 3
CET	473	Digital/Data Communications 4
EET	401	Digital Signal Processing for Multimedia 3
EET	494	ST: Digital Filter Hardware Design 3
Approved technical electives 9		
Total 22		

Electronics Engineering Technology
Program of Study
Typical First- and Second-Year Sequence

First Year

First Semester

ENG	101	First-Year Composition 3
ETC	100	Languages of Technology *CS* 4
MAT	170	Precalculus *MA* 3
PHY	111	General Physics *SQ*[1] 3
PHY	113	General Physics Laboratory *SQ*[1] 1
Total 14		

Second Semester

CST	100	Object-Oriented Software Development I 3
CST	150	Digital Systems I *CS* 4
ENG	102	First-Year Composition 3
MAT	260	Technical Calculus I *MA* 3
PHY	112	General Physics *SQ*[2] 3
PHY	114	General Physics Laboratory *SQ*[2] 1
Total 17		

Second Year

First Semester

CON	211	Applied Engineering Mechanics: Statics 3
CST	350	Digital Systems II 4
ECN	211	Macroeconomic Principles *SB* 3
EET	208	Electric Circuit Analysis I 4
MAT	261	Technical Calculus II *MA* 3
Total 17		

Second Semester

CHM	113	General Chemistry I *SQ* 4
EET	301	Electric Circuit Analysis II 4
MAT	262	Technical Calculus III *MA* 3
MET	340	Applied Thermodynamics and Heat Transfer 3
HU, SB, or awareness area course 3		
Total 17		

[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.

APPLIED SCIENCE—BAS

The Bachelor of Applied Science degree is a "capstone" degree for the Associate of Applied Science degree. The BAS degree exposes students to advanced concepts and diverse critical thinking skills that prepare them for future career opportunities and professional advancement. Students wishing to enroll in the BAS concentrations offered by the Department of Electronics and Computer Engineering Technology should have an AAS in electronics technology or computer programming.

Admission

Admission to the BAS degree program is restricted to students holding an AAS degree from a regionally accredited U.S. postsecondary educational institution. A GPA of 2.00 or higher is required for all resident applicants and a 2.50 for nonresident applicants.

Degree Requirements

The BAS degree in the College of Technology and Applied Sciences consists of 60 semester hours of upper-division (300-level and above) courses, with 30 semester hours in residence.

AAS degree	60
Assignable credit	6
BAS core	15
General Studies	19
Technical concentration	20
Total	120

General Studies Curriculum

The BAS curriculum builds on the general education content of the AAS degree. Additional General Studies (L, CS, and awareness areas) are met with courses in the core 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 93.

concentration. General Studies courses focus on contextual learning.

L	3
MA	3
HU	3
HU or SB	3
SB	3
SG	4
Total	19

Assignable Credit

Assignable credit allows space in the curriculum for the prerequisite courses needed to succeed in the program. The courses are determined by the student and the advisor.

BAS Core

The area core focuses on management and organization, professional communication, quantitative analysis, and computer competency. The BAS core consists of five courses and varies depending upon concentration.

BAS Core

CST	354 Microcomputer Architecture and Programming	4
CST	386 Operating Systems Principles	3
EET	494 ST: Data Analysis	3
TMC	346 Management Dynamics	3
TWC	400 Technical Communications *L*	3
Total		16

Technical Concentrations

Instrumentation. This concentration studies instrumentation, power systems, and computer systems. The curriculum prepares the graduate to specify and prepare solutions for a wide variety of electrical and electronic instrumentation systems. Graduates from this concentration are prepared for technical leadership positions in the various segments of the electronics industry.

Semiconductor Technology. This concentration prepares graduates for careers in the semiconductor industry. The BAS degree provides graduates with an understanding of integrated circuit processing, mask making, packaging, and the software tools used in this industry.

ELECTRONICS ENGINEERING TECHNOLOGY (EET)

E EET 191 First-Year Seminar. (1–3)
selected semesters

E EET 208 Electric Circuit Analysis I. (4)
fall and spring
Electrical models, AC/DC steady-state analysis of first and second order systems. Circuit theorems. Three-phase circuits. Lecture, lab. Pre- or corequisite: MAT 261.

E EET 294 Special Topics. (1–4)
selected semesters

E EET 301 Electric Circuit Analysis II. (4)
fall and spring
Analysis of continuous-time signals and linear systems of using Laplace and Fourier response of circuits. Lecture, lab. Prerequisite: EET 208. Pre- or corequisite: MAT 262.

E EET 304 Transmission Lines in Computer Networks. (3)
spring
Theory and application of transmission lines in high-speed computer networks. Signal propagation and impedance matching. Lecture, lab, computer labs. Prerequisite: EET 301.

E EET 310 Electronic Circuits I. (4)
fall and spring
Multistage amplifier, analysis, and design using models and computer simulation. Lecture, lab. Prerequisite: EET 208.

E EET 372 Communication Systems. (4)
fall and spring
Systems analysis and design of AM, FM, PCM, and SSB communication systems. Noise and distortion performance of communication systems. Lecture, lab. Pre- or corequisites: EET 301, 310.

E EET 394 Special Topics. (1–4)
selected semesters

E EET 396 Professional Orientation. (1)
fall and spring
Technical, professional, economic, and ethical aspects of electronics/computer engineering technology practice and industrial organization. Lecture, projects. Prerequisite: junior standing.

E EET 401 Digital Signal Processing for Multimedia. (3)
fall
Applies DSP techniques to multimedia. Digital filter analysis and design. Time and frequency techniques. Computer applications. Cross-listed as CET 401. Credit is allowed for only CET 401 or EET 401. Prerequisites: EET 301; MAT 262.

E EET 403 PLCs, Sensors, and Actuators. (3)
spring
Applications, programming, and troubleshooting using PLCs. Interfacing to motors, sensors, and actuators. Fluid power principles. Lecture, lab, projects. Prerequisite: EET 208 (or equivalent electrical science course).

E EET 406 Control System Technology. (4)
spring
Control system components, analysis of feedback control systems, stability, performance, and application. Lecture, lab, computer simulations. Prerequisites: EET 301; MAT 262.

E EET 407 Energy Conversion and Applications. (4)
fall
Electricity, magnetism, mechanics, heat and units, and three-phase circuits. Electrical machines, transformers, generation, transmission, and distribution of electrical energy. Lecture, lab. Prerequisite: EET 208.

E EET 410 Electronic Circuits II. (4)
fall and spring
Analysis and design of OP-amps, power amplifiers, and digital logic families. Feedback design using frequency response. Computer analysis and design. Lecture, lab. Prerequisites: EET 301, 310.

E EET 430 Instrumentation Systems. (4)
fall
Measurement principles and instrumentation, techniques. Signal and error analysis. Lecture, lab. Prerequisites: EET 301, 310.

E EET 460 Power Electronics. (4)
spring
Analyzes circuits for control and conversion of electrical power and energy. Lecture, lab. Prerequisites: EET 301, 310, 407.

E EET 482 Industrial Practice: Internship/Co-op. (1–4)
fall, spring, summer
Specially assigned or approved activities in electronic industries or institutions. Requires report. May be repeated for up to a maximum of 10 credits. Prerequisites: Electronics Engineering Technology major; junior or senior standing.

E EET 484 Internship. (1–3)
selected semesters

E EET 490 Electronics Project. (1–4)
fall, spring, summer
Individual or small group projects in applied electronics, with emphasis on laboratory practice or hardware solutions to practical problems. Prerequisite: instructor approval.

E EET 492 Honors Directed Study. (1–3)
selected semesters

E EET 493 Honors Thesis. (1–6)
selected semesters

E EET 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Data Analysis. (3)
- Digital Filter Hardware Design. (3)

E EET 498 Pro-Seminar. (1–3)
selected semesters

E EET 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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

MICROELECTRONICS ENGINEERING TECHNOLOGY (UET)

E UET 191 First-Year Seminar. (1–3)
selected semesters

E UET 194 Special Topics. (1–4)
selected semesters

E UET 294 Special Topics. (1–4)
selected semesters

E UET 305 Introduction to Microelectronics. (3)
fall, spring, summer
Quantifies the role of microelectronics technology and its associated skills as drivers for electronics systems development. Lecture with strong Web preparation and support. Prerequisite: junior standing.

E UET 331 Electronic Materials. (3)
fall
Physical, chemical, electromagnetic, and mechanical properties of electronic materials. Solid-state device characteristics and their material properties. Fee. Prerequisites: CHM 113; EET 208; PHY 112, 114.

E UET 411 Layer Deposition Technology. (3)
spring
Fundamentals, applications, and vacuum technology of layer deposition processes used in IC fabrication. Lecture with Web support. Fee. Credit is allowed for only UET 411 or 511. Prerequisite: UET 331. Corequisite: UET 417.

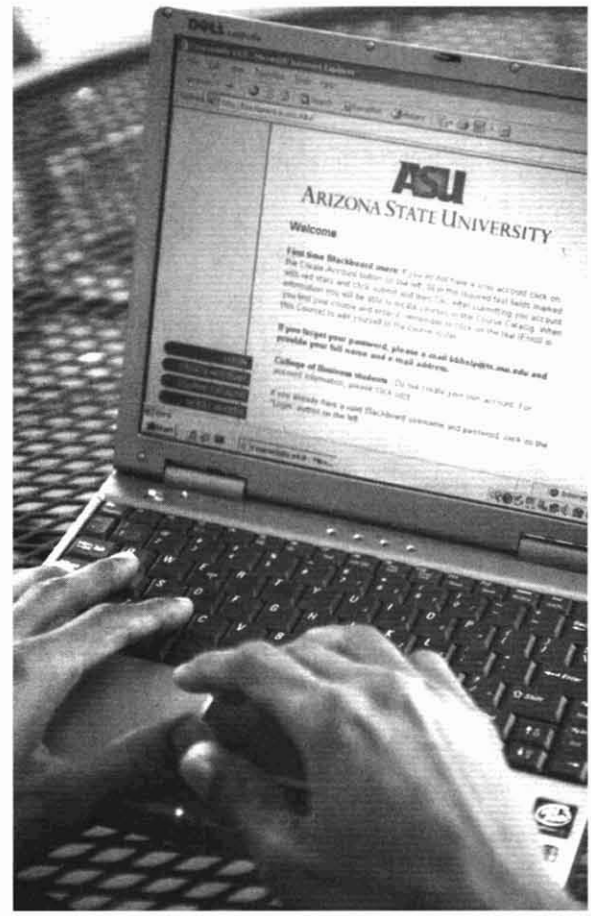
E UET 415 Electronic Manufacturing Engineering Principles. (3)
fall and spring
Electronic equipment design and fabrication principles and practice. Completion of electronics hardware design project and report. Lecture, lab. Fee. Prerequisite: senior standing (113 hours) in Electronics Engineering Technology.

E UET 416 Dopant Control Technology. (3)
fall
Design and practical realization of charge distribution in microelectronic devices, including ion implantation and diffusion processes. Lecture with Web support. Credit is allowed for only UET 416 or 516. Prerequisite: UET 331. Corequisite: UET 417.

E UET 417 Semiconductor Technology Practice. (3)
fall
Lab-based design and execution of safe and effective semiconductor fabrication operations. Lab. Prerequisite: UET 331 (or its equivalent). Corequisites: UET 411 and 416 and 424 (or their equivalents).

E UET 418 Systems on Silicon. (3)
spring
Factors that drive integration on silicon, including logic, memory, and interfaces. Economics of system-level solutions. Lecture with Web support and team activities. Credit is allowed for only UET 418 or 518. Prerequisite: UET 331. Corequisite: UET 417.

E UET 421 IC Device Characterization. (3)
fall
Design and operation of the major classes of semiconductor devices. Characterization by parameters and their extraction. Future technology trends. Lecture with Web support. Fee. Prerequisite: UET 331.



Many areas on campus accommodate wireless network connections, and wireless zones continue to expand on all ASU campuses. Tim Trumble photo

E UET 424 Pattern Transfer Technology. (3)
spring
Maskmaking, lithography, and etch processes for integrated circuit fabrication. Lecture with Web support. Prerequisite: UET 331. Corequisite: UET 417.

E UET 426 Software Tools for the Semiconductor Industry. (3)
spring
Introduces software tools commonly used in the semiconductor industry, such as SUPREM IV, PSPICE, VIEWLOGIC, and ICED. Prerequisite: UET 331.

E UET 432 Semiconductor Packaging and Heat Transfer. (3)
spring
Packaging theory and techniques; hermetic and plastic assembly; thermal management; electrical characteristics and reliability. Prerequisite: UET 331 (or their equivalents).

E UET 437 Process Control and Validation. (3)
spring
Statistical process control and its application to IC fabrication. Design, control, and performance validation techniques throughout the manufacturing process. Lecture with Web support. Prerequisite: 300-level statistics course. Corequisite: UET 417.

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 93.

E UET 484 Internship. (1–3)
selected semesters

E UET 492 Honors Directed Study. (1–3)
selected semesters

E UET 493 Honors Thesis. (1–6)
selected semesters

E UET 494 Special Topics. (1–4)
selected semesters

E UET 498 Pro-Seminar. (1–3)
selected semesters

E UET 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/catalog 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 Engineering

www.poly.asu.edu/ctas/engineering
480/727-2727
CNTR 110

Chell Roberts, Chair

Professors: Henderson, Jakubowski

Associate Professors: Grondin, Hinks, Kuo, Roberts

Assistant Professor: Sugar

PURPOSE

The emerging problems that engineers must solve require a broad set of interdisciplinary skills. Engineers are challenged with improving the quality of life for human kind, designing new innovative products, preparing for potential catastrophes, and providing society with technological leadership. The Department of Engineering provides a flexible, new generation engineering education that serves as a foundation for a variety of technical and professional careers in a rapidly changing world.

Learning is approached through student-focused inquiry, through the investigation and solution of realistic engineering problems, and through frequent participation on interdisciplinary project teams. Learners are guided in the development of a strong foundation in modern engineering skills and in the ability to design, analyze, and build. The department is committed to mentoring students in learning, in the selection of career pathways, and in the transition to the professional world. Students graduating from the program have excellent engineering skills, global awareness, strong communication skills, good business skills, an understanding of entrepreneurship and the ability to continue life-long growth in their professional skills.

The engineering program provides a unique learning environment with faculty who make learning and students a top priority and where students are actively involved in their own education. Realistic projects permeate the curriculum, providing extensive experience in teaming with learners from other disciplines and in communicating to diverse audiences. Classrooms are design studios. The environment and learning approach connects engineering, science, math, and technology to real-world problems and smoothes the transition to a professional career.

The program structure is flexible and responsive to emerging engineering fields. The program integrates a broad knowledge base with study in multiple concentrations, providing both breadth and depth. This provides a greater flexibility in curricular and career pathways allowing for multidisciplinary experiences and novel combinations of expertise. Throughout the curriculum students learn to think critically, with a particular focus on how engineering addresses a variety of technical and societal problems.

DEGREE

The faculty in the Department of Engineering offer a BSE degree in Engineering.

ACCREDITATION

The program will seek accreditation through the Engineering Accreditation Council of the Accreditation Board for Engineering and Technology, Inc. (111 Market Place, Suite 1050, Baltimore, MD 21202, 410/347-7700) under the general engineering criteria applicable to all engineering degrees. The Accreditation Board requires that a program have graduates before accreditation can be granted. Typically, graduates from the year preceding accreditation are granted the status of having an accredited degree.

ENGINEERING—BSE

The Engineering curriculum is a flexible engineering undergraduate curriculum. Flexibility is achieved through a primary and a secondary concentration, automatically making the degree multidisciplinary in nature. The primary concentration is selected from a range of engineering specializations. The secondary concentration is selected from another engineering specialization or from an area of interest outside the engineering field. In addition, the curriculum has nine semester hours of unrestricted electives. This flexibility in the curriculum allows students to take 45 to 66 semester hours of engineering course work in addition to zero to 27 semester hours in the secondary concentration.

A minimum of 128 semester hours with a cumulative GPA of 2.00 is required for graduation. Students must complete First-Year Composition and the University General Studies requirements for Humanities, Social and Behavioral Science and the Global, Historical and Cultural diversity in the US awareness requirements and meet all other University degree requirements.

It is recommended that a student seeking transfer admission to this program at a later date plan on taking MAT 270 and 271; PHY 121 and 122 and CHM 113 or 114 as part of their university general studies requirements. Engineering courses covered by the standard articulation agreements

between the various Arizona universities and community colleges that are articulated as equivalent will be accepted as credit toward this degree.

For more information and advising on courses, send e-mail to engr@asu.edu, call (480) 727-2727, or access the Web site at www.poly.asu.edu/ctas/engineering.

ENGINEERING (EGR)

E EGR 194 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Critical Inquiry in Engineering. (3)
- Introduction to Engineering. (3)
- Introduction to Engineering Design. (4)
- Technology and Society. (3)

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

Department of Mechanical and Manufacturing Engineering Technology

www.poly.asu.edu/ctas/mmet
480/727-1584
SIM 295

Scott G. Danielson, Chair

Associate Professors: Biekert, Danielson, Nam, Palmgren, Rajadas, Rogers

Assistant Professor: Post

Senior Lecturer: Gintz

PURPOSE

The Department of Mechanical and Manufacturing Engineering Technology emphasizes applied engineering practice through four-year degree programs in Manufacturing Engineering Technology and Mechanical Engineering Technology. Math and science principles are applied to the solution of technical problems in a lecture/laboratory environment.

The Mechanical and Manufacturing Engineering Technology (MMET) degree programs endeavor to produce qualified and competent applied engineering professionals (engineering technologists). Graduates are prepared to make substantial contributions to their employers in as short a time as possible. Specifically, the MMET program strives to graduate individuals who possess

1. the scientific, technical, analytical, statistical, computational, and problem solving skills necessary for mechanical and manufacturing engineering practice (including specific aeronautical or automation skills, as appropriate);
2. the competencies appropriate to entry-level professionals in manufacturing systems engineering, enterprise engineering, analysis, product and system design, product realization testing, and quality control;
3. team building, leadership, communication, and project management skills;
4. an understanding of the social, political, and economic environment in which engineering operations function to include broad ethical considerations (i.e., work habits, safety, hazmat);
5. a depth of understanding in either aeronautical or automation practice (for mechanical engineering technology specialty concentrations only);
6. the basic knowledge of production processes taking design manufacturability into account (for Mechanical Engineering Technology graduates only); and
7. a depth of understanding in applications of manufacturing science, technology, and engineering in relation to process and production engineering (for Manufacturing Engineering Technology graduates only).

The goal of the manufacturing engineering technology program is to prepare students for employment in areas such as manufacturing engineering, manufacturing processes, automation, and quality control. Major emphasis is placed on reducing the amount of time required by industry to make the graduate productive in any area of work. The department actively supports the student chapter of the Society of Manufacturing Engineers.

The Mechanical Engineering Technology program produces graduates with the ability to design, develop, implement, and improve machinery, workstations, and systems. The curriculum prepares graduates for many job opportunities in engineering design, manufacturing, and laboratory environments. Graduates are prepared to design and develop machines and related mechanical equipment. Aircraft and their components, automation as used in manufacturing, machine tools, materials handling systems, and industrial production equipment are just a few examples. The department actively supports a student chapter of the Society of Automotive Engineers.

For more information about both programs, access the Web site at www.poly.asu.edu/ctas/mmet.

ACCREDITATION

The BS degree in Manufacturing Engineering Technology and the BS degree in Mechanical Engineering Technology are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc. (See "Accreditation," page 245, for more information.)

DEGREES

The Department of Mechanical and Manufacturing Engineering Technology offers the BS degree in Manufacturing Engineering Technology and the BS degree in Mechanical Engineering Technology.

For students holding an AAS degree, the department offers the BAS degree with concentrations in manufacturing technology and management and materials joining and manufacturing technology.

A Master of Science in Technology degree with concentrations in manufacturing engineering technology, mechanical engineering technology, and aeronautical engineering technology is offered for graduate study. See the *Graduate Catalog* for more information.

BS Degree Requirements

All degree requirements for programs are shown on curriculum check sheets. Requirements include First-Year Composition, University General Studies (see "General Studies," page 93), and the Engineering Technology Core. All three General Studies awareness areas are required. Consult an advisor for an approved list of courses. To graduate, students are required to complete a minimum of 128 semester hours with a 2.00 cumulative GPA, including at least 50 semester hours of upper-division courses.

Manufacturing Engineering Technology—BS

The BS degree in Manufacturing Engineering Technology requires 128 semester hours as specified below:

Engineering technology core	14
First-Year Composition	6
General Studies/department requirements	45
Manufacturing Engineering Technology major	54
Selected concentration	9
Total	128

The following courses constitute the Manufacturing Engineering Technology major and are required of all Manufacturing Engineering Technology students. Refer to the specific concentrations for additional requirements.

Manufacturing Engineering Technology Major

EET	403 PLCs, Sensors, and Actuators	3
MET	150 Introduction to Engineering Technology	1
MET	230 Introduction to Engineering Materials	2
MET	231 Manufacturing Processes	3
MET	300 Applied Material Science	3
MET	302 Welding Survey	3
MET	309 Nondestructive Testing and Quality Assurance	1
MET	313 Applied Mechanics of Materials	3
MET	314 Applied Mechanics of Materials Laboratory	1
MET	331 Machine Design I	3
MET	341 Manufacturing Analysis	3
MET	344 Casting and Forming Processes	3
MET	345 Advanced Manufacturing Processes	3
MET	351 Introduction to Automation	3
MET	396 Manufacturing Professional Orientation	1
MET	401 Quality Assurance	3
MET	416 Applied Computer-Integrated Manufacturing *CS*	3
MET	443 CNC Computer Programming	3
MET	444 Production Tooling	3
MET	460 Manufacturing Capstone Project I	3
MET	461 Capstone Project II	3
Total		54

A student participating in the Manufacturing Engineering Technology program may select from two concentrations: manufacturing engineering technology or mechanical engineering technology.

Manufacturing Engineering Technology Concentration. This concentration is designed to prepare technologists with both conceptual and practical applications of processes, materials, and products related to manufacturing industries. Accordingly, this concentration provides additional preparation for students to meet the responsibilities in planning the processes of production, developing the tools and machines, and integrating facilities for production or manufacturing.

Required Courses

MET	409 Applied Engineering Economics	3
MET	410 Manufacturing Resource Management	3
MET	442 Specialized Production Processes	3
Total		9

Mechanical Engineering Technology Concentration. The primary objective of the mechanical engineering technology concentration is to offer manufacturing students an emphasis in mechanics and thermal sciences. Required courses are as follows:

MET	410 Manufacturing Resource Management	3
MET	434 Applied Fluid Mechanics	3
MET	438 Machine Design II	3
Total		9

Mechanical Engineering Technology—BS

The BS degree in Mechanical Engineering Technology requires 128 semester hours as specified below:

Mechanical Engineering Technology major	63
Engineering technology core	14
First-year composition	6
General Studies/department requirements	45
Total	128

Students interested in the BS degree in Mechanical Engineering Technology choose one of the following three concentrations: mechanical, aeronautical, or automation engineering technology. Each concentration includes six courses for a total of 18 semester hours.

The mechanical engineering technology concentration builds a strong base of knowledge of the field and is available to students who do not desire a focused specialty area.

The aeronautical engineering technology concentration provides a specialty content area in aircraft airframe, propulsion, and aircraft production and operations. It prepares students for employment in areas such as aircraft design and manufacturing, aerodynamics, propulsion, and wind tunnel testing. However, aeronautical concentration graduates have a good general background in mechanical engineering technology and are not limited to employment opportunities in just the aviation industry.

The automation engineering technology concentration provides specialty content in mechanical automation. Automated assembly and testing are major components of most modern, high volume mechanical systems and manufacturing operations. As a specialty area, this concentration provides students with an opportunity to develop knowledge

and skill in the broad area of automation. It also dovetails well with the semiconductor industry where most process tools are highly automated.

The following courses constitute the Mechanical Engineering Technology major and are required of all Mechanical Engineering Technology students.

Mechanical Engineering Technology Major

AET 210 Measurements and Testing	3
AET 312 Applied Engineering Mechanics: Dynamics	3
MET 150 Introduction to Engineering Technology	1
MET 230 Introduction to Engineering Materials	2
MET 231 Manufacturing Processes	3
MET 300 Applied Material Science	3
MET 309 Nondestructive Testing and Quality Assurance	1
MET 313 Applied Mechanics of Materials	3
MET 314 Applied Mechanics of Materials Laboratory	1
MET 331 Machine Design I	3
MET 345 Advanced Manufacturing Processes	3
MET 396 Manufacturing Professional Orientation	1
MET 401 Quality Assurance	3
MET 409 Applied Engineering Economics	3
MET 432 Thermodynamics	3
MET 434 Applied Fluid Mechanics	3
MET 460 Capstone Project I	3
MET 461 Capstone Project II	3
Concentration	18
Total	63

APPLIED SCIENCE—BAS

The Bachelor of Applied Science (BAS) degree is a "capstone" degree for the Associate of Applied Science degree. The BAS degree exposes students to advanced concepts and diverse critical thinking skills that prepare them for additional career opportunities and professional advancement.

Admission

Admission to the BAS degree program is restricted to students holding an AAS degree from a regionally accredited U.S. postsecondary educational institution. A GPA of 2.00 or higher is required for resident applicants and a 2.50 for nonresident applicants.

Degree Requirements

The BAS degree in the College of Technology and Applied Sciences consists of 60 semester hours of upper-division (300 level and above) courses, with 30 hours in residence. A total of 120 semester hours is required for graduation.

AAS degree	60
Assignable credit	6
BAS core	15
General Studies	19
Technical concentration	20
Total	120

General Studies Curriculum

The BAS curriculum builds on the general education content of the AAS degree. Additional General Studies (L, CS, and awareness areas) are met with courses in the core or concentration. General Studies courses focus on contextual learning.

L	3
MA	3
HU	3
HU or SB	3
SB	3
SG	4
Total	19

Assignable Credit

Assignable credit allows space in the curriculum for prerequisite courses needed to succeed in the program or additional technical electives. The courses are determined by the student and the advisor.

BAS Core

The area core focuses on management and organization, professional communication, quantitative analysis, and computer competency.

MET 401 Quality Assurance	3
MET 416 Applied Computer-Integrated Manufacturing *CS*	3
OMT 344 Industrial Organization	3
TMC 470 Project Management	3
TWC 400 Technical Communications *L*	3
Total	15

Technical Concentration

Manufacturing Technology and Management. This concentration prepares supervisors and other personnel for technical and management positions in the manufacturing industry. Students increase their knowledge of manufacturing and gain insight into other areas, such as management, that support their professional growth.

MET 300 Applied Material Science	3
MET 302 Welding Survey	3
MET 309 Nondestructive Testing and Quality Assurance	1
MET 341 Manufacturing Analysis	3
MET 344 Casting and Forming Processes	3
MET 345 Advanced Manufacturing Processes	3
MET 396 Manufacturing Professional Orientation	1
MET 444 Production Tooling	3
Total	20

Materials Joining and Manufacturing Technology. This concentration requires students to have a solid welding background, preferably a welding-based AAS degree, with welding certification desirable. The materials joining concentration includes additional study in welding and materials joining plus a series of manufacturing-related courses to provide a broad understanding of the complex world of manufacturing. This background allows transition into positions in process development, direct manufacturing support, quality control and assurance, sales, and management.

MET 300 Applied Material Science	3
MET 309 Nondestructive Testing and Quality Assurance	1
MET 351 Introduction to Automation	3
MET 396 Manufacturing Professional Orientation	1
MET 400 Materials and Joining Processes	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 93.

MET 402 Advanced Material Joining 3
MET 409 Applied Engineering Economics 3
MET 437 Design for Materials Joining 3
Total 20

AERONAUTICAL ENGINEERING TECHNOLOGY (AET)

E AET 191 First-Year Seminar. (1–3)
selected semesters

E AET 194 Special Topics. (1–4)
selected semesters

E AET 210 Measurements and Testing. (3)
fall
Measurement systems, components, system response, and the characteristics of experimental data. Integrated lecture/lab. Prerequisites: MET 230; PHY 112, 114.

E AET 215 Mechanics of Aerospace Systems. (3)
spring
Basic physics of flight. Principles and design of aircraft systems and powerplants.

E AET 294 Special Topics. (1–4)
selected semesters

E AET 300 Aircraft Design I. (3)
fall
Applied aerodynamics, standard atmosphere, speed measurement, infinite and finite wings, airplane performance. Fee. Prerequisites: MAT 260; PHY 112, 114.

E AET 310 Instrumentation. (3)
fall
Measurement systems, components, system response, and the characteristics of experimental data. Methods of collecting and analyzing data. Lecture, lab. Prerequisite: MAT 261. Pre- or corequisite: MET 313.

E AET 312 Applied Engineering Mechanics: Dynamics. (3)
fall
Masses; motion kinematics; dynamics of machinery. Prerequisite: MAT 261.

E AET 394 Special Topics. (1–4)
selected semesters

E AET 396 Aerospace Professional Orientation. (1)
fall
Career focus for Aeronautical Engineering Technology students. Familiarization with the aerospace industry. Prerequisite: junior standing.

E AET 415 Gas Dynamics and Propulsion. (3)
spring
Introduces compressible flow, internal and external flow, and aerothermodynamic analysis of propulsion systems. Prerequisite: MET 434.

E AET 417 Aerospace Structures. (3)
fall
Analysis and design of aircraft and aerospace structures. Shear flow. Semimonocoque structures. Effects of dynamic loading. Prerequisites: AET 300, 312; MET 313.

E AET 420 Applied Aerodynamics and Wind Tunnel Testing. (3)
fall
Introduces viscous and inviscid flow and their relationship to aircraft lift and drag. Wind tunnel design and testing. Integrated lecture/lab. Prerequisites: AET 300; MET 434.

E AET 432 Applied Heat Transfer. (3)
fall
Heat transfer by conduction, convection, and radiation. Applies heat transfer to engineering design problems. Pre- or corequisite: MET 434 or instructor approval.

E AET 484 Internship. (1–12)
selected semesters

E AET 487 Aircraft Design II. (3)
spring
Basic aerodynamics and airplane performance analysis methods applied to practical design project. Prerequisite: AET 300.

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

E AET 493 Honors Thesis. (1–6)
selected semesters

E AET 494 Special Topics. (1–4)
selected semesters

E AET 498 Pro-Seminar. (1–7)
selected semesters

E AET 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.

MECHANICAL AND MANUFACTURING ENGINEERING TECHNOLOGY (MET)

E MET 150 Introduction to Engineering Technology. (1)
fall
Introduces mechanical, manufacturing, and aeronautical engineering technology. Covers aspects of the industries utilizing these majors.

E MET 160 CADD and Solid Modeling. (1)
selected semesters
Uses 3-D solid modeling software to model mechanical parts and produce valid engineering drawings, including use of geometric dimensioning and tolerancing. Integrated lecture/lab.

E MET 191 First-Year Seminar. (1–3)
selected semesters

E MET 194 Special Topics. (1–4)
selected semesters

E MET 211 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. May be repeated for credit. Prerequisites: MAT 260 (or 270); PHY 111, 113.

E MET 230 Introduction to Engineering Materials. (2)
spring
Introduction to materials and their properties, emphasizing basic concepts and structures and how these properties relate to manufacturing and design.

E MET 231 Manufacturing Processes. (3)
fall
Design documentation and material processes on plastics, ferrous and nonferrous materials, emphasizing orthographic projection, geometric dimensioning and tolerances. Lecture, lab. Prerequisite: MAT 117 or 170.

E MET 294 Special Topics. (1–4)
selected semesters

E MET 300 Applied Material Science. (3)
fall
Principles of materials science emphasizing concepts relevant to design, manufacturing, and use. Covers metals, polymers, ceramics, and composites. 2 hours lecture, 1 hour lab. Prerequisite: MET 230 or instructor approval.

E MET 302 Welding Survey. (3)
fall
Theory and application of industrial welding processes; introductory welding metallurgy and weldment design; SMAW, GTAW, GMAW, oxyacetylene, and brazing experiences. Lecture, lab. Prerequisite: junior or senior standing.

E MET 309 Nondestructive Testing and Quality Assurance. (1)
fall
Part and material inspection using metrology and nondestructive inspection tools and techniques. Theory and application with use of pertinent standards. Lab. Prerequisite: MET 231.

E MET 313 Applied Mechanics of Materials. (3)
spring
Stress, strain, stress-strain relations. Axial, shear, bending, torsional and combined loads and deflections.

E MET 314 Applied Mechanics of Materials Laboratory. (1)
spring
Measurements of loads and deformations relating stress and strain in axial, shear, bending, torsional, and combined loading configurations. 3 hours lab. Pre- or corequisite: MET 313.

E MET 331 Machine Design I. (3)
fall
Applies mechanics to design of machine elements and structures. Stress analysis, failure modes, tolerances, cylindrical fits, and shaft design. Prerequisite: MET 313.

E MET 340 Applied Thermodynamics and Heat Transfer. (3)
fall and spring
Thermodynamic systems and processes, first and second laws of thermodynamics, properties of pure substances, and applications to heat engines and special systems. Fundamentals of conduction, radiation, and convection. May be repeated for credit. Prerequisites: MAT 261 (or 271); PHY 112, 114.

E MET 341 Manufacturing Analysis. (3)
spring
Organizational and functional requirements for effective production. Analysis of industrial specifications, geometric dimensioning and tolerancing, costs, and group technology. Writing assembly production plans. Prerequisite: MET 231.

E MET 344 Casting and Forming Processes. (3)
spring
Analyzes various forming processes to determine load requirements necessary for a particular metal-forming operation. Information used to select equipment and design tooling. Metal casting processes and design of castings. Introduces powder metallurgy. Prerequisite: MET 300.

E MET 345 Advanced Manufacturing Processes. (3)
spring
Material removal processes emphasizing advanced turning, milling, and machinability studies using cutting tools. CNC programming for machining and turning centers. Lecture, lab. Prerequisite: MET 231.

E MET 351 Introduction to Automation. (3)
spring
Introduces automation. Topics include assembly techniques, fixed and flexible automation systems, robots, material-handling systems, sensors, and controls. Integrated lecture/lab. Prerequisite: EET 208 or instructor approval.

E MET 394 Special Topics. (1–4)
selected semesters

E MET 396 Manufacturing Professional Orientation. (1)
fall
Career focus for Manufacturing Engineering Technology students. Familiarization with the manufacturing industry. Prerequisite: junior standing.

E MET 400 Materials and Joining Processes. (3)
fall
Effects of joining processes on metals and composites. Thermal cycle effects on solid-state and liquid-solid material transformations. Prerequisite: MET 300.

E MET 401 Quality Assurance. (3)
spring
Introduces statistical quality control methods design of experiments, sampling, gauge requirements, specifications, quality assurance tools emphasizing CNC-CMM programming. Integrated lecture/lab. Prerequisite: junior standing.

E MET 402 Advanced Material Joining. (3)
spring
In-depth analysis of common materials-joining processes and their process parameters. Includes automation, soldering, and adhesive bonding. Lecture, lab. Prerequisite: MET 302 (or its equivalent).

E MET 409 Applied Engineering Economics. (3)
spring
Fundamentals of engineering economics in a practical, industry-based approach. Includes effects of depreciation, taxes, inflation, and replacement analysis. Lecture, computer lab experiences.

E MET 410 Manufacturing Resource Management. (3)
fall
Measures like cycle time, throughput, capacity, work-in-process, inventory, variability, and how they drive operating relationships in a factory. Credit is allowed for only MET 410 or 510. Prerequisite: MET 341.

E MET 415 Manufacturing Simulation. (3)
spring
Computer simulation of manufacturing operations. Discrete event simulation models range from individual processes to whole factories. Lecture, computer lab experiences. Prerequisite: MET 341.

E MET 416 Applied Computer-Integrated Manufacturing. (3)
fall
Techniques and practices of computer-integrated manufacturing as applied in a broad range of industry. Integrated lecture/ lab. Prerequisite: MET 341.
General Studies: CS

E MET 418 Composites Materials Manufacturing. (3)
spring
Introduces composite materials and associated manufacturing issues, including tooling, processes, and quality control. Related issues, including testing and joining. Integrated lecture/lab. Credit is allowed for only MET 418 or 518. Prerequisite: MET 300 or instructor approval.

E MET 432 Thermodynamics. (3)
spring
Thermodynamics of mixtures. Combustion process. Applies thermodynamics to power and refrigeration cycles.

E MET 433 Thermal Power Systems. (4)
selected semesters
Analyzes gas power, vapor power, and refrigeration cycles. Components of air conditioning systems. Direct energy conversion. Psychrometry. Analyzes internal combustion engines and fluid machines. Lecture, lab. Prerequisite: MET 432 or instructor approval.

E MET 434 Applied Fluid Mechanics. (3)
spring
Fluid statics. Basic fluid flow equations. Viscous flow in pipes and channels. Compressible flow. Applies fluid measurement and flow in conduits.

E MET 435 Alternate Energy Sources. (3)
selected semesters
Alternate energy systems, energy use and its impact on the environment, and demonstrating practical alternative energy sources to fossil fuels. Prerequisite: instructor approval.

E MET 436 Turbomachinery Design. (3)
selected semesters
Applies thermodynamics and fluid mechanics to the analysis of machinery design and power cycle performance predictions. Prerequisite: MET 434.

E MET 437 Design for Materials Joining. (3)
spring
Uses design principles to analyze structures and determine appropriate weld/braze/solder or adhesive joint size. Uses welding codes. Lecture. Prerequisites: ASC 315, 325.

E MET 438 Machine Design II. (3)
spring
Applies mechanics to the design of machine elements and structures. Emphasizes basics of gears, springs, brakes, clutches, and bearings. Prerequisite: AET 312; MET 331.

E MET 442 Specialized Production Processes. (3)
fall
Nontraditional manufacturing processes, emphasizing EDM, ECM, ECG, CM, PM, HERF, EBW, and LBW. Prerequisite: MET 231.

E MET 443 CNC Computer Programming. (3)
fall
Theory and application of N/C languages using CAM software and CNC machine tools. Lecture, lab. Prerequisite: MET 345 or instructor approval.

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E MET 444 Production Tooling. (3)
spring
Design and fabrication of jigs, fixtures, and special industrial tooling related to manufacturing methods. Lecture, lab. Prerequisite: MET 345.

E MET 452 Implementation of Robots in Manufacturing. (3)
selected semesters
Robotic workcell design, including end effectors, parts presenters, and optimum material flow. Prerequisite: MET 351 or instructor approval.

E MET 455 Automation Systems Integration. (3)
fall
Applies sensors and devices and their integration with PLCs and computers into automated devices and systems. Integrated lecture/lab. Prerequisites: EET 403; MET 351.

E MET 460 Capstone Project I. (3)
fall
Group project designing, evaluating, and analyzing components, assemblies, and systems. Develop products/manufacturing techniques demonstrating state-of-the-art technology. Integrated lecture, lab. Prerequisites: MET 331, 341; senior standing.

E MET 461 Capstone Project II. (3)
spring
Small-group projects applying manufacturing techniques, with emphasis on demonstrating state-of-the-art technology. Integrated lecture/lab. Prerequisite: MET 460 or instructor approval.

E MET 484 Internship. (1–12)
selected semesters

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

E MET 493 Honors Thesis. (1–6)
selected semesters

E MET 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Composite Materials Manufacturing. (3)
- Consumer Manufacturing. (1–3)
- Manufacturing Resource Management. (3)
- Packaging Design. (1–3)

E MET 498 Pro-Seminar. (1–7)
selected semesters

E MET 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.

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Department of Technology Management

technology.poly.asu.edu/dtm
480/727-1781
TECH 102

Thomas E. Schildgen, Chair

Professors: Duff, Hild, Schildgen

Associate Professors: Grossman, Humble, Matson, Olson

Assistant Professor: Harris

Clinical Associate Professor: Thomas

Clinical Assistant Professor: Nelson

Professors of Practice: Kime, Peterson

Senior Lecturer: Wilson

Lecturers: Dolin, Lestar, Parmentier

PURPOSE

The mission of the department is to prepare graduates who are able to develop and communicate technological solutions to industrial problems, to manage systems operations, to improve and evaluate products, to provide customer support, and to facilitate technology transfer in industry and government. Increased complexity and sophistication have created great demand for those individuals who possess a working knowledge of the technical phases of planning, testing, production, and fabrication of consumer and industrial products and equipment. Technology includes the application of science, systematic methods, procedures, machines, communication protocols, and materials control for the development, improvement, and implementation of state-of-the-art solutions to industrial problems.

DEGREES

The faculty in the Department of Technology Management offer BS degrees in Environmental Technology, Graphic Information Technology, and Operations Management Technology. These degrees are fully accredited by the National Association of Industrial Technology (NAIT). For more information, call 734/677-0720, or write

NATIONAL ASSOCIATION OF INDUSTRIAL TECHNOLOGY
3300 WASHTENAW AVENUE
SUITE 220
ANN ARBOR MI 48104-4200

For students holding an AAS degree the department offers the BAS degree in Applied Science, with concentrations in digital media management, digital publishing,

emergency management, fire service management, operations management, municipal operations management, and technical graphics.

A Master of Science in Technology degree is offered for graduate study. The department offers five concentrations for the graduate degree: environmental technology management, fire service administration, global technology and development, graphic information technology, and management of technology. For more information about the graduate program, see the *Graduate Catalog*.

BACHELOR OF SCIENCE

The curriculum consists of First-Year Composition, University General Studies, and technical courses. Note that all three General Studies awareness areas are required. Consult with an advisor for an approved list of courses. The technical part of the curriculum includes a required technology management core, degree course work, and technical electives selected with approval of an advisor.

Technology management students are required to complete a minimum of 120 semester hours with a minimum 2.00 cumulative GPA, including a minimum of 50 semester hours of upper-division courses to graduate.

Technology Management Core*

ETC	100 Languages of Technology *CS*	4
GIT	303 Digital Publishing	3
TMC	331 Quality Assurance	3
TMC	346 Management Dynamics	3
TMC	396 Professional Orientation	1
TMC	470 Project Management	3
TMC	494 ST: Senior Project	3
Total		20

* These courses are for the operations management technology and graphic information technology majors.

ENVIRONMENTAL TECHNOLOGY MANAGEMENT—BS

The Environmental Technology Management degree prepares graduates to manage such challenging problems in industry as regulatory compliance, hazardous materials management, pollution prevention, and international environmental standards for manufacturing. The curriculum is designed to provide a unique blend of critical scientific, technical, and management skills. Degree requirements encompass the development of a broad background in the natural sciences and mathematics, social and behavioral sciences, management theory, regulatory issues, and applied sciences. The program is purposely structured to facilitate transfer students who are searching for a degree program that builds upon a strong technical background and focuses on the environmental issues faced by industry.

GRAPHIC INFORMATION TECHNOLOGY—BS

The Graphic Information Technology degree prepares students for technical and management positions in the diverse graphic communication and information technology industries: digital printing and publishing; technical/digital media production; management of graphic information assets; quality assurance of graphic products; planning and evaluation of print, Internet, multimedia, and computer-based communications. This is an intensive 120-semester-hour program of study emphasizing theory and hands-on laboratory practice. Students develop skills to plan and execute graphic solutions using visualization and prepress, engineering graphic standards, technical document design, higher-level graphic programming languages, computer drawing and illustration, commercial digital photography, multimedia and three-dimensional modeling, project management, quality assurance, and e-commerce practices.

The Graphic Information Solutions facility (GIS), located in the Technology Center, provides internship opportunities and exposes students to current production technology, problem-solving skills, cost analysis, and human resource issues. Graduates are able to present technical solutions using graphics in print and Internet publications, engineering documents, media-rich presentations, interactive training and instruction, models, and animations. Typical career opportunities include graphic operations management, sales and marketing, information technology support in graphics-related industries, graphic systems analysis, digital publishing (both print and online), and computer graphics content planning and creation.

OPERATIONS MANAGEMENT TECHNOLOGY—BS

The Operations Management Technology degree prepares students for supervisory and administrative positions in industry, manufacturing, and public service organizations. Course work includes data analysis, economics, effective decision making, international business, legal and ethical studies, marketing, operations management, organizational effectiveness, project management, and safety. Emphasis is placed on health and safety within the workplace.

The operations management technology program may be articulated with a broad range of community college technical courses. Community college specializations in areas such as aeronautics, construction, electronics, fire science, police science, graphic information technology, hazardous materials and waste management, computer graphics, safety and health, human resource management, production management, and manufacturing may form a technical specialty area within this program. Consultation with an advisor is required to coordinate the course selection for transfer to this program.

CERTIFICATE PROGRAM IN HAZARDOUS MATERIALS AND WASTE MANAGEMENT

The Certificate Program in Hazardous Materials and Waste Management is designed to provide current and prospective employees of industry and government with a comprehensive and practical curriculum of study in hazardous materials management. The certificate program features instruction by ASU faculty, attorneys, and professionals who work in the specific area in which they teach. Participation in the certificate program is available in three options: 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 93.

certificate program for nondegree students, a BS degree in Environmental Technology Management with a Certificate in Hazardous Materials and Waste Management, and a Master of Science in Technology degree with a Certificate in Hazardous Materials and Waste Management. Students must complete seven selected courses (five required and two electives) and earn a grade of "C" (2.00) or higher to receive the certificate. Except for the introductory course, ETM 501 Principles of Hazardous Materials and Waste Management, the remainder of the courses may be taken in any sequence.

BIS CONCENTRATION

Concentrations in hazardous materials and waste management, and fire service management 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 139.

APPLIED SCIENCE—BAS

The Bachelor of Applied Science (BAS) degree is a "capstone" degree for the Associate of Applied Science degree. The BAS degree exposes students to advanced concepts and diverse critical thinking skills that prepare them for future career opportunities and professional advancement.

Admission

Admission to the BAS degree program is restricted to students holding an AAS degree from a regionally accredited U.S. postsecondary educational institution. A GPA of 2.00 or higher is required for all resident applicants and a 2.50 for nonresident applicants.

Degree Requirements

The BAS degree in the College of Technology and Applied Sciences consists of 60 semester hours of upper-division (300 level and above) courses, with 30 hours in residence.

AAS degree	60
Assignable credit	6
BAS core	15
General Studies	19
Technical concentration	20
Total	120

General Studies Curriculum

The BAS curriculum builds on the general education content of the AAS degree. Additional General Studies (L, CS, and awareness areas) are met with courses in the core or concentration. General Studies courses focus on contextual learning.

L	3
MA	3
HU	3
HU or SB	3
SB	3
SG	4
Total	19

Assignable Credit

Assignable credit allows space in the curriculum for prerequisite courses needed to succeed in the program. The courses are determined by the student and the advisor.

BAS Core

The area core focuses on management and organization, professional communication, quantitative analysis, and computer competency.

APM	301 Introductory Statistics *CS*	3
GIT	335 Computer Systems Technology	3
OMT	452 Industrial Human Resource Management or TMC 470 Project Management (3)	3
TMC	346 Management Dynamics	3
TWC	400 Technical Communications *L*	3
Total		15

Technical Concentrations

Operations Management Technology. The purpose of this technical concentration is to prepare supervisors for management functions in industry, manufacturing, and public service organizations. The BAS degree provides the management and supervision content required for industry and governmental agencies.

Digital Media Management. This concentration prepares graduates for technical positions in industries implementing, planning, and producing interactive communications, integrated media, and multimedia for design, training, and marketing. Prospective students with AAS degrees in areas such as multimedia, printing and publishing, commercial graphics, desktop publishing, or computer illustration may be interested in pursuing a digital media management concentration.

Technical Graphics. This concentration prepares graduates for positions in industries implementing technical and engineering graphics in computer-aided design and computer integrated manufacturing. AAS degrees in drafting and design, computer-aided design, computer integrated manufacturing technology, mechanical technology, architectural technology, or construction technology may provide an excellent foundation for a technical graphics concentration.

Digital Publishing. This concentration prepares graduates for lead technical and entry-level management positions in the printing and publishing industry. AAS degrees in multimedia, printing and publishing, commercial art, desktop publishing, or computer illustration may find that this technical concentration provides excellent opportunities.

Emergency Management. This concentration prepares graduates for positions in industry, municipal departments, and government agencies. The curriculum addresses the established Federal Emergency Management Administration (FEMA) guidelines, on-site emergency response contingency planning, first responder scene management, logistical analysis, and communications protocol.

Fire Service Management. This concentration prepares graduates for positions in industry, municipal departments, and governmental agencies. The curriculum addresses services delivered by fire departments, fire service personnel development, zoning, planning, inspections, and arson investigations.

Municipal Operations Management. This concentration prepares students for supervisory and management functions within municipalities, public service organizations, or businesses that provide services to the public sector. The curriculum addresses quality assurance, ethical issues, leadership practices, operations management, project management, marketing, finance, public sector management, and organizational effectiveness.

Internet and Web Development. This concentration provides graduates with employment skills in the fields of e-commerce, online databases, active server pages, FLASH, HTML, and other computer languages and software applications.

Law Enforcement Management. This concentration is designed for law enforcement officers who work with firefighters and emergency managers in a changing global environment. The concentration focuses on supervisory and leadership skills needed to operate in a municipal environment, along with technological solutions to organizational effectiveness and complex interagency law enforcement investigations.

JOINT DEGREE

The joint Bachelor of Science or Bachelor of Applied Science and Master of Science in Technology degree program is designed to provide students with exceptional undergraduate standing the opportunity to include nine semester hours of upper-division course credit (three semester hours at the 400 level, six semester hours at the 500 level) in their graduate program of study. This joint degree is available for the following Master of Science in Technology concentrations: environmental technology management, fire service administration, graphic information technology, global technology and development, and the management of technology.

ADMISSIONS REQUIREMENTS

Students must meet these requirements to be considered for joint degree admission:

1. a minimum junior-senior GPA of 3.20;
2. ninety semester hours of undergraduate credit in a Department of Technology Management BS or BAS program; and
3. two letters of recommendation from Department of Technology Management faculty.

Senior Project Requirement

All baccalaureate degree students (BS and BAS) in the Department of Technology Management are required to complete a senior project for the requirements of graduation. The TMC senior project is a capstone experience that integrates theory and application of the undergraduate curriculum in an effort to address industry-inspired subject matter. The senior project is carried out under faculty supervision in a scheduled class and is related to the student's technical interests, academic goals, and career employment. The senior project is a study or research project involving a written document and oral presentation, which can involve service learning. A bound document and/or electronic copy of the project becomes part of the department's archival collection, available for public review.

ENVIRONMENTAL TECHNOLOGY MANAGEMENT (ETM)

E ETM 294 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Introduction to Organic Chemistry. (3)

E ETM 301 Environmental Management. (3)
selected semesters
Focuses on knowledge and skills necessary to manage environmental programs. Perspectives include regulatory, individual, corporate, and consulting. Lecture, full or partial Internet. Pre- or corequisites: CHM 101.

E ETM 302 Water and Wastewater Treatment Technology. (3)
selected semesters
Explores the development of treatment technologies. Addresses regulatory standards. Emphasizes theory and practice of system design, laboratory analysis standards and procedures. Pre- or corequisites: CHM 101; MAT 170.

E ETM 303 Environmental Regulations. (3)
selected semesters
Explores environmental laws, regulations, and directives. Addresses air, land, and water. Lecture, full or partial Internet.

E ETM 360 Introduction to Emergency Management. (3)
fall
Emergency management theories. Comprehensive emergency management. Mitigation, preparedness, response, and recovery. Post-disasters and policy formation. Current FEMA all-hazards approach.

E ETM 362 Managing Natural and Technological Disasters. (3)
spring
Federal, state, and local responses to emergencies. Management of mass casualties, evacuation, sheltering, and terrorism; declaration of emergency procedures.

E ETM 363 Computer Applications in Emergency Management. (3)
spring
Explores specific computer programs that are currently in use for contingency planning, tracking chemical inventories, and response resources. Cross-listed as FSM 363. Credit is allowed for only ETM 363 or FSM 363.

E ETM 364 Toxicology and Biohazards in Emergency Management. (3)
fall
Introduces poisons. Dose response routes of exposure and toxicokinetics. Diseases associated with natural disasters. Clinical presentation of treatments.

E ETM 401 Hazardous Waste Management. (3)
selected semesters
Definition of hazardous waste, RCRA and CERCLA regulations, hazardous waste classification system. Overview of hazardous waste management. Lecture, full or partial Internet. Prerequisite: ETM 301. Pre- or corequisite: CHM 101.

E ETM 402 Unit Treatment Technologies. (3)
selected semesters
Addresses various treatment technologies for contaminated air, water, and soil. Emphasizes design based upon medium, type of

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contamination, and concentration. Lecture, full or partial Internet. Prerequisite: ETM 302. Pre- or corequisites: CHM 101; MAT 170.

E ETM 406 Environmental Chemistry. (3)
selected semesters
Examines reactions, transport, and fates of hazardous chemicals in water, soil, air, and living organisms. Lecture, full or partial Internet. Prerequisites: CHM 101; MAT 170.

E ETM 407 Occupational Hygiene. (3)
spring
Overview of occupational health hazards, including recognition, evaluation, and control. Includes regulatory status and health standards. Prerequisites: CHM 101 (or 113 or 114); MAT 170.

E ETM 424 Comprehensive Emergency Management. (3)
summer
Addresses theory and management techniques for emergency preparedness, including mitigation, preparedness, response, and recovery. Pre- or corequisite: ETM 301.

E ETM 426 Environmental Issues. (3)
spring
Explores the science and policy implications of contemporary problems that threaten the environment. Pre- or corequisites: CHM 113; MAT 170.

E ETM 428 International Environmental Management. (3)
selected semesters
Emphasizes technological and economic pressures experienced by developing countries. Lecture, full or partial Internet.
General Studies: G

E ETM 460 National Incident Management System (NIMS). (3)
selected semesters
Covers concepts, terminology, players, compliance requirements including doctrine of National Incident Management System per HSPD-5. Discussion of National Response Plan.

E ETM 461 Homeland Security. (3)
selected semesters
In-depth analysis of policies, procedures, and organizational structure for effective homeland security program. Covers all hazard/all risk philosophy. Credit is allowed for only ETM 461 or 561. Prerequisite: junior or senior standing or instructor approval.

E ETM 468 Simulation and Exercising. (3)
selected semesters
Requirements, planning, conduct, and critique of exercises related to emergency planning. Emphasizes realism using moulage and props.

E ETM 469 Terrorism Defense. (3)
selected semesters
Explores the background and evolution of terrorism. Presents specific tactics for preparation for and response to acts of terrorism. Lecture, full or partial Internet.

E ETM 494 Special Topics. (1–4)
spring
Topics may include the following:
- Bioremediation. (3)
  Technical-regulatory and policy issues emanating from minetailing and animal waste. Lecture, case 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.

FIRE SERVICE ADMINISTRATION (FSA)

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.

FIRE SERVICE MANAGEMENT (FSM)

E FSM 304 Fire Personnel Management. (3)
fall
Promotion, personnel development, career and incentive systems, validation of physical requirements, managerial and supervisory procedures.

E FSM 305 Quality Emergency Services. (3)
selected semesters
Covers quality issues relating to services delivered by progressive fire departments. Covers management of personnel and resources during organizational change.

E FSM 306 Fire Prevention Organization and Management. (3)
selected semesters
Examines and evaluates the techniques, procedures, programs, and agencies involved in preventing fires.

E FSM 307 Fire Department Safety Organization and Management. (2)
summer
Focuses on the management of fire department safety programs.

E FSM 308 Fire Department Budgeting. (3)
spring
Examines the role of fire department budgets and their relationship to other levels of government as a planning tool.

E FSM 309 Emergency Medical Service Organization and Management. (3)
spring
Focuses on the administration and management of emergency medical services delivered by a fire department.

E FSM 363 Computer Applications in Emergency Management. (3)
spring
Explores specific computer programs that are currently in use for contingency planning, tracking chemical inventories, and response resources. Cross-listed as ETM 363. Credit is allowed for only ETM 363 or FSM 363.

E FSM 400 Human Behavior and the Fire Threat. (3)
selected semesters
Proper ways of conducting post-fire interviews; emphasizes the psychological effects of communications during emergencies.

E FSM 401 Labor Relations in the Fire Service. (3)
fall
Examines the relationships between management and unions using the Relations by Objectives model.

E FSM 404 Fire Service Program Management and Fire Department Accreditation. (3)
fall
Examines how to develop, manage, and implement fire department programs, including an examination of the ICMA/IAFC accreditation process.

E FSM 405 Fire Service Leadership. (3)
summer
Focuses on developing personal and organizational leadership qualities required to be successful in the fire service.

E FSM 421 Political and Legal Consideration in Fire Science. (3)
spring
Study of legal and political considerations that affect the decision making of fire service managers.

E FSM 425 Fire Service Administration. (3)
fall
Presents modern management and planning techniques that apply to organizing a fire department.

E FSM 460 Incident Management Systems and Emergency Operations Center. (3)
fall
Covers IMS, terminology, players, and management philosophy. EOC setup, activation, operation, and termination. EOC funding and politics.

E FSM 493 Fire Service Management Senior Project. (2)
fall and spring
Capstone applied project. Applies knowledge learned from FSM course work to solve a practical fire service problem.

E FSM 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.

GRAPHIC INFORMATION TECHNOLOGY (GIT)

E GIT 135 Graphic Communications. (3)
fall and spring
Introduces the technologies involved in the design, image generation, transmission, and industrial production of multiple images for consumer utilization. Integrated lecture/lab, field trips.

E GIT 194 Special Topics. (1–4)
selected semesters

E GIT 210 Creative Thinking and Design Visualization. (3)
fall and spring
Fundamental methods, concepts, and techniques of creative thinking, design visualization, and problem solving. Also includes communication, cultural, and societal influences. Integrated lecture/lab. Prerequisite: ETC 100.

E GIT 212 Computer-Aided Design and Drafting (CADD). (3)
fall and spring
CADD for product design, representation, and documentation; includes projection theory, descriptive geometry, graphics analysis, drafting standards, and precision dimensioning techniques. Integrated lecture/lab. Prerequisite: ETC 100 (or its equivalent).
General Studies: CS

E GIT 215 Introduction to Graphics Programming. (3)
fall
Introduces analyzing, planning, and executing graphic programs using industry-standard programming tools. Integrated lecture/lab. Prerequisite: ETC 100 (or its equivalent).

E GIT 230 Digital Illustration in Publishing. (3)
fall and spring
Raster and vector illustration in publishing. Integrated lecture/lab. Pre- or corequisite: GIT 135.

E GIT 237 Web Content Design. (3)
spring
Introduces design principles for visual content on the World Wide Web; raster, vector, fonts, portable documents, color palettes, file formats. Integrated lecture/lab. Prerequisite: GIT 135 (or its equivalent). Pre- or corequisite: GIT 303.

E GIT 303 Digital Publishing. (3)
fall and spring
Introduces software and hardware used for digital publishing and infographics. Integrated lecture/lab. Prerequisites: GIT 135, 230.

E GIT 312 3-D Computer Graphics Modeling and Representation. (3)
fall
3-D solid modeling applications: concepts, techniques, data structures, modeling strategies, assemblies, geometric representation. Integrated lecture/lab. Prerequisite: GIT 212.
General Studies: CS

E GIT 313 Technical Illustration and Photorealistic Rendering. (3)
fall
Computer-generated graphics for technical illustration and design presentation: axonometric and perspective drawing; shading, shadowing, materials and textures; photorealistic rendering for PostScript output. Integrated lecture/lab. Prerequisite: GIT 212.

E GIT 314 Multimedia Design, Planning, and Storyboards. (3)
spring
Creative and conceptual process of content selection, planning, designing, flowcharting, storyboarding, proposing, configuring, prototyping, and presenting multimedia projects. Integrated lecture/lab. Prerequisite: GIT 237.

E GIT 333 Printing Technology. (3)
spring
Theory and application of sheet and web press technology for offset-lithography, flexography, screen process, and digital printing. Integrated lecture/lab. Pre- or corequisite: GIT 135.

E GIT 334 Image Capture and Manipulation. (3)
fall
Theory and application of image capture techniques used for all copy formats and conversion processes required for reproduction or dissemination. Integrated lecture/lab. Prerequisite: GIT 303.

E GIT 335 Computer Systems Technology. (3)
selected semesters
Survey of computer-based technology covering hardware, software, storage, networking, Internet, telecommunications, and information systems. Integrated lecture/lab. Prerequisite: junior standing.

E GIT 337 Web Content Design. (3)
fall and spring
Introduces design principles for visual content on the World Wide Web; raster, vector, fonts, portable documents, color palettes, file formats. Integrated lecture/lab. Pre- or corequisite: GIT 303.

E GIT 352 Technical Presentations. (3)
spring
Technologies for planning, creating, and delivering individual and group presentations. Prerequisites: ENG 102; GIT 303.

E GIT 384 Commercial Digital Photography. (3)
fall, spring, summer
Digital image, conversion, and output in a commercial studio emphasizing publishing workflow. Integrated lecture and lab. Prerequisite: GIT 334.

E GIT 394 Special Topics. (1–4)
selected semesters

E GIT 411 Computer Animation. (3)
fall and spring
2-D and 3-D computer animation methods: project planning, scripting, storyboards, advanced modeling, lighting, materials mapping, and motion. Integrated lecture/lab. Prerequisites: GIT 312, 334.

E GIT 412 Multimedia Authoring, Scripting, and Production. (3)
fall and spring
Production of multimedia projects using industry-standard authoring applications: project management, client considerations, and project documentation; user interface design, interactivity, media, and databases. Integrated lecture/lab. Prerequisite: GIT 314.

E GIT 413 Professional Portfolio Design and Presentation. (3)
spring
Digital media portfolio design and production: planning, audience analysis, media selection, authoring, media formats, production, copyright considerations, marketing, and delivery. Integrated lecture/lab. Prerequisites: GIT 314, 334.

E GIT 414 Web Site Design and Internet/Web Technologies. (3)
spring
Web site design, authoring, standards, protocols, tools, and development techniques for commercial client-sided Web-based graphic information systems. Integrated lecture/lab. Prerequisites: GIT 334, 337.

E GIT 415 Computer Graphics: Business Planning and Management. (3)
spring
Implementation planning: feasibility and application studies; needs assessment and operational analysis techniques; organization, managerial, and technology considerations; business plan development. Integrated lecture/lab, field trips. Prerequisite: senior standing in Information Technology (graphic information technology 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 93.

E GIT 417 Advanced Internet Programming. (3)
fall
Uses industry-standard programming languages and techniques to create interactive graphic information Web sites and applications. Integrated lecture/lab. Prerequisite: GIT 414.

E GIT 432 Graphic Industry Business Practices. (3)
selected semesters
Business practices related to press/prepress/Web industries; trade customs, cost analysis, marketing and management approaches. Integrated lecture/lab, field trips. Prerequisite: GIT 333.

E GIT 435 Web Management and E-commerce. (3)
spring
Internet Web site management, security, online databases, and new e-commerce business models. Integrated lecture/lab. Prerequisite: GIT 414.

E GIT 436 Gravure Technology. (3)
spring
In-depth study of the market profile and production sequences related to the gravure method of printing. Prerequisite: GIT 135.

E GIT 437 Color Reproduction Systems. (3)
fall
Scientific analysis for the engineering of color reproduction systems and color models used in the graphics industry. Prerequisite: GIT 334.

E GIT 441 Graphic Information Systems. (3)
selected semesters
Graphic information systems common to the workplace: graphic user interfaces for online databases, geographic, industrial, architectural, and management applications. Integrated lecture/lab. Prerequisite: senior standing in Information Technology (graphic information technology concentration).

E GIT 450 Digital Workflow in Graphic Industries. (3)
fall
Analyzes digital production systems for input, assembly, and output of graphic information to print and Web, including networking and job tracking. Integrated lecture/lab. Prerequisite: GIT 334.

E GIT 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Computer Systems Applications. (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.

GLOBAL TECHNOLOGY AND DEVELOPMENT (GTD)

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.

TECHNOLOGY MANAGEMENT CORE (TMC)

E TMC 191 First-Year Seminar. (1–3)
selected semesters

E TMC 194 Special Topics. (1–4)
selected semesters

E TMC 233 Desktop Publishing and Infographics. (3)
fall and spring
Introduces software and hardware used for desktop publishing and infographics. Lecture, lab.

E TMC 294 Special Topics. (1–4)
selected semesters

E TMC 331 Quality Assurance. (3)
spring
Instrumentation and methodologies for materials testing and quality control in various manufacturing processes. Lecture, field trips.

E TMC 346 Management Dynamics. (3)
fall and spring
Management challenges and the leadership skills needed to achieve organizational objectives in the changing industrial and technical environments. Prerequisite: junior standing.

E TMC 394 Special Topics. (1–4)
selected semesters

E TMC 396 Professional Orientation. (1)
fall and spring
Senior advising, industry presentations, and career counseling.

E TMC 470 Project Management. (3)
spring
Introduces techniques for managing small groups within larger organizations, including team building, motivating, planning, tracking activities, and computer tools. Prerequisites: ECN 211; OMT 344; TMC 346.

E TMC 484 Internship. (1–12)
selected semesters

E TMC 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Senior Project. (3)

E TMC 498 Pro-Seminar. (1–7)
selected semesters

E TMC 499 Individualized Instruction. (1–3)
selected semesters

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OPERATIONS MANAGEMENT TECHNOLOGY (OMT)

E OMT 191 First-Year Seminar. (1–3)
selected semesters

E OMT 194 Special Topics. (1–4)
selected semesters

E OMT 294 Special Topics. (1–4)
selected semesters

E OMT 343 Occupational Safety and Ergonomics. (3)
fall
Health and safety movement, accident theories and effects, OSHA standards and liability, safeguarding, hazards, workers' compensation, ergonomics, and safety. Prerequisite: junior standing.

E OMT 344 Industrial Organization. (3)
spring
Industrial organization concepts. Topics relate to industrial relations, governmental regulations, organizational structure, labor relations, human factors, and current industrial practices. Prerequisite: TMC 346.

E OMT 345 Public Sector Management. (3)
fall and spring
Management in government and public agencies. Includes mission, planning and organizing to provide services, human resource issues, conflict resolution, coordination. Prerequisite: junior standing.

E OMT 394 Special Topics. (1–4)
selected semesters

E OMT 402 Legal Issues for Technologists. (3)
fall
American legal system and impact on technology management issues: contracts, torts, intellectual property, white collar crime, antitrust, environmental, and employment.

E OMT 405 Forecasting and Evolution of Technology. (3)
selected semesters
History and evolutionary nature of selected technologies, issues in the management of emerging technologies, and methods of technological forecasting. Prerequisite: TMC 346 (or its equivalent).

E OMT 430 Ethical Issues in Technology. (3)
spring
Topics in social responsibility for industrial technology and engineering. Prerequisite: TMC 346.

E OMT 440 Introduction to International Business. (3)
spring
International business principles and operations, including partnerships, trade agreements, currency issues, international sales, and cultural differences between countries. Prerequisite: TMC 346.
General Studies: G

E OMT 445 Industrial Internship. (1–10)
fall, spring, summer
Work experience assignment in industry commensurate with student's program. Specialized instruction by industry with university supervision. Pass/fail. Prerequisites: advisor approval; junior standing; 2.50 GPA.

E OMT 451 Industrial Distribution and Materials Management. (3)
selected semesters
Surveys topics in industrial distribution, including, but not limited to, materials handling, purchasing, receiving, warehousing, traffic, inventory control, and shipping. Prerequisite: OMT 343 or TMC 346.

E OMT 452 Industrial Human Resource Management. (3)
fall
Concepts and practices of human resource management in a global industrial environment. Prerequisite: TMC 346.

E OMT 453 Safety Management. (3)
selected semesters
Development and management of safety programs, education and training, and relationships within an organization. Prerequisite: OMT 343 or instructor approval.

E OMT 456 Introduction to Organized Labor. (3)
spring
Introduces labor relations, unions, federations, collective bargaining, grievances, and labor legislation. Prerequisites: OMT 344; TMC 346.

E OMT 461 Operations Management. (3)
fall
Introduces supervisory principles as applied to production of goods and services. Prerequisites: OMT 344; TMC 346.

E OMT 480 Organizational Effectiveness. (3)
spring
Human aspects of supervisory behavior in the industrial setting and how they influence efficiency, morale, and organizational practices. Prerequisite: TMC 346.

E OMT 484 Internship. (1–12)
selected semesters

E OMT 494 Special Topics. (1–4)
selected semesters

E OMT 498 Pro-Seminar. (1–7)
selected semesters

E OMT 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.

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Division of Computing Studies

www.poly.asu.edu/ctas/dcst
480/727-1257
SUTON 140

Timothy E. Lindquist, Associate Dean and Director

Professor: Lindquist

Associate Professors: Koehnemann, Millard, Morrell, O'Grady

Assistant Professors: B. Gannod, G. Gannod, Gary

Senior Lecturer: Whitehouse

PURPOSE

The Division of Computing Studies provides educational programs rich in contextual experiences, which prepare graduates for success in the rapidly evolving computing profession. With the increasingly diverse application of computing and software technologies comes a need for individuals who are well versed in the fundamentals of the computing profession. Course offerings focus on the languages, methods, and tools reflecting computing best practices, and provide an education that is rich in hands-on problem-based learning experiences. The curriculum builds upon a background of applied science and mathematics, including the concepts and application of calculus and discrete structures. Graduates are employed in the computing industry with responsibilities such as analyzing, designing, implementing, evaluating, and operating computer-based systems, including (re)engineering systems that embed computer hardware and software, Web-based applications, and systems of internetworked cooperating components.

DEGREES

The faculty in the Division of Computing Studies offer the BS degree in Applied Computer Science and the BS degree in Computer Systems. For students holding an AAS degree with the appropriate computer science and mathematical background, the Division offers the Bachelor of Applied Sciences (BAS) degree. Three BAS concentrations are available: computer systems administration, microcomputer systems, and software technology applications.

The division also offers the Master of Computing Studies and the Master of Technology with a concentration in computer systems degree programs that are available for qualified BS graduates. For more information, see the *Graduate Catalog* or access the division Web site at www.poly.asu.edu/ctas/dcst.

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 93.

APPLIED COMPUTER SCIENCE—BS

The BS degree in Applied Computer Science is designed to provide students with an education that targets the computing profession. The program prepares students who are interested in employment or advanced study in software applications or software systems by providing broad-based knowledge and skills in software processes and their application. The program focuses on computer software as used in networked, distributed, and Web-based systems and applications.

The program prepares students for careers in software applications in the context of an industry in which software solutions are increasingly distributed using object-oriented languages and frameworks, and in which the internet, Web, and wireless technologies play an important role.

Each student must satisfy the courses listed for First-Year Composition and the university General Studies requirements. In addition, the following courses are required.

DEGREE REQUIREMENTS

Social/Behavioral Sciences
ECN 211 Macroeconomic Principles *SB* 3
or ECN 212 Microeconomic Principles *SB* (3)

Literacy
TWC 400 Technical Communications *L* 3

Natural Sciences
Choose one of the following combinations 8–9
CHM 113 General Chemistry I *SQ* (4)
CHM 115 General Chemistry with Qualitative Analysis *SQ* (5)
or
PHY 111 General Physics *SQ*[1] (3)
PHY 113 General Physics Laboratory *SQ*[1] (1)
PHY 112 General Physics *SQ*[2] (3)
PHY 114 General Physics Laboratory *SQ*[2] (1)
Natural Science Laboratory elective 4
Total 18–19

[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.

Mathematics
APM 301 Introductory Statistics *CS* 3
MAT 243 Discrete Mathematical Structures 3
MAT 294 ST: Mathematics of Change I 3
MAT 294 ST: Mathematics of Change II 3
MAT 294 ST: Mathematics of Change III 3
Numeracy elective 3
Total 18

Lower-Division Core
CST 100 Object-Oriented Software Development I 3
CST 150 Digital Systems I *CS* 4
CST 200 Object-Oriented Software Development II 3
CST 230 Applied Data Structures 3
Total 13

Upper-Division Core
CST 315 Software Enterprise I: Tools and Process 3
CST 316 Software Enterprise II: Construction and Transition 3
CST 326 Programming Languages for Technology with C/C++ and Visual Basic 4
CST 335 Applications of Computer Theory 3
CST 354 Microcomputer Architecture and Programming 4
CST 364 Computer Architecture 3
CST 386 Operating Systems Principles 3
CST 415 Software Enterprise III: Inception and Elaboration 3
CST 420 Foundations of Distributed and Web-Based Applications in Java 3
CST 433 Database Technology 3
CST 459 Internet Networking Protocols 3
CST 496 Ethics and Professionalism in Computing 3
Total 38

Major Electives
Choose from the following electives 12
CST 425 Server Software Programming (3)
CST 427 Distributed Object Systems (3)
CST 428 Web-Client User Interface Programming (3)
CST 441 Software for Personal Digital Assistants (3)
CST 452 Digital Logic Applications (4)
CST 456 Microcomputer Systems Interfacing (4)
CST 457 Advanced Assembly Language Applications (3)
CST 486 Embedded C Programming (3)
CST 488 Systems Administration of UNIX (3)
CST 489 Network Administration with TCP/IP (3)
Technical electives 10

Applied Computer Science
Program of Study
Typical First- and Second-Year Sequence

First Year

First Semester
CHM 113 General Chemistry I *SQ* 4
CST 100 Object-Oriented Software Development I 3
ENG 101 First-Year Composition 3
MAT 294 ST: Mathematics of Change I 3
Total 13

Second Semester
CHM 115 General Chemistry with Qualitative Analysis *SQ* 5
CST 150 Digital Systems I *CS* 4
ENG 102 First-Year Composition 3
MAT 294 ST: Mathematics of Change II 3
HU or SB elective 3
Total 18

Second Year

First Semester
CST 200 Object-Oriented Software Development II 3
CST 315 Software Enterprise I: Tools and Process 3
CST 354 Microcomputer Architecture and Programming 4
ECN 211 Macroeconomic Principles *SB* 3
MAT 243 Discrete Mathematical Structures 3
Total 16

Second Semester
CST 230 Applied Data Structures 3
CST 364 Computer Architecture 3
MAT 294 ST: Mathematics of Change III 3
HU or SB elective 3
Laboratory science elective 4
Total 16

COMPUTER SYSTEMS—BS

Students interested in the BS degree in Computer Systems may choose to specialize in one of the following concentrations: computer hardware technology or embedded systems technology.

The computer hardware technology concentration is designed to provide students with an opportunity to develop broad-based knowledge and skills in digital systems, interfacing techniques, and computer hardware applications.

The embedded systems technology concentration prepares students for the application, interconnection, design, analysis, and realization of special-purpose systems that involve both software and hardware components. This concentration balances the concerns of computer hardware with the processes and technologies involved in producing reliable software solutions.

Each student must satisfy the courses listed for First-Year Composition and the university General Studies requirements. In addition, the following courses are required.

DEGREE REQUIREMENTS

Social/Behavioral Sciences

ECN 211 Macroeconomic Principles *SB* 3
or ECN 212 Microeconomic Principles *SB* (3)

Literacy

TWC 400 Technical Communications *L* 3

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
Natural Science Laboratory elective 4
Natural Science Laboratory elective 4
Total 22

[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.

Mathematics

APM 301 Introductory Statistics *CS* 3
MAT 243 Discrete Mathematical Structures 3
MAT 294 ST: Mathematics of Change I 3
MAT 294 ST: Mathematics of Change II 3
MAT 294 ST: Mathematics of Change III 3
Total 15

Lower-Division Core

CST 100 Object-Oriented Software Development I 3
CST 150 Digital Systems I *CS* 4
CST 200 Object-Oriented Software Development II 3
CST 230 Applied Data Structures 3
EET 208 Electric Circuit Analysis I 4
Total 17

Major (54 semester hours)

CST 326 Programming Languages for Technology with C/C++ and Visual Basic 4
CST 350 Digital Systems II 4
CST 354 Microcomputer Architecture and Programming 4
CST 364 Computer Architecture 3
CST 383 Shell and Script Programming with UNIX 3
CST 386 Operating Systems Principles 3
CST 400 Software Engineering Technology 3
CST 415 Software Enterprise III: Inception and Elaboration 3
or UET 415 Electronic Manufacturing Engineering Principles (3)
CST 456 Microcomputer Systems Interfacing 4
CST 494 ST: Professional Orientation 1
Total 32

Computer Hardware Technology Concentration

CET 458 Digital Computer Networks 3
or CET 473 Digital/Data Communications (4)
CST 452 Digital Logic Applications 4
EET 301 Electric Circuit Analysis II 4
EET 401 Digital Signal Processing for Multimedia 3
Technical electives 7–8

Embedded Systems Technology Concentration

CST 420 Foundations of Distributed Web-Based Applications in Java 3
CST 441 Software for Personal Digital Assistants 3
or CST 494 ST: Internet-Enabled Embedded Devices (3)
CET 458 Digital Computer Networks 3
or CST 459 Internet Networking Protocols (3)
CST 486 Embedded C Programming 3
EET 401 Digital Signal Processing for Multimedia 3
Technical electives 7

Computer Systems Program of Study
Embedded Systems Concentration
Typical First- and Second-Year Sequences

First Year

First Semester

CST 150 Digital Systems I *CS* 4
ENG 101 First-Year Composition 3
MAT 294 ST: Mathematics of Change I 3
PHY 111 General Physics *SQ*[1] 3
PHY 113 General Physics Laboratory *SQ*[1] 1
Total 14

Second Semester

CST 100 Object-Oriented Software Development I 3
ENG 102 First-Year Composition 3
MAT 294 ST: Mathematics of Change II 3
PHY 112 General Physics *SQ*[2] 3
PHY 114 General Physics Laboratory *SQ*[2] 1
HU/SB elective 3
Total 16

Second Year

First Semester

CST 200 Object-Oriented Software Development II 3
CST 350 Digital Systems II 4
CST 354 Microcomputer Architecture and Programming 4
ECN 211 Macroeconomic Principles *SB* 3
MAT 243 Discrete Mathematical Structures 3
Total 17

Second Semester

CST 230 Applied Data Structures 3
EET 208 Electric Circuit Analysis I 4
MAT 294 ST: Mathematics of Change III 3
Laboratory science elective 4
Total 14

[1] Both PHY 121 and 122 must be taken to secure SQ credit.
[2] Both PHY 112 and 114 must be taken to secure SQ 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 93.

APPLIED SCIENCE—BAS

For students who have completed an Associate of Applied Science from a regionally accredited institution, the Bachelor of Applied Science (BAS) offers a pathway to a bachelor's degree. The BAS is a flexible 60-semester-hour degree that builds on the associate's degree with upper-division course work. Computing Studies offers three concentrations: computer systems administration, microcomputer systems, and software technology applications.

Admission

Students interested in a BAS concentration offered by Computing Studies must have completed an Associate of Applied Science degree from a regionally accredited U.S. postsecondary educational institution. A GPA of 2.00 or higher is required for all resident applicants and 2.50 or higher for nonresident applicants. Applicants should have sufficient background in the area of intended study—software, microcomputer systems, or networking.

Degree Requirements

The BAS degree in the College of Technology and Applied Sciences consists of 60 semester hours of upper-division courses, with 30 semester hours in residence. The BAS course of study includes general studies, an area core, discipline-specific course work, and assignable credit.

AAS degree	60
Assignable credit	6
BAS core	15
General Studies	19
Technical concentration	20
Total	120

General Studies Curriculum

The BAS curriculum builds on the general education content of the AAS degree. Additional portions of the General Studies requirement (L, CS, and awareness areas) are met with courses in the core or concentration. General Studies courses focus on contextual learning.

L	3
MA	3
HU	3
HU or SB	3
SB	3
SG	4
Total	19

Assignable Credit

Assignable credit allows space in the curriculum for prerequisite courses needed to succeed in the program or additional technical electives. The courses are determined by the student and the advisor.

Technical Concentration

Computer Systems Administration

Choose from the following 20
- CST 354 Microcomputer Architecture and Programming (4)
- CST 383 Shell and Script Programming with UNIX (3)
- CST 386 Operating Systems Principles (3)
- CST 459 Internet Networking Protocols (3)
- CST 488 Systems Administration of UNIX (3)
- CST 489 Network Administration with TCP/IP (3)

CST 300- or 400-level major electives (7)

Microcomputer Systems

Choose from the following 20
- CST 326 Programming Languages for Technology with C/C++ and Visual BASIC (4)
- CST 354 Microcomputer Architecture and Programming (4)
- CST 364 Computer Architecture (3)
- CST 383 Shell and Script Programming with UNIX (3)
- CST 386 Operating Systems Principles (3)
- CST 457 Advanced Assembly Language Applications (3)

CST 300- or 400-level major electives (6)

Software Technology Applications

Choose from the following 20
- CST 326 Programming Languages for Technology with C/C++ and Visual BASIC (4)
- CST 354 Microcomputer Architecture and Programming (4)
- CST 386 Operating Systems Principles (3)
- CST 400 Software Engineering Technology (3)
- CST 420 Foundations of Distributed Web-Based Applications in Java (3)

Choose one of the following combinations (3)
- CST 425 Software Server Programming (3)

— or —

- CST 427 Distributed Object Systems (3)

— or —

- CST 428 Web-Client User Interface Programming (3)

CST 433 Database Technology 3
CST 300- or 400-level major electives 3

COMPUTER ENGINEERING TECHNOLOGY (CET)

E CET 401 Digital Signal Processing for Multimedia. (3)
fall
Applies DSP techniques to multimedia. Digital filter analysis and design. Time and frequency techniques. Computer applications. Cross-listed as EET 401. Credit is allowed for only CET 401 or EET 401. Prerequisites: EET 301; MAT 262.

E CET 458 Digital Computer Networks. (3)
spring
Network hardware and software, topologies, protocols, OSI model, LANs, WANs, Internet; basic concepts of packet switching, routing, error controlling. Prerequisite: CST 354.

E CET 473 Digital/Data Communications. (4)
fall
Signals, distortion, noise, and error detection/correction. Transmission and systems design. Interface techniques and standards. Lecture, lab. Prerequisites: CST 354; EET 372.

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

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COMPUTING STUDIES (CST)

E CST 100 Object-Oriented Software Development I. (3)
fall
Basic concepts of object-oriented analysis, design, and programming using Java. Basic Java variables, expressions, arrays, statements, methods, and classes.

E CST 150 Digital Systems I. (4)
fall and spring
Number systems, Boolean algebra, combinational logic, K-maps, flip-flops, sequential circuits, state machines, and minimization techniques. Lecture, lab. Prerequisite: MAT 117 (or its equivalent).
General Studies: CS

E CST 191 First-Year Seminar. (1–3)
selected semesters

E CST 200 Object-Oriented Software Development II. (3)
fall and spring
Object modeling with class and interaction diagrams; inheritance and run-time binding; introduces frameworks with Java collections and windowing. Prerequisite: CST 100.

E CST 230 Applied Data Structures. (3)
fall
Introduces data structures: strings, stacks, queues, binary trees, recursion, searching, and sorting. Prerequisite: CST 200.

E CST 256 C Programming for Engineering Technology. (3)
fall, spring, summer
Applied and practical problem solving using the C programming language. Prerequisite: ETC 100.

E CST 294 Special Topics. (1–4)
selected semesters

E CST 315 Software Enterprise I: Tools and Process. (3)
fall
Introduces tools and techniques used in software enterprise/ development, including coding, design, testing, configuration management, and personal process management. Prerequisite: CST 200.

E CST 316 Software Enterprise II: Construction and Transition. (3)
spring
Best practices in software construction in the context of a team project, including refactoring, defensive programming, unit testing, and configuration and release management. Lecture, lab. Prerequisites: CST 230, 315, 326.

E CST 326 Programming Languages for Technology with C/C++ and Visual BASIC. (4)
fall and spring
Programming language design and implementation concepts through programming C/C++, Visual BASIC; execution, run-time management, data control, pointers, templates, multiple inheritance. Lecture, lab. Prerequisites: CST 200; CST 150.

E CST 335 Applications of Computer Theory. (3)
fall
Introduces and applies formal language theory and automata, Turing machines, decidability, undecidability, recursive function theory, and complexity theory. Prerequisites: CST 230; MAT 243.

E CST 350 Digital Systems II. (4)
fall
Analysis and design of synchronous and asynchronous state machines. Introduces VHDL. Lecture, lab. Prerequisite: CST 150.

E CST 354 Microcomputer Architecture and Programming. (4)
fall and spring
Microcomputer architecture, assembly language programming, I/O considerations, exception and interrupt handling. Introduces interfacing. Lecture, lab. Prerequisite: CST 150.

E CST 364 Computer Architecture. (3)
fall
Processor performance, RISC/CISC, processor design and implementation, basic pipelining, memory hierarchy, I/O. Lecture, lab. Prerequisites: CST 200, 354.

E CST 383 Shell and Script Programming with UNIX. (3)
spring
UNIX operating system programming of shells, environment and 4th-generation languages and tools, such as sed, awk, perl, grep, make. Prerequisite: CST 100.

E CST 386 Operating Systems Principles. (3)
fall
Fundamentals of operating systems, process management, scheduling and synchronization techniques, memory and file management, protection and security issues. Prerequisites: CST 100 (or 256), 354.

E CST 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Applications of Computing Theory. (3)

E CST 400 Software Engineering Technology. (3)
spring
Software life-cycle models; project management; team development environments; software specification, design, implementation techniques and tools, validation, and maintenance; user documentation. Prerequisite: CST 326.

E CST 415 Software Enterprise III: Inception and Elaboration. (3)
fall
Third course in the four-course enterprise sequence. Students perform inception (project launch) and elaboration (requirements analysis) activities in project teams. Integrated lecture/lab, project. Prerequisite: CST 316 or 400.

E CST 420 Foundations of Distributed Web-Based Applications in Java. (3)
fall and spring
Principles underlying design and implementation of distributed software components; sockets, protocols, threads, XML, serialization, reflection, security, and events. Prerequisites: CST 230; CST 386.

E CST 425 Server Software Programming. (3)
once a year
Design and implementation of software servers, threaded socket servers, servers for distributed Web-based applications; security for the Web. Prerequisite: CST 420 or instructor approval.

E CST 427 Distributed Object Systems. (3)
fall
Distributed applications with Web services, NET, RMI, CORBA; concepts and frameworks for managing, registering, locating, and securing distributed object applications. Corequisite: CST 420.

E CST 428 Web-Client User Interface Programming. (3)
fall
Client-server model for window interfaces. Java Swing, Applets, mark-up and scripting languages; Web tools and related technologies. Prerequisite: CST 420 or instructor approval.

E CST 433 Database Technology. (3)
fall
Introduces database technologies and DBMS, data models, and languages. Prerequisites: CST 230, 326.

E CST 441 Software for Personal Digital Assistants. (3)
fall
Mobile computing using Java's K, Virtual Machine, MIDP for wireless applications; user interfaces, persistent data storage, and networking. Prerequisite: CST 420.

E CST 452 Digital Logic Applications. (4)
spring
Design of sequential machines using system design techniques and complex MSI/LSI devices with lab. Prerequisite: CST 350.

E CST 456 Microcomputer Systems Interfacing. (4)
fall
Programming using BIOS and DOS routines. Disk operations, TSR routines, and device drivers. Lecture, lab. Prerequisite: CST 354.

E CST 457 Advanced Assembly Language Applications. (3)
spring
Applies 32-bit assembly language programming using advanced assembler techniques and interfacing to high-level languages. Prerequisite: CST 354.

E CST 459 Internet Networking Protocols. (3)
fall
Computer networking for application, transmission control and network layers using the Internet protocols as a model; reliability and security. Prerequisites: CST 200 (or 256), 354.

E CST 484 Internship. (1–3)
selected semesters

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 93.

E CST 486 Embedded C Programming. (3)
fall
Programming concepts for embedded systems. Interfacing and controlling LED, LCD, keypads, buttons. Embedded OS concepts. Timers and interrupts. Serial communication. Integrated lecture/lab. Prerequisites: CST 326, 354.

E CST 488 Systems Administration of UNIX. (3)
fall
Administration of UNIX, its processes, system calls, kernel, file structure, and interprocess communication using command line tools. Integrated lecture/lab. Prerequisites: CST 383, 386.

E CST 489 Network Administration with TCP/IP. (3)
spring
Writing C programs and shell scripts to create, control, and administer computer networks. Installation and maintenance of computer networks. Prerequisites: CST 383, 459.

E CST 490 Reading and Conference. (1–12)
selected semesters

E CST 492 Honors Directed Study. (1–3)
selected semesters

E CST 493 Honors Thesis. (1–6)
selected semesters

E CST 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Applied Software Process. (3)
- Computer Project
- Embedded C. (3)
- Internet-Enabled Embedded Devices
- Professional Orientation. (1)

E CST 496 Ethics and Professionalism in Computing. (3)
fall
Studies major social and ethical issues in computing, including impact of computing on society, ethical behavior, and social responsibility. Prerequisite: senior standing.

E CST 498 Pro-Seminar. (1–3)
selected semesters

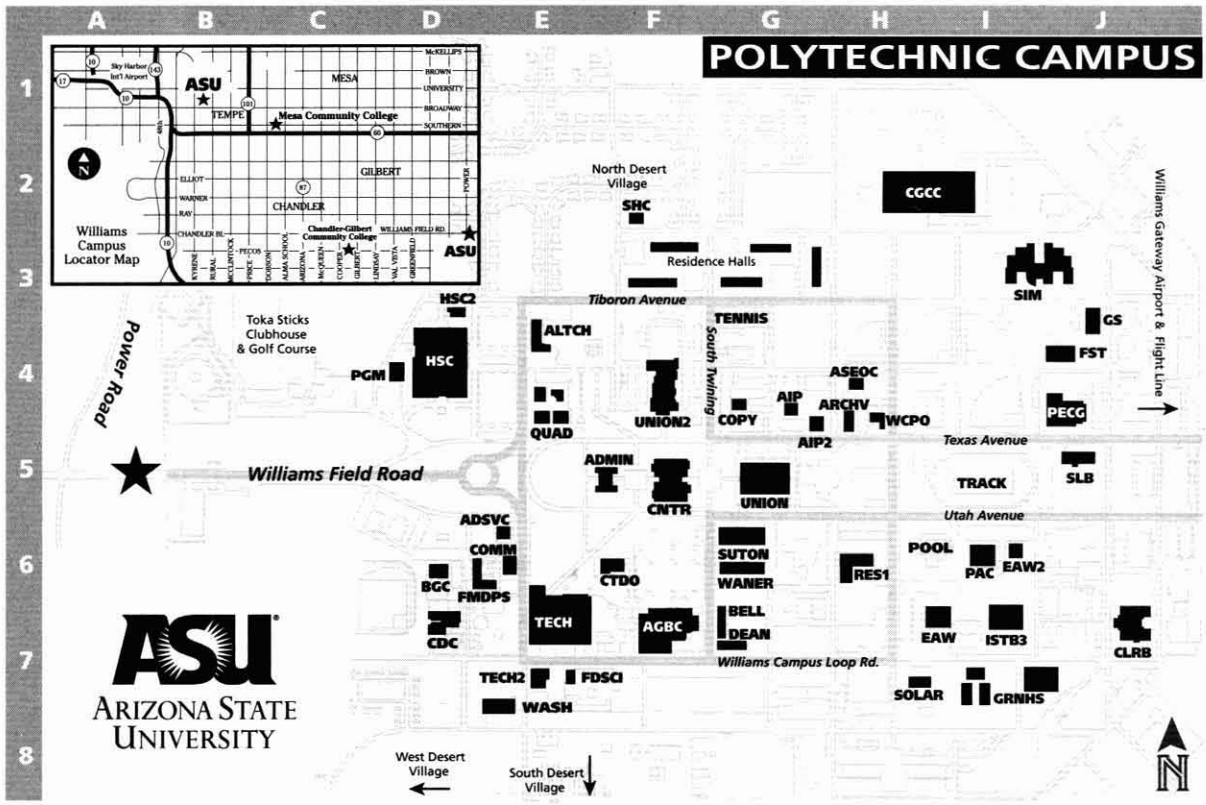
E CST 499 Individualized Instruction. (1–3)
selected semesters

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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62

The Polytechnic campus maintains facilities at the leading edge of technology.

Tim Trumble photo



ADMIN	Administration Building (F5)
ADSVC	Administrative Services (E5)
AGBC	Agribusiness Center (F7)
AIP	American Indian Programs (G4)
AIP2	American Indian Programs Annex (G4)
ALTCH	Altitude Chamber Building (E3)
ARCHV	Library Archives (H4)
ASEOC	Alternate State Emergency Operations Center (H4)
BELL	Bell Hall (G7)
BGC	Boys and Girls Club (D6)
CDC	Child Development Center (D7)
CGCC	Chandler-Gilbert Community College (H2)
CLRB	Classroom Building (J7)
CNTR	Academic Center Building (F5)
COMM	Communications (E6)
COPY	Williams Express Copy Services (G4)
CTDO	College of Technology Dean's Office (F6)
DEAN	Dean Hall (G7)
EAW	Exercise and Wellness Center (I7)
EAW2	Exercise Instructional Lab Building (I6)
FDSCI	Agribusiness Food Science Lab (E7)
FMDPS	Facilities Management/DPS (D6)
FST	Fire Science Technology (J4)
GRNHS	Greenhouses (I7)
GS	General Studies (J4)
HSC	Health Sciences Center (D4)
HSC2	Health Sciences Center Research (D3)
ISTB3	Interdisciplinary Science and Technology Building 3 (I7)
PAC	Physical Activity Center (I6)
PECG	Physical Education Center/Gym (J5)
PGM	Professional Golf Management (D4)
POOL	Swimming Pool (H6)
QUAD	Student Affairs (1,2,4), CERTT Lab (3) (E4)
RES1	Freshman Experience Dorm (H6)
SHC	Student Health Center (F2)
SIM	Flight Simulator Building (I3)
SLB	CGCC Science Lab Building (J5)
SOLAR	Photovoltaic Testing Laboratory (H7)
SUTON	Sutton Hall (G6)
TECH	Technology Center (E7)
TECH2	Technology Center Annex (E7)
TENNIS	Tennis Courts (G4)
UNION	Williams Campus Union (G5)
UNION2	Campus Union Annex (F4)
WANER	Wanner Hall (G6)
WASH	Launderette (E7)
WCPO	Williams Campus Post Office (H4)

Tempe Campus

www.asu.edu

Milton D. Glick, PhD, Executive Vice President and Provost of the University

Founded in 1885, the Tempe campus of Arizona State University is located near the heart of metropolitan Phoenix in the city of Tempe. The Tempe campus comprises more than 700 acres and offers outstanding physical facilities to support the university's educational programs. The campus is characterized by broad pedestrian malls laid out in an easy-to-follow grid plan, with spacious lawns and subtropical landscaping.

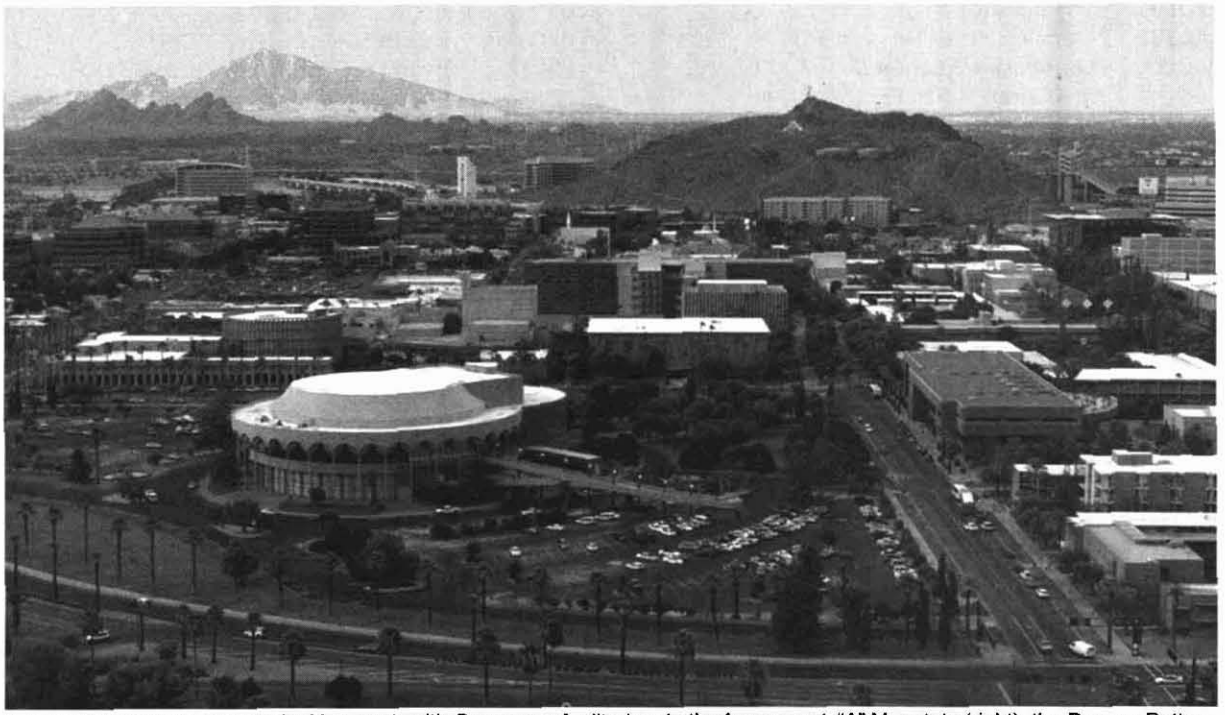
ASU is a multicampus state-supported university with a student enrollment of more than 48,900 on the Tempe campus. Among the colleges are more than 90 programs leading to bachelor's degrees and more than 140 programs leading to graduate degrees, including a law degree program. These colleges are located on the Tempe campus:

1. Barrett Honors College;
2. College of Design;
3. College of Education;
4. College of Law;
5. College of Liberal Arts and Sciences;
6. Katherine K. Herberger College of Fine Arts;
7. Ira A. Fulton School of Engineering;
8. W. P. Carey School of Business; and
9. Walter Cronkite School of Journalism.

The Division of Graduate Studies and University Libraries are also administered through the Tempe campus.

The mission of the university is to provide outstanding programs in instruction, research, and creative activity; to promote and support economic development; and to provide service appropriate for the nation, the state of Arizona, and the state's major metropolitan area. The Tempe campus supports the university mission through faculty who are excellent scholars and researchers and who are committed to teaching excellence.

The Tempe campus offers a broad range of educational experiences through a traditional semester calendar and summer and winter sessions. ASU programs offer diversity in academic, athletic, cultural, and social activities to prepare students to be productive citizens in a multicultural society.



A view of the Tempe campus looking north with Gammage Auditorium in the foreground, "A" Mountain (right), the Papago Buttes (left), and Camelback Mountain in the distance

Tim Trumble photo

Tempe Campus Student Services

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The mission of the Division of Student Affairs is to provide the highest quality programs and services that support undergraduate and graduate education of ASU students. In fostering student success, Student Affairs provides access for every student to a holistic living and learning environment in collaboration with the broader university community. To fulfill this mission, the Division of Student Affairs is fully committed to enhancing student persistence and graduation. The Office of the Vice President for Student Affairs is located in FOUND 210. For more information, call 480/965-7293, or access the Web site at www.asu.edu/studentaffairs.

The university is committed to the belief that an education involves more than attending class. While the acquisition of knowledge is a central part of the university experience, learning about others, about independence and leadership, and about living in a complex society are equally important. Student Affairs' services and developmental programs reflect this philosophy.

RESIDENTIAL LIFE

Living in one of the ASU residence halls provides students the opportunity to make the most of their university experience. Special residential communities for freshmen, honors students, students in particular academic areas, and students interested in a healthy living community offer opportunities and activities that enrich the educational experience.

The Freshman Year Experience program (see "Freshman Year Experience," page 282) provides a unique environment of classrooms, live-in tutors, academic advisors, and other support services designed to help freshmen develop skills for success.

Because the demand for campus housing is high, students are encouraged to apply for housing early (before February 1) for the best chance to live on campus for fall semester. Housing is not guaranteed. Students must be admitted to ASU before applying for housing. Requests for specially modified rooms for students with disabilities should be noted on the application.

Students will receive residence hall application information with their admission certificate. For more information, access the Web site at www.asu.edu/studentaffairs/reslife, call 480/965-3515, or write to

RESIDENTIAL LIFE
ARIZONA STATE UNIVERSITY
PO BOX 870212
TEMPE AZ 85287-0212

Information about meal plans on the Tempe campus may be obtained by calling 480/965-3464 or writing

CAMPUS DINING
ARIZONA STATE UNIVERSITY
PO BOX 871101
TEMPE AZ 85287-1101

STUDENT DEVELOPMENT AND THE MEMORIAL UNION

ASU students experience success through active involvement in learning and within their community. Student development enhances student learning through academic support services and programs and encourages student involvement in the community through participation in cocurricular programs, clubs, employment, leadership opportunities, organizations, service, and the arts.

Memorial Union

The Memorial Union (MU) serves as the campus community center for students, faculty, staff, and guests on the Tempe campus. Opportunities for student involvement are abundant with programs and services that enhance the ASU experience. Students can connect through activities, clubs, community service, organizations, student government, and the arts.

The building's features include an art café; computer lab and workroom; Internet stations; multipurpose meeting rooms; study and group work areas; Sparky's Den: a recreation center with bowling, billiards, and a video arcade; and tutoring and academic support.

Services provided in the MU include banking facilities and several ATMs, catering, infant care facilities, food venues, a general store, a hair salon, Internet stations, a music store, a travel agency, ASU athletic ticket office outlet and team shop, SunCard office, and Copy Center.

The MU also maintains a permanent art collection composed of paintings, fine art prints, photographs, sculptures, and tapestries. The collection, located throughout the four levels of the building, includes works of faculty, alumni, and students from ASU's Herberger College of Fine Arts, as well as works of other recognized artists.

A variety of student employment opportunities are available at the MU. Some of the student positions include administrative clerk, building manager, computer lab attendant, event assistant, information desk associate, and Sparky's Den associate. The MU offers flexible work schedules to accommodate class schedules. Promotion from within the various work groups is encouraged.

For more information about any of these services or to explore employment, call the MU Information Desk at 480/965-5728, or access the Web site at www.asu.edu/studentaffairs/mu.

Child and Family Services. Child and Family Services (CFS) provides resource and referral services to students, faculty, and staff. Information about the Campus Children's Center (480/921-2737), Child Development Laboratory (480/965-7267), Child Study Laboratory (480/965-5320), the College of Education Preschool (480/965-2510), and Open Horizons (480/894-8870) may be obtained at CFS or by calling the programs directly. CFS maintains a child care referral database and coordinates workshops and discussion groups on child and elder care issues. Educational materials and listings of additional on- and off-campus activities, programs, and services for children and their families are available at the CFS office, MU 14C.

For more information, call 480/965-9515, or access the Web site at www.asu.edu/studentaffairs/mu/family.

Student Legal Assistance. Student Legal Assistance counsels and advises students regarding their legal rights and responsibilities. This service is offered free of charge to currently enrolled ASU students. Notary services are also available. Typical consultation topics include auto-related issues, criminal matters, debt, domestic relations, wills, towing and traffic violations, landlord/tenant issues, and miscellaneous issues. Student Legal Assistance is located in the Memorial Union, Room 329.

For more information, call 480/965-6307, or access the Web site at www.asu.edu/studentaffairs/mu/legal.

Transition and Parent Programs

The Transition and Parent Programs office coordinates and directs transition activities and parent programs and services for new students and their families on behalf of the Division of Student Affairs. Additionally, Transition and Parent Programs engages parents and families in support of their students' educational and developmental experiences. The purpose of this office is to assimilate new students and their families to the services, resources, and campus culture at ASU and to provide resources, programs, and information for parents and families. Some of the programs coordinated by this office include Sun Devil 101/Welcome Week, More to Explore, Family Weekend, and Spring Welcome.

For more information, call Transition and Parent Programs at 480/965-4564, or access the Transition and Parent Programs Web site at asu.edu/studentaffairs/mu/transitions.

Sun Devil Involvement Center

Located on the third floor of the Memorial Union, the Sun Devil Involvement Center (SDIC) provides opportunities for student involvement through clubs, coalitions, community service, fraternities and sororities, leadership, programming, student government, and cocurricular connections.

For more information, call 480/965-2255, or access the Web site at www.asu.edu/studentaffairs/mu/sdic.

Associated Students of Arizona State University. Associated Students of Arizona State University (ASASU) is the student government of the university and the official representative of the undergraduate student government (USG) and graduate and professional student association (GPSA) in matters of university governance and budgeting. Through elected, volunteer, and paid positions, students can become active, contributing members of ASASU. Students can participate in a wide variety of activities and services, including College Councils, Student Senate, Graduate Assembly, and Safety Escort Service. Students interested in concerts, lectures, and Homecoming are encouraged to become involved with the Programming and Activities Board.

For more information, call 480/965-3161, or access the Web site at www.asu.edu/asasu.

Co-Curricular Programs and Activities. Co-Curricular Programs and Activities (CCPA) engages the ASU community in programs and activities that promote student learning and involvement. CCPA provides opportunities for students to become actively involved in the campus community through participation on the Mean Plan Committee, Student Development and Memorial Union Advisory Board, and Faculty Recognition Committee. CCPA works closely with faculty to offer programs that foster dialogue, lead to the exchange of ideas, and provide out-of-class learning experiences for students. Each year, CCPA sponsors a number of annual events, such as the Student/Faculty Retreat and Last Lecture Series.

For more information on CCPA programs or student involvement opportunities, call 480/965-9600, or access the Web site at www.asu.edu/studentaffairs/partnerships.

Student Organization Resource Center. The Student Organization Resource Center (SORC) provides opportunities for students to get involved with established campus organizations and helps students start new organizations. The center maintains a list of all registered groups, assists with the coordination of major events, and provides a resource desk where students can access information on student activities and leadership opportunities. Members of

REACH, a student paraprofessional organization, are available for outreach sessions.

SORC also connects students with opportunities to participate in special events and programs on campus. Programs supported by SORC include live entertainment in the Memorial Union's Art Café and two weekly student-run comedy troupes—*Barren Mind Improv* and *Farce Side Comedy Hour.*

For more information, call 480/965-2255, or access the Web site at www.asu.edu/clubs.

Community Service Program. The Community Service Program strives to engage students, faculty, and staff in meaningful cocurricular service. By engaging students in worthwhile service while promoting a lifelong commitment to citizenship and social justice, the Community Service Program affords students the key opportunity to turn learning into social action.

For more information, visit the Community Service Program, located at the Sun Devil Involvement Center on the third floor of the Memorial Union, access the Web site at www.asu.edu/studentaffairs/mu/community, or call 480/965-0305.

Short-Term Service Projects. The Community Service Program collaborates with Valleywide agencies and campus entities to provide meaningful episodic service events such as the Cesar Chavez Day of Service, the Fall Service Plunge, and the Martin Luther King Jr. Day of Service.

Community Service Opportunity Clearinghouse. A clearinghouse of information from more than 400 social service and nonprofit agencies across the Valley of the Sun offers information about internships, post-graduation opportunities, and long-term service. Students can use this resource to design a service experience that complements their academic, personal, and professional goals.

Greek Life. Fraternities and sororities have held a prominent place on the Tempe campus for the past 100 years. The Greek life community is a home away from home — a place that plays a critical role in enhancing a student's quality of life while developing their potential. Currently the Greek life community is experiencing record growth and comprises over 50 fraternities and sororities and approximately 2,800 undergraduate students. It is self-governing and represented by the following five councils: Interfraternity Council, Multicultural Greek Council, National Association of Latino Fraternal Organizations Council, National Pan-Hellenic Council, and Panhellenic Council.

For more information, call Greek Life at 480/965-5292, or access the Web site at www.asu.edu/studentaffairs/mu/greeklife.

STUDENT LIFE

Student Life strives to enhance student learning and student achievement by fostering a positive, inclusive campus environment; providing services to meet the needs of a diverse student body; and empowering students to advocate for their needs and interests by developing leadership and life skills. Opportunities for leadership and community involvement help students prepare for their roles as responsible citizens. Students learn and sharpen their leadership skills through their involvement in student activities, workshops, and community service.

For more information, access the Web site at www. asu.edu/studentaffairs/studentlife.

Student Judicial Affairs. Student Judicial Affairs oversees the review of conduct issues, involving both students and student organizations, as set forth by the Arizona Board of Regents (ABOR) *Student Code of Conduct.* This code is designed to balance the rights and needs of the individual with the responsibility of the individual to meet the needs of the community. Outreach and education are provided to students, faculty, and staff in areas such as student rights and responsibilities, campus and community standards, and university policies. Referrals for student conduct issues are accepted from faculty, staff, students, or observers. The Student Judicial Affairs designee reviews all referrals. Students who are found to have violated the ABOR *Student Code of Conduct* are subject to appropriate sanctions for student misconduct. Student Judicial Affairs is located in Student Life, SSV 263.

For more information, call 480/965-6547, or access the Web site at www.asu.edu/studentaffairs/studentlife/judicial.

Danforth Chapel. Built in 1948 as a multifaith chapel and retreat for the university community to use for prayer, meditation, weddings, memorial services, baptisms, Bible study groups, and worship, Danforth Chapel continues to provide opportunities for those functions. The chapel is located on Cady Mall between the Memorial Union and Hayden Library.

For more information, call 480/965-6547, or access the Web site at www.asu.edu/studentaffairs/studentlife/danforth.

STUDENT RISK MANAGEMENT

Student Risk Management assists student organization leaders, members, and advisors as well as Division of Student Affairs staff in learning to identify the potential and perceived risks involved in their activities. Guided by a philosophy of shared responsibility, the staff encourages the development of prudent judgment skills used to eliminate, limit, or accept these risks. Outreach efforts focus on the empowerment of students to make intelligent, fair, and reasonable choices within the boundaries established by state, federal, or local laws; the ASU *Code of Conduct* and institutional policies; and the educational mission of ASU. Student leaders as well as faculty and staff advisors wishing to collaborate on the creation of student organization environments that support members and leaders in their decision-making processes are encouraged to access these services. Additionally, Student Risk Management works to provide information regarding institutional policies as well as information regarding trends in higher education that are related to risk management while serving as a resource to assist staff with compliance needs when planning or facilitating events on behalf of the Division of Student Affairs.

For more information, call 480/965-5298, or access the Web site at www.asu.edu/studentaffairs/risk.

MULTICULTURAL STUDENT SERVICES

Educational Opportunity Center. The Educational Opportunity Center is a community outreach service that focuses on first-generation, low-income individuals. The center offers vocational testing and guidance as well as assistance in application for admission, scholarships, and financial assistance at a postsecondary institution suited to a particular individual's needs. Services are free, partially funded by the U.S. Department of Education. The center has a main office at 1000 East Apache Blvd., Suite 118, in Tempe and satellite offices around Maricopa County.

For more information, call 480/894-8451, or access the Web site at asu.edu/studentaffairs/mss/eoc.

Multicultural Student Center. The Multicultural Student Center supports the transition, retention, and graduation of multicultural students by engaging them in various support services and programs within a culturally affirming environment. One-on-one guidance, consultation, and referral are offered to address the academic, personal, and cultural needs of multicultural students. The African American Men of ASU Program, the Hispanic Mother/Daughter Program, and the Native American Achievement Program strive to increase the persistence and graduation rates of students within the African American, Hispanic, and American Indian communities. Summer opportunities, such as the Academic Program Promoting Leadership Enrichment and Service, African American Summer Bridge Program, LINKS @ ASU, and the Native American Summer Institute, assist students with the transition and adjustment to university life. The Asian Lead Academy and Black Youth Recognition Conference provide outreach to the community in an effort to help junior high and high school students develop academically, personally, and professionally. The student coalitions, as well as other multicultural student organizations, provide cultural programming and academic support to African American, American Indian, Asian, Asian Pacific American, Hispanic/Latino, gay, lesbian, bisexual, transgendered, and women student communities.

The MSC office is located in SSV 394. For more information, call 480/965-6060, or access the Web site at www.asu.edu/studentaffairs/mss/mcc.

Upward Bound Program. Upward Bound is a college preparatory program designed to increase the academic skills and motivational levels of participants (low-income, potential first-generation college students) to encourage their completion of high school, as well as enrollment in and graduation from postsecondary institutions. The year-round program includes summer residential components funded by the U.S. Department of Education. The Upward Bound Program office is located in SSV 276.

For more information, call 480/965-6483, or access the Web site at www.asu.edu/studentaffairs/mss/upwardbound.

Veterans Upward Bound. Veterans Upward Bound is designed for low-income, first-generation veterans who wish to pursue postsecondary education but whose life experiences did not adequately prepare them for the educational requirements of today. College preparation instruction in writing, reading, mathematics, general science, study skills, and computer literacy are provided to suit each veteran's individual needs. Veterans lacking a high school diploma can also prepare for obtaining their General Education Development (GED) while participating in Veterans Upward Bound. Interest inventory assessments and career advising are also available. All services are free, funded by the U.S. Department of Education. The Veterans Upward Bound office is located at 1000 East Apache Blvd., Suite 106, in Tempe.

For more information, call 480/965-3944, or access the Web site at asu.edu/student/affairs/mss/vub.

EDUCATIONAL DEVELOPMENT

International Student Office. The International Student Office (ISO) supports student success by engaging students to maintain compliance with visa regulations and by providing programming and advising that enriches their educational experiences. The ISO's principal responsibilities and services include administrative support, immigration counseling, initial orientation, visa administration, and campus and community activities that promote international awareness and enrich the educational experiences of students. The ISO is located in SSV 265.

For more information, call 480/965-7451, or access the Web site at www.asu.edu/studentaffairs/ed/iso.

Disability Resource Center. The Disability Resource Center (DRC) facilitates equal access to educational and cocurricular programs, campus activities, career exploration, and employment opportunities for qualified ASU students with disabilities, ensuring they are provided with mandated reasonable and effective accommodations. A U.S. Department of Education TRIO Student Support Services Grant also allows DRC to incorporate a unique academic enhancement model into the disability support services program for 270 selected students with disabilities who meet TRIO eligibility requirements. Disability documentation is required and information regarding disabilities is confidential. DRC is located on the first floor of Matthews Center.

For more information, call 480/965-1234 (voice) or 480/965-9000 (TTY), send a fax to 480/965-0441, or access the Web site at www.asu.edustudentaffairs/ed/drc.

LEARNING SUPPORT SERVICES

Adult Re-Entry Program. The Adult Re-Entry Program offers a variety of services to assist undergraduate students age 25 and older in reaching their academic goals, such as preenrollment assistance, orientation, peer mentoring, resource and referral information, support groups, and scholarships. The Adult Re-Entry Center in MU 14 provides a welcoming environment for individual or group study.

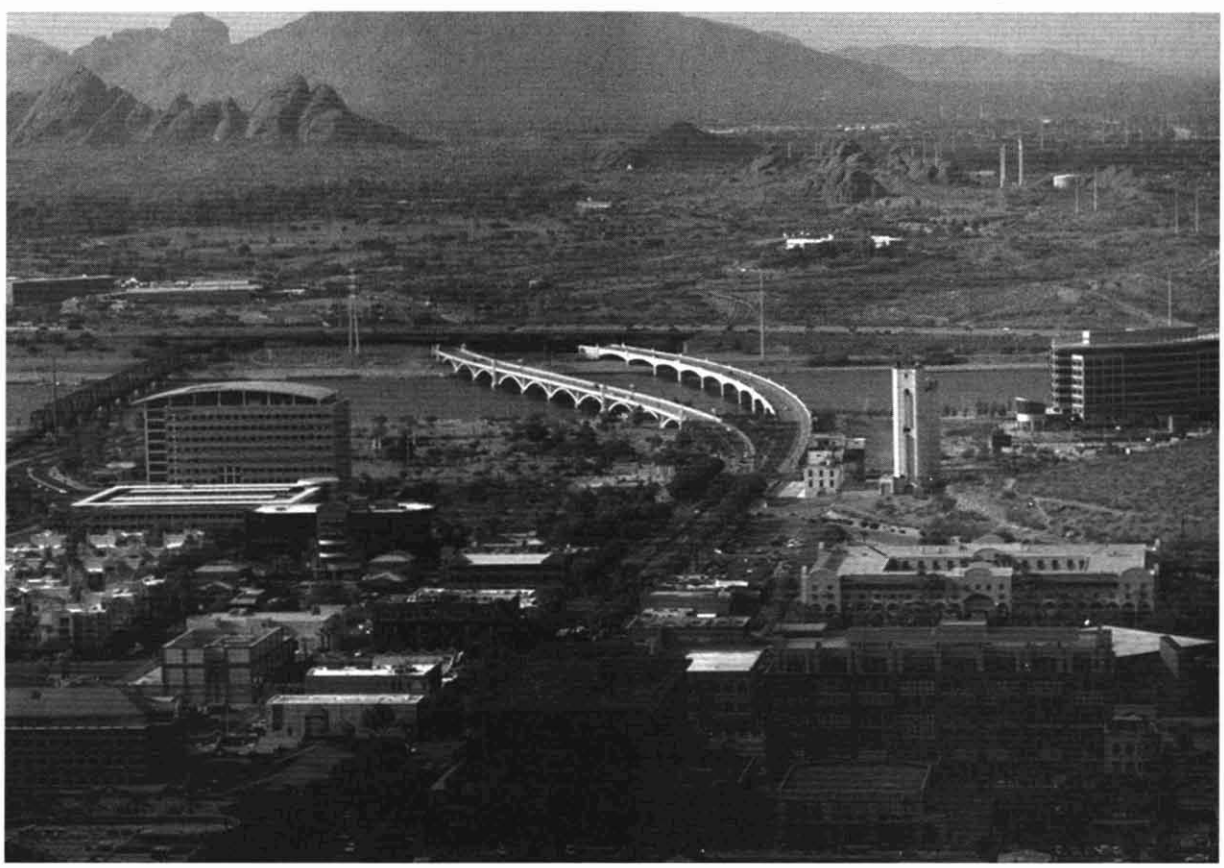
For more information, call 480/965-2252, or access the Web site at www.asu.edu/studentaffairs/reentry.

Freshman Year Experience. A student's freshman year is a time to learn new ideas, meet new people, and grow as an educated citizen ready to contribute to the community. Freshman Year Experience (FYE) provides a strong foundation for all first-year students and students in transition that fosters the student's academic and personal success. FYE achieves this mission by providing academic support services, opportunities for the exchange of ideas, and

workshops; generating and supporting research and scholarship; hosting visiting scholars and practitioners; fostering faculty interaction within living and learning communities; administering a Web site; and offering student involvement opportunities with the university community. FYE helps freshmen achieve academic and personal success by coordinating services and programs in settings designed just for freshmen.

FYE features

1. tutoring support offered at no cost to all freshmen by tutors who live in the residence halls, creating an academic-focused atmosphere available through tutoring centers in the residence halls open five evenings each week;
2. academic advising in FYE sites, with academic advisors employing a developmental approach to advising;
3. computer labs at FYE sites available 24 hours a day, with lab attendants available during evening hours to provide assistance and answer questions;
4. a full complement of freshman courses offered at FYE sites, such as freshman-level English, history, mathematics, political science, and the university success course for freshmen;
5. peer coaching: undergraduate and graduate students working with first-year students individually or in a group setting to assist the students with transitional issues such as time management, note taking, study skills, critical reading, and test taking;
6. a peer mentoring program: through which freshmen can request a sophomore or junior-level student mentor of the same major to guide them through their first year.
7. personal development and support programs, with presentations from various departments, focusing on academic expectations, academic skills, freshman transition, major and career choice, and other related developmental issues; and
8. living and learning communities for freshmen in the W. P. Carey School of Business, Ira A. Fulton School of Engineering, Tempe campus College of Education, Katherine K. Herberger College of Fine Arts, College of Public Programs, College of Nursing, College of Liberal Arts and Sciences, College of Design, Barrett Honors College, Walter Cronkite School of Journalism and Mass Communication, University College's Exploratory/Undecided majors, as well as communities for students interested in the themes of Leadership/Civic Engagement and Healthy Living.



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

FYE is open to all freshmen regardless of their place of residence (on or off-campus). Halls designated as FYE sites in 2006–2007 are Cholla, Manzanita, McClintock, Palo Verde complex, San Pablo, Sonora, and Sahuaro.

For more information, call 480/965-1512, send e-mail to FYE-Q@asu.edu, or access the Web site at www.asu.edu/studentaffairs/fye.

Learning Resource Center. The Learning Resource Center (LRC) provides comprehensive learning support services to ASU students including tutoring, academic coaching, academic skills workshops, and software training. LRC services are designed to support student retention and improve academic performance and graduation rates. Recent research shows that ASU freshmen who engage in weekly tutoring at the LRC have a 0.50 higher cumulative GPA than nonusers at the end of freshman year.

The LRC offers tutoring in a variety of locations and formats to serve different student needs. This includes free, scheduled, and drop-in small group tutoring; test review sessions; online tutoring (through the LRC Web site); and individual, fee-based tutoring by appointment. Tutoring is offered in approximately 100 courses, including mathematics, first-year composition, languages, business, chemistry, biology, engineering, and computer science. Daytime tutoring is offered Monday through Friday in two locations: MU 14 and Palo Verde West. Evening tutoring is offered Sunday through Thursday in the MU location and in tutoring sites located in Freshman Year Experience residence halls. Residential and off-campus students are welcome to use tutoring in any of these locations.

The academic coaching program provides individual assistance to help students improve general academic skills, including time and stress management, organizational strategies, textbook reading, and test preparation. Students can schedule an appointment or walk-in to meet with a peer coach, and those who qualify can schedule weekly coaching meetings throughout the semester. Peer coaches also present workshops on academic skills topics in LRC daytime and evening locations throughout the year.

The LRC offers two options for students who want to improve their software skills: individual tutoring and group workshops. Students can walk in or schedule tutoring sessions with software specialists or participate in workshops offered in LRC instructional computer labs. Students can practice new skills in staffed lab sessions that supplement all software workshops. LRC instructional computer labs are located in the Memorial Union (Montgomery Instructional Lab) and in SSV 392.

Students can view tutoring schedules and workshops on the LRC Web site at www.asu.edu/studentaffairs/lrc.

For more information or to schedule an appointment, call or drop in at the LRC in Palo Verde West at 480/965-6254, or in MU 14 at 480/965-7728.

DEAN OF STUDENTS OFFICE

Student Advocacy and Assistance

Student Advocacy and Assistance guides students in resolving educational, personal, and other campus impediments toward successful completion of their academic goals. Student Advocacy and Assistance links students with appropriate university and community resources, agencies, and individuals; collaborates with faculty and staff in the best interest of the students; and follows through to bring efficient closure to student concerns. Student Advocacy and Assistance is located in Student Life, SSV 263.

For more information, call 480/965-5852, or access the Web site at www.asu.edu/studentaffairs/deanofstudents/advocacy.

COUNSELING AND CONSULTATION

Services. Counseling and Consultation offers a range of confidential, time-limited counseling and psychiatric services for ASU students. Staff members are available to discuss any important personal concern a student may be facing, particularly issues related to the adjustment to university life. Professional help in the following areas is available: psychological issues, personal concerns, interpersonal issues, and crisis intervention. Counseling and Consultation staff members have a strong commitment to meeting the needs of students of color and nontraditional students. Counseling and Consultation staff consists of both male and female mental health professionals, including psychologists, counselors, psychiatric providers, and social workers. Students are initially seen by an individual counselor for assessment. Continuing services in the form of individual, couples, or group meetings are then offered on a time-limited basis depending upon the student's need and staff availability. Limited psychiatric services are available, if needed, for students receiving counseling.

Counseling and Consultation offers counseling groups on topics such as women's and men's issues, eating disorders, substance abuse, stress management, multicultural/diversity issues, and interpersonal relationships. Other services available to the ASU community include consultation and outreach programming.

Crisis Intervention. Crisis intervention for students experiencing mental health emergencies is available. During normal working hours, students may call and request same day appointments to discuss urgent situations. After office hours, EMPACT Suicide Prevention Center, Inc., is available for crisis consultation by calling 480/921-1006.

Confidentiality. Confidentiality is of utmost importance. Information about a student is not released without that student's written permission, except in the case of imminent danger to self or others, child/adult abuse, court order, or where otherwise required by law. Notations of counseling and psychiatric services are not a part of a student's academic record.

Appointments. ASU students may schedule an initial counseling appointment by phone (480/965-6146) or in person at SSV 334. There is no cost for the initial personal consultation. Fees are charged for additional sessions, career testing, and psychiatric services. Fee reductions and waivers are available. Office hours are 8 A.M. to 5 P.M. Monday through Friday. Counseling and Consultation is located at SSV 334. Additional information is available on the Counseling and Consultation Web site at www.asu.edu/studentaffairs/counseling.

Training Programs. Counseling and Consultation provides training for psychologists and other mental health professionals through postdoctoral, internship, residency, and practicum training programs.

Testprep@ASU. Testprep@ASU offers courses to help students prepare for the following graduate entrance exams: the Graduate Record Exam (GRE), the Graduate Management Admissions Test (GMAT), and the Law School Admission Test (LSAT).

The office is located in SSV 340 and is open 9 A.M. to 6 P.M. Monday through Thursday and 9 A.M. to 5 P.M. Friday.

For more information about test preparation workshops call 480/965-6777, visit the office, or access the Web site at www.asu.edu/testprep.

Career Testing Services. Counseling and Consultation offers two separate Exploration Workshops through Career Testing Services (CTS). Both workshops are based upon well-established tests taken before attending each workshop. The Career Exploration Workshop focuses on career/major selection and uses the Strong Interest Inventory to help individuals find a major or career based upon interests. The Personal Styles Exploration Workshop focuses on personal style evaluation and uses the Myers Briggs Type Indicator to help individuals understand their personality preferences. Career testing is available to students and nonstudents.

For more information about career testing workshop schedules and fees, call CTS at 480/965-6777, or access the Web site at www.asu.edu/studentaffairs/counseling/personaldev.html.

CAMPUS HEALTH SERVICE

Services. Campus Health Service offers fully accredited outpatient health care to all students enrolled at ASU. The professional staff, consisting of physicians, nurse practitioners, registered nurses, dietitians, and health educators, has special interest and training in college health care. Consultant physicians in dermatology, orthopedics, and other specialties are on-site and are available by referral from a member of the Campus Health Service professional staff.

Additional services include comprehensive women's health care, immunizations, a travel clinic, and an allergy clinic for students needing periodic injections. The pharmacy at the Campus Health Service provides many prescription and over-the-counter medications at reasonable costs. Radiology and laboratory services are also available.

A parental "consent to treat" form is required before a student under 18 can receive treatment at Campus Health Service. A copy of the parental consent form may be obtained from the Campus Health Service Web site at www.asu.edu/studentaffairs/health.

Hours. Students are strongly encouraged to schedule appointments to minimize waiting time and to allow students the opportunity to establish a relationship with one clinician. Appointments are available by calling 480/965-3349. Patients with urgent health care problems may be seen at the Campus Health Service Acute Care Clinic on a same-day basis. The clinic is open weekdays from 9 A.M. to 5:30 P.M.

Fees. Full-time students are charged for primary care visits at Campus Health Service and for consultant visits, radiological procedures, laboratory procedures, medications, certain special or surgical procedures, and certain health education services. Patients receiving medical treatment off campus, such as consultations, emergency care, and hospitalization, are responsible for any resulting charges.

Insurance. *While Campus Health Service provides comprehensive ambulatory care, it is not a substitute for health insurance.* Medical insurance coverage is strongly recommended for all students and is required for international students. Eligible students and dependents may enroll in health insurance coverage arranged by ASU. Dependents must complete an application and may require underwriting approval by the insurance carrier. The coverage assists students in paying for laboratory and radiology procedures, off-campus consultations, hospitalization, surgery, and emergency and after-hours care. Students may purchase health insurance through SunDial, the ASU touch-tone telephone registration system, or at Student Health.

For more information, call the Campus Health Service insurance office at 480/965-2411.

Bridge Discount Program. This discount program reduces the total health care costs for certain services rendered at Campus Health Service. Students enrolled in this program are charged co-payments for specialist visits, basic x rays, and laboratory tests.

For more information, call 480/965-2411, or access the Web site at www.asu.edu/studentaffairs/health.

WELLNESS AND HEALTH PROMOTION

ASU Wellness and Health Promotion advances wellness and fosters a healthy campus environment that supports academic, personal, and professional success. Relevant health information is provided to reduce risk and address critical issues that impact campus life. Information, support, and referral is available for alcohol and other drug abuse prevention, body image enhancement and eating disorders prevention, healthy eating and nutrition, HIV/AIDS and sexually transmitted infection prevention, sexual health promotion, sexual assault and relationship violence prevention and victim advocacy, stress management, and violence prevention.

Wellness and Health Promotion offers presentations, special events, information booths, a resource room, workshops, Web and printed materials, and peer education programs.

The Home Safe Violence Prevention and Advocacy Center offers a 24 hour helpline for information, support, and referral. Peer advocates are trained to answer the helpline and assist other students.

Student organizations such as AIDS HOPE, V-Day Campaign, and Students Educating about Rape and Violence Everywhere offer excellent opportunities for students to address issues of personal interest.

Wellness and Health Promotion offers programs and services during and outside of regular business hours. Students are invited to drop in, call, or connect via email for information or to get involved in helping others.

For more health information, wellness calendar, and program information call 480/965-4721, or access the Web site at www.asu.edu/studentaffairs/wellness.

STUDENT MEDIA

Student Media offers the largest combined news products for the university, produced completely by student employees and volunteers.

The *State Press* campus newspaper, one of the largest daily newspapers in Arizona, is published five days a week by ASU students who make editorial decisions with the support of experienced university staff. It is distributed free of charge on the Polytechnic, Tempe, and West campuses, and in downtown Tempe.

The *ASU Web Devil* is Student Media's online news center and community guide, with local news and listings of restaurants, hotels, apartments, transportation, campus maps, and interesting cultural and entertainment opportunities within the community surrounding ASU. Access the Web site at www.asuwebdevil.com.

Sun Devil Television (SDTV) broadcasts on Channel 2 to ASU residence halls, Greek housing, the Towers apartment building, the Memorial Union, the Student Recreation Center, and various departments that utilize the university cable system. Student employees and volunteers produce several news and entertainment programs a day. Music videos and premium movies are also aired nightly.

All of these products provide students with on-the-job training in newswriting, photography, editing, broadcast reporting and production, online reporting, design, and advertising. They also address the many informational needs of the university community, not only through stories about the campus and local and national events, but through paid classified and display advertisements by area merchants, campus groups, and university faculty, students, and staff.

Student Media provides complete prepress services, including graphics and design, to the university community.

For more information, call 480/965-7572.

CAREER SERVICES

Career Services provides advising for individual career planning concerns and offers information about numerous career fields and opportunities. Students are encouraged to use the Career Education Center throughout their academic careers. An online career planning system assists students in evaluating and making career choices. Career Services offers workshops and classroom presentations on career planning, interviewing skills, résumé writing, and a myriad of additional career-related topics. Advisors are available to assist students on an individual basis in career planning and employment.

Hundreds of employers from business, industry, government, social service agencies, health organizations, and educational institutions come to ASU to interview students seeking permanent positions and career-related summer, intern, and co-op employment. Career Services facilitates these interviews for both employers and students to meet each group's needs and interests. In addition, career and job fairs are scheduled throughout the year.

The agency's services support students' career development throughout their college experience, and Career Services encourages participation in programs as early as the student's freshman year. The Tempe campus office is located in SSV 329.

For more information, call 480/965-2350, or access the Web site at www.asu.edu/studentaffairs/career.

STUDENT RECREATION COMPLEX AND CAMPUS RECREATION

The Student Recreation Complex (SRC) is the place to become involved and meet people with similar interests in an active lifestyle. Opportunities for involvement are plentiful, as Student Affairs' Campus Recreation is one of the largest programs of its kind in the country, serving more than 27,000 students annually. Programs offered include intramural sports, informal recreation, fitness, aquatic and sports skills classes, outdoor recreation, children and family programs, sport clubs, adaptive recreation for individuals with long- or short-term disabilities, a wellness program, safety education, experiential learning, and special events.

A variety of student employment opportunities, with flexible work schedules, are available at the SRC. Student positions include: facility managers, lifeguards, weight room supervisors, equipment room attendants, administrative assistants, personal trainers, group fitness instructors, outdoor trip leaders, Web developers, graphic designers, and front desk monitors.

The SRC is located on the south end of Palm Walk. Features include a variety of resistance and cardiorespiratory equipment, a 9,000 square-foot weight room, three large gymnasiums, 14 indoor racquetball courts, one squash court, martial arts, aerobics and sport club rooms, outdoor equipment rental, and adaptive weight equipment. Outdoor facilities include a lighted, multiuse complex with four fields, a .43-mile perimeter walking and jogging path, four sand volleyball courts, 14 tennis courts, and a 70-meter swimming pool with two movable bulkheads that allow the pool to be divided into three parts for simultaneous multiuse programming. Any student taking a class on the Tempe campus is an automatic member and can use the SRC for drop-in use. Polytechnic campus and West campus students can pay a student membership fee to use the SRC facility.

For more information, call 480/965-8900, stop by for a tour, or access the Web site at www.asu.edu/studentaffairs/src.

ARIZONA PREVENTION RESOURCE CENTER

The Arizona Prevention Resource Center (APRC) serves as a centralized source for individuals, schools, and communities throughout Arizona to support, enhance, and initiate programs focused on the prevention of the use and abuse of alcohol and other drugs; gangs and violence; and other areas, such as health promotion, domestic violence, and dropout prevention. The APRC operates in the following program areas:

1. Clearinghouse—provides accurate, timely, and personalized prevention information and materials through an in-house library, access to national

sources, and links with prevention programs in Arizona.

2. Training and Technical Assistance—provides high quality, responsive training and technical assistance for organizations and individuals undertaking prevention programs in local communities and schools; focus is on research-based (promising and proven) practices.
3. Evaluation and Accountability—coordinates and provides leadership for a statewide evaluation strategy for accountability in alcohol and other drug prevention and treatment programs; produces an annual inventory of substance abuse and gang prevention and treatment programs in Arizona; designs and conducts contracted evaluations of community-based prevention programs; and promotes accountability in all aspects of APRC operations.
4. Strategic Initiatives and Planning—promotes effective collaboration between prevention and treatment program leadership; broadens the funding base for prevention programs; researches and develops strategies for comprehensive statewide systems and accountability.

For more information, call 480/727-2772 or toll-free at 1-800-432-2772, access the Web site at www.azprevention.org, or write

ARIZONA PREVENTION RESOURCE CENTER
ARIZONA STATE UNIVERSITY
PO BOX 872208
TEMPE AZ 85287-2208

Information can also be obtained by fax, at 480/727-5400, or at 542 East Monroe Street in Phoenix, Building D.

INTERCOLLEGIATE ATHLETICS

The university is a member of the National Collegiate Athletic Association, Division I, and the Pacific-10 Conference. The university has 22 varsity intercollegiate sports and more than 500 participants. Intercollegiate athletics at ASU are governed by a board of faculty, students, and staff under the regulations of the Arizona Board of Regents, the NCAA, the Pacific-10 Conference, and the university. Policies are administered by Intercollegiate Athletics. All athletic grants-in-aid and scholarships are administered in coordination with Intercollegiate Athletics.

FAITH COMMUNITIES

Various religious centers representing most major religious groups are available near the Tempe campus and provide students with opportunities to participate in programs of religious worship and to meet other students through social activities.

For more information, call the Campus Interfaith Council at 480/965-6547, or access the Web site at www.asu.edu/studentaffairs/studentlife/interfaith.

OTHER OPPORTUNITIES FOR STUDENT INVOLVEMENT

Communication Activities: Interpreters Theater. Participants write, compile, and perform scripts for presentation in diverse on- and off-campus settings through the Hugh Downs School of Human Communication.

For more information, call 480/965-5061.

Dance. The Department of Dance presents six to eight faculty- and/or student-directed concerts a year.

For more information, call 480/965-5029.

Forensics. The ASU Forensic squad, associated with Pi Kappa Delta national forensic honorary association, travels to trophy tournaments across the country.

For more information, access the Web site at www.asu.edu/clas/communication/undergraduate/forensics.

KASC Radio. At KASC, in the Walter Cronkite School of Journalism and Mass Communication, students work in programming, performance, news, production, promotion, sales, and management. The station, programmed entirely by students, offers a modern rock format as an alternative to other Valley radio stations. New music by national as well as local bands is the focus of the KASC format. The music is complemented by ASU news and sports features.

For more information, access the Web site at www.theblaze1260.com.

Music. Performing organizations within the School of Music provide opportunities for involvement and credit, including bands, Lyric Opera Theatre, symphony orchestra, and choral organizations.

For more information, call 480/965-3371.

Theatre. The School of Theatre and Film presents six to eight mainstage theatre productions and many student-generated productions each year. Auditions for roles in mainstage productions are open to all university students, regardless of major. Backstage production participation opportunities are also available to all students. Audition information is available from the School of Theatre and Film, GHALL 232, 480/965-5337. The department provides community outreach opportunities with schools and connections with professional theatre companies.

W. P. Carey School of Business

wpcarey.asu.edu **Robert E. Mittelstaedt Jr., MBA, Dean**

Accountancy, School of **297**
Economics, Department of **298**
Finance, Department of **301**
Health Management and Policy, School of **302**
Information Systems, Department of **303**
International Business Studies **304**
Management, Department of **306**
Marketing, Department of **309**
Supply Chain Management, Department of **311**

PURPOSE

The mission of the W. P. Carey School of Business reflects a commitment to expand knowledge and educate future business leaders in a world-class learning environment that values thought leadership, real-world applications, technology, global perspective, ethics, and community. These programs address issues of importance to future managers in a world characterized by demands for continuous improvements in quality; growing sophistication of information technology; globalized markets; racial, cultural, and gender diversity in the workforce; and a demand for managers with practical, realistic skills.

Students have many opportunities to supplement their academic experiences. The school offers an honors program for academically talented students, an international component to provide a variety of international opportunities, an internship program that provides related practical experience, and more than 30 cocurricular organizations to increase student interaction and learning.

The school is a member of AACSB International—The Association to Advance Collegiate Schools of Business, the official accrediting organization in the field of business. The undergraduate and graduate programs and the School of Accountancy are also accredited by this organization.

The school is host to a chapter of Beta Gamma Sigma, a national society that recognizes high academic achievement in AACSB International–accredited schools. Selection to Beta Gamma Sigma is the highest scholastic honor a student in business can earn. Students in the top seven percent of the junior class and the top ten percent of the senior class are invited for membership every spring. For more information about Beta Gamma Sigma, access the Web site at betagammasigma.org, or stop by BA 150.

In addition to the regular degree curricula, other programs of study in the school are designed to meet special needs. Selected majors are available in the evening, and continuing education courses are conducted for qualified persons who are regularly employed and who otherwise would be unable to enroll in college courses. Short courses and institutes on a noncredit basis are organized in cooperation with various business groups for the furtherance of in-service training of employed personnel.

The school works in partnership with the business community, and the board of the Dean's Council of 100 serves as a primary source of advice and counsel for the school. Through the various divisions of the L. William Seidman Research Institute, the school reaches out to the business community through research and executive education. For more information, access the school's Web site at wpcarey.asu.edu.

ORGANIZATION

The courses offered by the W. P. Carey School of Business are organized into groups so that a related sequence may be established for the various subject fields. For administrative purposes, these fields are organized into the following academic units:

School of Accountancy
Department of Economics
Department of Finance
School of Health Management and Policy
Department of Information Systems
Department of Management
Department of Marketing
Department of Supply Chain Management

ADMISSION

The Prebusiness Program. Each student admitted to the W. P. Carey School of Business is designated as a prebusiness student. The student follows the freshman and sophomore sequence of courses listed in the curriculum outline. Students should follow the recommendations of an academic advisor in completing the prescribed background and skill courses in preparation for the subsequent professional program. The skill courses follow.

ACC 230 Uses of Accounting Information I 3
ACC 240 Uses of Accounting Information II 3
CIS 105 Computer Applications and Information Technology *CS* 3
ECN 211 Macroeconomic Principles *SB* 3
ECN 212 Microeconomic Principles *SB* 3
Choose between the course combinations below ..... 6 or 3
ENG 101 First-Year Composition (3)
ENG 102 First-Year Composition (3)
or
ENG 105 Advanced First-Year Composition (3)

—*or*—

ENG 107 English for Foreign Students (3)
ENG 108 English for Foreign Students (3)
MAT 210 Brief Calculus *MA* 3
MAT 211 Mathematics for Business Analysis 3
QBA 221 Statistical Analysis *CS* 3

Total ..... 27 or 30

Accountancy and Computer Information Systems majors should refer to their specific requirements under the "School of Accountancy," page 297, and the "Department of Information Systems," page 303, which list variations in the skill courses.

Completion of lower-division requirements does not ensure acceptance to the upper-division professional program. Prebusiness students are not allowed to register for 300- and 400-level business courses.

The Professional Program. The junior and senior years constitute the professional program of the undergraduate curriculum.

Students who wish to apply to the W. P. Carey School of Business professional program must submit an application during one of the three annual application periods. Candidates are strongly encouraged to visit the undergraduate programs office, in BA 109, at the beginning of the semester in which they wish to apply to pick up information regarding academic qualifications, admissions criteria, and application deadlines. The application can be found on the Web at wpcarey.asu.edu/up/up_professional_program.cfm. All applicants must be admitted to ASU by the time they submit their professional program application and must provide official SAT or ACT scores.

Nonbusiness Students. A nonbusiness student is permitted to register for selected 300- and 400-level business courses only during online registration and only if, (1) at the time of registration, the student has junior standing (56 semester hours completed) and (2) the student has a minimum cumulative GPA of 2.50 at ASU and a minimum GPA of 2.50 for all business courses completed at ASU. Students who have 56 semester hours completed but have never attended ASU are given a one-semester period to register and to establish a GPA at ASU. Students must meet all prerequisites and course requirements as listed in the catalog. Economics courses have different prerequisites; see the individual economics courses for those requirements.

Nonbusiness majors are limited to a maximum of 15 semester hours of selected upper-division business courses (excluding ECN courses).

Bachelor of Interdisciplinary Studies. The W. P. Carey School of Business participates in the Bachelor of Interdisciplinary Studies (BIS) degree. For details about the BIS degree, refer to "School of Interdisciplinary Studies," page 139.

Minors. Two minors are available to nonbusiness students: a minor in Business and a minor in Small Business. The Small Business minor is offered only at the Polytechnic campus. To complete the Business minor, students must obtain the requirements from the undergraduate programs office in the W. P. Carey School of Business and complete the specified business courses with a grade of "C" (2.00) or higher. To complete the Small Business minor, students must obtain the requirements from the Polytechnic campus Business Administration program on SUTTON, third floor. Courses used in a student's major may not be used toward a minor. Students are advised to consult an advisor in the colleges of their majors to ensure the proper selection of courses for the minor. The upper-division courses for the minor are restricted to students with 56 hours who are in good standing (a 2.00 ASU GPA or better).

Nondegree Undergraduate and Graduate Students. A nondegree undergraduate or graduate student is permitted to enroll in selected 300- and 400-level business courses only during online registration and only if (1) the student has an ASU cumulative GPA of at least 2.50 and an ASU cumulative business GPA of at least 2.50 at the time of online registration or (2) the student has never attended ASU, in which case he or she is given a one-semester period to register during online registration and to establish a GPA at ASU. Students must meet all prerequisites and course requirements as listed in the catalog. Economics courses have different prerequisites; see the individual economics courses for those requirements.

Nondegree undergraduate and graduate students are limited to a maximum of 15 semester hours of selected upper-division business courses (excluding ECN courses).

SECONDARY EDUCATION—BAE

The College of Education offers a Bachelor of Arts in Education degree in Secondary Education with an academic specialization in business.

Academic Specialization ITC Admission Requirements

This degree is offered through the Initial Teacher Certification (ITC) program in the College of Education. See "Initial Teacher Certification Professional Program Admission," page 350, 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.

The following courses must be completed with a grade of "C" (2.00) or higher before applying to the ITC professional program:

ECN 211 Macroeconomics Principles *SB* 3
ECN 212 Microeconomic Principles *SB* 3

In addition, the following courses may be in progress when applying to the ITC but must be completed before starting the program:

ACC 230 Uses of Accounting Information I 3
CIS 105 Computer Applications and Information Technology *CS* 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 93.

Business. The major teaching field consists of 46 semester hours and six additional 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:

ACC	230	Uses of Accounting Information I ... 3
ACC	240	Uses of Accounting Information II ... 3
CIS	105	Computer Applications and Information Technology *CS* ... 3
ECN	211	Macroeconomic Principles *SB* ... 3
ECN	212	Microeconomic Principles *SB* ... 3
ENG	301	Writing for the Professions *L* ... 3
FIN	300	Fundamentals of Finance ... 3
		or FIN 380 Personal Financial Management (3)
LES	305	Legal, Ethical, and Regulatory Issues in Business ... 3
MAT	211	Mathematics for Business Analysis ... 3
MGT	300	Organizational Management and Leadership ... 3
MGT	440	Small Business and Entrepreneurship ... 3
MKT	300	Principles of Marketing ... 3
MKT	310	Principles of Selling ... 3
		or MKT 424 Retail Management (3)
QBA	221	Statistical Analysis *CS* ... 3
SCM	300	Global Supply Operations ... 3
Typing/keyboarding ... 1		
Total ... 46		

Teaching Methods

BUE	480	Teaching Business Subjects ... 3
BUE	481	Technology in Business and Vocational Education ... 3
Total ... 6		

ADVISING

The student should follow the sequence of courses in the "Curriculum Outline Prebusiness Program," on this page, and the recommendations of the academic advisor in completing the prescribed background and skill courses in preparation for the subsequent professional program.

For more advising information, access the undergraduate programs Web site at wpcarey.asu.edu/up.

Curriculum Outline Prebusiness Program

First Year

First Semester

CIS	105	Computer Applications and Information Technology *CS* ... 3
ENG	101	First-Year Composition ... 3
		or ENG 107 English for Foreign Students (3)
MAT	210	Brief Calculus *MA* ... 3
General Studies ... 3		
PGS or SOC course ... 3		
Total ... 15		

Second Semester

COM	100	Introduction to Human Communication *SB* ... 3
		or COM 225 Public Speaking *L* (3)
		or COM 230 Small Group Communication *SB* (3)
		or COM 259 Communication in Business and the Professions (3)
ECN	211	Macroeconomic Principles *SB* ... 3
		or ECN 212 Microeconomic Principles *SB* (3)
ENG	102	First-Year Composition ... 3
		or ENG 108 English for Foreign Students (3)
MAT	211	Mathematics for Business Analysis ... 3
Laboratory science *SQ* ... 4		
Total ... 16		

Second Year

Third Semester

ACC	230	Uses of Accounting Information I ... 3
ECN	212	Microeconomic Principles *SB* ... 3
		or ECN 211 Macroeconomic Principles *SB* (3)
QBA	221	Statistical Analysis *CS* ... 3
General Studies ... 3		
PGS or SOC course ... 3		
Total ... 15		

Fourth Semester

ACC	240	Uses of Accounting Information II ... 3
General Studies ... 9		
Laboratory science *SQ/SG* ... 4		
Total ... 16		

Prebusiness program total ... 62

Accountancy and Computer Information Systems majors should refer to their specific course requirements under the "School of Accountancy," page 297, and the "Department of Information Systems," page 303, which list course requirement variations. Management majors should refer to their specific course requirements under the "Department of Management," page 306.

Students are encouraged to have College Algebra (MAT 117) proficiency before registering in ECN 211 and 212. ECN 211 and 212 should be taken during the second and third semesters without any delay in the prebusiness program.

Professional Program. Students admitted to the professional program should select the necessary upper-division business courses to complete the major by consulting their departmental advising guide, with an academic advisor, or with a faculty advisor. Professional program students must complete WPC 301, ENG 301, and SCM 300 during their first semester in the professional program.

Transfer Credit. Credit from other institutions is accepted subject to the following guidelines. Students planning to take their first two years of work at a community college or another four-year college should take only those courses in business and economics that are offered as freshman- or sophomore-level courses at any of the state-supported Arizona universities. These lower-division courses are numbered 100 through 299. *A maximum of 30 hours of business and economics courses from community colleges are accepted toward a bachelor's degree in business.*

Students may transfer a maximum of nine semester hours of approved upper-division business course work required for the business degree to the Tempe campus. Professional business courses taught in the junior or senior year in the state universities may not be completed at a two-year college for transfer credit in the business core or major. The introductory course in the legal, ethical, and regulatory issues in business is accepted as an exception to this policy, but only lower-division credit is granted. Such courses may be utilized in the free elective category subject to the 30-hour limitation. Courses taught as vocational or career

W. P. Carey School of Business Baccalaureate Degrees and Majors

Major	Degree	Concentration	Administered By
Accountancy	BS	—	School of Accountancy
Computer Information Systems	BS	—	Department of Information Systems
Economics*	BS	—	Department of Economics
Finance	BS	—	Department of Finance
Management	BS	—	Department of Management
Marketing	BS	—	Department of Marketing
Supply Chain Management	BS	—	Department of Supply Chain Management

* This major is offered by the College of Liberal Arts and Sciences as well, with different requirements.

classes at the community colleges that are not taught in the schools of business at any one of the state universities are not accepted for credit toward a bachelor's degree. Courses taught in the upper-division business core at the state universities must be completed at the degree-granting institution unless transferred from an accredited four-year school. Normally, upper-division transfer credits are accepted only from AACSB International–accredited schools. To be accepted for credit as part of the professional program in business, all courses transferred from other institutions must carry prerequisites similar to those of the courses they are replacing at ASU.

An Associate in Transfer Partnership degree is available to Maricopa community college students who wish to complete their first two years of course work at a Maricopa community college and transfer to the W. P. Carey School of Business without loss of credit. An Associate of Business degree is available to students who wish to complete their first two years of course work at an Arizona community college and transfer to the W. P. Carey School of Business without loss of credit. Students should consult with an academic advisor in undergraduate programs to plan curriculum requirements and/or access Business Transfer Guides for optimal course selection at www.asu.edu/provost/articulation.

DEGREES

The faculty in the W. P. Carey School of Business offer the BS degree in Accountancy, Computer Information Systems, Economics, Finance, Management, Marketing, and Supply Chain Management upon successful completion of a four-year curriculum of 120 semester hours. Students may select one of the majors shown in the "W. P. Carey School of Business Baccalaureate Degrees and Majors" table, on this page. Each major is administered by the academic unit indicated.

GRADUATE PROGRAMS

The faculty in the W. P. Carey School of Business offer graduate degrees as shown in the "W. P. Carey School of Business Graduate Degrees and Majors" table, page 292. Students have the opportunity to obtain dual degrees in two years with several master's degree programs in the W. P. Carey School of Business, including these examples:

MBA/MAIS
MBA/MHSM
MBA/MS degree in Information Management
MBA/MTax

Other concurrent degrees available are as follows:

MBA/JD
MBA/MArch
MBA/MIM with Thunderbird, the Garvin School of International Management, Glendale, AZ; Graduate School of Business Administration (Peru); Graduate School of Commerce (France); Monterrey Institute for Technical and Superior Studies, Mexico State Campus (Mexico); and Carlos III University of Madrid (Spain)

Applicants to the MBA degree program must have significant work experience.

For more information about the W. P. Carey MBA program, see the *Graduate Catalog.*

UNIVERSITY GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, students must meet all university graduation requirements. For more information, see "University Graduation Requirements," page 89.

General Studies Requirement

All students enrolled in a baccalaureate degree program must satisfy a university requirement for a minimum of 35 hours of approved course work in General Studies, as described under "General Studies," page 93. Note that all three General Studies awareness areas are required.

General Studies courses are listed in the "General Studies Courses" table, page 96, in the course descriptions, in the *Schedule of Classes,* and in the *Summer Sessions Bulletin.*

First-Year Composition Requirement

Completion of both ENG 101 and 102 or ENG 105 with a grade of "C" (2.00) or higher is required for graduation from ASU in any baccalaureate program.

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 93.

W. P. Carey School of Business Graduate Degrees and Majors

Major	Degree	Concentration[1]	Administered By
Accountancy and Information Systems	MAIS	—	School of Accountancy
Business Administration	MBA	—	W. P. Carey School of Business
	PhD	Accountancy, agribusiness,[2] computer information systems, finance, health services research,[3] management, marketing, or supply chain management	W. P. Carey School of Business
Economics	MS[3], PhD	—	Department of Economics
Health Sector Management	MHSM	—	School of Health Management and Policy
Information Management	MS	—	Department of Information Systems
Public Health[3]	MPH	Community health practice or health administration and policy	School of Health Management and Policy
Statistics[4]	MS	—	Committee on Statistics
Taxation	MTax	—	School of Accountancy

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

[2] This concentration is administered in collaboration with the Morrison School of Agribusiness.

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

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

SCHOOL DEGREE REQUIREMENTS

School degree requirements supplement the General Studies requirement with additional course work from the approved university general studies list or the W. P. Carey School of Business Policy Statement. Business courses may not be used to fulfill school degree requirements except for ECN 211 and 212 and QBA 221.

A well-planned program of study may enable students to complete many General Studies and school degree requirements concurrently. Students are encouraged to consult with an academic advisor in planning a program to ensure that they comply with all necessary requirements.

Specific courses from the following areas must be taken to fulfill the school degree requirements.

Social and Behavioral Sciences. W. P. Carey School of Business students must complete ECN 211 and 212, one course with the PGS prefix, and one course with the SOC prefix and may include these courses toward the General Studies requirements.

Mathematical Studies. W. P. Carey School of Business students must complete MAT 210 and MAT 211 (or a more advanced MAT course) and QBA 221 and may include these courses toward the General Studies requirements.

Communication. All students in the W. P. Carey School of Business except Accountancy and Management majors must complete COM 100, 225, 230, or 259 and ENG 301. Accountancy majors must complete COM 230 (or 100) and 259. Management majors must complete COM 225 or 259.

Additional Courses. Additional courses, as needed to complete 60 hours (54 hours for Accountancy majors), may be selected from the General Studies areas (see "General Studies," page 93) or from the W. P. Carey School of Business Policy Statement. Students are encouraged to consult with an academic advisor to ensure that they comply with all necessary requirements. Business courses may not be used to fulfill this requirement except for ECN 211 and 212 and QBA 221.

Additional Graduation Requirements

In addition to completion of courses outlined under "Major Requirements," page 293, to be eligible for the BS degree in the W. P. Carey School of Business, a student must

1. have completed at least 30 semester hours at the Tempe campus;
2. have attained a cumulative GPA of 2.00 or higher for all courses taken at this university, for all business courses taken at this university, and for all courses for the major taken at this university;
3. have earned a "C" (2.00) or higher in each lower-division core and skill course and each course in the major;
4. have earned a minimum of 51 semester hours in traditional courses that were designed primarily for junior or senior students and were completed in an accredited, four-year institution; and
5. have met all university degree requirements.

Exceptions. Any exception to these requirements must be approved by the Standards Committee of the W. P. Carey School of Business.

Declaration of Graduation. A student in a professional program must complete a Declaration of Graduation during

the semester in which the student completes 87 semester hours. The Degree Audit Reporting System should be used to guide the student in successfully completing degree requirements in a timely manner. Students who have not met this requirement are prevented from further registration. Some students may be required to complete a Program of Study in place of the Declaration of Graduation. Students should consult their advisors for the proper procedure.

Pass/Fail

Business majors may not include among the credits required for graduation any courses taken at this university on a pass/fail basis. Pass/fail credits taken at another institution may be petitioned for use, but only if the student can demonstrate proof that the pass grade was equivalent to a "C" (2.00) or higher.

MAJOR REQUIREMENTS

Students seeking a BS degree in the W. P. Carey School of Business must satisfactorily complete a curriculum of 120 semester hours.

A major consists of a pattern of 18 to 24 semester hours in related courses falling primarily within a given subject field. Available majors are shown in the "W. P. Carey School of Business Baccalaureate Degrees and Majors" table, page 291.

Major Proficiency Requirements. Students must receive grades of "C" (2.00) or higher in upper-division courses for the major. If a student receives a grade below "C" (2.00) in any course in the major, this course must be repeated. If a second grade below "C" (2.00) is received in either an upper-division course in the major already taken or in a different upper-division course in the major, the student is no longer eligible to take additional upper-division courses in that major. University policy states a course may be repeated only one time.

Business Core Requirements

The business core is designed to provide an understanding of the fundamentals of business and to develop a broad business background. The faculty designed the core to cover the impact of information technology and e-business practices on business. By educating and training students in the use of data-driven decision-making tools and applications software, the school provides greater opportunity for its students. All students seeking a BS degree in the W. P. Carey School of Business complete the core courses.

The lower-division business core courses provide the fundamental skills needed in professional program courses and introduce students to the supply chain, business processes, and enterprise solutions software in addition to technology skills such as Excel and Access.

Lower-Division Business Core

ACC	230	Uses of Accounting Information I	3
ACC	240	Uses of Accounting Information II	3
CIS	105	Computer Applications and Information Technology *CS*	3
Lower-division business core total			9

The upper-division business core provides an enhanced understanding of the digital economy, e-business, and business processes in addition to increasing content knowledge and other skills.

Upper-Division Business Core

FIN	300	Fundamentals of Finance	3
LES	305	Legal, Ethical, and Regulatory Issues in Business	3
MGT	300	Organizational Management and Leadership	3
MKT	300	Principles of Marketing	3
SCM	300	Global Supply Operations	3
WPC	301	Business Forum (first semester)	1
International business course			3
Upper-division business core total			19
Business core total			28

Accountancy, Computer Information Systems, and Management majors should refer to their specific requirements under the "School of Accountancy," page 297, and "Department of Information Systems," page 303, and "Department of Management," page 306, which list variations in the business core courses.

Elective Courses

Sufficient elective courses are to be selected by the student to complete the total of 120 semester hours required for graduation.

ACADEMIC STANDARDS

Probation. All business students, freshman through senior, must maintain a minimum GPA of 2.00 for all courses completed at ASU. If this standard is not maintained, the student is placed on probation. Students on probation must see an advisor before further registration.

Students on probation must obtain a semester GPA of 2.50 with no grade lower than a "C" (2.00). If a student on probation meets this requirement, but the cumulative GPA remains below 2.00, the student is given an additional semester on continued probation. At the end of continued probation, the student must return to good standing (a minimum GPA of 2.00) to avoid disqualification.

Disqualification. Students who do not meet probation requirements are academically disqualified. Disqualified students should meet with an academic advisor. These students may attend ASU during summer and winter sessions; however, they are not eligible to enroll in upper-division business courses.

Reinstatement and Readmission. Students seeking reinstatement (after disqualification) or readmission (after an absence from the university) should contact the undergraduate programs office, in BA 109, regarding procedures and guidance for returning to good standing.

Academic Dishonesty. The faculty of the W. P. Carey School of Business follow the guidelines in the Student Academic Integrity Policy on academic dishonesty. A copy of the policy may be obtained in the undergraduate programs office, BA 109.

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 93.

W. P. Carey School of Business Undergraduate Certificates

Certificate	Administered By	Campus
Automotive Entrepreneurs and Leaders, Certificate for*	W. P. Carey School of Business	Tempe
Healthcare Organizations and Society, Certificate in	School of Life Sciences and the W. P. Carey School of Business	Tempe
International Business Studies, Certificate in	W. P. Carey School of Business	Tempe
Quality Analysis Certificate	W. P. Carey School of Business	Tempe
Small Business and Entrepreneurship Certificate*	W. P. Carey School of Business	Tempe

* This certificate is only for students in the W. P. Carey School of Business.

Student Appeal Procedure on Grades. The faculty of the W. P. Carey School of Business have adopted a policy on the student appeal procedure on grades. A copy of the policy may be obtained in the undergraduate programs office, BA 109.

SPECIAL PROGRAMS

Asian Studies. Students in the W. P. Carey School of Business may pursue a program with an emphasis in Asian studies as part of the BS degree requirements in business. For more information, visit the Center for Asian Studies, in COOR 6611, or call 480/965-7184.

Certificate for Automotive Entrepreneurs and Leaders. The Certificate for Automotive Entrepreneurs and Leaders is available only to business majors at ASU. This certificate program provides students with the knowledge and basic skills necessary to enter careers in automotive management. These skills include hiring and managing personnel and teams, understanding consumers and human behavior, managing financing and cash flows, handling the demand chain for car inventory, managing customer service operations, and managing automobile marketing efforts.

Students are required to complete a bachelor's degree from the ASU W. P. Carey School of Business and complete a minimum of 15 semester hours of approved course work, including the following six hours:

MGT 494 ST: Dealership Management 3
or MKT 494 ST: Dealership Management (3)
WPC 494 Special Topics 3

To complete the certificate the student selects at least nine additional hours of business courses, including a three-semester-hour internship. Courses must be approved in advance by the faculty advisor for the certificate program. The student must complete the 15 semester hours of course work with grades of "C" (2.00) or higher.

To assure students a quality experience, space in the Certificate for Automotive Entrepreneurs and Leaders program is limited and based on available resources. Professional program students must submit an application. Admission criteria include GPA, career goals, and application materials.

For more information, call 480/965-9640, visit BA 109, or access the Web site at wpcarey.asu.edu/dealership.

Certificate in Small Business and Entrepreneurship. A certificate in Small Business and Entrepreneurship is available only to business majors at ASU. The certificate requires 15 semester hours of classes, of which the following six semester hours must be included:

MGT 440 Small Business and Entrepreneurship 3
MGT 445 Business Plan Development 3

The remaining nine semester hours consist of three additional upper-division courses relevant to small business. A copy of the approved electives for business majors pursuing the Certificate in Small Business and Entrepreneurship is available in the undergraduate programs office, BA 109. To receive the certificate, students must complete the specified business courses with a grade of "C" (2.00) or higher.

Certificate in International Business Studies. See "Certificate in International Business Studies," page 304, for requirements.

Certificate in Quality Analysis. The program of study leading to the Certificate in Quality Analysis prepares students to perform technical analyses associated with quality measurement and improvement of manufacturing and service processes. Graduates with the ability to implement these analyses are in high demand in the marketplace. This program is not a substitute for the listed areas of business specialization; rather, the courses required for the certificate add quantitative strength and implementation skills for quality tools to the student's chosen field of specialization.

Students are required to complete a minimum of 15 semester hours of approved course work, including the following nine hours:

MGT 450 Changing Business Processes *L* 3
QBA 321 Intermediate Business Statistics 3
QBA 421 Applied Quality Analysis 3

To complete the certificate, the student selects at least six additional hours of course work related to quality analysis approved in advance by the advisor for the certificate program. The student must also complete the 15 hours of course work with a minimum GPA of 2.50.

BIS Concentration. A concentration in quality analysis 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 139.

Certificate in 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 the W. P. Carey School of Business.

Business Honors. W. P. Carey School of Business students who have been admitted to the Barrett Honors College are eligible to participate in Business Honors.

Business Honors provides opportunities for academically talented undergraduate business students to interact with other leading students, faculty, and business professionals inside and outside the classroom. The result is a challenging and enriched education experience that is valuable for professional or graduate work.

To be a part of Business Honors, students must be enrolled in the Barrett Honors College and have sufficient time to complete the honors requirements of the Business Honors program and Barrett Honors College.

The honors course work consists of HON 171 and 172 The Human Event or HON 394 Special Topics and the following core business courses: FIN 300, MGT 300, MKT 300, and SCM 300.

All Business Honors students are required to complete at least 18 upper-division honors credits, including the honors thesis project, to graduate from the program. The honors curriculum normally allows students to complete all requirements within the 120 semester hours of credit required for graduation.

Business Honors emphasizes activities beyond the normal classroom setting in order to broaden the educational experience. Such activities include special honors scholarships, student/faculty mixers, professional seminars and panel discussions, and the Global Business Series with the opportunity for international travel.

A specific academic advisor is assigned to assist honors students in course selection, to monitor progress toward honors recognition, and to be actively involved in career and educational guidance upon completion of the degree. Prebusiness students should plan to meet with the honors advisor.

For more information, see "The Barrett Honors College," page 145, visit Business Honors in BA 150, call 480/965-8710, or access the Business Honors Web site at wpcarey.asu.edu/honors. Faxes may be sent to 480/727-7277.

The Rodel Community Scholars. With the establishment of the Rodel Community Scholars Program, the ASU W. P. Carey School of Business greatly expands its effort to produce civic-minded leaders for the Phoenix metropolitan area and Arizona. The program focuses the energy and intellect of talented ASU business, psychology, sociology, education, and family studies students in a collaborative venture to develop and implement strategies directed toward education related concerns that impact high-potential, at risk students in targeted Valley high schools.

Internships. The school encourages students to complement their academic program with career-related work. This practical experience gives students a distinct advantage in the job market when seeking their first full-time professional positions. Additional benefits include industry contacts, a deeper understanding of career options, and monetary compensation that helps students finance their education.

Formal internships and co-ops offer professional work experience and experiential learning opportunities that enrich the student's academic preparation. Students may undertake internships in the summer or part-time during semesters. Co-op positions are full-time and require a one-semester or longer break in school attendance. The school

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 93.

provides guidelines to companies and encourages them to sponsor internship and co-op positions that benefit the firm and the student. Both benefit because positions are built around projects and challenging responsibilities that enable students to apply learning acquired in advanced business classes.

ASU Career Services and the W. P. Carey School of Business work cooperatively to help students identify and obtain career-related work. The process of obtaining internships and co-ops is a learning opportunity. Students use the same job-search skills and resources used to obtain permanent career positions. Informational materials, workshops, and required class activities help students learn job-search and career-exploration skills and locate internship and co-op opportunities.

Some academic units within the school offer internship courses. Work assignments for these courses must be approved in advance by a designated faculty member, and all internship courses include an academic component. Limited numbers of international internship opportunities are available through the school's foreign partner institutions. Eligibility for these internships may require the student to participate in an exchange with the partner institutions or to pay additional fees.

For more information, visit BAC 119, or meet with faculty advisors in the departments or Career Services. Students interested in international internships should contact the W. P. Carey School of Business coordinator of international programs, in BA 109, or access the Web site at wpcarey.asu.edu/international.

Latin American Studies Center. Students in the W. P. Carey School of Business may pursue a program with an emphasis in Latin American area studies. For more information, visit the Latin American Studies Center, in COOR 4450, or call 480/965-5127.

Prelaw Studies. Prelaw students may pursue a program of study in the W. P. Carey School of Business.

The admission requirements of colleges of law differ considerably. The student should communicate with the admissions office of the law school the student hopes to attend and should plan a program to meet the requirements of that school. Most law schools, including the ASU College of Law, require a baccalaureate degree and completion of the Law School Admission Test (LSAT) for admission.

Students who plan to complete a bachelor's degree before entering law school may follow any field of specialization in the W. P. Carey School of Business. In addition to a student's assigned advisor, a prelaw advisor is available in the undergraduate programs office, BA 109. More information is available on the prelaw Web site at clas.asu.edu/prelaw.

RESEARCH CENTERS

L. William Seidman Research Institute

The school has seven research centers operating under the umbrella of the L. William Seidman Research Institute. These centers provide support for faculty research, give opportunities for advanced graduate students' involvement with faculty, and provide information and assistance to the business community on a wide variety of subjects:

Bank One Economic Outlook Center
Center for Advanced Purchasing Studies
Center for the Advancement of Small Business
Center for Advancing Business through Information Technology
Center for Business Research
Center for Services Leadership
Institute for Manufacturing Enterprise Systems

The institute's mission is to encourage and support applied business research by serving as a public access point to the W. P. Carey School of Business, by supporting faculty and student research, by transferring new knowledge to the public, by encouraging the development of education programs grounded in applied business research, and by conducting high-quality, applied business research.

The institute increases the level of funded research by adding support services to facilitate grant preparation and assistance in grant administration and by facilitating the mission of research centers as liaisons between faculty and businesses. In addition, the institute provides desktop publishing services.

For more details, see "L. William Seidman Research Institute," page 41. For more information, call 480/965-5362, access the institute's Web site at wpcarey.asu.edu/seid, or write

L. WILLIAM SEIDMAN RESEARCH INSTITUTE
PO BOX 874011
TEMPE AZ 85287-4011

SCHOOL OF BUSINESS (WPC)

M WPC 194 Special Topics. (1–4)
selected semesters

M WPC 294 Special Topics. (1–4)
selected semesters

M WPC 301 Business Forum. (1)
fall, spring, summer
Provides professional program business students with information on careers, interviewing, job hunting, and résumé skills. Must be taken in the first semester of the professional program for business students. Prerequisite: professional program business student.

M WPC 380 Small Business Leadership. (3)
fall, spring, summer
Develops leadership skills needed to form, lead, and operate a small business. Emphasizes creating a vision, research, and problem solving. Team teaching, collaborative learning. Prerequisites: 2.00 GPA; 47 hours; nonbusiness major.

M WPC 381 Small Business Accounting and Finance. (3)
fall and spring
Accounting and finance skills needed by small business owners to acquire, allocate, and track monetary resources and evaluate performance. Team teaching, collaborative learning. Prerequisites: WPC 380; 2.00 GPA; 56 hours; nonbusiness major.

M WPC 382 Small Business Sales and Market Development. (3)
fall and spring
Building and maintaining customers, developing a market identity and a niche, and the importance of sales. Team teaching, collaborative learning. Prerequisites: WPC 380; 2.00 GPA; 56 hours; nonbusiness major.

M WPC 383 Small Business Working Relationships. (3)
fall and spring
Addresses communication and the people in a business—clients, employees, suppliers, competitors, governments, family, and self development. Team teaching, collaborative learning. Prerequisites: WPC 380; 2.00 GPA; 56 hours; nonbusiness major.

M WPC 384 Small Business Operations and Planning. (3)
fall and spring
Planning and executing plans—the what, when, where, how, and who from product/service/project idea to pay back or completion. Team teaching, collaborative learning. Prerequisites: WPC 380; 2.00 GPA; 56 hours; nonbusiness major.

M WPC 394 Special Topics. (1–4)
fall and spring

M WPC 492 Honors Directed Study. (2)
fall and spring

M WPC 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Financial Resources
- Honors Research. (1)
- Human Resources

M WPC 497 Honors Colloquium. (1–6)
selected semesters
Topics may include the following:
- Professional Leadership Forum. (3)

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

School of Accountancy

wpcarey.asu.edu/acc
480/965-3631
BA 223

Charles W. Christian, Director

Professors: J. R. Boatsman, Christian, Gupta, Johnson, Kaplan, Ohlson, Pany, Pei, Reckers, Schultz

Associate Professors: Golen, Hwang, Regier, Whitecotton

Assistant Professors: Comprix, Lee, Petersen, Robinson, Rowe

Senior Lecturers: Geiger, Goldman, Maccracken

Lecturers: J. L. Boatsman, Levendowski, Munshi, Wigal

ADMISSION

The School of Accountancy follows the W. P. Carey School of Business policies and procedures for admission to its undergraduate professional program in Accountancy.

To be considered for admission to the Accountancy major, a student must meet the W. P. Carey School of Business admission requirements, and have a grade of "C" (2.00) or higher in an introductory computer programming course as specified by the school. CIS 220 or its equivalent is taken in place of CIS 105.

Due to resource limitations, admission to the school's program is very competitive. Applicants are reviewed using a portfolio approach. Among the factors considered are cumulative GPA, skill course GPA, transfer GPA and institution (if applicable), SAT or ACT scores, work experience, demonstrated community involvement and leadership skills, and responses to questions in the professional program application.

ACCOUNTANCY—BS

The major in Accountancy includes the essential academic preparation for students who are

1. pursuing professional careers in public, corporate, and governmental accounting;
2. seeking positions in personal financial planning and portfolio analysis;
3. seeking positions in consulting;
4. planning to operate their own businesses; or
5. planning to pursue a graduate degree or attend law school.

The major in Accountancy consists of the following courses:

ACC	330	Enterprise Process Analysis and Design	3
ACC	340	External Reporting I	3
ACC	350	Internal Reporting	3
ACC	430	Taxes and Business Decisions *L*	3
ACC	440	External Reporting II	3
ACC	450	Principles of Auditing	3
Total			18

As part of the requirements, all Accountancy majors must complete the following courses:

ACC	250	Introductory Accounting Lab	1
CIS	220	Programming Concepts for Accountancy Majors[1]	3
CIS	360	Business Database Concepts	3
COM	100	Introduction to Human Communication *SB*[2]	3
		or COM 230 Small Group Communication *SB*[2] (3)	
COM	259	Communication in Business and the Professions[3]	3
		or COM 225 Public Speaking *L*[3] (3)	
ECN	306	Survey of International Economics *SB, G*[4]	3
Electives[5]			9
Total			25

[1] CIS 220 is used in the business core in place of CIS 105.
[2] COM 230 is recommended over COM 100.
[3] COM 259 is recommended over COM 225.
[4] ECN 306 is counted in the business core in place of the international business course.
[5] Electives must be selected from a list approved by the School of Accountancy.

MAJOR PROFICIENCY REQUIREMENTS

In addition to school of business and university requirements, Accountancy majors must receive grades of "C" (2.00) or higher in the required upper-division major and major support courses. If a student receives a grade below "C" (2.00) in any required upper-division major course, this course must be repeated before any other upper-division major course can be taken. If a second grade below "C" (2.00) is received in either an upper-division major course

already taken or in a different upper-division major course, the student is no longer eligible to take additional upper-division major courses.

GRADUATION REQUIREMENTS

In addition to fulfilling major requirements, students seeking a degree must meet all university and school requirements. See "University Graduation Requirements," page 89, and "School Degree Requirements," page 292.

ACCOUNTANCY (ACC)

For more ACC courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M ACC 230 Uses of Accounting Information I. (3)
fall, spring, summer
Introduces the uses of financial accounting information for decision making from an external perspective within the context of the evolution of the business cycle. Prerequisite: sophomore standing.

M ACC 240 Uses of Accounting Information II. (3)
fall, spring, summer
Introduces the uses of management accounting information for decision making from an internal perspective within the context of an organization's strategy. Prerequisites: ACC 230; sophomore standing.

M ACC 250 Introductory Accounting Lab. (1)
fall, spring, summer
Procedural details of accounting for the accumulation of information and generation of reports for internal and external users. Lab. Fee. Prerequisites: ACC 230; sophomore standing.

M ACC 315 Financial Accounting and Reporting. (3)
fall and spring
Accounting theory and practice related to uses of financial statements by external decision makers. Prerequisite: non-Accountancy major. Prerequisites with a grade of "C" (2.00) or higher: ACC 240, 250.

M ACC 316 Management Uses of Accounting. (3)
fall and spring
Uses of accounting information for managerial decision making, budgeting, and control. Prerequisites: ACC 240; non-Accountancy major.

M ACC 330 Enterprise Process Analysis and Design. (3)
fall, spring, summer
Analysis and design of efficient and effective business processes. Emphasizes taking advantage of new information technologies to improve managerial decision making. Fee. Prerequisites: ACC 230, 240; CIS 105 (or 220); QBA 221; professional program business student majoring in Accountancy or Computer Information Systems.

M ACC 340 External Reporting I. (3)
fall, spring, summer
Financial accounting theory and practice related to external reporting. Prerequisites: CIS 220; FIN 300; professional program business student majoring in Accountancy. Prerequisites with a grade of "C" (2.00) or higher: ACC 230, 240, 250.

M ACC 350 Internal Reporting. (3)
fall, spring, summer
Internal reporting systems for planning, control, and decision making. Prerequisites: SCM 300; professional program business student majoring in Accountancy. Prerequisites with a grade of "C" (2.00) or higher: ACC 250, 330.

M ACC 394 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Accounting and Financial Analysis. (3)
- Financial Analysis and Accounting for Small Businesses. (3)

M ACC 430 Taxes and Business Decisions. (3)
fall, spring, summer
Federal income taxation of sole proprietors, partnerships, corporations, fiduciaries, and individuals with an emphasis on tax consequences of business and investment decisions. Prerequisites: LES 305; professional program business student majoring in Accountancy. Prerequisite with a grade of "C" (2.00) or higher: ACC 340.
General Studies: L

M ACC 440 External Reporting II. (3)
fall, spring, summer
Continuation of ACC 340 with emphasis on the recognition, research, and resolution of financial reporting issues. Prerequisite: professional program business student majoring in Accountancy. Prerequisite with a grade of "C" (2.00) or higher: ACC 340.

M ACC 450 Principles of Auditing. (3)
fall and spring
Standards and procedures in auditing. Planning, evidence gathering and accumulation, and reporting. Ethical and legal considerations. Fee. Prerequisite: professional program business student majoring in Accountancy. Prerequisite with a grade of "C" (2.00) or higher: ACC 440.

M ACC 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/catalog 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 Economics

wpcarey.asu.edu/ecn
480/965-3531
BAC 659

Arthur E. Blakemore, Chair

Regents' Professor: Prescott

Professors: Blakemore, Boyes, Brada, Burgess, DeSerpa, Happel, Hoffman, Kingston, Low, Manelli, Mayer, McDowell, McPheters, Melvin, Méndez, Ormiston, Rogerson, Santos, Schlee, Zhou

Associate Professors: Ahn, Chade, Datta, Herrendorf, Reffett

Senior Lecturer: Roberts

The W. P. Carey School of Business offers a Bachelor of Science (BS) degree in Economics. The BS program of study can be designed for students intending to seek employment in the private or public sector upon completion of their undergraduate studies. Such a program provides students with the typical analytical and quantitative skills employers expect of individuals holding economics degrees. The BS program of study can also be tailored to prepare students for graduate programs in economics, business, or law.

ECONOMICS—BS

Requirements for the W. P. Carey School of Business BS in Economics consist of three parts: university requirements, see "University Graduation Requirements," page 89, for all students at ASU; the requirements of the

W. P. Carey School of Business; and the requirements of the Department of Economics.

DEPARTMENT OF ECONOMICS REQUIREMENTS

The BS program of study consists of 24 semester hours of upper-division course work as shown below. To qualify for upper-division course work in economics, business students must be admitted to the W. P. Carey School of Business professional program or the Barrett Honors College. Only courses in which a student receives a grade of "C" (2.00) or higher may be used to meet the major requirements. Students must meet all prerequisites and course requirements as listed in the catalog:

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. At least two of these courses must be at the 400-level or above. A maximum of three semester hours of ECN 484 Economics Internship can be used to satisfy this requirement. ECN 475 and 493 cannot be used to fulfill this requirement.

SECONDARY EDUCATION—BAE

For more information, see "Secondary Education—BAE," page 536.

GRADUATION REQUIREMENTS

In addition to fulfilling major requirements, students must fulfill university requirements, see "University Graduation Requirements," page 89, and "School Degree Requirements," page 292.

SPECIAL PROGRAMS

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 courses of wholly Latin American content. For more information, see "Latin American Studies Center," page 296.

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 "International Business Studies," page 304.

Certificate in Quality Analysis. Students majoring in Economics may elect to pursue a Certificate in Quality Analysis, combining courses from the major with selected technical analysis courses. For more information, see "Certificate in Quality Analysis," page 294.

Nonbusiness Students. A nonbusiness student is eligible to register for upper-division economics courses if the student has met all prerequisites and course requirements as listed in the catalog.

Business Honors. Students admitted to the Barrett Honors College may substitute ECN 213 Honors; Macroeconomics for ECN 211 and 313 and ECN 214 Honors: Microeconomics for ECN 212 and 314. These courses with grades of "C" (2.00) or higher satisfy the prerequisites and/or corequisites for all 400-level economics courses.

ECONOMICS (ECN)

For more ECN courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M ECN Note 1. MAT 211 or 271 with a grade of "C" (2.00) or higher is a prerequisite for all upper-division economics courses except ECN 382 and 384.

M ECN 211 Macroeconomic Principles. (3)
fall, spring, summer
Basic macroeconomic analysis. Economic institutions and factors determining income levels, price levels, and employment levels.
General Studies: SB

M ECN 212 Microeconomic Principles. (3)
fall, spring, summer
Basic microeconomic analysis. Theory of exchange and production, including the theory of the firm.
General Studies: SB

M ECN 213 Honors Macroeconomics. (3)
fall
Introduces modern macroeconomic analysis. Theory of national income, unemployment, inflation, and economic growth and its application to economic policy. Not open to students with credit in ECN 313. Prerequisite: Barrett Honors College student. Pre- or corequisite: MAT 210 or 270 or AP calculus.
General Studies: SB

M ECN 214 Honors Microeconomics. (3)
fall
Introduces modern microeconomic analysis. Theories of consumer behavior, production, and cost. Output and price determination in a variety of market settings. Not open to students with credit in ECN 314. Prerequisite: Barrett Honors College student. Pre- or corequisite: MAT 210 or 270 or AP calculus.
General Studies: SB

M ECN 294 Special Topics. (1–4)
selected semesters

M ECN 306 Survey of International Economics. (3)
fall, spring, summer
Survey of international trade issues, commercial policy, trade theory, customs unions, and international monetary topics. Cross-listed as IBS 306. Credit is allowed for only ECN 306 or IBS 306. See ECN Note 1. Prerequisites: ECN 211, 212.
General Studies: SB, G

M ECN 313 Intermediate Macroeconomic Theory. (3)
fall, spring, summer
Determinants of aggregate levels of employment, output, and income of an economy. Not open to students with credit in ECN 213. See ECN Note 1. Prerequisites: ECN 211, 212.
General Studies: SB

M ECN 314 Intermediate Microeconomic Theory. (3)
fall, spring, summer
Role of the price system in organizing economic activity under varying degrees of competition. See ECN Note 1. Prerequisites: ECN 211, 212.
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 93.

M ECN 315 Money and Banking. (3)
once a year
Functions of money. Monetary systems, credit functions, banking practices, and central banking policy. See ECN Note 1. Prerequisites: ECN 211, 212.

M ECN 331 Alternative Economic Systems. (3)
once a year
Alternative institutions, past and present, for organizing the social division of labor. Property rights, information, and incentives in industrial societies. See ECN Note 1. Prerequisites: ECN 211, 212.
General Studies: SB, G

M ECN 360 Economic Development. (3)
selected semesters
Theories of economic growth and development. Role of capital formation, technological innovation, population, and resource development in economic growth. See ECN Note 1. Prerequisites: ECN 211, 212.
General Studies: SB, G

M ECN 365 Economics of Russia and Eastern Europe. (3)
selected semesters
Origins and analysis of contemporary institutions. Comparative development and differentiation in the 20th century. See ECN Note 1. Prerequisites: ECN 211, 212.
General Studies: SB, G

M ECN 382 Managerial Economics. (3)
fall, spring, summer
Applies economic analysis to managerial decision making. Market analysis in the context of the socio-legal environment. Does not satisfy Economics major requirements. Prerequisites: minimum ASU 2.00 GPA; junior standing.

M ECN 384 Economics of Social Behavior. (3)
selected semesters
Applies economic analysis to contemporary behavior; discrimination, work versus leisure, crime, medical care, macroeconomic policies. Does not satisfy Economics major requirements. Prerequisites: minimum ASU 2.00 GPA; junior standing.
General Studies: SB

M ECN 394 Special Topics. (3)
selected semesters
Current topics of domestic or international interest. See current *Schedule of Classes* for offerings. See ECN Note 1. Prerequisites: ECN 211, 212.

M ECN 404 History of Economic Thought. (3)
once a year
Development of economic doctrines, theories of mercantilism, physiocracy, classicism, neoclassicism, Marxism, and contemporary economics. Prerequisite: ECN 314. Pre- or corequisite: ECN 313.
General Studies: SB

M ECN 410 Applied Business Forecasting. (3)
once a year
Applies forecasting techniques in business and institutional environments. Fee. Prerequisites: ECN 314; QBA 221 (or STP 226). Pre- or corequisite: ECN 313.

M ECN 421 Earnings and Employment. (3)
once a year
Origins of labor movement, analysis of labor unions, labor markets, collective bargaining, and current policy issues. Prerequisite: ECN 314. Pre- or corequisite: ECN 313.
General Studies: SB

M ECN 425 Introduction to Econometrics. (3)
once a year
Elements of regression analysis: estimation, hypothesis tests, prediction. Emphasizes use of econometric results in assessment of economic theories. Prerequisites: ECN 314; QBA 221 (or STP 226). Pre- or corequisite: ECN 313.
General Studies: CS

M ECN 436 International Trade Theory. (3)
once a year
Comparative-advantage doctrine, including practices under varying commercial policy approaches. Economic impact of international disequilibrium. Prerequisite: ECN 314. Pre- or corequisite: ECN 313.
General Studies: SB, G

M ECN 438 International Monetary Economics. (3)
once a year
History, theory, and policy of international monetary economics. Balance of payments and exchange rates. International financial markets, including Eurocurrency markets. Prerequisite: ECN 313. Pre- or corequisite: ECN 314.
General Studies: SB, G

M ECN 441 Public Finance. (3)
once a year
Public goods, externalities, voting models, public expenditures, taxation, and budget formation with emphasis on the federal government. Prerequisite: ECN 314. Pre- or corequisite: ECN 313.
General Studies: SB

M ECN 450 Law and Economics. (3)
once a year
Economics of the legal system, including analysis of property, contracts, torts, commercial law, and other topics. Prerequisite: ECN 314. Pre- or corequisite: ECN 313.

M ECN 453 Government and Business. (3)
once a year
Development of public policies toward business. Antitrust activity. Economic effects of government policies. Prerequisite: ECN 314. Pre- or corequisite: ECN 313.

M ECN 470 Mathematical Economics. (3)
once a year
Integrates economic analysis and mathematical methods into a comprehensive body of knowledge within contemporary economic theory. Prerequisite: ECN 314. Pre- or corequisite: ECN 313.

M ECN 475 Capstone In Economics. (3)
fall and spring
Capstone course integrating several areas of economics. Prerequisites: ECN 313, 314. Pre- or corequisite: ECN 410 (or 425) or QBA 321 or STP 421.
General Studies: L

M ECN 484 Economics Internship. (3)
fall, spring, summer
Academic credit for professional work organized through the Internship Program. Prerequisite: minimum cumulative ASU 3.00 GPA. Prerequisites: ECN 313, 314.

M ECN 493 Honors Thesis. (3)
fall and spring
General Studies: L

M ECN 494 Special Topics. (1–4)
selected semesters
Current economic topics of domestic or international interest. Analytical emphasis may be macro, micro, or both. See current *Schedule of Classes* for offerings. Prerequisites: ECN 313, 314.

M ECN 498 Pro-Seminar. (3)
selected semesters
Topics chosen from current area of interest. Prerequisites: ECN 313, 314.

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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

QUANTITATIVE BUSINESS ANALYSIS (QBA)

For more QBA courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M QBA 221 Statistical Analysis. (3)
fall and spring
Methods of statistical description. Applies probability theory and statistical inference in business. Fee. Prerequisite: MAT 211 or 272.
General Studies: CS

M QBA 321 Intermediate Business Statistics. (3)
once a year
Applies advanced statistical methods used in business and economic research. Primary emphasis on regression analysis and modeling. Prerequisite: QBA 221.

M QBA 421 Applied Quality Analysis. (3)
once a year
Applies statistical tools to improve business processes and increase quality. Topics include data analysis tools, experimental design, customer surveys, process control, and process capability. Prerequisite: QBA 221.

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/catalog 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 Finance

wpcarey.asu.edu/fin
480/965-3131
BAC 519

Jeffrey L. Coles, Chair

Professors: Booth, Coles, Guntermann, Hertzel, Kaufman, Nanda, Sushka, Wahal

Associate Professors: Cesta, Davis, Gallinger, Hoffmeister

Assistant Professors: Aragon, Deli, Dieckmann, Juergens, Lindsey, Martin, Nardari, Strickland

Clinical Assistant Professors: Licon, Simonson

Professor of Practice: Stearns

Lecturer: Hoffman

FINANCE—BS

The study of finance prepares students to understand the financial implications inherent in virtually all business decisions. Students majoring in Finance are prepared for entry-level careers in corporate management, depository institutions, investment management, and financial services. The finance curriculum emphasizes financial markets, evaluation of investments, and efficient allocation of resources. The major in Finance consists of the following courses:

ACC	315	Financial Accounting and Reporting	3
FIN	331	Financial Markets and Institutions	3
FIN	361	Managerial Finance	3
FIN	421	Security Analysis and Portfolio Management	3
FIN	461	Financial Cases and Modeling *L*	3
		One additional approved 400-level FIN course	3
Total			18

As part of the requirements, all Finance majors must complete ACC 250 Introductory Accounting Lab. Finance majors are strongly advised to take ACC 316 Management Uses of Accounting. FIN 484 Finance Internship is available for nonmajor elective credit.

ACC 250 must be completed before taking ACC 315. FIN 300 must be completed before taking FIN 361. FIN 331 and 361 and ACC 315 must be completed before taking 400-level FIN courses.

MAJOR PROFICIENCY REQUIREMENTS

Students must receive grades of "C" (2.00) or higher in upper-division courses for the major. If a student receives a grade below "C" (2.00) in any course in the major, this course must be repeated before taking any further courses for which this course is a prerequisite. If a second grade below "C" (2.00) is received in either an upper-division course in the major already taken or in a different upper-division course in the major, the student is no longer eligible to take additional upper-division courses in that major.

GRADUATION REQUIREMENTS

In addition to fulfilling major requirements, students seeking a degree must meet all university and school requirements. See "University Graduation Requirements," page 89, and "School Degree Requirements," page 292.

FINANCE (FIN)

For more FIN courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M FIN Note 1. In addition to individual course prerequisites, nonbusiness students must have at least a 2.50 ASU cumulative GPA, a 2.50 ASU business GPA, and 56 earned semester hours to register for any upper-division business course unless otherwise noted.

M FIN 300 Fundamentals of Finance. (3)
fall, spring, summer
Theory and problems in financial management of business enterprises. Prerequisites: ACC 240; ECN 212; QBA 221. Pre- or corequisite: SCM 300.

M FIN 331 Financial Markets and Institutions. (3)
fall, spring, summer
Analyzes financial markets and intermediaries. Theory of financial intermediation, interest rate theory, money and capital market instruments, and government regulation. Prerequisite: professional program business student majoring in Finance.

M FIN 361 Managerial Finance. (3)
fall, spring, summer
Theories and problems in resource allocation, cost of capital, CAPM and capital budgeting, asset valuation, capital structure, and financing policy. See FIN Note 1. Prerequisite: professional program business student majoring in Finance.

M FIN 380 Personal Financial Management. (3)
fall, spring, summer
Dynamic analysis of personal financial planning, including time value of money, stock and bond investment, and retirement and estate planning. Prerequisites: minimum cumulative 2.00 GPA; junior standing; non-Finance major.

M FIN 394 Special Topics. (1–4)
selected semesters
See FIN 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 93.

M FIN 421 Security Analysis and Portfolio Management. (3)
fall, spring, summer
Security analysis theory and practice. Selection and management of financial asset portfolios. Securities markets and portfolio risk-return analysis. Lecture, discussion. Prerequisite: professional program business student majoring in Finance. Prerequisites with a grade of "C" (2.00) or higher: ACC 315; FIN 331, 361.

M FIN 427 Derivative Financial Securities. (3)
fall, spring, summer
Study of stock options, index options, convertible securities, financial futures, warrants, subscription rights, and arbitrage pricing theory. Lecture, discussion. Prerequisite: professional program business student majoring in Finance. Prerequisite with a grade of "C" (2.00) or higher: FIN 421.

M FIN 431 Management of Financial Institutions. (3)
fall, spring, summer
Asset/liability and capital management in financial institutions. Influence of market factors and regulatory agencies. Emphasizes commercial banks. Lecture, discussion. Prerequisite: professional program business student majoring in Finance. Prerequisites with a grade of "C" (2.00) or higher: ACC 315; FIN 331, 361.

M FIN 456 International Financial Management. (3)
fall, spring, summer
Exchange rate determination, financial markets, managing multinational corporations, capital budgeting, and hedging currency risk exposure from an international perspective. Prerequisite: professional program business student majoring in Finance. Prerequisites with a grade of "C" (2.00) or higher: ACC 315; FIN 331, 361.
General Studies: G

M FIN 461 Financial Cases and Modeling. (3)
fall and spring
Case-oriented capstone course in managerial finance. Contemporary issues of liquidity management, capital budgeting, capital structure, and financial strategy. Lecture, discussion, group work. Prerequisite: professional program business student majoring in Finance. Prerequisites with a grade of "C" (2.00) or higher: ACC 315; FIN 331, 361 421.
General Studies: L

M FIN 481 Honors Seminar in Finance. (3)
once a year
Honors course covering topics that include theory and applications concerning managerial finance, investments, and financial institutions. Lecture, discussion. Prerequisite: Finance Business Honors program student. Prerequisites with a grade of "C" (2.00) or higher: ACC 315; FIN 331, 361.

M FIN 484 Finance Internship. (3)
fall, spring, summer
Academic credit for field work in finance organized through the internship program. Prerequisites: FIN 331, 361; instructor approval.

M FIN 494 Special Topics. (1–4)
selected semesters
Prerequisite: professional program business student majoring in Finance.

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.

REAL ESTATE STUDIES (REA)

For more REA courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M REA 380 Real Estate Fundamentals. (3)
fall and spring
Real estate for the student/consumer with an emphasis on the applied aspects of each area of real estate specialization. Not open to Real Estate majors. Prerequisites: 2.00 ASU GPA; junior standing.

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

School of Health Management and Policy

wpcarey.asu.edu/hmp
480/965-7778
BA 318

Jeffrey R. Wilson, Director

Professors: Baldwin, Johnson, Kirkman-Liff, Schneller

Associate Professors: Reiser, Wilson

Assistant Professors: Furukawa, Jehn, Ketcham

Research Professors: Patton, Rimsza

Associate Research Professor: Schwenke

While the School of Health Management and Policy does not offer an undergraduate major, a number of courses at the 200 and 400 levels are available to students who have a strong interest in health care, public health, and health policy. Students may enroll in these courses regardless of their undergraduate major. Registration for courses at the 400 level is with permission of the instructor and subject to seat availability.

HEALTH SECTOR MANAGEMENT (HSM)

M HSM Note 1. In addition to individual course prerequisites, nonbusiness students must have at least a 2.50 ASU cumulative GPA, a 2.50 ASU business GPA, and 56 earned semester hours to register for any upper-division business course unless otherwise noted.

M HSM 220 Health Care Organizations. (3)
fall, spring, summer
Overview of United States health care delivery systems; financing, health policy, basic principles of budgeting, cost-benefit analysis, and resource management. Cross-listed as HCR 220. Credit is allowed for only HCR 220 or HSM 220.
General Studies: H

M HSM 498 Pro-Seminar. (1–7)
selected semesters
See HSM Note 1. Topics may include the following:
- Health Care Finance. (3)
- Health Economics. (3)
- Health Service Administration and Policy. (3)
- Legal and Ethical Issues in Healthcare. (3)
- Policy Issues in Health Care. (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 Information Systems

wpcarey.asu.edu/is
480/965-3252
BA 223

Robert D. St. Louis, Chair

Professors: Goul, Roy, St. Louis, Steinbart, Vinze

Associate Professors: David, Iyer, Keim, Kulkarni, O'Leary, Santanam

Assistant Professors: Corral, Demirkan, Ravindran, Roussinov, Shao

Senior Lecturers: Birney, Hayes, Shrednick

Lecturer: McCarthy

ADMISSION

The Department of Information Systems follows the W. P. Carey School of Business policies and procedures for admission to its undergraduate professional program in Computer Information Systems.

To be considered for admission to the Computer Information Systems major, a student must meet the W. P. Carey School of Business admission requirements and have a grade of "C" (2.00) or higher in an introductory computer science course as specified by the school.

Due to resource limitations, admission to the program is very competitive. Applicants are reviewed using a portfolio approach. Among the factors considered are cumulative GPA, skill course GPA, transfer GPA and institution (if applicable), SAT or ACT scores, work experience, demonstrated community involvement and leadership skills, and responses to questions in the professional program application.

COMPUTER INFORMATION SYSTEMS—BS

Computer Information Systems (CIS) involves the design, development, and maintenance of information systems that support both business operations and managerial decision-making. Students majoring in Computer Information Systems develop familiarity with software application development, database development, and network deployment. Special emphasis is placed on business process workflows, systems integration, and project management. The focus throughout the program is on using information technology to add value to organizations. Specific skills include Java, Visual Basic, SQL, Oracle, Access, network security, and Web services. Students also acquire problem solving, critical thinking, communication, and team-building skills.

A degree in Computer Information Systems offers a diverse range of job opportunities in a variety of industries, including entertainment, national defense, transportation, education, healthcare, and finance. Information systems is also a key component in the success of other functional business areas such as accounting, supply chain, finance, and marketing.

Entry-level information systems positions include database administrator, systems analyst, network administrator, project manager, systems administrator, and consultant. Long-term career aspirations for a student with a CIS degree include chief information officer (CIO), chief technology officer (CTO), chief knowledge officer (CKO), chief security officer (CSO), and chief executive officer (CEO). The average beginning salary is in the mid to high $40,000s.

U.S. News & World Report ranks the ASU CIS program among the nation's top 20 public and private programs.

The major in Computer Information Systems consists of the following courses:

ACC	330	Enterprise Process Analysis and Design	3
CIS	340	Object-Oriented Modeling and Programming	3
CIS	360	Business Database Concepts	3
CIS	425	Electronic Commerce Strategy	3
CIS	430	Networks and Distributed Systems	3
CIS	440	Systems Design and Electronic Commerce *L*	3
Total			18

All Computer Information Systems majors must complete an introductory computer science course as specified by the department, which may be used as a school of business requirement, and CIS 235 Introduction to Information Systems, which is used in the business core.

MAJOR PROFICIENCY REQUIREMENTS

In addition to school of business and university requirements, Computer Information Systems majors must receive grades of "C" (2.00) or higher in the required upper-division major courses. If a student receives a grade below "C" (2.00) in any required upper-division major course, this course must be repeated before any other upper-division major course can be taken. If a second grade below "C" (2.00) is received in either an upper-division major course already taken or in a different upper-division major course, the student is no longer eligible to take additional upper-division major courses.

GRADUATION REQUIREMENTS

In addition to fulfilling major requirements, students seeking a degree must meet all university and school requirements. See "University Graduation Requirements," page 89, and "School Degree Requirements," page 292.

COMPUTER INFORMATION SYSTEMS (CIS)

For more CIS courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D

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 93.

(Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M CIS Note 1. In addition to individual course prerequisites, nonbusiness students must have at least a 2.50 ASU cumulative GPA, a 2.50 ASU business GPA, and 56 earned semester hours to register for any upper-division business course unless otherwise noted.

M CIS 105 Computer Applications and Information Technology. (3)
fall, spring, summer
Introduces business information systems and the uses of business application software with emphasis on database and spreadsheet packages. Fee.
General Studies: CS

M CIS 220 Programming Concepts for Accountancy Majors. (3)
fall, spring, summer
Introduces business computer programming. Uses programming languages such as Visual BASIC to teach proper programming style and practice. Fee. Prerequisite: prebusiness student.

M CIS 235 Introduction to Information Systems. (3)
fall, spring, summer
Survey course introducing the competitive and strategic uses of information systems, how information systems are transforming organizations and their management, and the issues, difficulties, and opportunities facing the technology professional and business manager today. Fee. Prerequisite: MAT 210 or 211. Prerequisite with a grade of "C" (2.00) or higher: CIS 105.

M CIS 300 Web Design and Development. (3)
fall and spring
Focuses on Web site development, including target audience, image presentation, page/content topic organization, site navigational functionality, implementation needs, and future needs. Web site design and development practice using business software products. Prerequisites: junior or senior standing; 2.00 ASU GPA.

M CIS 335 Visual Paradigms for Information Systems Development. (3)
selected semesters
Uses visual programming languages such as Visual BASIC to implement data structures, file structures, and interfaces in business information systems. Fee. See CIS Note 1. Prerequisites: both CSE 100 and professional program business student majoring in Computer Information Systems or both CIS 220 and professional program business student majoring in Accountancy.

M CIS 340 Object-Oriented Modeling and Programming. (3)
fall and spring
Object-oriented modeling of business information systems. Abstract data types and object-oriented programming using a language such as C#. Fee. See CIS Note 1. Prerequisite: professional program business student majoring in Computer Information Systems. Prerequisites with a grade of "C" (2.00) or higher: CIS 235; CSE 181.

M CIS 360 Business Database Concepts. (3)
fall and spring
Database theory, design, and application, including the entity-relationship model; the relational, hierarchical, and network database models; and query languages. Fee. See CIS Note 1. Prerequisite: professional program business student majoring in Computer Information Systems or Accountancy. Prerequisite with a grade of "C" (2.00) or higher: ACC 330.

M CIS 394 Special Topics. (1–4)
selected semesters
See current *Schedule of Classes* for course offerings at Polytechnic campus. See CIS Note 1.

M CIS 425 Electronic Commerce Strategy. (3)
fall and spring
Key business strategies and technology elements of contemporary electronic commerce. Covers Web design and interactions between Web pages and databases. Fee. See CIS Note 1. Prerequisite: professional program business student majoring in Computer Information Systems or Accountancy. Prerequisite with a grade of "C" (2.00) or higher: CIS 360.

M CIS 430 Networks and Distributed Systems. (3)
fall and spring
Advanced topics such as communications protocols, distributed systems, network security and client-server systems; applications based on platforms such as.NET and networked UNIX. Fee. See CIS Note 1. Prerequisites with a grade of "C" (2.00) or higher: ACC 330; CIS 340; professional program business student majoring in Computer Information Systems. Pre- or corequisite with a grade of "C" (2.00) or higher: CIS 360.

M CIS 440 Systems Design and Electronic Commerce. (3)
fall and spring
Systems design for organizational and electronic commerce systems; use of project management and systems analysis and design tools. Fee. See CIS Note 1. Prerequisites with a grade of "C" (2.00) or higher: CIS 360, 430; professional program business student majoring in Computer Information Systems.
General Studies: L

M CIS 494 Special Topics. (1–4)
selected semesters
See CIS Note 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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

International Business Studies

wpcarey.asu.edu/international

480/965-0596

BA 109

Josef C. Brada, Director

Adela Gasca, Coordinator

Certificate in International Business Studies

The Certificate in International Business Studies is designed to prepare students for positions with multinational firms, banks, government agencies, and international organizations. The certificate is not a substitute for the listed areas of business specialization; rather, the program of study for the certificate enables students to apply business skills in a global environment.

Requirements for the certificate are designed to provide an understanding of international business environments, principles, and operations; to provide an awareness of global social processes and a sensitivity to foreign cultures; and to develop competence in a foreign language. These objectives are met in the following ways: international business principles and operations, global and area studies, foreign language, and GPA proficiency. Students seeking the certificate are strongly encouraged to obtain some international experience through study in a foreign country.

International Business Principles and Operations. At least nine semester hours of approved courses in international business are required. Students must take either IBS 300 Principles of International Business or ECN/IBS 306

Survey of International Economics. Other international business courses from which the remaining hours are selected include

ECN	306	Survey of International Economics *SB, G**	3
		or IBS 306 Survey of International Economics *SB, G** (3)	
ECN	331	Alternative Economic Systems *SB, G**	3
ECN	360	Economic Development *SB, G**	3
ECN	365	Economics of Russia and Eastern Europe *SB, G**	3
ECN	436	International Trade Theory *SB, G**	3
ECN	438	International Monetary Economics *SB, G**	3
FIN	456	International Financial Management *G**	3
IBS	300	Principles of International Business *G**	3
IBS	394	ST: Economics of Latin America	3
IBS	394	ST: Regional Business Environment of Southeast Asia	3
		or IBS 494 ST: Regional Business Environment of Southeast Asia (3)	
IBS	400	Cultural Factors in International Business *C, G**	3
		or MGT 400: Cultural Factors in International Business *C, G* (3)	
IBS	459	International Management *G*	3
		or MGT 459 International Management *G* (3)	
IBS	484	International Business Internship	3
IBS	493	International Honors Thesis *L**	3
IBS	494	ST: Economics of the European Union	3
IBS	499	Individualized Instruction of International Business	3
MGT	459	International Management *G*	3
		or IBS 459: International Management *G* (3)	
MGT	494	ST: Applied International Management	3
MKT	394	ST: Global Markets	3
MKT	435	International Marketing	3
MKT	494	ST: Applied International Marketing	3
SCM	463	Global Supply Chain Management	3

* W. P. Carey School of Business students may not use this course to fulfill the 60 semester hours in school degree requirements.

Honors students who select an international business topic for their thesis may use that as part of the 9 hours of international business course work for the certificate.

Global and Area Studies. The global and areas studies requirement can be satisfied either by means of course work or through participation in programs the W. P. Carey School of Business has with foreign schools of business, or by some combination of the two. The course work option requires at least nine semester hours of approved credits in international and area studies.

The W. P. Carey School of Business has academic agreements with universities throughout Europe, Latin America, and Asia. Students who participate and are successful in one of these approved programs abroad for one semester are deemed to have fulfilled the global and area studies requirements of the Certificate in International Business. Students who participate in an approved W. P. Carey School of Business program may satisfy some of the nine semester hours of international and area studies credit.

The requirements for the international business studies concentration in the Bachelor of Interdisciplinary Studies degree are slightly different from those for the certificate. For more information, call 480/965-0596.

Foreign Language. Evidence of competency in a foreign language equivalent to one year of college study is required.

Additional Requirements. Applicants for the Certificate in International Business must earn a "C" (2.00) or higher in each of the courses selected for the certificate, have at least a 2.50 GPA for all course work applied to the certificate, and have completed all of the business course work at the Tempe campus.

Advising. When planning and selecting courses to meet the requirements for the certificate and to take advantage of opportunities for participation in exchanges with foreign schools of business, students should consult with an international business faculty advisor or the coordinator of international programs, in BA 109. For more information, call 480/965-0596, or access the Web site at wpcarey.asu.edu/international.

BIS CONCENTRATION

A concentration in international business 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 139.

INTERNATIONAL BUSINESS STUDIES (IBS)

M IBS Note 1. In addition to individual course prerequisites, nonbusiness students must have at least a 2.50 ASU cumulative GPA, a 2.50 ASU business GPA, and 56 earned semester hours to register for any upper-division business course unless otherwise noted.

M IBS Note 2. MAT 211 or 272 with a grade of "C" (2.00) or higher is a prerequisite for all upper-division economics courses except ECN 382 and 384.

M IBS 300 Principles of International Business. (3)
fall, spring, summer
Multidisciplinary analysis of international economic and financial environment. Operations of multinational firms and their interaction with home and host societies. See IBS Note 1. Prerequisite: ECN 212.
General Studies: G

M IBS 306 Survey of International Economics. (3)
fall, spring, summer
Survey of international trade issues, commercial policy, trade theory, customs unions, and international monetary topics. Cross-listed as ECN 306. Credit is allowed for only ECN 306 or IBS 306. See IBS Notes 1, 2. Prerequisites: ECN 211, 212.
General Studies: SB, G

M IBS 394 Special Topics. (1–4)
fall and spring
See IBS Note 1. Topics may include the following:
- Economics of Latin America. (3)
- Regional Business Environment of Southeast Asia. (3)

Prerequisites: 2.00 ASU GPA; junior standing.

M IBS 400 Cultural Factors in International Business. (3)
fall and spring
Cultural role in international business relations; applied principles of cross-cultural communications, negotiations, and management;

regional approaches to business relations. Cross-listed as MGT 400. Credit is allowed for only IBS 400 or MGT 400. See IBS Note 1. Prerequisites: IBS 300, 306 (or ECN 306); MGT 300 (or 320).
General Studies: C, G

M IBS 459 International Management. (3)
fall and spring
Concepts and practices of multinational and foreign firms. Objectives, strategies, policies, and organizational structures for operating in various environments. Cross-listed as MGT 459. Credit is allowed for only IBS 459 or MGT 459. See IBS Note 1. Prerequisites: IBS 300, 306 (or ECN 306); MGT 300 (or 320 or 380).
General Studies: G

M IBS 484 International Business Internship. (3)
selected semesters
Academic credit for professional work organized through the internship/international program. See IBS Note 1. Prerequisites: IBS 300 or 306 (or ECN 306); professional program business student; senior; minimum cumulative ASU 3.40 GPA; minimum ASU business 3.40 GPA.

M IBS 493 International Honors Thesis. (3)
fall and spring
See IBS Note 1.
General Studies: L

M IBS 494 Special Topics. (1–4)
fall and spring
See IBS Note 1. Topics may include the following:
- Economics of the European Union. (3)
- Regional Business Environment of Southeast Asia. (3)

M IBS 499 Individualized Instruction of International Business. (3)
fall and spring
See IBS Note 1.

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

Department of Management

wpcarey.asu.edu/mgt
480/965-3431
BA 323

Regents' Professor: Gomez-Mejia

Professors: Ashforth, Cannella, Cardy, Hershauer, Hom, Hoskisson, Keim, Kinicki, Mittelstaedt, Roberson, Tsui

Associate Professors: Boyd, Hillman, Keats, Moorhead, Olivas, Van Hook

Assistant Professors: Corley, Koka, Lee

Lecturers: Beer, Davila

Faculty in the ASU Department of Management are widely recognized for their work in the areas of organizational behavior, human resource management, and strategic management. The faculty's research and instruction emphasize corporate governance, high-tech management, knowledge management, quality, process and project management, strategic alliances, value chain analysis, global supply operations, globalization, diversity, small business and entrepreneurship, change management, organizational identity, and human resource management practices in their research, consulting, and teaching.

The W. P. Carey School of Business management major ranks 24th in the nation by *U.S. News and World Report* (September 2003). Nominated by deans and senior faculty of business schools around the country, the W. P. Carey BS degree in Management is recognized as one of the best programs in this specialty area.

Students at the undergraduate and graduate levels gain the most current and relevant knowledge of management practice and theory from esteemed faculty who are excellent scholars and teachers. ASU faculty rank first place internationally in the number of leading textbooks in all areas of management. In a recent update of a study originally published in the *Academy of Management Journal* (Dennis, et al., 2001), the ASU Department of Management climbed to third place internationally in research performance in top journals, up from 21st place. The department is also ranked third place internationally in the number of most cited management scholars. Faculty members have also won numerous local and international teaching awards, including citations in the prestigious *Business Week*'s listing of the best MBA professors. For more information, access the department's Web site at wpcarey.asu.edu/mgt.

Department of Management faculty take great pride in their teaching excellence and have been very active in continuing to improve collaborative teaching techniques. Eleven management faculty members and teaching assistants have won recent school, university, and international awards for their excellence in teaching effectiveness.

Department of Management faculty excel at developing the latest materials to facilitate student learning. Teaching awards and student evaluations place faculty among the elite at ASU. Faculty members also have the distinction of publishing more leading textbooks on management topics than faculty at any other university worldwide.

MANAGEMENT—BS

Business in the 21st century calls for managers who are dynamic leaders and effective team builders. The leaders of companies that are succeeding in the new marketplace possess excellent written and oral communication skills and extensive experience in guiding collaborative teams. After analyzing surveys of students, graduates, and their employers and after many insightful discussions with executives and recruiters, the department concluded that the Management major should have a strong emphasis on collaboration, leadership, communication, team building, and major group projects with the community in not-for-profit and for-profit business settings. The newly revised curriculum begins with the global supply operations course—an immersion in the fundamentals of the global economy, the world of e-business, and collaborative teams. Students are encouraged to concurrently enroll in the introductory courses on collaborative team skills and managing people in organizations during their first semester. Throughout the program, understanding of theory and concepts of management are enhanced by experiencing and testing these concepts in skill-based exercises, case discussions, and team-based project work in the classroom and in the community.

The Management major prepares men and women for managerial leadership in a world characterized by the fast pace of e-business; demands for continuous process improvements to enhance the value chain; growing technological sophistication; racial, cultural, and gender diversity in the workforce; and the need for skills in communicating and working with people, managing projects, and managing change. Graduates with these skills are likely to be recruited by management consulting firms, high-tech firms, service and manufacturing firms, for-profit and not-for-profit organizations, and large and small organizations. These employers recruit Management graduates for challenging trainee positions or entry-level management positions and immediately benefit from their preparation.

Program Requirements

The major in Management consists of the following courses:

MGT	320 Managing People in Organizations	3
MGT	410 Responsible Leadership	3
MGT	420 Performance Management	3
MGT	450 Changing Business Processes *L*	3
MGT	460 Strategic Leadership *L*	3
Management electives*		6
Total		21

* Management electives must be selected from the approved list.

All Management majors must complete the following specific courses that fulfill other pre-business or professional program requirements:

ENG	301 Writing for the Professions *L*	3
COM	225 Public Speaking *L*	3
	or COM 259 Communication in Business and the Professions[1] (3)	
IBS	300 Principles of International Business[2] *G*	3
MGT	310 Collaborative Team Skills[3]	3
Total		12

[1] COM 225 is recommended over COM 259. Either is counted in the school communication requirement.

[2] IBS 300 is counted in the business core in place of the international business course.

[3] MGT 310 is counted in place of MGT 300 in the business core.

Approved Electives for Management. The following electives have been approved for the management major.

ACC	316 Management Uses of Accounting	3
MGT	400 Cultural Factors in International Business *C, G*	3
MGT	440 Small Business and Entrepreneurship	3
MGT	445 Business Plan Development	3
MGT	459 International Management *G*	3
MGT	484 Management Internship	3
MGT	494 Special Topics	3
MKT	302 Fundamentals of Marketing Management *L*	3

Undergraduate Internships in Management. The Department of Management strongly supports the concept of student internships, believing all students can benefit from the experience. Undergraduate internships in management provide an opportunity for students to gain on-the-job work experience related to their academic preparation and to increase their employment potential at graduation. For more information about the management internship program and the application process, access the department internship Web site at www.wpcarey.asu.edu/mgt/internships.cfm. Management majors may use a maximum of three semester hours of MGT 484 for the major. Any additional internship credits may be used for nonmanagement electives.

Certificates. The Department of Management also strongly supports certification in key areas that strengthen the Management degree and help to differentiate individual students for recruiters. The certificates allow students to gain particular analytical skills related to their education and to increase their employment prospects. These certificates are particularly relevant to students majoring in Management:

1. the Certificate for Automotive Entrepreneurs and Leaders (see wpcarey.asu.edu/dm_certificate.cfm);
2. the International Business Certificate (see wpcarey.asu.edu/up/ipo/ibc.cfm);
3. the Certificate in Quality Analysis (see wpcarey.asu.edu/up/qa_certificate.cfm); and
4. the Certificate in Small Business and Entrepreneurship (see wpcarey.asu.edu/up/smallbusiness.cfm).

Major in Management. More information, links to courses and faculty, and any updates on the undergraduate major in Management can be found on the Web at wpcarey.asu.edu/mgt.

Major Proficiency Requirements

Students must receive grades of "C" (2.00) or better in upper-division courses for the major. If a student receives a grade below "C" (2.00) in any course in the major, the course must be repeated. If a second grade below "C" (2.00) is received in either an upper-division course in the major already taken or in a different upper-division course in the major, the student is no longer eligible to take additional upper-division courses in that major.

Graduation Requirements

In addition to fulfilling major requirements, students seeking a degree must meet all university and school requirements. See "University Graduation Requirements," page 89, and "School Degree Requirements," page 292.

GRADUATE PROGRAMS

The Department of Management participates actively in several master's and PhD programs, particularly the technology MBA and executive MBA. For a detailed description of these programs, see the *Graduate Catalog.*

The Department of Management has adopted a modular approach to PhD education to improve our ability to deliver focused, high-quality seminars, give students more flexibility in defining their areas of expertise, increase their rate of quality publications, and enhance the quality of PhD placements.

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 93.

Graduate Programs. For additional information, links to courses and faculty, and general information about ASU MBA programs, access the Web at wpcarey.asu.edu/mba.

More information, application procedures, links to faculty, and any updates on the PhD program in Management can be found on the Web at wpcarey.asu.edu/mgt/degree/phd.

MANAGEMENT (MGT)

For more MGT courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M MGT Note 1. In addition to individual course prerequisites, nonbusiness students must have at least a 2.50 ASU cumulative GPA, a 2.50 ASU business GPA, and 56 earned semester hours to register for any upper-division business course unless otherwise noted.

M MGT 300 Organizational Management and Leadership. (3)
fall, spring, summer
Analyzes strategic, behavioral, and human resource management perspectives, including principles of strategic management and leadership of human resources. Fee. See MGT Note 1. Prerequisites: a course in psychology (social and behavioral) and a course in sociology. Pre- or corequisite: SCM 300.

M MGT 310 Collaborative Team Skills. (3)
fall, spring, summer
Development of skills in managing and working in collaborative environments. Theories and applications in small group dynamics and team facilitation. Interactive, learner-centered. See MGT Note 1. Prerequisite: professional program business student majoring in Management. Prerequisite for nonmajors: instructor approval. Pre- or corequisites: MGT 320; SCM 300 (recommended as corequisites).

M MGT 320 Managing People in Organizations. (3)
fall, spring, summer
Management processes, fundamentals of business-level strategy, individual difference issues, motivation and leadership of people in organizations. Lecture, discussion, interactive, learner-centered. See MGT Note 1. Prerequisite: professional program business student majoring in Management. Prerequisite for nonmajors: instructor approval. Pre- or corequisites: MGT 310; SCM 300 (recommended as corequisites).

M MGT 350 Seminar in International Business. (3)
summer
Broad exposure to global business; cross-cultural differences across business disciplines; European Union history and future; impact of exchange rates. Lecture, discussion, on- and off-campus business visits. Cross-listed as MKT 350. Credit is allowed for only MGT 350 or MKT 350. See MGT Note 1. Prerequisites for business majors: SCM 300; professional program admission. Prerequisites for nonmajors: MGT 380; completion of at least 56 hours with at least 2.00 GPA.

M MGT 380 Management and Strategy for Nonmajors. (3)
fall, spring, summer
Introduces the functions and applications of management in organizations, including controlling, decision making, leadership, motivation, planning, and social responsibility. Not open to business majors. Prerequisites: 2.00 ASU GPA; junior standing.

M MGT 394 Special Topics. (3)
selected semesters
See MGT Note 1.

M MGT 400 Cultural Factors in International Business. (3)
fall and spring
Cultural role in international business relations; applied principles of cross-cultural communications, negotiations, and management; regional approaches to business relations. Cross-listed as IBS 400. Credit is allowed for only IBS 400 or MGT 400. See MGT Note 1. Prerequisites: IBS 300, 306 (or ECN 306); MGT 300 (or 320).
General Studies: C, G

M MGT 410 Responsible Leadership. (3)
fall, spring, summer
Values, core beliefs, legal and ethical mandates and cultural norms as they apply to the conduct of organizations; application through a Service Learning project. Interactive, learner-centered. See MGT Note 1. Prerequisites: MGT 310, 320.

M MGT 420 Performance Management. (3)
fall, spring, summer
Development of skills and knowledge to lead associates effectively: hiring, developing, evaluating, retaining, and rewarding employees. Preparation for leadership roles. Lecture, discussion, interactive, learner-centered. See MGT Note 1. Prerequisites: MGT 310, 320.

M MGT 440 Small Business and Entrepreneurship. (3)
fall and spring
Opportunities, risks, and problems associated with small business development and operation. See MGT Note 1.

M MGT 445 Business Plan Development. (3)
fall and spring
Develops a complete strategic business plan emphasizing the planning process undertaken by successful small business owners and entrepreneurs. Lecture, discussion, experiential exercise. See MGT Note 1. Prerequisite: MGT 440.

M MGT 450 Changing Business Processes. (3)
fall and spring
Describes and analyzes business processes. Generates and evaluates alternatives. Creates improvement and implementation plans. Fee. See MGT Note 1. Prerequisite: completion of 100 hours, including all business administration core requirements. Pre- or corequisite: FIN 461 or MGT 460 or MKT 460 or SCM 479 or any other recommended business integrative course.
General Studies: L

M MGT 459 International Management. (3)
fall and spring
Concepts and practices of multinational and foreign firms. Objectives, strategies, policies, and organizational structures for operating in various environments. Cross-listed as IBS 459. Credit is allowed for only IBS 459 or MGT 459. See MGT Note 1. Prerequisites: IBS 300, 306 (or ECN 306); MGT 300 (or 320 or 380).
General Studies: G

M MGT 460 Strategic Leadership. (3)
fall, spring, summer
Systems theory of organizations, strategy formulation and administration in organizations, creating organizational cohesiveness, and leading change within organizations. Lecture, cases, exercises. See MGT Note 1. Prerequisites: MGT 410, 420; completion of 100 hours, including all business administration core requirements. Pre- or corequisite: MGT 450 (recommended as corequisite).
General Studies: L

M MGT 464 Collaborative Design Development I. (5)
fall
Team-based product development course featuring applied projects. Open to senior students from business, engineering, design, and other disciplines. Cross listed as IND 464. Credit is allowed for only IND 464 or MGT 464. Lecture, lab. See MGT Note 1. Prerequisites: instructor approval; application process (www.innovationspace.org).

M MGT 465 Collaborative Design Development II. (5)
spring
Team-based product development course featuring applied projects. Open to senior students from business, engineering, design, and other disciplines. Cross listed as IND 465. Credit is allowed for only IND 465 or MGT 465. Lecture, lab. See MGT Note 1. Prerequisites: instructor approval; application process (www.innovationspace.org).

M MGT 484 Management Internship. (3)
fall and spring
Internships are strongly recommended to improve employment potential. The Department of Management internship coordinator must approve all internships to receive credit. See MGT Note 1.

M MGT 494 Special Topics. (1–4)
selected semesters
Current topics in management, primarily designed for business majors. See the *Schedule of Classes* for current offerings of courses. Topics may include the following:
- Applied International Management. (3)
- Cultural Factors in International Business. (3)

Prerequisite: IBS 300 (or 459) or MGT 300 (or 459).
- Dealership Management. (3)
- Strategic Management. (3)

M MGT 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/catalog 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 Marketing

wpcarey.asu.edu/mkt
480/965-3621
BAC 460

Michael P. Mokwa, Chair

Professors: Bitner, Bolton, Brown, Hutt, Jackson, Kumar, Lastovicka, Mokwa, Nowlis, L. Ostrom, Reingen, Walker, Ward

Associate Professors: Blasko, A. Ostrom, Sinha, Stephens

Assistant Professors: Jarvis, Mandel, Morales

Clinical Assistant Professor: Peloso

Senior Lecturer: Spiers

Study in the field of marketing involves analysis of how organizations plan, organize, deploy, and control their resources to achieve market objectives. Focus is placed on market forces, growth, and the deployment of firms in competitive markets and on the marketing strategy and tactics of the firm. Through the proper selection of courses, a student may prepare for a career in

1. selling and sales management;
2. services and retail marketing;
3. promotion and advertising management;
4. business to business marketing;
5. international marketing;
6. market research and planning;
7. general marketing management; or
8. retail management.

MARKETING—BS

The major in Marketing consists of 18 semester hours. The following courses must be included:

MKT 302 Fundamentals of Marketing Management *L*	3
MKT 304 Consumer Behavior	3
MKT 351 Marketing Research *L*	3
MKT 460 Strategic Marketing	3
Total	12

To complete the major, students, in consultation with their faculty advisors, select six additional hours from among the following list of courses:

MKT 301 Principles of Advertising	3
MKT 310 Principles of Selling	3
MKT 411 Sales Management	3
MKT 412 Promotion Management	3
MKT 424 Retail Management	3
MKT 430 Marketing for Service Industries	3
MKT 434 Business-to-Business Marketing	3
MKT 435 International Marketing	3
MKT 484 Internship	3
MKT 494 Special Topics	1–4
MKT 499 Individualized Instruction	1–3

Major Proficiency Requirements

Students must receive grades of "C" (2.00) or higher in upper-division courses for the major. If a student receives a grade below "C" (2.00) in any course in the major, this course must be repeated. If a second grade below "C" (2.00) is received in either an upper-division course in the major already taken or in a different upper-division course in the major, the student is no longer eligible to take additional upper-division courses in the major.

GRADUATION REQUIREMENTS

In addition to fulfilling major requirements, students seeking a degree must meet all university and school requirements. See "University Graduation Requirements," page 89, and "School Degree Requirements," page 292.

GRADUATE PROGRAMS

The department offers a distinctive MBA curriculum in services marketing and management. For more information, see the *Graduate Catalog.*

MARKETING (MKT)

For more MKT courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M MKT Note 1. In addition to individual course prerequisites, nonbusiness students must have at least a 2.50 ASU cumulative GPA, a 2.50 ASU business GPA, and 56 earned semester hours to register for any upper-division business course unless otherwise noted.

M MKT 300 Principles of Marketing. (3)
fall, spring, summer
Role and process of marketing within the society, economy, and business organization. See MKT Note 1. Prerequisite: ECN 212. Pre- or corequisite: SCM 300.

M MKT 301 Principles of Advertising. (3)
fall, spring, summer
Advertising as a communications tool in marketing and business management. Survey of market segmentation, creative strategy, media, and effectiveness measures. See MKT Note 1. Prerequisite: MKT 300.

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 93.

M MKT 302 Fundamentals of Marketing Management. (3)
fall, spring, summer
Marketing planning, implementation, and control by organizations, with special emphasis on identifying market opportunities and developing marketing programs. See MKT Note 1. Prerequisites: MKT 300; professional program Marketing major.
General Studies: L

M MKT 304 Consumer Behavior. (3)
fall, spring, summer
Applies behavioral concepts in the analysis of consumer behavior and the use of behavioral analysis in marketing strategy formulation. See MKT Note 1. Prerequisite: MKT 300.

M MKT 310 Principles of Selling. (3)
once a year
Basic principles underlying the selling process and their practical application in the sale of industrial goods, consumer goods, and intangibles. See MKT Note 1. Prerequisite: MKT 300.

M MKT 350 Seminar in International Business. (3)
summer
Broad exposure to global business; cross-cultural differences across business disciplines; European Union history and future; impact of exchange rates. Lecture, discussion, on- and off-campus business visits. Cross-listed as MGT 350. Credit is allowed for only MKT 350 or MGT 350. See MKT Note 1. Prerequisites for business majors: SCM 300; professional program admission. Prerequisites for nonmajors: MGT 380; completion of at least 56 hours with at least 2.00 GPA.

M MKT 351 Marketing Research. (3)
fall, spring, summer
Integrated treatment of methods of market research and analysis of market factors affecting decisions in the organization. Fee. See MKT Note 1. Prerequisite with a grade of "C" (2.00) or higher: QBA 221. Pre- or corequisite: MKT 302.
General Studies: L

M MKT 382 Advertising and Marketing Communication. (3)
fall and spring
Introduction for nonbusiness majors to the communication process within marketing and advertising. Creation and presentation of an ad campaign. Not open to business majors. Prerequisites: junior or senior standing; 2.00 ASU GPA.

M MKT 394 Special Topics. (1–4)
fall
Not open to Marketing majors. See MKT Note 1. Topics may include the following:
- Applied International Marketing. (1–3)
- Global Markets. (3)
- Marketing and Selling. (3)

M MKT 411 Sales Management. (3)
once a year
Applies management concepts to the administration of the sales operation. See MKT Note 1. Prerequisite: MKT 302.

M MKT 412 Promotion Management. (3)
once a year
Integrates the promotional activities of the firm, including advertising, personal selling, public relations, and sales promotion. See MKT Note 1. Prerequisite: MKT 302.

M MKT 424 Retail Management. (3)
selected semesters
Role of retailing in marketing. Problems and functions of retail managers within various retail institutions. See MKT Note 1. Prerequisite: MKT 300.

M MKT 430 Marketing for Service Industries. (3)
once a year
Concepts and strategies for addressing distinctive marketing problems and opportunities in service industries. Current issues and trends in the service sector. See MKT Note 1. Prerequisites: MKT 300, professional program business student.

M MKT 434 Business-to-Business Marketing. (3)
once a year
Strategies for marketing products and services to commercial, institutional, and governmental markets. Changing industry and market structures. See MKT Note 1. Prerequisite: MKT 302 or instructor approval.

M MKT 435 International Marketing. (3)
once a year
Analyzes marketing strategies developed by international firms to enter foreign markets and to adapt to changing international environments. See MKT Note 1. Prerequisites: MKT 302 (or instructor approval); professional program business student.

M MKT 460 Strategic Marketing. (3)
fall, spring, summer
Policy formulation and decision making by the marketing executive. Integrates marketing programs and considers contemporary marketing issues. Prerequisite: professional program business student. See MKT Note 1. Prerequisites with a grade of "C" (2.00) or higher: MKT 302, 304, 351.

M MKT 484 Internship. (3)
fall, spring, summer
See MKT Note 1. Prerequisite with a grade of "B" (3.00) or higher: MKT 302.

M MKT 494 Special Topics. (1–4)
fall, spring, summer
Chosen from topics in the marketing and international marketing arenas to include seminars in international marketing in Europe and Asia. See MKT Note 1. Topics may include the following:
- Applied International Marketing
- Dealership Management

M MKT 499 Individualized Instruction. (1–3)
fall, spring, summer
Topics of special interest chosen by students and agreed to by the departments to do independent studies with a professor acting as a guide. See MKT Note 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/catalog 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 Supply Chain Management

wpcarey.asu.edu/scm
480/965-6044
BA 446

Joseph R. Carter, Chair

Professors: J. Carter, P. Carter, Choi, Dooley, Ellram, Jennings, Kirkwood, Pearson, Roth, V. Smith-Daniels

Associate Professors: Brooks, Callarman, Keefer, Krause, Maltz, Rungtusanatham, Siferd, D. Smith-Daniels, Verdini

Assistant Professors: Barratt, Rabinovich

Clinical Assistant Professor: Pfund

Research Professor: Monczka

Senior Lecturers: Brown, Koretz

The faculty in the Department of Supply Chain Management offer courses in two separate areas: legal and ethical studies and supply chain management.

Legal and Ethical Studies

The legal and ethical studies faculty offer the undergraduate and the Master of Business Administration core requirements in legal and ethical studies. In addition, the faculty offer specialized courses in law and ethics relating to health care, insurance, real estate, and professional sports.

SUPPLY CHAIN MANAGEMENT—BS

A "supply chain" consists of all of the entities necessary to transform ideas into delivered products and services. Supply chain management directs and transforms a firm's resources in order to design, purchase, produce, and deliver high-quality goods and services. As goods and services flow from supplier to producer to customer to final user, supply chain management is particularly concerned with the interfaces between organizations. One way to view supply chain management is as managing linkages between organizations.

The competitive and global nature of today's business environment dictates that this direction and transformation take place in a way that is as efficient and effective as possible. Continuing emphasés on time, cost, and quality improvements have sharpened the need to coordinate and cooperate with trading partners around the world to achieve results that allow customers to be successful. Supply chain management focuses on the integration of activities across several companies to manage the flow of products, services, people, equipment, facilities, and other resources. Supply chain management is also concerned with recycling, reuse, and final disposal of products.

The major in Supply Chain Management consists of the following courses:

SCM	345 Logistics Management	3
SCM	355 Supply Management	3
SCM	432 Planning and Control Systems for Supply Chain Management *L*	3
SCM	440 Quality Management and Measurement	3
SCM	455 Research and Negotiation	3
SCM	479 Supply Chain Strategy	3
Total		18

MAJOR PROFICIENCY REQUIREMENTS

Students must receive grades of "C" (2.00) or higher in upper-division courses for the major. If a student receives a grade below "C" (2.00) in any course in the major, this course must be repeated. If a second grade below "C" (2.00) is received in either an upper-division course in the major already taken or in a different upper-division course in the major, the student is no longer eligible to take additional upper-division courses in that major.

GRADUATION REQUIREMENTS

In addition to fulfilling major requirements, students seeking a degree must meet all university and school requirements. See "University Graduation Requirements," page 89, and "School Degree Requirements," page 292.

LEGAL AND ETHICAL STUDIES (LES)

For more LES courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M LES Note 1. In addition to individual course prerequisites, nonbusiness students must have at least a 2.50 ASU cumulative GPA, a 2.50 ASU business GPA, and 56 earned semester hours to register for any upper-division business course unless otherwise noted.

M LES 305 Legal, Ethical, and Regulatory Issues in Business. (3)
fall, spring, summer
Legal theories, ethical issues, and regulatory climate affecting business policies and decisions. Lecture, Web-based delivery. See LES Note 1.

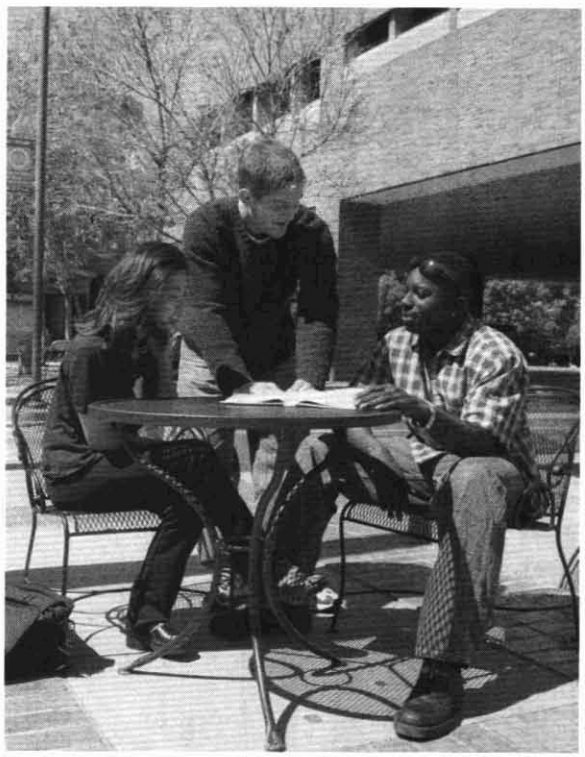
M LES 380 Consumer Perspective of Business Law. (3)
fall and spring
Role of law as it affects society. Uses case studies to present principles that govern business and consumers. Lecture, television. See LES Note 1. Prerequisites: 2.00 GPA; junior standing.

M LES 411 Real Estate Law. (3)
once a year
Legal and ethical aspects of land ownerships, interests, transfer, finance development, and regulations of the real estate industry. See LES Note 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/catalog 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 93.



Students on the plaza outside the Business Administration building

Tim Trumble photo

SUPPLY CHAIN MANAGEMENT (SCM)

M SCM Note 1. In addition to individual course prerequisites, nonbusiness students must have at least a 2.50 ASU cumulative GPA, a 2.50 ASU business GPA, and 56 earned semester hours to register for any upper-division business course unless otherwise noted.

M SCM 300 Global Supply Operations. (3)
fall, spring, summer
Resources and information to create and deliver products globally. Interfirm systems and industry supply chains. Customer, producer, and employee perspectives. Lecture, discussion. Fee. See SCM Note 1. Prerequisites: ACC 240; CIS 105; QBA 221.

M SCM 301 Supply Chain Management. (3)
selected semesters
Examines the purchasing, materials, and logistics management areas. Presents techniques for acquiring, storing, processing, and moving material inventory. See SCM Note 1. Prerequisite: professional program business student.

M SCM 345 Logistics Management. (3)
fall and spring
Logistics and supply chain activities emphasizing integration of transportation, inventory, warehousing, facility location, customer service, packaging, and materials handling. See SCM Note 1. Prerequisite: professional program business student majoring in Supply Chain Management. Pre- or corequisite: SCM 300.

M SCM 355 Supply Management. (3)
fall and spring
Management of the supply function, including organization, procedures, supplier selection, quality, inventory decisions, and price determination. See SCM Note 1. Prerequisites: SCM 300; professional program business student majoring in Supply Chain Management.

M SCM 405 Urban Transportation. (3)
selected semesters
Economic, social, political, and business aspects of passenger transportation. Public policy and government aid to urban transportation development. See SCM Note 1. Prerequisites: both SCM 345 and upper-division standing or only instructor approval.

M SCM 432 Planning and Control Systems for Supply Chain Management. (3)
fall and spring
Planning and control systems for product and service flows in supply chain: production planning, master scheduling, MRP, ERP, inventory management. Lab. Fee. See SCM Note 1. Prerequisites: SCM 300, 345; professional program business student majoring in Supply Chain Management. Pre- or corequisite: SCM 355.
General Studies: L

M SCM 440 Quality Management and Measurement. (3)
fall and spring
Quality management and measurement, relationships with suppliers and customers, quality awards, certifications, programs, tools for process improvement and cost analyses. See SCM Note 1. Prerequisites: SCM 300; professional program business student majoring in Supply Chain Management. Pre- or corequisites: SCM 345, 355.

M SCM 455 Research and Negotiation. (3)
fall and spring
Current philosophy, methods, techniques for conducting strategic and tactical supply chain research and negotiations. Includes supplier price and cost analysis. See SCM Note 1. Prerequisite: professional program business student majoring in Supply Chain Management. Prerequisite with a grade of "C" (2.00) or higher: SCM 355.

M SCM 460 Carrier Management. (3)
selected semesters
Analyzes carrier economics, regulation, management, and rate-making practice; evaluates public policy issues related to carrier transportation. See SCM Note 1. Prerequisites: both SCM 345 and upper-division standing or only instructor approval.

M SCM 463 Global Supply Chain Management. (3)
once a year
Supply chain activities in international business with special emphasis on management of transportation, global sourcing, customs issues, and facility location in a global environment. See SCM Note 1. Prerequisite: upper-division standing.

M SCM 479 Supply Chain Strategy. (3)
fall and spring
Integrated supply chain strategies synthesizing supply management, production, logistics, and enterprise systems. Provides a comprehensive perspective of supply chain management. Fee. See SCM Note 1. Prerequisite: professional program business student majoring in Supply Chain Management. Prerequisites with a grade of "C" (2.00) or higher: SCM 345, 355, 432.

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 Design

www.asu.edu/caed **Wellington Reiter, MArch, Dean**

Architecture and Landscape Architecture, School of **318**
Industrial Design, Department of **326**
Interior Design, Department of **331**
Planning, School of **337**
Visual Communication Design, Department of **344**

PURPOSE

The practice of architecture and environmental design is the culturally responsible shaping of our environment—from the scale of the cities in which we live to the buildings and interiors we inhabit and the artifacts and products we use. What we design must be durable, useful, beautiful, appropriate to its context, and not a waste of resources, energy, or materials. Designing our environment is an art, a technology, and a social science that has a history as long as human culture. The goals of the faculty include offering students an education that becomes the basis for life-long growth and improvement as professionals, advancing the discipline in both theory and practice, and improving the quality of the environment by making the expertise and knowledge of the faculty available to other professionals and to the public.

ORGANIZATION

Academic Organization. The college is composed of five academic units:

Department of Industrial Design
Department of Interior Design
Department of Visual Communication Design
School of Architecture and Landscape Architecture
School of Planning

Administration of the college is the responsibility of the dean, who in turn is responsible to the president of the university through the executive vice president and provost of the university.

College Facilities. Most of the College of Design's programs are housed in a single complex. Facilities include the Architecture and Environmental Design Library; computer laboratories; design studios; the Gallery of Design; lecture and seminar rooms; the Media Center; offices for faculty, the administration, and student organizations; the shop; the slide collection; Materials Resource Center; and technology laboratories. The bridge between the original building and the expansion places the college's review and display space at the heart of the complex.

Architecture and Environmental Design Library. As a branch of the University Libraries, the Architecture and Environmental Design Library provides easy access to more than 50,000 books, periodicals, and reference materials for students, faculty, and the professional community. The library's special collections include archives of Blaine Drake, Victor Olgyay, Calvin Straub, Will Bruder, and others, as well as research materials on Paolo Soleri and Frank Lloyd Wright. The Alternative Energy Collection and the Materials Resource Center provide additional sources for research.

Gallery of Design. The Gallery of Design in the College of Design focuses exhibitions on architecture; landscape architecture; planning; and graphic, industrial, and interior design. Changing exhibitions feature top student work for each semester; faculty research and design projects; and special exhibitions from local, national, and international designers. A flat projection monitor provides a changing mural of design projects, college information, and announcements. Additional space for College of Design student projects is located throughout the Design buildings. The gallery is open Monday through Friday from 8 A.M. to 5 P.M. For more information, call 480/965-6384.

Special Facilities. College programs are supplemented by several special laboratories, including the Phoenix Urban Research Lab (PURL), which is an information-rich environment for researchers, decision makers, industry professionals and students to seek new solutions to the most pressing design problems facing cities today. Other facilities include the computer-aided design and graphics lab; the high-bay research lab; the lighting lab; the solar research lab; the solar roofdeck work area; an extensive shop equipped to handle wood, plastic, and metal; the Herberger Center for Design Research; InnovationSpace, an interdisciplinary product development laboratory; and the Community Design Studio, which is located at PURL in downtown Phoenix. The Media Center includes traditional graphics and audiovisual equipment as well as portable gear. The slide collection, with more than 100,000 images, is available for instructional use, and the college maintains an array of materials testing equipment.

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 93.

College of Design Baccalaureate Degrees and Majors

Major	Degree	Concentration	Administered By
Architectural Studies	BSD	—	School of Architecture and Landscape Architecture
Design Science*	BSD	—	College of Design
Graphic Design	BSD	—	Department of Visual Communication Design
Housing and Urban Development	BSD	—	School of Planning
Industrial Design	BSD	—	Department of Industrial Design
Interior Design	BSD	—	Department of Interior Design
Landscape Architecture	BSLA	—	School of Architecture and Landscape Architecture
Urban Planning	BSP	—	School of Planning

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

ADMISSION

Lower-Division Programs. A new or transfer student who has been admitted to the university and has selected a college major is admitted to the lower-division program of his or her choice. A separate application procedure is required for entry to upper-division programs and graduate programs. Acceptance into lower-division programs does not guarantee acceptance to upper-division programs. Acceptance into lower-division programs requires a TOEFL score of 500 or higher for international students whose native language is not English.

Transfer Credits. While the university accepts credits transferred from other accredited institutions, transfer credits are not applied to specific degree programs until reviewed and accepted by the appropriate academic units. Transfer course work must be equivalent in both content and level of offering. In addition, a review of samples of work (portfolio format) from previous studio classes is required. Students who change majors to transfer into the college or one of its program areas must have a minimum cumulative GPA of 2.50.

Change of Major. Current ASU students who wish to change majors to one of the college's professional degrees must have a cumulative ASU GPA of 2.50 or higher.

Upper-Division Programs. Admission to upper-division programs is competitive. Consult the requirements of each major for details. Students applying to more than one program must make a separate application to each and must submit separate portfolios. Students not enrolled at ASU when they apply to upper-division programs must also make a separate application to the university. Transfers into upper-division programs are considered only if vacancies occur, and such transfers are limited to students with equivalent course work who are competitive with continuing students. Students not admitted to an upper-division program are not dismissed from the university and may reapply or transfer to other programs. Students who plan to reapply should contact a college academic advisor. Acceptance into some upper-division programs requires a TOEFL score of 500 or higher for international students whose native language is not English.

ADVISING

While the college and its academic units provide academic advising, *it is ultimately the responsibility of each student to fulfill academic and program requirements.* Advising and record keeping for lower-division programs are the responsibility of a college academic advisor (located in ARCH 115). Records for upper-division program students are kept in the appropriate academic units, and advising is provided by the academic unit's curriculum advisor. General career advising is available from all faculty members. Administration of program requirements is the responsibility of the head of the academic unit and the dean.

Appeals Procedures. Academic appeals and requests for variances are typically made first to the student's advisor and then, if necessary, to the head of the appropriate academic unit, the College Standards and Appeals Committee, and, finally, the dean. A student who feels unjustly treated in academic or other matters relating to his or her career as a student may contact a college academic advisor or may take the grievance to the college ombudsperson.

DEGREES

Undergraduate. The college offers curricula for four year degree programs: the Bachelor of Science in Design (BSD) degree in Architectural Studies, Housing and Urban Development, Industrial Design, Interior Design, and Graphic Design; the Bachelor of Science in Landscape Architecture (BSLA) degree; and the Bachelor of Science in Planning (BSP) degree in Urban Planning. Applications for the BSD degree in Design Science are not being accepted at this time. For more information, see the "College of Design Baccalaureate Degrees and Majors" table, on this page.

Each undergraduate program is divided into lower-division and upper-division programs. Completion of a lower-division program does not guarantee advancement to an upper-division program.

College of Design Graduate Degrees and Majors

Major	Degree	Concentration*	Administered By
Architecture	MArch	—	School of Architecture and Landscape Architecture
Building Design	MS	Design knowledge and computing, energy performance and climate-responsive architecture, or facilities development and management	School of Architecture and Landscape Architecture
Design	MSD	Graphic design, industrial design, or interior design	College of Design
Environmental Design and Planning	PhD	Design; history, theory, and criticism; or planning	College of Design
Urban and Environmental Planning	MUEP	—	School of Planning

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

GRADUATE PROGRAMS

The faculty in the College of Design offer the National Architectural Accrediting Board-accredited Master of Architecture (MArch) professional degree; Planning Accreditation Board-accredited Master of Urban and Environmental Planning (MUEP) professional degree; MS degree in Building Design; Master of Science in Design (MSD) degree; and PhD degree in Environmental Design and Planning. For more information, see the "College of Design Graduate Degrees and Majors" table, on this page, and the *Graduate Catalog*.

MINORS

The faculty in the School of Architecture and Landscape Architecture offer two minors: Architectural Studies, see "Architectural Studies Minor," page 322, and "Landscape Studies Minor," page 322. The faculty in the Departments of Industrial, Interior, and Visual Communication Design offer a minor in Design Studies; see the individual department listings for more information. The faculty in the Department of Interior Design offer a minor in Interior Design History, see "Minors," page 327. The faculty in the School of Planning offer a minor in Urban Planning. See "Minor," page 337, for more information.

SCHOOL OF EXTENDED EDUCATION

The university-wide School of Extended Education provides an interactive link between ASU and the diverse communities it serves. The school 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 "School of Extended Education," page 134, or access the Web site at www.asu.edu/xed.

UNIVERSITY GRADUATION REQUIREMENTS

In addition to fulfilling college and major requirements, students seeking a bachelor's degree must meet all university graduation requirements. See "University Graduation Requirements," page 89.

General Studies Requirement

All students enrolled in a baccalaureate degree program must satisfy the university requirement of a minimum of 35 semester hours of approved course work in General Studies, as described under "General Studies," page 93. General Studies courses are listed in the "General Studies Courses" table, page 96, in the course descriptions, in the *Schedule of Classes,* and in the *Summer Sessions Bulletin.*

COLLEGE DEGREE REQUIREMENTS

College of Design degree requirements supplement the General Studies requirement. Each curriculum offered by the college includes sufficient approved course work to fulfill the General Studies requirement.

To be eligible for the Bachelor of Arts (BA), Bachelor of Science in Design (BSD), Bachelor of Science in Landscape Architecture (BSLA), or Bachelor of Science in Planning (BSP) degrees in the College of Design, a student must have

1. attained a cumulative GPA of 2.00 or higher for all course work taken at ASU;
2. earned a "C" (2.00) or higher in each studio course; and
3. met all university degree requirements.

MAJOR REQUIREMENTS

A student seeking the BA, BSD, BSLA, or BSP must satisfactorily complete a curriculum of 120 semester hours.

Special Honors at Graduation. At the time of graduation, students with academic distinction are awarded the respective designation *cum laude, magna cum laude,* or *summa cum laude.* For more information, see "Graduation with Academic Recognition," page 92.

ACADEMIC STANDARDS

Lower-Division Retention Standards. A student in any of the college's lower-division programs is placed on probation when he or she fails to maintain a cumulative GPA of 2.00.

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 93.

Students on probation must observe rules or limitations the college imposes on their probation as a condition of retention. If, after one semester on probation, the overall GPA is not at least 2.00 and the conditions of probation have not been met, the student is disqualified for a minimum of two full academic semesters. A disqualified student may attend summer sessions at ASU to raise their cumulative GPA; if a 2.00 or higher cumulative GPA is achieved upon completion of summer course work, the student may petition the college for early reinstatement. Appeals may be made to the college Standards and Appeals Committee; see a college advisor for the necessary appeals forms. There are also other options available for immediate reinstatement for qualified students; see an academic advisor to discuss these options. For more information, see "Retention and Academic Standards," page 86.

Upper-Division Retention Standards. Students in upper-division programs are placed on probation when *any* of the following occurs:

1. failure, incomplete, or withdrawal from any required course;
2. a semester GPA below 3.00;
3. a grade of "D" (1.00) or "E" (0.00) in a design studio, a design laboratory, or a design lecture; or
4. violation of the university's *Code of Student Conduct* or any admission agreement.

Students on probation must observe rules or limitations that the college or academic unit places on their probation as a condition of continuation. Students may be removed from a program (but not necessarily the university) if

1. the requirements imposed are not met or the probationary semester GPA is below 3.00 after one semester on probation;
2. failures or withdrawals in required courses are not resolved at the next offering of the course;
3. they fail or withdraw from required sequential courses; or
4. incompletes in required sequential courses are not completed before the first day of class of the next semester.

A student removed from a program is not guaranteed reinstatement in the program even if probation requirements or requirements placed on readmission are fulfilled. Appeals may be made first to the appropriate academic unit and, if necessary, to the college Governance and Grievance Committee. For more information, see "Retention and Academic Standards," page 86.

Incompletes. Students are responsible for contacting the instructor regarding the process of requesting and fulfilling an incomplete. Tardiness in contacting the instructor may result in a failing grade. Students must obtain official "Request for Grade of Incomplete" forms from their academic unit. The completed form must include a justification, a listing of requirements that have not been fulfilled, and a proposed schedule of completion. The instructor reviews the request, proposes modifications if necessary, and submits a copy of the request to the appropriate school office. An incomplete in any course that is a prerequisite for sequential courses automatically denies enrollment in subsequent courses. For more information, see "Incomplete," page 83.

Withdrawals. University withdrawal regulations apply to all courses. In addition, because the college's upper-division curricula are modular and sequential and because space in the programs is limited, a student is expected to progress through the curriculum with his or her class. Withdrawal from a required upper-division course automatically places a student on probation. Withdrawal from a required upper-division course in a required sequence automatically removes the student from the program beginning the subsequent semester. For more information, see "Grading System," page 82.

Pass/Fail or Credit/No Credit. The only courses accepted toward graduation with a grade of pass/fail or credit/no credit are internships and field studies.

Foreign Study. The College of Design maintains active communications with several foreign institutions offering professional course work similar to the programs of the college. This opportunity is available for students who wish to pursue professional studies at a foreign institution in lieu of resident course work for up to one academic year. Any interested student is encouraged to inform the head of his or her academic unit at the earliest possible date of any intentions for foreign study. The student must petition the academic unit regarding course equivalency for any exchange programs.

Exchange programs currently exist with Stuttgart University, Germany; Wageningen University, the Netherlands; the University of Valladolid, Spain; the University of British Columbia, Canada; and the Autonomous University of Guadalajara, Mexico. Foreign study programs in France, Italy, and Spain and summer and winter break off-campus courses are also offered.

Students are also encouraged to consider foreign travel for either a semester or an entire academic year. A leave of absence must be requested for foreign study and foreign travel. Each academic unit reserves the right to evaluate the content and the student's competency in each of the courses completed at foreign institutions.

Internship. Upper-division students majoring in Architectural Studies, Industrial Design, Interior Design, Landscape Architecture, or Graphic Design are required to complete an internship program as part of their curriculum between the third and fourth years of study. Internships are optional for Housing and Urban Development and Urban Planning majors.

Attendance. Attendance is expected at all classes, laboratories, and seminars and is a criterion for evaluating performance. Absences and missing work due to absences may result in failure of a course or academic probation. A student may not be excused from attending a class except for medical reasons or other serious personal conditions beyond his or her control. Requests for special consideration must be submitted in writing to the instructor. If accepted, a student may be allowed to take a late or special examination or to submit missing work. Tardiness in

contacting the instructor is cause for denying acceptance. For university policy regarding religious holidays, see "Equal Opportunity and Affirmative Action," page 28.

Employment. It is difficult for students in the college to work while in school. Acceptance to any of the college's upper-division programs presumes a commitment of a minimum of eight hours a day for professional studies. If students must work to help pay for educational or living expenses, it is recommended that they do not work more than 20 hours per week. Prior work experience is not a requirement for admission to upper-division programs.

Retention of Student Work. The college reserves the right to retain any or all projects or work submitted to meet course requirements for the college's future use in instruction, publication, and exhibition.

Student Leave of Absence. Upper-division students who withdraw from classes or do not continue sequentially in enrollment must request both a leave of absence and readmission in writing from the head of the appropriate academic unit. Leaves of absence are for one-year increments and may be approved for personal reasons, travel, work, or additional study in other disciplines. Students on leave must make the written request for readmission before April 15 for the fall semester of the year of return or before November 1 for the spring semester so that a space may be reserved. Failure to request a leave of absence may result in removal from the program and deferrals are not allowed.

STUDENT RESPONSIBILITY

The purpose of this code is to promulgate standards of conduct for students of the university and to establish procedures for reviewing violations. Students are expected to support and maintain the highest professional standards with regard to their individual conduct and their personal and common environments in the university. Copies of the *Code of Student Conduct* are available from the Office of the Dean or from a college academic advisor.

SPECIAL PROGRAMS

The college and its academic units regularly sponsor lecture series, symposia, and exhibits. In addition, faculty and students attend regional and national meetings of educators and professionals. Academic units sponsor student awards programs and regularly invite professionals and critics to reviews of student projects. The college also participates with the Barrett Honors College, offering a wide range of courses for honors credit.

GENERAL INFORMATION

Accreditation. Most states require that an individual intending to become an architect hold an accredited degree. There are two types of degrees that are accredited by the National Architectural Accrediting Board (NAAB): (1) the Bachelor of Architecture (not offered by ASU), which requires a minimum of five years of study, and (2) the Master of Architecture, which requires a minimum of two years of study following a related preprofessional bachelor's degree or three years following an unrelated bachelor's degree. These professional degrees are structured to educate those who aspire to registration/licensure as architects.

The four-year preprofessional degree, where offered, is not accredited by NAAB. The preprofessional degree is useful for those desiring a foundation in the field of architecture, as preparation for either continued education in a professional degree program or for employment options in architecturally related areas. For more information, see "Accreditation and Affiliation," page 855.

Dean's List. Undergraduate students who earn 12 or more graded semester hours ("A" [4.00], "B" [3.00], "C" [2.00], "D" [1.00], or "E" [0.00]) during a semester in residence at ASU with a GPA of 3.50 or higher are eligible for the Dean's List. A notation of achieving the distinction of being listed on the Dean's List appears on the final grade report for that semester.

College of Design Alumni Chapter. The College of Design Alumni Chapter encourages graduates to contribute to the college by acting as liaisons among the college community, students, and practicing professionals. Each year, the College of Design Alumni Chapter sponsors a mentoring program to match local professionals with student designers.

Council for Design Excellence. The Council for Design Excellence has been created to consolidate a partnership between the College of Design and key community leaders who share a vital interest in the development of high quality in the built environment of the Phoenix metropolitan area. By joining together professionals, business and civic leaders, students, and faculty in a common pursuit of design excellence, the council seeks to make a profound difference in the quality of the natural and built environments and the education of students.

Affiliations. For information on affiliations maintained by the college, see "Accreditation and Affiliation," page 855.

Student Professional Associations. The purpose of the student associations is to assist students with the transition into professional life and to acquaint them with the profession relating to their program of study. These include the following associations:

Alpha Rho Chi-Satyros Chapter
American Indian Council of Architects and Engineers
American Institute of Architecture Students
Student Association of Interior Designers
Student Chapter/American Planning Association
Student Chapter/American Society of Landscape Architects
Student Chapter/Industrial Designers Society of America
Student Chapter/American Institute of Graphic Artists

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 93.

DESIGN (DSC)

M DSC 100 Introduction to Environmental Design. (3)
fall and spring
Survey of environmental design: includes historic examples and the theoretical, social, technical, and environmental forces that shape them.
General Studies: HU, G, H

M DSC 101 Design Awareness. (3)
fall and spring
Survey of cultural, global, and historical context for the design professions.
General Studies: HU, G

M DSC 236 Introduction to Computer Modeling. (3)
fall and spring
Computers in design, including software concepts, specific packages, and problem solving, illustration, typography, modeling, and animation. Lab. Prerequisite: Design major.
General Studies: CS

M DSC 484 Internship. (1–3)
summer
Full-time summer internship under supervision of practitioners in the Phoenix area or other locales. Prerequisite: instructor approval.

M DSC 494 Special Topics. (1–4)
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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

ENVIRONMENTAL DESIGN AND PLANNING (EPD)

Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/catalog 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 Architecture and Landscape Architecture

www.asu.edu/caed/sala
480/965-3536
AED 162

Darren Petrucci, Director

Professors: Brooks, Bryan, Hoffman, McCoy, Meunier, Ozel, Reiter, Rotondi, Underhill, Underwood

Associate Professors: Cook, Ellin, Ewan, Fish Ewan, Hartman, Loope, Petrucci, Spellman, Steele, Zygas

Assistant Professors: Burnette, Hejduk, Kobayashi, Lerum, Morton, Vekstein

Clinical Associate Professors: Addison, Murff

PURPOSE

The architecture and landscape architecture programs at ASU offer an integrated curriculum of professional courses and focus on the design laboratory. The programs reflect an awareness of the complex factors affecting the quality of the built environment. The programs seek through scholarship, teaching, research, design, and community service to develop the discipline and the knowledge necessary to address the important environmental and design issues faced by society.

In addition to developing knowledge and skills in architectural design, building technology, landscape architecture, and professional practice, students are encouraged to select electives from a broad range of approved courses both within the college and across the university. These electives may be selected to devise a minor, to further professional study, or in some other fashion to enrich the student's academic experience.

ORGANIZATION

The School of Architecture and Landscape Architecture programs are organized by the faculty under the direction and administration of the director and standing committees of the faculty.

DEGREES

The faculty in the School of Architecture and Landscape Architecture offer the Bachelor of Science in Design (BSD) degree with a major in Architectural Studies and a Bachelor of Science in Landscape Architecture (BSLA) degree.

The program in architecture culminates with the professional degree Master of Architecture (MArch), which is accredited by the National Architectural Accrediting Board (NAAB). Completion of the program is intended to take six years.

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The NAAB, which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes two types of degrees: the Bachelor of Architecture and the Master of Architecture. A program may be granted a five-year, three-year, or two-year term of accreditation, depending on its degree of conformity with established educational standards.

Master's degree programs may consist of a preprofessional undergraduate degree and a professional graduate degree, which, when earned sequentially, compose an accredited professional education. However, the preprofessional degree is not, by itself, recognized as an accredited degree.

Admission to the professional program in architecture is competitive and begins after completion of lower-division requirements, as described in "Admission," page 319 and "Degree Requirements," page 320. The professional program includes two years of upper-division study leading to the BSD and two years of graduate study leading to the MArch, as described in "Upper-Division Professional Program," page 319.

Applicants who already hold a bachelor's degree in another field should apply to the 3+ year MArch degree program. See the *Graduate Catalog* for more information.

The BSLA degree prepares students to be professional landscape architects. Students explore the reasons for and

the techniques involved in the analysis, planning, and design of the environment, both natural and built. The BSLA is a professional degree accredited by the American Society of Landscape Architects (ASLA) Landscape Architectural Accreditation Board (LAAB).

In cooperation with the Barrett Honors College, the school offers a special honors curriculum for students with Barrett Honors College standing. Consult the advising officers in the college for information.

ADMISSION

Lower-Division Program. New and transfer students who have been admitted to the university and who have selected Architectural Studies or Landscape Architecture Studies as their major are admitted to the lower-division architecture program without separate application to the School of Architecture and Landscape Architecture. Completion of lower-division requirements does not ensure acceptance to the upper-division professional program.

Transfer credits for the lower-division program are reviewed by the college faculty. To be admissible to this curriculum, transfer courses must be equivalent in both content and level of offering. A review of samples of work is required for studio classes. Consult a college academic advisor for additional information.

Entering lower-division students who are not prepared to enroll in some of the required courses are required to complete additional university course work. These additional prerequisite courses do not apply to the Bachelor of Science in Design or the Bachelor of Science in Landscape Architecture degree requirements.

Upper-Division Professional Program. Admission to the upper-division professional program is competitive and limited by available resources. Admission is awarded to those applicants demonstrating the highest promise for professional success..

Transfer students who have completed the equivalent required lower-division course work may apply to the upper-division program. Prior attendance at ASU is not required for application to the upper-division program.

To be eligible for admission to the upper-division program, the following requirements must be met:

1. admission to ASU (note that application and admission to the upper-division program are separate from application and admission to ASU);
2. completion of lower-division requirements or equivalents as approved by a college academic advisor and the faculty of the school;
3. a minimum university cumulative GPA of 3.00
4. a minimum grade of "C" (2.00) or higher in all architecture and landscape architecture core courses or equivalents as approved by a college academic advisor and the faculty of the school; and
5. submission of a portfolio (for detailed information about this requirement, see "Portfolio Format Requirements," page 320).

In an unusual circumstance, when the admission standard deficiency is slight, written evidence of extenuating circumstances is convincing, and promise for success is evident, a student may be granted admission to the upper division on a *provisional* basis.

Students not admitted to the upper-division program are not dismissed from the school and may reapply or may transfer to other programs. Students who intend to reapply should meet with a college academic advisor.

Applications for transfer into the upper-division professional program are considered only if transfer students have met the eligibility requirements above. Transfer applicants must demonstrate that equivalent course work has been completed, and applicants must be academically competitive with continuing students.

Students who successfully complete the upper-division requirements receive the Bachelor of Science in Design degree in Architectural Studies. This is not a professional degree. To complete the professional architecture program, students must attain the NAAB-accredited Master of Architecture degree. Students who receive the BSD are eligible to apply for the graduate program and should see the *Graduate Catalog* for proper application procedures. This application process is competitive and based on a thorough review of a student's undergraduate preparation and performance.

Students with the four-year Bachelor of Science in Design degree (with a major in Architectural Studies or an equivalent degree from another school that offers an accredited professional degree in architecture) should apply directly to the graduate program.

Students who successfully complete the upper-division BSLA requirements receive the Bachelor of Science in Landscape Architecture. This is the LAAB-accredited program.

APPLICATION TO UPPER-DIVISION PROGRAMS

Upper-Division Application Procedures. Students should access the Web site at www.asu.edu/caed/sala for the application form well in advance of the application deadline. The following dates and procedures are for students applying to 2007–2008 upper-division programs.

Upper-Division Application Deadlines. *May 2, 2007 (last day of classes).* Portfolio and application documents are due in the school office by 5 P.M. Applications received after the deadline are not accepted.

June 1, 2007. If the spring 2007 semester includes transfer course work (i.e., course work taken at an institution other than ASU), a student must submit his or her transcripts to the school no later than June 1. These transcripts may be unofficial copies. A second set of official transcripts must be sent to the University Registrar's office. The application is not complete until the university receives official transcripts for transfer course work. For those transfer students whose academic term ends in June rather than May, this deadline may be extended upon the written request of the applicant.

July 2, 2007. Acceptance notices are mailed no later than July 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 93.

Return of Letter of Acceptance. A signed receipt of acceptance of admission must be received by the school by the date indicated on the Notice of Acceptance. Alternates may be accepted at a later date if space becomes available.

Matriculation. An accepted student is expected to begin his or her upper-division professional program at the beginning of the immediate fall term. There is no spring admission to the upper-division program and deferrals are not allowed.

Portfolio Format Requirements. Application materials must be submitted at one time in a presentation binder (portfolio).

Students should present work sufficient to demonstrate the depth and breadth of their creative activity. This work should include (but is not limited to) examples of two- and three-dimensional design and graphics. Each project should be clearly identified (course, length of project, etc.), with a concise accompanying description of the assignment. Students should consult the School of Architecture and Landscape Architecture Web site at www.asu.edu/caed/sala for specific application information.

Students are encouraged to include additional materials, written or pictorial, that provide additional evidence of skills, abilities, aptitude, and commitment to the major. When any work submitted is not completely original, the source must be given. When work is of a team nature, the applicant's role should be clearly indicated. Original examples or slides must not be submitted. All examples must be photographs or other reproduction graphic media.

Return of Portfolios. The application remain the property of the College of Design. However, the remaining portfolio is returned after the admissions review, provided the applicant encloses a self-addressed return mailer with sufficient prepaid postage. Portfolios may be claimed in person after July 2, 2007. If the applicant provides written permission, another person may claim the portfolio. After one year, unclaimed portfolios are discarded. While care is taken in handling the portfolios, no liability for lost or damaged materials is assumed by the college or school.

ADVISING

Advising for the lower-division curriculum is through the college Academic Advising Office. Advising for upper-division is provided by the academic unit's curriculum advisor.

DEGREE REQUIREMENTS

The Bachelor of Science in Design degree in Architectural Studies requires a minimum of 120 semester hours of course work.

GENERAL STUDIES REQUIREMENT

The following curriculum includes sufficient approved course work to fulfill the General Studies requirement. See "General Studies," page 93, for requirements and a list of approved courses. Note that all three General Studies awareness areas are required.

GRADUATION REQUIREMENTS

In addition to fulfilling college and major requirements, students must meet all university graduation and college degree requirements. See "University Graduation Requirements," page 89, and "College Degree Requirements," page 315.

The accredited professional degree Master of Architecture requires an additional 56 hours of approved graduate-level course work. For more information, see the *Graduate Catalog.*

Architectural Studies—BSD[1]
Lower-Division Requirements

First Year

Fall

ALA 100	Introduction to Environmental Design[2] *HU, G, H*	3
	or ALA 120 Design Fundamentals I[3] (3)	
ENG 101	First-Year Composition	3
MAT 170	Precalculus *MA*	3
Elective[4]		3
SB elective		3
Total		15

Spring

ALA 120	Design Fundamentals I[3]	3
	or ALA 100 Introduction to Environmental Design *HU, G, H*[2] (3)	
ENG 102	First-Year Composition	3
Elective[4]		3
C elective[2]		3
SB elective[2]		3
Total		15

Second Year

Fall

ALA 200	Introduction to Architecture *HU, G*[2]	3
ALA 221	Design Fundamentals II[3]	3
ALA 223	Design Fundamentals II Lecture	1
ALA 236	Introduction to Computer Modeling *CS*[2]	3
PHY 101	Introduction to Physics *SQ*[2]	4
Total		14

Spring

ALA 222	Design Fundamentals III[3]	3
ALA 224	Design Fundamentals III Lecture	1
ALA 240	Architectural and Landscape Architectural Construction	3
L elective		3
SG or SQ elective[2, 5]		4
Total		14
Option A lower-division total		58

[1] Transfer credits are reviewed by the college and evaluated for applicability to this curriculum. To be applicable, transfer courses must be equivalent in both content and level of offering.

[2] This course satisfies a general studies requirement.

[3] Portfolio review is required for transfer studio work. Submit the portfolio to the Academic Advising Office, ARCH 115.

[4] Students considering application to both Architecture and Landscape Architecture upper-division programs, see the BSLA lower-division requirements. The suggested elective is PLA 101.

[5] Students considering application to both Architecture and Landscape Architecture upper-division programs, see the BSLA lower division requirements. The suggested elective is GPH 111.

Architectural Studies—BSD
Upper-Division Requirements

Third Year

Fall

ADE	321	Architectural Studio I ... 5
APH	313	History of Architecture I *L/HU, G, H* ... 3
ATE	361	Building Structures I ... 3
Elective*		... 3
Total		... 14

Spring

ADE	322	Architectural Studio II ... 5
APH	314	History of Architecture II *L/HU, G, H* * ... 3
ATE	362	Building Structures II ... 3
Elective*		... 3
Total		... 14

Summer

ARP	484	Clinical Internship ... 3
Total		... 3

Fourth Year

Fall

ADE	421	Architectural Studio III ... 5
ANP	431	Programming for Architecture ... 3
ATE	451	Building Systems I ... 3
Elective*		... 3
Design Professional elective*		... 3
Total		... 17

Spring

ADE	422	Architectural Studio IV ... 5
ATE	452	Building Systems II ... 3
Design history elective*		... 3
Elective*		... 3
Total		... 14
Option A upper-division total		... 62
BSD option A minimum total		... 120

* These courses may be completed before admission into the upper division.

Landscape Architecture—BSLA
Lower-Division Requirements

First Year

Fall

ALA	120	Design Fundamentals I[1, 2] ... 3
		or ALA 100 Introduction to Environmental Design *HU, G, H* [1] (3)
ENG	101	First-Year Composition ... 3
		or ENG 105 Advanced First-Year Composition if qualified (3)
MAT	170	Precalculus *MA* ... 3
Social/Behavioral Science Elective *SB*		... 3
Elective[3]		... 3
Total		... 15

Spring

ALA	100	Introduction to Environmental Design *HU, G, H* ... 3
		or ALA 120 Design Fundamentals I[1, 2] (3)
ENG	102	First-Year Composition ... 3
PLA	101	Landscape and Society *HU, G* ... 3
Social/Behavioral Science Elective *SB*		... 3
Cultural Diversity Elective *C*		... 3
Total		... 15

Second Year

Fall

ALA	221	Design Fundamentals II[1, 2] ... 3
ALA	223	Design Fundamentals II Lecture ... 1
ALA	236	Introduction to Computer Modeling *CS*[1, 2] ... 3
GPH	111	Introduction to Physical Geography *SQ* ... 4
Elective[3]		... 3
Total		... 14

Spring

ALA	222	Design Fundamentals III[1, 2] ... 3
ALA	224	Design Fundamentals III Lecture ... 1
ALA	240	Architectural and Landscape Architectural Construction ... 3
L elective		... 3
SG or SQ elective[4]		... 4
Total		... 14
Option A lower-division total		... 58

[1] Transfer credits are reviewed by the college and evaluated for applicability to this curriculum. To be applicable, transfer courses must be equivalent in both content and level of offering.

[2] Portfolio review is required for transfer studio work. Submit portfolio to the Academic Advising Office, ARCH 115.

[3] Students considering application to both Architecture and Landscape Architecture upper-division programs, see the BSD lower-division requirements. The suggested elective is ALA 200.

[4] Students considering application to both Architecture and Landscape Architecture upper-division programs, see the BSD lower division requirements. The suggested elective is PHY 101.

Landscape Architecture—BSLA
Upper-Division Requirements

Third Year

Fall

PLA	310	History of Landscape Architecture *H*[1] ... 3
PLA	343	Landscape Construction I ... 3
PLA	361	Landscape Architecture III ... 4
PLA	494	ST: Plant Materials ... 3
Total		... 13

Spring

PLA	311	Contemporary Landscape Architecture *HU* ... 3
PLA	344	Landscape Construction II ... 4
PLA	345	Professional Practice Seminar ... 1
PLA	362	Landscape Architecture IV ... 4
PLA	363	Landscape Planting Design ... 4
Total		... 16

Summer

PLA	484	Clinical Internship[2] ... 2
Total		... 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 93.

Fourth Year

Fall

PLA 411 Landscape Architecture Theory and Criticism *L*	3
PLA 461 Landscape Architecture V	4
Electives[1]	6
Upper-division HU or SB Elective	3
Total	16

Spring

PLA 446 Landscape Construction III	3
PLA 462 Landscape Architecture VI	4
Design Professional elective[1, 3]	3
Design history elective[1, 3]	3
Total	13
Upper-division total	62
BSLA program total	120

[1] These courses may be completed before admission to the upper-division.

[2] Students complete the internship over the summer, but register for the credit during the fall of the fourth year, with the exception of international students, who are required to register for the internship during the summer.

[3] Professional elective is a 300 or higher level course, taken within College of Design (Architecture, Design, and/or Planning). The history elective is a 300 or higher level course also taken within the college and must have historical/theoretical content.

ARCHITECTURAL STUDIES MINOR

The Architectural Studies minor is available to nonarchitecture majors interested in this field. A minimum of 18 semester hours are required for the minor. The courses are designed to provide an overview of architecture throughout history while focusing on architectural design with the intention to explore the process of design thinking.

Required Courses

ALA 200 Introduction to Architecture *HU, G*	3
APH 300 World Architecture I/Western Cultures *HU, G*	3
APH 313 History of Architecture I *L/HU, G, H*	3
APH 314 History of Architecture II *L/HU, G, H*	3
Total	12

Six additional semester hours of electives in the architectural history and theory concentration must be selected from the following list for a total of 18 semester hours of which 12 hours must be upper-division credit:

APH 394 ST: Special Topics	3
APH 411 History of Landscape Architecture *H*	3
APH 414 History of the City *H*	3
APH 446 20th-Century Architecture I *HU*	3
APH 447 20th-Century Architecture II *HU*	3
APH 494 ST: Special Topics	3
APH 499 Individualized Instruction*	3

* These courses require a petition to the School of Architecture and Landscape Architecture.

A minimum GPA of 3.00 is required to pursue the minor in Architectural Studies.

LANDSCAPE STUDIES MINOR

The minor in Landscape Studies is designed for students who have an interest in landscape aesthetics, but are pursuing a major in another field. The course selection is intended to provide greater understanding of landscape issues that may be relevant in related professional disciplines and to broaden knowledge about the landscape in which we live.

Students must complete a minimum of 18 semester hours from the following list of courses of which 12 hours must be upper-division credit.

Required Courses

PLA 101 Landscape and Society	3
PLA 310 History of Landscape Architecture *H*	3
PLA 311 Contemporary Landscape Architecture *HU*	3

Nine additional semester hours of electives in the landscape architectural history and theory concentration must be selected from the following list for a total of 18. Consult the catalog for necessary prerequisites.

PLA 394 Special Topics	3
PLA 410 Social Factors in Landscape and Urban Planning	3
PLA 411 Landscape Architecture Theory and Criticism *L*	3
PLA 412 Landscape Ecology and Planning	3
PLA 413 Southwest Landscape Interpretation	3
PLA 420 Theory of Urban Design *HU*	3
PLA 485 International Field Studies in Planning	3
PLA 494 Special Topics	3
PLA 499 Individualized Instruction*	3

* This course requires a petition to the School of Architecture and Landscape Architecture.

The minor is open to students of all majors. Students must, however, have an overall GPA of 3.00 or higher and achieve a minimum 3.00 GPA in minor classes to be awarded the minor.

BIS CONCENTRATION

Concentrations in architectural studies and landscape studies 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 139.

INQUIRIES

For more information, call a college academic advisor at 480/965-3584, e-mail caed.advising@asu.edu, or write

ACADEMIC ADVISING/STUDENT SERVICES OFFICE
COLLEGE OF DESIGN
ARIZONA STATE UNIVERSITY
PO BOX 871905
TEMPE AZ 85287-1905

COURSES

Subject matter within the school is categorized in the following instructional areas.

Architectural Administration and Management. AAD courses focus on the organizational and management aspects of architectural practice, including management coordination, administrative procedures, ethics, legal constraints, and the economics of practice.

Architectural Design and Technology Studios. ADE courses require the synthesis of knowledge and understanding gained from other course work and develop an understanding of design theory and design skill through a series of comprehensive design projects. Students apply analytical methods, compare alternative solutions, and develop sophisticated technical and conceptual results.

Architecture and Landscape Architecture. ALA courses provide lower-division students an introduction to basic knowledge and skills of architecture and landscape architecture.

Environmental Analysis and Programming. ANP courses develop the ability to analyze and program environmental and human factors as preconditions for architectural design using existing and emerging methods of evaluation and analysis.

Architectural Philosophy and History. APH courses develop an understanding of architecture as both a determinant and a consequence of culture, technology, needs, and behavior in the past and present. Studies are concerned with the theory as well as the rationale behind methods and results of design and construction. Case studies are both domestic and international.

Architecture Professional Studies. ARP courses provide students with off-campus opportunities, educational experience in group and individual studies relative to specific student interests, and faculty expertise, including summer internships and field trips.

Architectural Technology. ATE courses develop knowledge of the technical determinants, resources, and processes of architecture. These studies focus on the science and technology of design and construction, including materials, building systems, acoustics, lighting, structural systems, environmental control systems, computer applications to design and technology, and both passive and active solar systems. Emphasis is on measurable and quantifiable aspects.

Architectural Communication. AVC courses develop the student's understanding of communication theory as it applies to architectural design and practice as well as skills in drawing, graphics, photography, presentation design, and the design process.

The courses required in the upper-division and graduate levels of the professional program are not open to nonmajors and students not admitted to the upper-division program.

Landscape Architectural Technology. LTC courses develop knowledge of the technical determinants, resources, and processes of landscape architecture. These studies focus on the science and technology of design and construction, including materials, building systems, acoustics, lighting, structural systems, environmental control systems, computer applications to design and technology, and both passive and active solar systems. Emphasis is on measurable and quantifiable aspects.

GRADUATE PROGRAMS

The faculty of the School of Architecture and Landscape Architecture offer a Master of Architecture and a MS degree in Building Design. Concurrent application to both degree programs is possible, and each application is evaluated by the respective admission committees separately. Also, a dual career program, Master of Architecture/Master of Business Administration, has been established in cooperation with the W. P. Carey School of Business. Also offered is a collegewide, interdisciplinary PhD degree in Environmental Design and Planning with concentrations in design; history, theory, and criticism; and planning. For more information, see the *Graduate Catalog*.

ARCHITECTURAL ADMINISTRATION AND MANAGEMENT (AAD)

M AAD 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.

ARCHITECTURAL DESIGN AND TECHNOLOGY STUDIOS (ADE)

M ADE 321 Architectural Studio I. (5)
fall
Introductory building design problems. Emphasizes design process, communication methods, aesthetics, construction, and technology. Lecture, studio, field trips. Fee. Prerequisite: admission to upper division.

M ADE 322 Architectural Studio II. (5)
spring
Site and building design problems. Emphasizes programmatic and environmental determinants and building in natural and urban contexts. Lecture, studio, field trips. Fee. Prerequisite with a grade of "C" (2.00) or higher: ADE 321.

M ADE 421 Architectural Studio III. (5)
fall
Topical design problems of intermediate complexity, including interdisciplinary problems. Lecture, studio, field trips. Fee. Prerequisite with a grade of "C" (2.00) or higher: ADE 322. Corequisite: ARP 484.

M ADE 422 Architectural Studio IV. (5)
spring
Topical design problems of advanced complexity, including interdisciplinary problems. Lecture, studio, field trips. Fee. Prerequisite with a grade of "C" (2.00) or higher: ADE 421.

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 93.

ARCHITECTURE AND LANDSCAPE ARCHITECTURE (ALA)

M ALA 100 Introduction to Environmental Design. (3)
fall and spring
Survey of environmental design: includes historic examples and the theoretical, social, technical, and environmental forces that shape them. Cross-listed as PUP 100. Credit is allowed for only ALA 100 or PUP 100.
General Studies: HU, G, H

M ALA 120 Design Fundamentals I. (3)
fall, spring, summer
Development of visual literacy. Introduces drawing and graphic representation as methods of seeing and problem solving. Studio. Prerequisite: major in College of Design.

M ALA 200 Introduction to Architecture. (3)
fall and summer
Survey of issues and polemics affecting current architectural theory and practice. Lecture, discussion.
General Studies: HU, G

M ALA 221 Design Fundamentals II. (3)
fall
Exercises in basic design, stressing creative problem-solving methods, principles of composition, and aesthetic evaluation. Development of vocabulary for environmental design. Lecture, studio. Prerequisite with a grade of "C" (2.00) or higher: ALA 120. Corequisite: ALA 223.

M ALA 222 Design Fundamentals III. (3)
spring
Applies design fundamentals with an emphasis on architectural issues. Lecture, studio. Prerequisite: ALA 200. Prerequisite with a grade of "C" (2.00) or higher: ALA 221. Corequisite: ALA 224.

M ALA 223 Design Fundamentals II Lecture. (1)
fall
Theory and applications of basic design principles, history and theory of how architecture design is impacted by basic design. Lecture, discussion. Corequisite: ALA 221.

M ALA 224 Design Fundamentals III Lecture. (1)
spring
History and theory of design fundamentals with an emphasis on architectural issues. Lecture, discussion. Corequisite: ALA 222.

M ALA 236 Introduction to Computer Modeling. (3)
fall
Fundamentals of computer operation, geographic information systems, geometric modeling of 3-D forms and rendering of light, mathematical modeling of processes using spreadsheets. Lab. Prerequisite: major in the School of Architecture and Landscape Architecture.
General Studies: CS

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

ENVIRONMENTAL ANALYSIS AND PROGRAMMING (ANP)

M ANP 331 Programming for Design. (3)
spring
Theory and methods for refracting "constraints" into opportunities for design excellence. Corequisite: ADE 322.

M ANP 475 Computer Programming in Architecture. (3)
fall and spring
Computer programming for architectural problems and applications. Lecture, lab.

M ANP 494 Special Topics. (1–4)
fall, spring, summer

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.

ARCHITECTURAL PHILOSOPHY AND HISTORY (APH)

M APH 300 World Architecture I/Western Cultures. (3)
fall
Historical and contemporary built environments of Western civilizations: Mediterranean, Europe, and the Americas as manifestations of cultural history and responses to environmental determinants. Prerequisite: nonmajor.
General Studies: HU, G

M APH 305 Contemporary Architecture. (3)
selected semesters
Europe and America from the foundations of the modern movement to the present. Prerequisite: nonmajor.
General Studies: HU, H

M APH 313 History of Architecture I. (3)
fall
Survey of the monuments, buildings, and cities of Europe and Africa from the earliest human settlements to the present day. Prerequisite: junior standing or instructor approval.
General Studies: L/HU, G, H

M APH 314 History of Architecture II. (3)
spring
Survey of the monuments, buildings, and cities of Asia and the Americas from the earliest human settlements to the present day. Prerequisite: APH 313.
General Studies: L/HU, G, H

M APH 394 Special Topics. (1–4)
selected semesters

M APH 411 History of Landscape Architecture. (3)
fall
Physical record of human attitudes toward the land. Ancient through contemporary landscape planning and design. Cross-listed as PLA 310. Credit is allowed for only APH 411 or PLA 310.
General Studies: H

M APH 414 History of the City. (3)
fall
The city from its ancient origins to the present day. Emphasizes European and American cities during the last five centuries. Cross-listed as PUP 412. Credit is allowed for only APH 414 or PUP 412. Prerequisite: College of Design junior standing.
General Studies: H

M APH 444 Baroque Architecture. (3)
selected semesters
Selected examples of Baroque architecture and urbanism with emphasis on relationships between architecture and other arts. Prerequisite: APH 314.
General Studies: HU

M APH 446 20th-Century Architecture I. (3)
fall
Architecture in Europe and America from the foundations of the modern movement to the culmination of the international style. Prerequisite: instructor approval.
General Studies: HU

M APH 447 20th-Century Architecture II. (3)
spring
Developments in architecture since the international style. Prerequisite: APH 446.
General Studies: HU

M APH 494 Special Topics. (1–4)
once a year

M APH 499 Individualized Instruction. (1–3)
selected semesters

M APH 505 Foundation Theory Seminar. (3)
fall
Foundation of conceptual architectural inquiry, stressing the reciprocal and interdependent relationship between design and theory. Lecture, seminar. Corequisite: ADE 521.

M APH 509 Foundation Seminar. (3)
summer
Historical, technical, theoretical, environmental, and professional issues in architecture. Lecture, seminar, field trips. Corequisite: ADE 510.

M APH 511 Energy Environment Theory. (3)
fall
Solar and other energy sources in designed and natural environments; architectural, urban, and regional implications of strategies using other renewable resources.

M APH 515 Current Issues and Topics. (3)
spring
Critical examination of current architectural issues, topics, and discourse. Prerequisite with a grade of "C" (2.00) or higher: APH 505. Corequisites: ADE 522; ATE 556.

M APH 581 Contemporary Urban Design. (3)
spring
Explores contemporary city and urban design issues related to contemporary cities. Seminar, lecture, discussion.

M APH 598 Special Topics. (1–4)
fall or spring

M APH 683 Critical Regionalism. (3)
spring
Critical inquiry in cultural grounding; the definition of place in architectural theory and practice. Lecture, field studies.

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

ARCHITECTURE PROFESSIONAL STUDIES (ARP)

M ARP 451 Architecture Field Studies. (1–6)
selected semesters
Organized field study of architecture in specified national and international locations. May be repeated for credit with director approval. Field trips, study abroad.

M ARP 484 Clinical Internship. (1–3)
fall
Full-time internship under the supervision of practitioners in the Phoenix area or other locales. Credit/no credit. Corequisite: ADE 421.

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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

ARCHITECTURAL TECHNOLOGY (ATE)

M ATE 353 Architectural Construction. (3)
fall
Materials and methods of construction. Aesthetic, code, and cost considerations. Lecture, lab. Corequisite: ADE 321 or 511.

M ATE 361 Building Structures I. (3)
spring
Introduces load distribution on structures. Static analysis of determinant beams, trusses, arches, and rigid frames. Computer applications. Lecture, lab. Prerequisite: admission to upper division or Master of Architecture program.

M ATE 451 Building Systems I. (3)
fall
Principles of solar radiation, heat and moisture transfer, and environmental control systems as form influences. Energy-conscious design. Lecture, lab. Prerequisite: admission to upper division or Master of Architecture program.

M ATE 452 Building Systems II. (3)
spring
Architectural design implications of heating, ventilation, and air conditioning systems. Principles of lighting, daylighting, and acoustics, and their applications. Lecture, lab. Prerequisite: ATE 451.

M ATE 462 Building Structures II. (3)
fall
Strength of materials. Stresses in beams and columns. Thermal effects on structures. Analysis, design, and detailing of wood structural systems. Lecture, lab. Prerequisite: ATE 361.

M ATE 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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

ARCHITECTURAL COMMUNICATION (AVC)

M AVC 494 Special Topics. (1–4)
once a year

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/catalog on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

LANDSCAPE ARCHITECTURE (PLA)

M PLA 101 Landscape and Society. (3)
fall
Examines interrelationship between society and the landscape with emphasis on human involvement in shaping the landscape.
General Studies: G

M PLA 161 Graphic Communication. (3)
fall or spring
Develops drawing skills and understanding of the graphic communication systems used by planning, homebuilding, and landscape architecture professions. Studio. Cross-listed as HUD 161/PUP 161. Credit is allowed for only HUD 161 or PLA 161 or PUP 161.

M PLA 194 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Presentation Graphics. (3)

M PLA 222 Computers in Landscape Architecture. (3)
fall
Computer applications in landscape architecture, including CAD, GIS, graphics, and visualization. Lab.

M PLA 240 Landscape Survey Techniques. (3)
spring
Develops landscape survey skills, including aerial photography, satellite images, geo-referencing, landscape surveys, and field data collection. Lecture, lab.

M PLA 242 Landscape Construction I. (4)
fall
Landscape constructions focusing on landform transformations. Topics include landform analysis, grading, and earthwork. Studio. Prerequisite: admission to professional program.

M PLA 261 Landscape Architecture I. (4)
fall
Landscape communication: communication techniques for urban planning and landscape architecture. Credit is allowed for only PLA 261 or PUP 261. Studio. Prerequisites: ALA 120; GPH 111.

M PLA 262 Landscape Architecture II. (4)
spring
Reading the landscape: observing, experiencing, and graphically expressing the symbolic and aesthetic significance of natural landscapes. Prerequisites: ALA 120; PLA 261; admission to professional program.

M PLA 310 History of Landscape Architecture. (3)
fall
Physical record of human attitudes toward the land. Ancient through contemporary landscape planning and design. Cross-listed as APH 411. Credit is allowed for only APH 411 or PLA 310.
General Studies: 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 93.

M PLA 311 Contemporary Landscape Architecture. (3)
spring
Explores concerns, projects, and movements in landscape architecture of late 20th-century understanding; social, ecological, regional, and historical influences.
General Studies: HU

M PLA 344 Landscape Construction II. (4)
spring
Characteristics of materials and methods used in landscape architectural construction. Studio. Prerequisite: PLA 242 or instructor approval.

M PLA 345 Professional Practice Seminar. (1)
spring
Landscape architecture practice, including contracts, project and office management, liability, licensing, and professional development.

M PLA 361 Landscape Architecture III. (4)
fall
Site planning: analysis of natural and cultural features; site systems and implications for plan making and design. Studio. Fee. Prerequisite: admission to professional program.

M PLA 362 Landscape Architecture IV. (4)
spring
Site design: site-specific design of configured space by the creative development of form. Studio. Fee. Prerequisite: admission to professional program.

M PLA 363 Landscape Planting Design. (4)
spring
Functional and aesthetic use of plants in arid-region landscape design. Explores design philosophies through planting design problems. Studio. Prerequisite: admission to professional program.

M PLA 394 Special topics. (1–4)
Selected semesters

M PLA 410 Social Factors in Landscape and Urban Planning. (3)
fall
Examines the influence of social factors in landscape architecture and urban planning.

M PLA 411 Landscape Architecture Theory and Criticism. (3)
spring
Critically analyzes landscape architecture theories and projects to evaluate validity of design and contribution to society. Prerequisites: PLA 310, 361, 362, 420, 461.
General Studies: L

M PLA 412 Landscape Ecology and Planning. (3)
selected semesters
Reviews the evolution of landscape ecology and landscape planning and examines use and value.

M PLA 413 Southwest Landscape Interpretation. (3)
selected semesters
Explores methods and implications of landscape interpretation within the American Southwest.

M PLA 420 Theory of Urban Design. (3)
spring
Analyzes the visual and cultural aspects of urban design. Theories and techniques applied to selected study models. Prerequisite: junior standing.
General Studies: HU

M PLA 446 Landscape Construction III. (3)
spring
Landscape construction focusing on low-technology, biotechnical, regional, and experimental techniques or systems. Lecture, studio.

M PLA 461 Landscape Architecture V. (4)
fall
Landscape ecological planning: collection and application of ecological data relevant to planning and design at landscape scale. Studio. Fee. Prerequisite: PLA 362.

M PLA 462 Landscape Architecture VI. (4)
spring
Advanced landscape architecture: integrative capstone studio with multifaceted design problems. Fee. Prerequisite: PLA 461.

M PLA 484 Internship. (3)
fall, spring, summer session 1
Full-time internship under the supervision of practitioners in the Phoenix area or other locales. Credit/no credit. Prerequisite: school major or instructor approval.

M PLA 485 International Field Studies in Planning. (1–12)
summer
Organized field study of planning in specified international locations. May be repeated for credit with school approval. Study abroad, field trip. Cross-listed as PUP 485. Credit is allowed for only PLA 485 or PUP 485.
General Studies: G (3 hours must be taken to secure G credit.)

M PLA 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Plant Materials. (3)

M PLA 498 Pro-Seminar. (1–7)
spring
Topics may include the following:
- Professional Senior Seminar. (1)

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

Department of Industrial Design

www.asu.edu/caed/SOD
480/965-1767
AED 162

Lauren McDermott, Chair

Professor: Giard

Associate Professor: McDermott

Assistant Professors: Boradkar, Shin, White

Clinical Associate Professor: Herring

Faculty Associates: Shigo, Velasquez

ORGANIZATION

Programs in the Department of Industrial Design are organized by the faculty of the department under the direction and administration of the chair, and standing committees of the faculty.

DEGREES

The faculty in the Department of Industrial Design offers the Bachelor of Science in Design degree with a major in Industrial Design.

Industrial Design. The Industrial Design program is an accredited institutional member of the National Association of Schools of Art and Design (NASAD). The curriculum prepares individuals for a professional career in product design and development, especially in the area of manufactured objects used by people on a daily basis. By developing products that are innovative, useful, safe, aesthetically appropriate, and socially, culturally, and environmentally

sensitive, the industrial design profession serves the needs of society, consumers, and manufacturers.

The Industrial Design Program at ASU focuses on a new model of interdisciplinary product development called integrated innovation. The primary goal of integrated innovation is to produce design solutions that 1) meet user needs in unexpected ways, 2) create value in the marketplace, and 3) improve society and the environment. This unique focus has led the program to form strong academic partnerships with visual communication design and the schools of engineering and business at ASU. Students graduating with this experience can expect to possess an acute understanding of the potential that industrial design brings to the social, commercial, and environmental challenges facing the twenty-first century.

To support integrated innovation, the Industrial Design program at ASU teaches both traditional and cutting-edge design skills and knowledge, including a strong visual acumen; technological aptitude; a practical knowledge of manufacturing, sustainability, and ergonomics; critical comprehension of design history; and a clear understanding of how to identify, evaluate, and respond to the physical and psychological needs of users. By way of studio projects, students learn to research problems and opportunities; visualize and communicate ideas; and to refine their skills in freehand sketching, computer-aided design, and model simulation. Assignments are a balance of conceptual challenges and practical techniques. Typical design projects (some of which are conducted with external partners) feature product planning and user experience along with exercises dealing with the design of electronic devices, housewares, sports equipment, and medical equipment. Focus is placed on the role of the industrial designer as a member of a team. Third-year students perform internships in either a corporation or a consulting firm. The program also has very close ties with the Industrial Designers Society of America.

MINORS

Design Studies

Students interested in design who do not wish to major in industrial design can earn a minor in Design Studies. The courses may also appeal to students not accepted to the upper-division of industrial design but who wish to pursue the study of design within the Bachelor of Interdisciplinary Studies degree.

Courses selected must satisfy the minimum requirement of 18 semester hours for the minor. In addition, students must take 12 semester hours in upper-division course work.

To enhance understanding of the subject matter, some of the designated courses are sequential in nature and require certain prerequisites. Consequently, students should carefully note the semester in which these particular courses are offered. All designated courses for the minor in design studies are lecture courses.

To pursue the minor in Design Studies, students must have a minimum cumulative GPA of 2.50.

Designated Courses for the Minor

Design

DSC 101 Design Awareness *HU, G* 3
GRA 440 Finding Purpose 3

Graphic Design

GRA 111 Graphic Design History I *HU* 3
GRA 112 Graphic Design History II 3
GRA 225 Communication/Interaction Design Theory 3

Industrial Design

IND 242 Materials and Design 3
IND 243 Process and Design 3
IND 316 20th-Century Design I *HU, H* 3
IND 317 20th-Century Design II *HU, H* 3
IND 344 Human Factors in Design 3
IND 354 Principles of Product Design 3
IND 470 Professional Practice for Industrial Design *L* 3

Interior Design

INT 111 Interior Design Issues and Theories *HU* 3
INT 121 Introduction to Computer Modeling for Interior Design *CS* 3
INT 131 Design and Human Behavior *SB* 3
INT 238 Introduction to Computer-Aided Design of Built Environments 3
INT 310 History of Interior Design I *HU, H* 3
INT 311 History of Interior Design II *HU, H* 3
INT 412 History of Decorative Arts in Interiors *HU* 3
INT 413 History of Textiles in Interior Design 3

BIS CONCENTRATIONS

A concentration in design 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 139.

GRADUATE PROGRAMS

The College of Design offers a Master of Science in Design (MSD) degree with concentrations in industrial design, interior design, and graphic design. The faculty also participates in a collegewide, interdisciplinary PhD degree in Environmental Design and Planning with concentrations in design; history, theory, and criticism; and planning. For more information, see the *Graduate Catalog*.

ADMISSION

Lower-Division Program. New and transfer students who have been admitted to the university and who have selected Industrial Design as a major are admitted to the lower-division program. Transfer credits for the lower-division program are reviewed by the college and evaluated for applicability to this curriculum. To be applicable, transfer courses must be equivalent in both content and level of offering. A review of samples of work is required for studio classes. Consult a college academic advisor for further information.

Lower-division students entering the program who are not prepared for certain courses in the curriculum (for example, algebra and trigonometry or a second course in

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 93.

computer programming) are required to take additional courses that do not apply to the Bachelor of Science in Design degree. If such courses are required, an additional year of study may be necessary to complete the lower-division program.

Completion of lower-division requirements does not ensure acceptance to an upper-division professional program.

Upper-Division Program. When students have completed the lower-division curriculum requirements, they may apply for acceptance to the upper-division program in Industrial Design. The limited spaces available each year are awarded to applicants with the highest promise for professional success, as determined by each program. The faculty of the Department of Industrial Design retains the right to admit any meritorious student who may be deficient in a published department criterion. Such admission requires an extraordinary review of the applicant by the program's admissions committee. Should the faculty choose to admit such an applicant, the student is placed automatically on a provisional admission status with stipulations as to what is required to be removed from probation. See "Application to Upper-division Programs," on this page.

Students not admitted to upper-division programs are not dismissed from the university and may reapply or transfer to other programs. Students who intend to reapply should meet with a college academic advisor.

APPLICATION TO UPPER-DIVISION PROGRAMS

Upper-Division Application Procedures. Students should write to a college academic advisor for the application form well in advance of the application deadline. For more information on portfolios, students should ask a college academic advisor for a copy of the application and portfolio guidelines. The following dates and procedures are for students applying to 2007–2008 upper-division programs.

Upper-Division Application Deadlines. The following dates and procedures apply to the Industrial Design program.

April 16, 2007. Portfolio and application documents are due in AED 162 by 5 P.M.

June 1, 2007. If the spring 2007 semester includes transfer course work (i.e., course work taken at an institution other than ASU), a student must submit his or her transcripts to the Academic Advising/Student Services office, ARCH 115, no later than June 1. These transcripts may be unofficial copies. A second set of official transcripts must be sent to the University Registrar's office. Application is not complete until the university receives official transcripts for transfer course work. For those transfer students whose academic term ends in June rather than May, this deadline may be extended upon the written request of the applicant.

July 2, 2007. Acceptance notices are mailed no later than July 2.

Return of Letter of Acceptance. A signed receipt of acceptance of admission must be received by the school by the date indicated on the Notice of Acceptance. Alternates may be accepted at a later date if space becomes available.

Matriculation. An accepted student is expected to begin his or her upper-division professional program at the beginning of the immediate fall term. There is no spring admission to the upper-division program, and deferrals are not allowed.

Industrial Design Portfolio Format Requirements. Each applicant is responsible for obtaining the following documents and including them in the portfolio. Application materials are submitted at one time in a presentation binder (portfolio); 8.5" x 11" format only. The student's name must be affixed to the outside. Items must appear in the following order:

Page 1. The application form should be completely filled out with the first page visible. Application forms are available from the college Academic Advising Office, ARCH 115.

Page 2. An application essay.

Page 3. All college transcripts for both ASU and transfer work should be included through the fall 2006 semester. Copies are acceptable. An academic advisor forwards spring 2007 ASU transcripts. Applicants wishing to transfer spring semester 2007 work are responsible for submitting these transcripts by June 1 so that they may be added to their portfolios. The student is also responsible for getting an official transfer transcript sent directly to the Office of the Registrar.

Page 4. A certificate of admission to ASU is necessary only for those students who have been newly admitted for fall 2007 and who are applying directly into an upper-division program. The certificate is not required for students currently attending ASU.

Following Pages (Usually from 10 to 20 Sheets). Students should present sufficient work to demonstrate the depth and breadth of their creative activity. This work should include (but is not limited to) examples of two- and three-dimensional design and graphics. Each project should be clearly identified (course, length of project, etc.), with a concise accompanying description of the assignment.

Students should obtain an application and a portfolio guidelines form for their major from the college's Academic Advising Office, ARCH 115, at the beginning of the academic year in which they intend to apply to the upper-division program. Requirements or instructions indicated in the guidelines for that academic year take precedence over any other printed material.

Students are encouraged to include additional materials, written or pictorial, that provide further evidence of skills, abilities, aptitude, and commitment to the major. When any work submitted is not completely original, the source must be given. When work is of a team nature, the applicant's role must be clearly indicated. Original examples or slides must not be submitted unless specified in the guidelines. All examples must be photographs or other reproduction graphic media.

Return of Portfolios. Application documents (pages 1 to 4) remain the property of the College of Design. However, the remainder of the portfolio is returned after the admissions review, provided the applicant encloses a self-addressed return mailer with sufficient prepaid postage. Portfolios may be claimed in person after July 2, 2007. If the applicant provides written permission, another person may claim the

portfolio. After one year, unclaimed portfolios are discarded. While care is taken in handling the portfolios, no liability for lost or damaged materials is assumed by the college or department.

ADVISING

Advising for the lower-division curricula is through a college academic advisor in ARCH 115. Advising for the upper-division curricula is provided by the department's academic advisor in AED 162.

DEGREE REQUIREMENTS

The Bachelor of Science in Design degree requires a minimum of 120 semester hours for a major in Industrial Design. The program may include required field trips. Students are responsible for these additional costs. An internship is a required part of the program.

Industrial Design. The curriculum in Industrial Design is divided into a preprofessional (first and second years) and a professional program (third and fourth years):

Preprofessional program	61
Professional program	59
Total	120

The preprofessional curriculum balances a foundation in academic subjects such as English, algebra and trigonometry, computing, and physics with design courses that include history as well as studio courses in drawing, design fundamentals, human factors, and materials and processes.

The professional curriculum includes studio and laboratory work in industrial design, graphics, project development, and professional practice. Students also take a number of approved program electives. A supervised summer internship is part of the curriculum.

Upper-division studios emphasize projects that promote an interdisciplinary approach to solving problems and that develop the student's intellectual understanding of the philosophy, methodology, and theories related to industrial design. Problems proceed from small consumer products with simple task functions to larger and more complex problems and systems. Studio projects also emphasize the design processes: problem resolution through concept ideation, dialogue with specialists in related areas, and product development, presentation, and marketing.

Graduates of the program accept positions in industry and with firms involved in industrial design. Designers may focus on consumer products, electronics, medical devices, health products, or recreational products, among others. Designers may also choose to continue their education with graduate studies to enrich their design knowledge, to specialize, or to prepare for college-level teaching.

General Studies Requirement. The following curriculum includes sufficient approved course work to fulfill the General Studies requirement. See "General Studies," page 93, for requirements and a list of approved courses. Note that all three General Studies awareness areas are required. Consult an advisor for an approved list of courses.

Graduation Requirements. In addition to fulfilling college and major requirements for this degree, students must meet all university graduation and college degree requirements. See "University Graduation Requirements," page 89, and "College Degree Requirements," page 315.

Industrial Design—BSD
Preprofessional Program Requirements[1]

First Year

Fall			
DSC	101	Design Awareness *HU, G*	3
ENG	101	First-Year Composition	3
		or ENG 105 Advanced First-Year Composition (if qualified) (3)	
IND	120	Drawing for Industrial Design[1]	3
MAT	170	Precalculus *MA*	3
Elective			3
Total			15
Spring			
ENG	102	First-Year Composition	3
		or elective if ENG 105 is taken (3)	
IND	121	Principles for Industrial Design I[1]	3
IND	122	Principles for Industrial Design II[1]	3
PGS	101	Introduction to Psychology *SB*	3
PHY	111	General Physics *SQ*[2]	3
PHY	113	General Physics Laboratory *SQ*[2]	1
Total			16

Second Year

Fall			
IND	227	Visual Methods for Problem Solving	3
IND	236	Introduction to Computer Modeling for Industrial Design	3
IND	242	Materials and Design	3
IND	260	Industrial Design I	3
IND	316	20th-Century Design I *HU, H*	3
Total			15
Spring			
ECN	212	Microeconomic Principles *SB*	3
IND	228	Imaging and Visualization	3
IND	243	Process and Design	3
IND	261	Industrial Design II	3
IND	317	20th-Century Design II *HU, H*	3
Total			15
Preprofessional program total			61

[1] Transfer credits for the lower-division program must be equivalent in both content and level of offering. Samples of studio work to be accepted for credit must be submitted for evaluation through the college's Academic Advising Office, ARCH 115. Most studio courses and some lecture courses are sequential. They must be taken in, and may be offered only during, the semester noted.

[2] Both PHY 111 and 113 must be taken to secure SQ 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 93.

Industrial Design—BSD
Professional Program Requirements

Third Year

Fall

IND	327 Presentation Graphics	3
IND	344 Human Factors in Design	3
IND	354 Principles of Product Design	3
IND	360 Industrial Design III	5
Total		14

Spring

IND	328 Graphics for Industrial Design	3
IND	361 Industrial Design IV	5
MKT	382 Advertising and Marketing Communication	3
Elective		3
Total		14

Summer

IND	484 Internship: Industrial Design	2
Total		2

Fourth Year

Fall

ENG	301 Writing for the Professions *L*	3
IND	460 Design Project I	5
IND	470 Professional Practice for Industrial Design *L*	3
Elective		3
Total		14

Spring

IND	461 Design Project II	5
Elective		3
C elective		3
SQ, SG elective with approved laboratory		4
Total		15

Professional program total	59
BSD minimum total	120

INQUIRIES

For more information, call a college academic advisor at 480/965-3584, send e-mail to caed.advising@asu.edu, or write

ACADEMIC ADVISING/STUDENT SERVICES
OFFICE
COLLEGE OF DESIGN
ARIZONA STATE UNIVERSITY
PO BOX 871905
TEMPE AZ 85287-1905

INDUSTRIAL DESIGN (IND)

M IND Note 1. In addition to individual course prerequisites, nonbusiness students must have at least a 2.50 ASU cumulative GPA, a 2.50 ASU business GPA, and 56 earned semester hours to register for any upper-division business course unless otherwise noted.

M IND 120 Drawing for Industrial Design. (3)
fall
Drawing as language to explore and communicate ideas. Development of drawing aptitude as language and process for industrial design thinking. Studio. Prerequisite: Industrial Design major.

M IND 121 Principles for Industrial Design I. (3)
spring
Industrial design as a language and process for creative thinking and realization. Studio. Prerequisite: Industrial Design major. Corequisite: IND 122.

M IND 122 Principles for Industrial Design II. (3)
spring
Continued exploration of industrial design as a language and process for creative thinking and realization. Studio. Prerequisite: Industrial Design major. Corequisite: IND 121.

M IND 194 Special Topics. (1–4)
selected semesters

M IND 227 Visual Methods for Problem Solving. (3)
fall
Introduces conceptual design activity based on the mind-eye-media feedback loop. Graphic language used to represent conjecture, analysis, synthesis of objects, and their contexts. Seminar, studio. Prerequisite: IND 122.

M IND 228 Imaging and Visualization. (3)
spring
Design activities stressing graphic language abstraction practiced for presentation. Discusses structure of criticism, including description, interpretation, and evaluation. Seminar, studio. Prerequisite: IND 227.

M IND 236 Introduction to Computer Modeling for Industrial Design. (3)
fall and spring
Computers in industrial design, including software concepts, specific packages, and problem solving, illustration, typography, modeling, and animation. Lab. Prerequisite: Industrial Design major.

M IND 242 Materials and Design. (3)
fall
Materials application in design. Introduces characteristics and properties of metals and organic materials, including plastics, and inorganic materials.

M IND 243 Process and Design. (3)
spring
Influences of industrial processing on design. Introduces basic materials processing and post-forming processes. Emphasizes appearance enhancement and design constraints of material processing. Prerequisite: IND 242.

M IND 260 Industrial Design I. (3)
fall
Introduces the method and process of the industrial designer. Determinants necessary in small product design. 1 hour lecture, 2 hours studio. Prerequisite: IND 122.

M IND 261 Industrial Design II. (3)
spring
Issues of physical form development related to product and design; form development properties of paper, fibers, wood, metal, and plastics. 1 hour lecture, 2 hours studio. Prerequisite: IND 260 (or its equivalent).

M IND 316 20th-Century Design I. (3)
fall
Modern European and American design from 1900 to 1940. Emphasizes transportation, product, furniture, exhibition, and graphic design.
General Studies: HU, H

M IND 317 20th-Century Design II. (3)
spring
Modern European, Asian, and American design since 1940. Emphasizes transportation, product, furniture, exhibition, and graphic design.
General Studies: HU, H

M IND 327 Presentation Graphics. (3)
fall
Studies methods for portfolio and professional product presentation using graphic media for information transfer. Stresses aesthetic judgment, organization, and craftsmanship. Seminar, studio. Prerequisite: acceptance into Industrial Design professional program.

M IND 328 Graphics for Industrial Design. (3)
spring
Investigates and applies packaging applications and planning to the development of an identity for a product line structured as a system. Lab. Prerequisite: IND 327.

M IND 344 Human Factors in Design. (3)
fall
Man-machine environment systems; human characteristics and behavior applied to design of products, systems, and their operating environment.

M IND 354 Principles of Product Design. (3)
fall
Influences of physical and mechanical concepts in product design; mechanisms, kinematics, and fastening systems. Concepts of analysis for product design. Influences of concepts on aesthetics. Prerequisites: PHY 111; Industrial Design major.

M IND 360 Industrial Design III. (5)
fall
Methods of visual thinking, conceptualization, and ideation related to building skill levels in professional design presentation techniques. 10 hours studio. Fee. Prerequisite: school approval.

M IND 361 Industrial Design IV. (5)
spring
Emphasizes developing ideas into a complete functional product, including survey and application of aesthetics, human factors, materials, and manufacturing. 10 hours studio. Fee. Prerequisite: IND 360.

M IND 460 Design Project I. (5)
fall
Complete analysis of the product unit as an element of mass production, featuring marketing, technology, human factors, and visual design. Emphasizes professional standards. 10 hours studio. Fee. Prerequisites: DSC 484; IND 361.

M IND 461 Design Project II. (5)
spring
Product design, with emphasis in systems interaction. Culmination of design process and technique. Encourages individual project direction. 10 hours studio. Fee. Prerequisite: IND 460.

M IND 464 Collaborative Design Development I. (5)
fall
Team-based product development course featuring applied projects. Open to senior students from business, engineering, design, and other disciplines. Cross listed as MGT 464. Credit is allowed for only IND 464 or MGT 464. Lecture, lab. See IND Note 1. Prerequisites: instructor approval; application process (www.innovationspace.org).

M IND 465 Collaborative Design Development II. (5)
spring
Team-based product development course featuring applied projects. Open to senior students from business, engineering, design, and other disciplines. Cross listed as MGT 465. Credit is allowed for only IND 465 or MGT 465. Lecture, lab. See IND Note 1. Prerequisites: instructor approval; application process (www.innovationspace.org).

M IND 470 Professional Practice for Industrial Design. (3)
fall
Business procedures, management techniques, accounting systems, ethics, and legal responsibilities of the design professions. May be repeated for credit. Prerequisite: senior standing.
General Studies: L

M IND 474 Design Seminar. (3)
spring
Manufacturer's liability, statutes, regulations, and common law rules; role of expert witnesses; insurance and product safety programs. Seminar. Prerequisite: senior standing.

M IND 484 Internship: Industrial Design. (1–3)
summer
Full-time summer internship under supervision of practitioners in the Phoenix area or other locales. Students must register for IND 484 in the fall semester following their summer internship. Prerequisite: IND 361.

M IND 494 Special Topics. (3)
selected semesters
Applies mechanical drafting knowledge and skills. Manual drafting principles and techniques with transition to computer-aided industrial design.

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

Department of Interior Design

www.asu.edu/caed/SOD
480/965-3571
AED 162

Lorraine M. Cutler, Chair

Professor: Brandt

Associate Professors: Bernardi, Cutler, Johnson, Witt

Assistant Professors: Bender, Thibeau Catsis

Faculty Associates: Johannes, Jones, Patsy, Sola

PURPOSE

The mission of the Interior Design program is to prepare students for "Leading in Context." As leaders in design education and research, faculty constructs courses that encourage the development of leadership qualities. Courses examine the context in which individuals and groups live and work. Contextual issues identify and promote environments that sustain human health and development of professionals that are physically, socially, and culturally aware. This leadership focus is further conditioned by the belief that designers have responsibility to their communities and the public to solve problems at the global level of sustainability and at the professional level of responsibility and integrity. Students are immersed in a full-breadth learning experience that includes courses in design history, human behavior, design theories, and the rigor of design studio. Aesthetics, functionality, ambient influences, and technical expertise assist the students in the program to excel in the profession of interior design.

ORGANIZATION

Programs in the Department of Interior Design are organized by the faculty of the department under the direction and administration of the chair, and standing committees of the faculty.

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 93.

DEGREES

The faculty in the Department of Interior Design offers the Bachelor of Science in Design degree with a major in Interior Design.

Interior Design. The Interior Design program is accredited by the Foundation for Interior Design and Research (FIDER), the national interior design accrediting agency. The four-year curriculum emphasizes design process, problem solving, technical skill development, and management. Computer technology is integrated into each level of the curriculum. The program offers an excellent environment for experimenting with sophisticated software for presentation and simulation. Studios provide a unique learning environment and opportunities for application of concepts learned in lecture courses. Studio work examines human interaction with the built environment along with sustainable design issues allowing preservation of the natural environment for future generations. Assignments offer conceptual and practical problem solving challenges. Between the third and fourth year, students perform summer internships with well-known design companies in the United States. This offers students the opportunity to work with leaders in the interior design profession.

The interior design program offers a multidisciplinary approach to design education facilitated by its location with allied design disciplines: architecture, planning, housing and urban development, graphic design, and industrial design. This environment provides a living laboratory for the program's focus upon the context of design. Graduates of the program can expect to work in the profession as residential, corporate, retail, hospitality or health care designers. With their understanding of contextual issues affecting design, graduates will often find themselves in leadership roles within the profession.

MINORS

Design Studies

Students interested in design who do not wish to major in interior design can earn a minor in Design Studies. The courses may also appeal to students not accepted to the upper-division of interior design but who wish to pursue the study of design within the Bachelor of Interdisciplinary Studies degree.

Courses selected must satisfy the minimum requirement of 18 semester hours for the minor. In addition, students must take 12 semester hours in upper-division course work. To enhance understanding of the subject matter, some of the designated courses are sequential in nature and require certain prerequisites. Consequently, students should carefully note the semester in which these particular courses are offered. All designated courses for the minor in design studies are lecture courses.

To pursue the minor in Design Studies, students must have a minimum cumulative GPA of 2.50.

Designated Courses for the Minor

Design

DSC	101	Design Awareness *HU, G*	3
GRA	440	Finding Purpose	3

Graphic Design

GRA	111	Graphic Design History I *HU*	3
GRA	112	Graphic Design History II	3
GRA	225	Communication/Interaction Design Theory	3

Industrial Design

IND	242	Materials and Design	3
IND	243	Process and Design	3
IND	316	20th-Century Design I *HU, H*	3
IND	317	20th-Century Design II *HU, H*	3
IND	344	Human Factors in Design	3
IND	354	Principles of Product Design	3
IND	470	Professional Practice for Industrial Design *L*	3

Interior Design

INT	111	Interior Design Issues and Theories *HU*	3
INT	121	Introduction to Computer Modeling for Interior Design *CS*	3
INT	131	Design and Human Behavior *SB*	3
INT	238	Introduction to Computer-Aided Design of Built Environments	3
INT	310	History of Interior Design I *HU, H*	3
INT	311	History of Interior Design II *HU, H*	3
INT	412	History of Decorative Arts in Interiors *HU*	3
INT	413	History of Textiles in Interior Design	3

Interior Design History

The minor in Interior Design History is available to students interested in design and culture. The courses designated for the minor are part of the professional studies in interior design within the School of Interior Design. Moreover, the courses serve to inform the students about the importance of the global community, especially sociocultural groups, and the impact of the global community on the design of the interior environment.

The selected courses satisfy the minimum requirement (18 semester hours, 12 of which must be from the upper division) for the minor. To enhance the understanding of the subject matter, the selected courses are sequential in nature and require certain prerequisites. Consequently, students should carefully note the semester in which any of these courses are offered.

Required Courses

DSC	101	Design Awareness *HU, G*	3
INT	111	Interior Design Issues and Theories *HU*	3
INT	310	History of Interior Design I *HU, H*	3
INT	311	History of Interior Design II *HU, H*	3
INT	412	History of Decorative Arts in Interiors *HU*	3
INT	413	History of Textiles in Interior Design	3
Total			18

The minor in Interior Design History is open to students majoring in Architectural Studies, Art, Communication, Psychology, or Sociology, and students in any W. P. Carey School of Business major or the Bachelor of Interdisciplinary Studies program. All other majors are considered on an individual basis and approved by the chair of the Department of Interior Design. To pursue the minor in Interior Design History, students must have a minimum cumulative GPA of 2.50.

BIS CONCENTRATIONS

Concentrations in design studies and interior design history 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 139.

GRADUATE PROGRAMS

The College of Design offers a Master of Science in Design (MSD) degree with concentrations in industrial design, interior design, and graphic design. The faculty also participates in a collegewide, interdisciplinary PhD degree in Environmental Design and Planning with concentrations in design; history, theory, and criticism; and planning. For more information, see the *Graduate Catalog*.

ADMISSION

Lower-Division Program. New and transfer students who have been admitted to the university and who have selected Interior Design as a major are admitted to the lower-division program. Transfer credits for the lower-division program are reviewed by the college and evaluated for applicability to this curriculum. To be applicable, transfer courses must be equivalent in both content and level of offering. A review of samples of work is required for studio classes. Consult a college academic advisor for further information.

Lower-division students entering the program who are not prepared for certain courses in the curriculum (for example, algebra and trigonometry or a second course in computer programming) are required to take additional courses that do not apply to the Bachelor of Science in Design degree. If such courses are required, an additional year of study may be necessary to complete the lower-division program.

Completion of lower-division requirements does not ensure acceptance to an upper-division professional program.

Upper-Division Program. When students have completed the lower-division curriculum requirements, they may apply for acceptance to the upper-division program in interior design. The limited spaces available each year are awarded to applicants with the highest promise for professional success. The faculty of the Department of Interior Design retain the right to admit any meritorious student who may be deficient in a published department criterion. Such admission requires an extraordinary review of the applicant by the program's admissions committee. Should the faculty choose to admit such an applicant, the student is placed automatically on a provisional admission status with stipulations as to what is required to be removed from probation. See "Application to Upper-Division Programs," on this page.

Students not admitted to upper-division programs are not dismissed from the university and may reapply or transfer to other programs. Students who intend to reapply should meet with a college academic advisor.

APPLICATION TO UPPER-DIVISION PROGRAMS

Upper-Division Application Procedures. Students should write to a college academic advisor for the application form well in advance of the application deadline. For more information on portfolios, students should ask a college academic advisor for a copy of the application and portfolio guidelines. The following dates and procedures are for students applying to 2007–2008 upper-division programs.

Upper-Division Application Deadlines. The following dates and procedures apply to the Interior Design program.

April 16, 2007. Portfolio and application documents are due in AED 162 by 5 P.M.

June 1, 2007. If the spring 2007 semester includes transfer course work (i.e., course work taken at an institution other than ASU), a student must submit his or her transcripts to the Academic Advising/Student Services office, ARCH 115, no later than June 1. These transcripts may be unofficial copies. A second set of official transcripts must be sent to the University Registrar's office. Application is not complete until the university receives official transcripts for transfer course work. For those transfer students whose academic term ends in June rather than May, this deadline may be extended upon the written request of the applicant.

July 2, 2007. Acceptance notices are mailed no later than July 2.

Return of Letter of Acceptance. A signed receipt of acceptance of admission must be received by the department by the date indicated on the Notice of Acceptance. Alternates may be accepted at a later date if space becomes available.

Matriculation. An accepted student is expected to begin his or her upper-division professional program at the beginning of the immediate fall term. There is no spring admission to the upper-division program, and deferrals are not allowed.

Interior Design Portfolio Format Requirements. Each applicant is responsible for obtaining the following documents and including them in the portfolio. Application materials are submitted at one time in a presentation binder (portfolio); 8.5" x 11" format only. Items must appear in the following order:

Page 1. The application form should be completely filled out with the first page visible. Application forms are available from the college Academic Advising Office, ARCH 115.

Page 2. Application Essay or Letter of Intent.

Page 3. All college transcripts for both ASU and transfer work should be included through the fall 2006 semester. Copies are acceptable An academic advisor forwards spring 2007 ASU transcripts. (Applicants wishing to transfer spring semester 2007 work are responsible for submitting these transcripts by June 1 so that they may be added to their portfolios. The student is also responsible for getting an official transfer transcript sent directly to the Office of the Registrar.)

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 93.

Page 4. A certificate of admission to ASU is necessary only for those students who have been newly admitted for fall 2007 and who are applying directly into an upper-division program. The certificate is not required for students currently attending ASU.

Following Pages (Usually from 10 to 20 Sheets). Students should present sufficient work to demonstrate the depth and breadth of their creative activity. This work should include (but is not limited to) examples of two- and three-dimensional design and graphics. Each project should be clearly identified (course, length of project, etc.), with a concise accompanying description of the assignment.

Students should obtain an application and a portfolio guidelines form for their major from the college's Academic Advising Office, ARCH 115, at the beginning of the academic year in which they intend to apply to the upper-division program. Requirements or instructions indicated in the guidelines for that academic year take precedence over any other printed material.

Students are encouraged to include additional materials, written or pictorial, that provide further evidence of skills, abilities, aptitude, and commitment to the major. When any work submitted is not completely original, the source must be given. When work is of a team nature, the applicant's role should be clearly indicated. Original examples or slides must not be submitted unless specified in the guidelines. All examples must be photographs or other reproduction graphic media.

Return of Portfolios. Application documents (pages 1 to 4) remain the property of the College of Design. However, the remainder of the portfolio is returned after the admissions review, provided the applicant encloses a self-addressed return mailer with sufficient prepaid postage. Portfolios may be claimed in person after July 2, 2007. If the applicant provides written permission, another person may claim the portfolio. After one year, unclaimed portfolios are discarded. While care is taken in handling the portfolios, no liability for lost or damaged materials is assumed by the college or department.

ADVISING

Advising for the lower-division curricula is through a college academic advisor in ARCH 115. Advising for the upper-division curricula is provided by the department's academic advisor in AED 162.

DEGREE REQUIREMENTS

The Bachelor of Science in Design degree requires a minimum of 120 semester hours for a major in Interior Design. The program may include required field trips. Students are responsible for these additional costs. Foreign study opportunities are available for students. An internship is a required part of the program.

Interior Design

The curriculum in Interior Design is divided into a preprofessional program (first and second year) and a professional program (third and fourth year):

Preprofessional program	60
Professional program	60
Total	120

The preprofessional curriculum balances a foundation in academic subjects such as English, algebra and trigonometry, computer technology, and physics with design courses that include history and theory, as well as studio courses in drawing, design fundamentals, and conceptual design.

The professional curriculum includes studio work in interior design, construction methods/structures, codes as related to materials and finishes, environmental control systems, as well as lecture courses in the history of interior design. An eight-week supervised summer internship is part of the curriculum.

Graduates from the program accept entry-level professional positions in a variety of settings, including interior design firms, departments of space planning, architectural firms, public institutions, and industry. Students may also choose to continue their education through graduate studies, which provide greater enrichment in studio disciplines and contribute to the possibility for postsecondary-level academic appointments.

General Studies Requirement. The following curriculum includes sufficient approved course work to fulfill the General Studies requirement. See "General Studies," page 93, for requirements and a list of approved courses. Note that all three General Studies awareness areas are required. Consult an advisor for an approved list of courses.

Graduation Requirements. In addition to fulfilling college and major requirements for this degree, students must meet all university graduation and college degree requirements. See "University Graduation Requirements," page 89, and "College Degree Requirements," page 315.

Interior Design—BSD
Preprofessional Program Requirements[1]

First Year

Fall			
DSC	101	Design Awareness *HU, G*	3
ENG	101	First-Year Composition	3
		or ENG 105 Advanced First-Year Composition (3)	
INT	111	Interior Design Issues and Theories *HU*	3
INT	121	Introduction to Computer Modeling for Interior Design *CS*[1]	3
MAT	170	Precalculus *MA*	3
Total			15
Spring			
ENG	102	First-Year Composition	3
INT	120	Design Drawing and Media[1]	3
INT	131	Design and Human Behavior *SB*	3
INT	238	Introduction to Computer-Aided Design of Built Environments	3
PHY	111	General Physics *SQ*[2]	3
PHY	113	General Physics Laboratory *SQ*[2]	1
Total			16

Second Year

Fall			
INT	221	Principles of Design[1]	3
INT	222	Principles of Design Lecture[1]	1

INT 223 Drafting for Interior Design[1]	3
L elective	3
SB elective	3
Elective	3
Total	16

Spring

ARS 102 Art from Renaissance to Present *HU, H*	3
INT 261 Interior Design Studio I: Residential[1]	3
Elective	3
SQ or SG elective	4
Total	13
Lower-division total	60

[1] Transfer credits for the lower-division program must be equivalent in both content and level of offering. Samples of studio work to be accepted for credit must be submitted for evaluation through the college's Academic Advising Office, ARCH 115. Most studio courses and some lecture courses are sequential. They must be taken in, and may be offered only during, the semester noted.

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

Interior Design—BSD
Professional Program Requirements*

Third Year

Fall

INT 310 History of Interior Design I *HU, H*	3
INT 321 Concepts for Interior Design	3
INT 352 Construction Methods in Interior Design	3
INT 362 Interior Design Studio II: Hospitality and Retail	5
INT 381 Preinternship Seminar	1
Total	15

Spring

INT 311 History of Interior Design II *HU, H*	3
INT 351 Ambient Environment	3
INT 353 Interior Materials, Finishes, and Specifications	3
INT 363 Interior Design Studio III: Poetics and Materiality	5
Total	14

Summer

INT 484 Internship: Interior Design	2
Total	2

Fourth Year

Fall

INT 341 Interior Codes: Public Welfare and Safety	2
INT 464 Interior Design Studio IV: Work Environments	5
INT 471 Facilities Management	3
Elective	3
L upper-division elective	3
Total	16

Spring

INT 465 Interior Design Studio V: Institutional Design	5
INT 472 Professional Practice for Interior Design	2
Electives	6
Total	13
Upper-division total	60
BSD minimum total	120

* Transfer credits for the lower-division program must be equivalent in both content and level of offering. Samples of studio work to be accepted for credit must be submitted for evaluation through the college's Academic Advising Office, ARCH 115. Most studio courses and some lecture courses are sequential. They must be taken in, and may be offered only during, the semester noted.

INQUIRIES

For more information, call a college academic advisor at 480/965-3584, send e-mail to caed.advising@asu.edu, or write

ACADEMIC ADVISING/STUDENT SERVICES OFFICE
COLLEGE OF DESIGN
ARIZONA STATE UNIVERSITY
PO BOX 871905
TEMPE AZ 85287-1905

INTERIOR DESIGN (INT)

M INT 111 Interior Design Issues and Theories. (3)
fall
Interiors issues, theories, and philosophies. Emphasizes unique social and cultural factors that shape 20th-century design concepts.
General Studies: HU

M INT 120 Design Drawing and Media. (3)
spring
Visual thinking: Development of freehand drawing techniques as a language and tool to explore, communicate, and process ideas. Studio. Prerequisite: Interior Design major.

M INT 121 Introduction to Computer Modeling for Interior Design. (3)
fall and spring
Computers in interior design, including software concepts, specific packages, and problem solving, illustration, typography, modeling, and animation. Lab. Prerequisite: Interior Design major.
General Studies: CS

M INT 131 Design and Human Behavior. (3)
spring
Applies conceptual design to issues of programming and space planning, user needs, and behavior.
General Studies: SB

M INT 194 Special Topics. (1–4)
fall
Topics may include the following:
- Drafting for Interior Design. (3)

M INT 221 Principles of Design. (3)
fall
Applied visual vocabulary: studio experience exploring applications, process, and conceptual development of the principles of order and composition. Studio. Prerequisite: INT 120. Corequisite: INT 222.

M INT 222 Principles of Design Lecture. (1)
fall
Applications of the visual vocabulary: explores the principles of organization through examination of historical precedence and contemporary interior design. Corequisite: INT 221.

M INT 223 Drafting for Interior Design. (3)
fall
Orthographic, paraline, axonometric, and perspective projection; shades and shadows; and basic descriptive geometry for interior designers. Studio. Prerequisite: Interior Design major.

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 93.

M INT 238 Introduction to Computer-Aided Design of Built Environments. (3)
fall and spring
Introduces AutoCAD computer-aided design principles and strategies for designers of the built environment. Lecture, lab.

M INT 261 Interior Design Studio I: Residential. (3)
spring
Studio problems in interior design related to behavioral response in personal and small-group spaces. Studio. Prerequisite: INT 221.

M INT 294 Special Topics. (1–4)
selected semesters
Topics may include the following:
- AutoCAD. (3)

M INT 310 History of Interior Design I. (3)
fall
Design of interior spaces as an expression of cultural influences to 1835. Prerequisite: ARS 102.
General Studies: HU, H

M INT 311 History of Interior Design II. (3)
spring
Design of interiors as an expression of cultural influences from 1835 to the present. Prerequisite: INT 310 or instructor approval.
General Studies: HU, H

M INT 321 Concepts for Interior Design. (3)
spring
Conceptual design development, including scale and proportion, light, texture, form, volume, and spatial hierarchy; passage and repose. 1 hour lecture, 4 hours lab. Prerequisites: INT 261; admission to upper-division program. Corequisites: INT 341, 362, 381.

M INT 341 Interior Codes: Public Welfare and Safety. (2)
fall
Codes and regulations as performance criteria for interior design. Prerequisite: admission to upper-division program. Corequisites: INT 352, 362, 381.

M INT 351 Ambient Environment. (3)
spring
Surveys environmental control systems, acoustics, and lighting issues. Lecture, field trips. Prerequisite: admission to upper-division program. Corequisites: INT 353, 363.

M INT 352 Construction Methods in Interior Design. (3)
fall
Design theory related to analysis, materials, and building techniques of horizontal and vertical construction in interior design. Lecture, field trips. Prerequisite: admission to upper-division program. Corequisites: INT 341, 362, 381.

M INT 353 Interior Materials, Finishes, and Specifications. (3)
spring
Survey, evaluation, and specification of materials, finishes, and performance criteria for interiors. Prerequisite: admission to upper-division program. Corequisites: INT 351, 363.

M INT 362 Interior Design Studio II: Hospitality and Retail. (5)
fall
Investigates interior design issues in hospitality and retail environments. 10 hours studio. Fee. Prerequisite: admission to upper-division program. Corequisites: INT 341, 352, 381.

M INT 363 Interior Design Studio III: Poetics and Materiality. (5)
spring
Explores the poetics of materials and their assemblage in the design of public and private spaces. 10 hours studio. Fee. Prerequisite: INT 362. Corequisites: INT 351, 353.

M INT 381 Preinternship Seminar. (1)
fall
Preparation of internship materials that produce and enhance a successful internship experience. Seminar. Prerequisite: 3rd-year major in the College of Design.

M INT 412 History of Decorative Arts in Interiors. (3)
fall
Design of decorative arts as an expression of cultural influences and as an extension of interior spaces. Prerequisite: INT 311 or instructor approval.
General Studies: HU

M INT 413 History of Textiles in Interior Design. (3)
spring
Cultural and historical expression of textiles as related to interiors. Possible field trips. Prerequisite: INT 412 or instructor approval.

M INT 446 Furniture Design and Production. (3)
selected semesters
Design, construction, cost estimating, and installation in interior furniture and millwork. 1 hour lecture, 4 hours studio. Prerequisite: acceptance into Interior Design professional program or instructor approval.

M INT 464 Interior Design Studio IV: Work Environments. (5)
fall
Studio problems in interior design-related issues in work environments. 10 hours studio. Fee. Prerequisite: INT 363.

M INT 465 Interior Design Studio V: Institutional Design. (5)
spring
Advanced interior design problem solving related to institutional facilities. 10 hours studio. Fee. Prerequisite: INT 464.

M INT 466 Interior Design Studio. (5)
fall
Advanced interior design problem solving, design theory, and criticism. Thesis project development based upon the major's concentration. 10 hours studio. Fee. Prerequisite: INT 465.

M INT 467 Interior Design Studio. (5)
spring
Advanced series of specialized projects or continuation of thesis project based upon the major's concentration. 10 hours studio. Fee. Prerequisite: INT 466.

M INT 471 Facilities Management. (3)
fall
Facility management process in large-scale organizations. Planning, long-range forecasting, and productivity. Project management methodologies using micro-based software programs. Prerequisite: admission to upper-division program.

M INT 472 Professional Practice for Interior Design. (2)
spring
Business procedures, project control, fee structures, and professional product liabilities. Prerequisite: admission to upper-division program.

M INT 484 Internship: Interior Design. (2)
summer
Full-time summer internship under supervision of practitioners in the Phoenix area or other locales. Students must register for INT 484 in the fall semester following their summer internship. Prerequisite: INT 363.

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

School of Planning

www.asu.edu/caed/sop
480/965-7167
AED 162

Hemalata Dandekar, Director

Professors: Dandekar, Kihl, Lai, Pijawka

Associate Professors: Cameron, Crewe, Guhathakurta, Kim, Yabes

Assistant Professors: Balsas, Kamel, Lara-Valencia

Professor of Practice: Tiger

Faculty Associates: Abele, Adhikari, Boozer, Borushko, Brennan, Cromarty, Decker, Dollin, Dworkin, Gammage, Hartman, Holway, Keane, Kulaga, Moya, Newcombe, Pearce, Sender, Starkey, Stephenson, Sumner

PURPOSE

The faculty in the School of Planning offer curricula that provide an education for careers in environmental planning, housing and urban development, urban and regional planning, and urban design. The goal of the faculty is to advance the profession of planning through scholarship, teaching, research, and community service.

Planners work on projects that range in scale from site development to the design of entire communities and the formulation of policies that shape urban and regional growth. Planning graduates work for private firms, government agencies, and nonprofit organizations. Their work typically involves fields such as land-use planning, housing, natural resource management, urban transportation, development controls, and environmental impact assessment.

ORGANIZATION

The programs are organized by the faculty of the school under the direction and administration of the program coordinators and the school director.

DEGREES

The faculty in the School of Planning offer the Bachelor of Science in Planning degree in Urban Planning, and the Bachelor of Science in Design degree in Housing and Urban Development.

Bachelor of Science in Planning (BSP)

The BSP degree prepares students for careers in urban planning. Students take courses that include comprehensive planning, socioeconomic and environmental analysis, computer and analytical methods, planning law, site planning, landscape architecture, urban design, and public-policy formulation and administration. An internship or an approved elective is required between the third and fourth years. Many students continue to specialize in planning at the graduate level. Students in planning are exposed to the theories, methods, and practices of the profession of planning.

Bachelor of Science in Design (BSD)

A BSD degree with a major in Housing and Urban Development (HUD) educates and trains professionals to lead in the production of high-quality affordable housing, in the development of creatively designed and soundly planned neighborhoods and communities, in the revitalization of communities, and in the exemplification of social inclusiveness and environmental sensitivity in responsible land development. HUD graduates may pursue careers in the private home development industry, in publicly sponsored housing and community redevelopment, with nonprofit housing agencies, or in postgraduate housing and urban development research and education. The BSD degree with a major in Housing and Urban Development is offered in conjunction with the School of Extended Education.

MINOR

Urban Planning

The minor in Urban Planning is designed for students who are interested in the field but who wish to pursue other majors. The course selection is designed to provide an overview of the field and offer information of broad appeal.

All students must complete PUP 301 Introduction to Urban Planning plus a minimum of 15 semester hours, of which nine semester hours must be from upper-division courses (for a total of 12 semester hours of upper-division course work) from the following courses:

PUP	100	Introduction to Environmental Design *HU, G, H*	3
PUP	190	Sustainable Cities *HU/SB, G*	3
PUP	200	The Planned Environment *HU, H*	3
PUP	363	History of Planning	3
PUP	420	Theory of Urban Design *HU*	3
PUP	425	Urban Housing Analysis	3
PUP	430	Transportation Planning and the Environment	3
PUP	432	Planning and Development Control Law	3
PUP	433	Zoning Ordinances, Subdivision Regulations, and Building Codes	3
PUP	434	Urban Land Economics	3
PUP	442	Environmental Planning	3
PUP	444	Preservation Planning	3
PUP	445	Women and Environments *C*	3
PUP	452	Ethics and Theory in Planning *L*	3
PUP	475	Environmental Impact Assessment	3
PUP	485	International Field Studies in Planning *G*	3
PUP	510	Citizen Participation	3

The minor is open to students of all majors. Students must, however, have an overall GPA of 2.50 or higher and achieve a minimum 2.50 GPA in minor classes to be awarded the minor. Students seeking admission to the minor in Urban Planning must submit a minor verification form to the student coordinator in the School of Planning.

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 93.

BIS CONCENTRATIONS

A concentration in urban planning 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 139.

GRADUATE PROGRAMS

School of Planning faculty offer a Master of Urban and Environmental Planning (MUEP) degree. This is an interdisciplinary, professional degree designed to prepare students for leadership roles in planning within both the public and private sectors and from local to international organizations. Four specializations are offered: community and urban development, environmental planning, international planning, and transportation planning. The community and urban development specialization provides students with knowledge and skills in areas such as housing, economic and community development, public policy analysis, transportation, land use planning, urban design, and historic preservation. The environmental planning specialization provides students with knowledge and skills in such areas as sustainable design, environmental resources, growth management, environmental policy analysis, open space design, and conservation. The international planning specialization prepares students to work in the diverse and changing urban fabric of developing nations and in U.S. cities, with their growing multinational and multicultural populations. Transportation planning focuses on: nonmotorized transportation, economic development, border issues, and the environment. Faculty also participate in offering a collegewide, interdisciplinary PhD degree in Environmental Design and Planning with concentrations in design; history, theory, and criticism; and planning. For more information, see the *Graduate Catalog*.

ADMISSION

Lower-Division Program. New and transfer students who have been admitted to the university and who have selected a program in the School of Planning are admitted to the lower-division program. Transfer credits for the lower-division program are reviewed by the college and evaluated for applicability to this curriculum. To be applicable, transfer courses must be equivalent in both content and level of offering. See a college academic advisor for an appointment.

Completion of lower-division requirements does not ensure acceptance to the upper-division professional program. Admission to the upper division is competitive and limited to the space available. Admission requires formal application and acceptance.

Upper-Division Program. Admission to the upper-division programs of the School of Planning is limited to applicants who have completed the lower-division program requirements and who are determined by the admissions committee to have the best potential for academic success. Spaces in the program are limited by available facilities, faculty, and qualified applicants. A minimum lower-division program GPA of 3.00 may be required. See "Application to Upper-Division Programs," on this page.

Students not admitted to upper-division programs are not dismissed from the university and may reapply later or may transfer to other programs. Students who plan to reapply should meet with a college academic advisor.

APPLICATION TO UPPER-DIVISION PROGRAMS

Upper-Division Application Procedures. Students should see a college academic advisor for the application form well in advance of the application deadline.

Urban Planning, and Housing and Urban Development students in good standing who will complete all required lower-division courses by the end of the spring semester of their sophomore year may apply for admission to the upper-division in April of their sophomore year.

Upper-Division Application Deadlines. *April 16, 2007.* Urban Planning, and Housing and Urban Development application and optional portfolio documents due in the school office by 5 P.M.

June 1, 2007. Urban Planning, and Housing and Urban Development students must submit transcripts of non-ASU course work if their spring semester includes course work taken at another institution. These transcripts may be unofficial copies.

Official Transcripts. A second set of official transcripts must be sent to the university's Office of the Registrar. An application is not complete until the university receives official transcripts for transfer course work.

July 2, 2007. Acceptance notices are mailed no later than July 2.

Return of Letter of Acceptance. A signed receipt of acceptance of admission must be received by the school by the date indicated on the Notice of Acceptance. Alternates may be accepted at a later date if space becomes available.

Matriculation. An accepted student is expected to begin his or her upper-division professional program at the beginning of the immediate fall term for Urban Planning, and Housing and Urban Development. Deferrals are not allowed.

Admission Requirements. Each applicant is responsible for obtaining the following documents:

1. a statement of intent describing the applicant's specific background and interest in the major;
2. latest college-level transcript(s) (no high school transcripts are required);
3. one example of written work (e.g., a class paper); and
4. samples of individual work; team work can be included, but the contribution of the candidate must be clarified.

Students are also strongly encouraged to submit evidence of other endeavors related to the major. The applicant's GPA based on required courses and cumulative GPA is evaluated. Housing and Urban Development students completing the

Phoenix Community College (PCC) articulation program with the BSD-HUD program should submit similar material from PCC.

ADVISING

Advising for the lower-division curriculum is provided through a college academic advisor. Advising for the upper-division curriculum is provided by the school's faculty and advisor.

DEGREE REQUIREMENTS

Urban Planning

The Bachelor of Science in Planning degree requires a total of 120 semester hours.

Preprofessional program courses	60
Professional program courses	60
Total	120

General Studies Requirement. The following curriculum includes sufficient approved course work to fulfill the General Studies requirement. See "General Studies," page 93, for requirements and a list of approved courses. Note that all three General Studies awareness areas are required. Consult an advisor for an approved list of courses.

Graduation Requirements. In addition to fulfilling college and major requirements for this degree, students must meet all university graduation and college degree requirements. See "University Graduation Requirements," page 89, and "College Degree Requirements," page 315.

Bachelor of Science in Planning,
Major in Urban Planning
Preprofessional Program Requirements*

First Year

Fall

ENG 101 First-Year Composition	3
or ENG 105 Advanced First-Year Composition (3)	
PUP 100 Introduction to Environmental Design *HU, G, H*	3
G electives	6
MA elective	3
Total	15

Spring

ENG 102 First-Year Composition	3
or elective if ENG 105 is taken (3)	
C elective	3
Elective	3
SB elective	3
SQ elective	4
Total	16

Second Year

Fall

PUP 190 Sustainable Cities *HU/SB, G*	3
PUP 200 The Planned Environment *HU, H*	3
or any HU elective (3)	
Electives	6
SB elective	3
Total	15

Spring

PUP 301 Introduction to Urban Planning *L*	3
or elective	
Electives	6
Free elective	1
SQ or SG elective	4
Total	14
Preprofessional program total	60

* Transfer credits are reviewed by the college and evaluated as applicable to this curriculum. To be applicable, transfer courses must be equivalent in both content and level of offering.

The first round of admission to the upper-division takes place after the spring semester of the second year. The second round, if needed, takes place after the summer semester.

Bachelor of Science in Planning,
Major in Urban Planning
Professional Program Requirements

Third Year

Fall

PUP 301 Introduction to Urban Planning *L*	3
or Elective (if PUP 301 already taken)	
PUP 361 Introductory Urban Planning Studio	4
PUP 424 Planning Methods	4
Approved statistics or quantitative reasoning *CS*	3
Minimum total	14

Spring

PUP 363 History of Planning	3
PUP 420 Theory of Urban Design *HU*	3
PUP 436 City Structure and Planning	3
Approved program electives*	6
Total	15

Summer

PUP 484 Internship	3
or PUP 484 Study Abroad (3)	
or PUP 485 International Field Studies in Planning *G* (3)	
or approved program elective* (3)	
Total	3

Fourth Year

Fall

PUP 432 Planning and Development Control Law	3
PUP 433 Zoning Ordinances, Subdivision Regulations, and Building Codes	3
PUP 442 Environmental Planning	3
PUP 452 Ethics and Theory in Planning *L*	3
Approved program elective*	3
Total	15

Spring

PUP 434 Urban Land Economics	3
PUP 462 Advanced Urban Planning Studio	4
PUP 510 Citizen Participation	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 93.

Approved program elective*	3
Total	13
Professional program total	60
BSP minimum total	120

* Approved program elective: Select a minimum of four classes (12 semester hours) from the approved SOP list.

Housing and Urban Development

The Bachelor of Science in Design degree in Housing and Urban Development requires a total of 120 semester hours.

Preprofessional program courses	60
Professional program courses core	60
Total	120

General Studies Requirements. The following curriculum includes sufficient approved course work to fulfill the General Studies requirement. See "General Studies," page 93, for requirements and a list of approved courses.

Graduation Requirements. In addition to fulfilling college and major requirements, students must meet all university graduation and college degree requirements. See "University Graduation Requirements," page 89, and "College Degree Requirements," page 315.

Bachelor of Science in Design, Major in Housing and Urban Development Preprofessional Program Requirements[1]

First Year

Fall

ENG 101 First-Year Composition	3
or ENG 105 Advanced First-Year Composition (3)	
HUD 161 Graphic Communication	3
Elective	3
MA elective	3
SB elective	3
Total	15

Spring

ENG 102 First-Year Composition	3
HUD 201 Introduction to Housing and Urban Development	3
HU, H elective	3
SB elective	3
SG or SQ elective	4
Total	16

Second Year

Fall

ALA 200 Introduction to Architecture *HU, G*	3
or any CAED history course (3)[2]	
CON 252 Building Construction Methods, Materials, and Equipment	3
Elective	3
C elective	3
CS statistics elective	3
Total	15

Spring

ACC 230 Uses of Accounting Information I	3
Free elective	1
HU or SB upper-division elective	3
L elective	3
SQ elective	4
Total	14
Preprofessional program total	60

[1] Transfer credits are reviewed by the college and evaluated as admissible to this curriculum. To be admissible, transfer courses must be equivalent in both content and level of offering.

[2] See "College of Design History Courses," on this page. If the selected course does not also satisfy the G requirement, the student must select a course that does satisfy the G requirement either as an elective, or in conjunction with another General Studies course.

College of Design History Courses. These College of Design history courses also fulfill HU. See the course listings for prerequisites.

APH	300	World Architecture I/Western Cultures *HU, G*	3
APH	305	Contemporary Architecture *HU, H*	3
APH	313	History of Architecture I *L/HU, G, H*	3
APH	446	20th-Century Architecture I *HU*	3
DSC	101	Design Awareness *HU, G*	3
GRA	111	Graphic Design History I *HU*	3
GRA	112	Graphic Design History II	3
IND	316	20th-Century Design I *HU, H*	3
IND	317	20th-Century Design II *HU, H*	3
INT	111	Interior Design Issues and Theories *HU*	3
INT	310	History of Interior Design I *HU, H*	3
INT	311	History of Interior Design II *HU, H*	3
INT	412	History of Decorative Arts in Interiors *HU*	3
PUP	200	The Planned Environment *HU, H*	3
PUP	420	Theory of Urban Design *HU*	3

Bachelor of Science in Design, Major in Housing and Urban Development Professional Program Requirements

Third Year

Fall

CON 383 Construction Estimating	4
HUD 301 Housing and Community Design and Development	3
HUD 361 Housing and Urban Development Studio I: Residential Design and Development	2
HUD 363 Housing and Urban Development Seminar I: Residential Design and Development	3
REA elective course	3
Total	15

Spring

CON 389 Construction Cost Accounting and Control *CS*	3
HUD 302 Housing Production Process	3
HUD 362 Housing and Urban Development Studio II: Community Design and Development	2
HUD 364 Housing and Urban Development Seminar II: Community Design and Development	3
HUD 403 Advanced Topics in Housing and Urban Development	3
Elective	3
Total	17

Fourth Year

Fall

CON 495 Construction Planning and Scheduling *CS*	3
HUD 401 Assisted Housing	3

HUD 461 Housing and Urban Development Studio III: Comprehensive Housing Development Process 2
HUD 463 Housing and Urban Development Seminar III: Comprehensive Housing Development Process 3
PUP 452 Ethics and Theory in Planning *L* 3
Total 14

Spring
HUD 402 Community Revitalization: Problems and Strategies ... 3
HUD 462 Housing and Urban Development Studio IV: Neighborhood Revitalization Process 2
HUD 464 Housing and Urban Development Seminar IV: Neighborhood Revitalization Process 3
PUP 433 Zoning Ordinances, Subdivision Regulations, and Building Codes 3
or *PUP 432 Planning and Development Control Law* (3)
Elective 3
Total 14
Professional program total 60
BSD-HUD minimum total 120

INQUIRIES

For more information, call a college academic advisor at 480/965-3584, send e-mail to caed.advising@asu.edu, or write

ACADEMIC ADVISING/STUDENT SERVICES OFFICE
COLLEGE OF DESIGN
ARIZONA STATE UNIVERSITY
PO BOX 871905
TEMPE AZ 85287-1905

HOUSING AND URBAN DEVELOPMENT (HUD)

M HUD 161 Graphic Communication. (3)
fall or spring
Develops drawing skills and understanding of the graphic communication systems used by planning, homebuilding, and landscape architecture professions. *Studio. Cross-listed as PLA 161/* PUP 161. Credit is allowed for only HUD 161 or PLA 161 or PUP 161.

M HUD 201 Introduction to Housing and Urban Development. (3)
spring
Perspectives and issues concerning HUD. Guest lectures by interdisciplinary faculty and private, public, and nonprofit practitioners.

M HUD 301 Housing and Community Design and Development. (3)
fall
Single- and multifamily housing, residential neighborhoods, and planned communities. Affordability in owner-occupied and rental housing. First-time, move-up, and adult markets.

M HUD 302 Housing Production Process. (3)
spring
Development feasibility analysis, finance, contracts, land acquisition, community and permit presentation and negotiation, scheduling, cost control, marketing, and sales.

M HUD 361 Housing and Urban Development Studio I: Residential Design and Development. (2)
fall
Affordable residential design, development, and production process. Studio. Pre- or corequisites: HUD 301, 363; upper-division HUD major.

M HUD 362 Housing and Urban Development Studio II: Community Design and Development. (2)
spring
Neighborhood and new community design and development process. *Studio. Pre- or corequisites:* HUD 301, 361, 363, 364; upper-division HUD major.

M HUD 363 Housing and Urban Development Seminar I: Residential Design and Development. (3)
fall
Affordable residential design, development, and production process. Seminar. Pre- or corequisites: HUD 301, 361; upper-division HUD major.

M HUD 364 Housing and Urban Development Seminar II: Community Design and Development. (3)
spring
Neighborhood and new community design and development process. Seminar. Pre- or corequisites: HUD 301, 361, 362, 363; upper-division HUD major.

M HUD 401 Assisted Housing. (3)
fall
Publicly subsidized and nonprofit housing. Policy, implementation, and administration. FHA, Section 8, FmHA, projects and scatter site, and tax considerations.

M HUD 402 Community Revitalization: Problems and Strategies. (3)
spring
Public policy and strategies for neighborhood revitalization and community renewal. Preservation and adaptive reuse, gentrification, neighborhood safety, and related socioeconomic concerns.

M HUD 403 Advanced Topics in Housing and Urban Development. (3)
fall and spring
Varying topics, such as manufactured housing, homelessness, mortgage and finance in housing, housing abroad, marketing housing, and sustainable community development.

M HUD 461 Housing and Urban Development Studio III: Comprehensive Housing Development Process. (2)
fall
Comprehensive development process simulation. Feasibility analysis, finance, design, community and permit presentation, construction, cost management, and marketing. Studio. Pre- or corequisites: HUD 302, 463; upper-division HUD major.

M HUD 462 Housing and Urban Development Studio IV: Neighborhood Revitalization Process. (2)
spring
Housing rehabilitation, neighborhood revitalization, and urban infill. CDBG, empowerment-enterprise zoning, code enforcement, citizen participation, etc. Studio. Pre- or corequisites: HUD 401, 402, 464; upper-division HUD major.

M HUD 463 Housing and Urban Development Seminar III: Comprehensive Housing Development Process. (3)
fall
Comprehensive development process simulation. Feasibility analysis, finance, design, community and permit presentation, construction and cost management, and marketing. Seminar. Pre- or corequisites: HUD 302, 461; upper-division HUD major.

M HUD 464 Housing and Urban Development Seminar IV: Neighborhood Revitalization Process. (3)
spring
Housing rehabilitation, neighborhood revitalization, and urban infill. CDBG, empowerment-enterprise zoning, code enforcement, citizen participation, etc. Seminar. Pre- or corequisites: HUD 401, 402, 462; upper-division HUD major.

M HUD 484 Internship. (1)
summer

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

URBAN AND ENVIRONMENTAL PLANNING (PUP)

M PUP 100 Introduction to Environmental Design. (3)
fall and spring
Survey of environmental design: includes historic examples and the theoretical, social, technical, and environmental forces that shape

them. Cross-listed as ALA 100. Credit is allowed for only ALA 100 or PUP 100.
General Studies: HU, G, H

M PUP 161 Graphic Communication. (3)
fall or spring
Develops drawing skills and understanding of the graphic communication systems used by planning, home building, and landscape architecture professions. Studio. Cross-listed as HUD 161/ PLA 161. Credit is allowed for only HUD 161 or PLA 161 or PUP 161.

M PUP 190 Sustainable Cities. (3)
fall
Introduces technological, social, and cultural principles and innovations for cities under the notion of sustainability and sustainable development within the global, regional, and local contexts. Lecture, online.
General Studies: HU/SB, G

M PUP 200 The Planned Environment. (3)
fall
Environmental, aesthetic, social, economic, political, and other factors influencing urban development.
General Studies: HU, H

M PUP 261 Urban Planning I. (4)
fall
Planning communication: communication techniques for urban planning and landscape architecture communication. Credit is allowed only for PUP 261 or PLA 261. Prerequisite: PUP 161 (or its equivalent).

M PUP 262 Urban Planning II. (4)
spring
Reading the landscape: observing, experiencing, and graphically expressing the symbolic and aesthetic significance of natural landscapes. Studio. Prerequisite: PUP 261.

M PUP 301 Introduction to Urban Planning. (3)
fall, spring, summer
Theoretical and practical aspects of city planning. Interrelationships among physical planning, environment, government, and society.
General Studies: L

M PUP 322 Computers in Planning. (3)
fall
Planning methods using Geographic Information Systems, database, spreadsheet, image manipulation, and desktop publishing computer software packages. Lecture, lab.

M PUP 361 Introductory Urban Planning Studio. (4)
fall
Basic site planning and design techniques. Collection and analysis of information and basic planning research. Report writing and public presentation skills. Studio. Fee. Prerequisite: upper-division BSP majors.

M PUP 362 Urban Planning III. (4)
spring
Neighborhood planning: local community plan making; urban development and neighborhood improvement. Studio. Fee. Prerequisite: PUP 361 or instructor approval.

M PUP 363 History of Planning. (3)
spring
Historical overview of western urban and regional planning and planning theory, focusing on the 19th and 20th centuries. Prerequisite: College of Design junior standing.

M PUP 412 History of the City. (3)
fall
The city from its ancient origins to the present day. Emphasizes European and American cities during the last five centuries. Cross-listed as APH 414. Credit is allowed for only APH 414 or PUP 412. Prerequisite: College of Design junior standing.
General Studies: H

M PUP 420 Theory of Urban Design. (3)
spring
Analyzes the visual and cultural aspects of urban design. Theories and techniques applied to selected study models. Prerequisite: junior standing.
General Studies: HU

M PUP 424 Planning Methods. (4)
fall
Methods for urban planning research. Emphasizes research design, quantitative and qualitative methods, survey research, and data analysis. Studio. Pre- or corequisites: PUP 301; junior standing.

M PUP 425 Urban Housing Analysis. (3)
fall
Methods for urban planning research. Emphasizes research design, quantitative and qualitative methods, survey research, and data analysis. Prerequisite: junior standing. Pre- or corequisite: PUP 301.

M PUP 430 Transportation Planning and the Environment. (3)
spring
Overview of transportation planning from the perspective of land use planning, economic development, environmental planning, and social needs. Lecture, discussion. Prerequisite: junior standing or instructor approval.

M PUP 432 Planning and Development Control Law. (3)
fall
Case studies on police power, eminent domain, zoning, subdivision controls, exclusion, preservation, urban redevelopment, and aesthetic and design regulation. Prerequisite: admission to upper division or Construction major or instructor approval.

M PUP 433 Zoning Ordinances, Subdivision Regulations, and Building Codes. (3)
fall and spring
Analyzes zoning ordinances, subdivision regulations, building codes, and other planning implementation techniques relative to local development. Prerequisite: upper-division BSP, HUD, or Environmental Planning major.

M PUP 434 Urban Land Economics. (3)
spring
Interaction between space and economic behavior. Examines the use and value of land through economic theories. Prerequisite: admission to upper division or instructor approval.

M PUP 436 City Structure and Planning. (3)
spring
Political structure and organization of government as it relates to planning. Prerequisites: PUP 301; junior standing.

M PUP 442 Environmental Planning. (3)
fall
Environmental planning problems, including floodplains, water quality and quantity, solid and hazardous waste, air quality, landslides, and noise. Field trips. Prerequisites: PUP 301; junior standing.

M PUP 444 Preservation Planning. (3)
spring
History, theory, and principles of historic preservation. Emphasizes legal framework and methods practiced. Prerequisite: junior standing.

M PUP 445 Women and Environments. (3)
fall
Examines the role women play in shaping the built environment; ways built/natural forms affect women's lives. Focuses on contemporary U.S. examples. Prerequisite: junior standing.
General Studies: C

M PUP 452 Ethics and Theory in Planning. (3)
fall
Ethics and theory of professional planning practice in urban and regional communities. Prerequisite: admission to upper division or instructor approval.
General Studies: L

M PUP 461 Urban Planning IV. (4)
fall
Comprehensive planning: collection and analysis of economic, social, and environmental data relevant to urban planning; development of land-use plans. Studio. Fee. Prerequisite: PLA 362 or PUP 362 or instructor approval.

M PUP 462 Advanced Urban Planning Studio. (4)
spring
Comprehensive planning. Synthesis of complex data- and community-based analyses. Advanced report writing and public presentation skills. Studio. Fee. Prerequisite: upper-division BSP. Prerequisite with a grade of "C" or higher: PUP 361.

M PUP 475 Environmental Impact Assessment. (3)
spring
Criteria and methods for compliance with environmental laws; development of skills and techniques needed to prepare environmental impact statements/assessments.

M PUP 484 Internship. (1–12)
fall, spring, summer session 1
Full-time internship under the supervision of practitioners in the Phoenix area or other locale. Credit/no credit. Topics may include the following:
- Study Abroad. (3)

Prerequisite: school major or instructor approval.

M PUP 485 International Field Studies in Planning. (1–12)
summer
Organized field study of planning in specified international locations. May be repeated for credit with school approval. Study abroad, field trip. Cross-listed as PLA 485. Credit is allowed for only PLA 485 or PUP 485.
General Studies: G (3 hours must be taken to secure G credit.)

M PUP 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Environmental Planning Economics. (3)

Prerequisite: junior standing.

M PUP 498 Pro-Seminar. (1–7)
fall
Topics may include the following:
- Senior Pro-Seminar. (1)

M PUP 501 The Idea of Planning. (3)
fall
Comprehensive review of planning profession within a political, governmental, multicultural, and gender framework.

M PUP 510 Citizen Participation. (3)
spring
Theory and practice of citizen participation in planning. Examines and critiques participation techniques and roles of planners. Prerequisite: upper-division BSP, HUD, or Master of Urban and Environmental Design major.

M PUP 520 Planning Theories and Processes. (3)
fall
Reviews past and current theoretical developments related to social change perspectives, the role and ethics of planners. Prerequisite: instructor approval.

M PUP 524 Planning Methods I. (3)
fall
Methods for urban planning research. Emphasizes research design, demographic analysis, forecasting, and survey research. Pre- or corequisite: PUP 501.

M PUP 525 Urban Housing Analysis. (3)
fall
Nature, dimensions, and problems of urban housing, government policy environment, and underlying economics of the housing market.

M PUP 526 Historic Preservation Planning Practice. (3)
spring
In-depth study of practical applications of historic preservation theory and methods. Overview of the professional work of the preservation field. Prerequisite: PUP 444 recommended.

M PUP 531 Planning and Development Control Law. (3)
spring
Case studies on police power, eminent domain, zoning, subdivision controls, exclusion, preservation, urban redevelopment, and aesthetic and design regulation.

M PUP 532 Advanced Urban Planning Law. (3)
spring
Advanced study on selected issues in planning law, such as urban design controls, exclusionary practices, compensable regulation, and tax policy. Prerequisite: PUP 432 or instructor approval.

M PUP 535 Water Law and Planning. (3)
spring
In-depth study of legal materials providing substantive knowledge of water law, water management issues, and land use planning options. Cross-listed as GPH 535. Credit is allowed for only PUP 535 or GPH 535.

M PUP 541 Economics of Environmental Planning. (3)
spring
Application and limitations of economics in environmental planning and policy making in the United States and internationally. Prerequisite: economics or microeconomics course recommended.

M PUP 542 Environmental Administration and Planning. (3)
spring
Environmental administration of policies and their relationship to environmental planning practices. Prerequisite: PUP 442.

M PUP 544 Urban Land Use Planning. (3)
spring
Theory and methods of urban land use planning, including the rational planning process, comprehensive, functional, and neighborhood plans. Pre- or corequisite: PUP 501 or instructor approval.

M PUP 546 Urban Design Policy. (3)
selected semesters
Advanced study of local, state, and federal urban design policy. Prerequisite: PLA 420 or PUP 420.

M PUP 548 Planning for Urban Environmental Sustainability. (3)
fall
Theory and applications connecting sustainability sciences and practice to urban environmental planning. Sustainable urban development, restoration, and preservation.

M PUP 550 Transportation and the Environment. (3)
spring
Examines transportation planning from the perspectives of land use planning, economic development, environmental planning, and social needs.

M PUP 561 Urban Design Studio. (4)
selected semesters
Current urban form and urban landscape design problems within the Phoenix-centered region. Studio.

M PUP 572 Planning Studio I: Data Inventory and Analysis. (4)
fall
Comprehensive planning workshop dealing with real community problems. Focuses on the data gathering and analysis steps of the planning process. Fee. Prerequisite: Master of Environmental Planning major or instructor approval.

M PUP 574 Planning Studio II: Options and Implementation. (4)
spring
Comprehensive planning workshop dealing with real community problems. Focuses on the development of options, plan making, and plan implementation. Studio. Fee. Prerequisite: PUP 572 or instructor approval.

M PUP 575 Environmental Impact Assessment. (3)
spring
Criteria and methods for compliance with environmental laws; develops skills and techniques needed to prepare environmental impact statements/assessments.

M PUP 576 GIS Studio. (3)
spring
GIS as a tool to address large, multifaceted planning problems. Prerequisites: a combination of GPH 373 (or 598) and PAF 591 and PUP 322 or only instructor approval.

M PUP 580 Practicum. (1–12)
fall, spring, summer
Topics may include the following:
- Capstone Studio/Workshop. (5)
  Comprehensive planning workshop dealing with real community problems. Focuses on integrative real-world planning applications culminating in a professional report.

M PUP 584 Internship. (3)
fall, spring, summer session 1
Internship under the supervision of practitioners in the Phoenix area or other locales. Credit/no 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 93.

M PUP 591 Seminar. (1–12)
fall and spring
Topics may include the following:
- Transportation Systems Pro-Seminar

M PUP 593 Applied Project. (1–12)
fall, spring, summer
Topics may include the following:
- Professional Project. (5)
  Applies advanced planning techniques and methodology to a specific, real-world planning issue, with a specified client.

M PUP 598 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Transportation Planning and the Environment

M PUP 599 Thesis. (5)
fall, spring, summer
Creative, scholarly work developed from independent inquiry involving a substantial body of original research. Fee.

M PUP 622 Planning Methods II: Quantitative Planning Analysis. (3)
spring
Methods and models used as the basic quantitative techniques of urban, regional, and environmental planning and policy analysis. Prerequisites: PUP 524; a course in statistics; instructor approval.

M PUP 642 Land Economics. (3)
fall
Land use and locational impact of economic activity and the urban real property market. Prerequisite: instructor approval.

M PUP 644 Public Sector Planning. (3)
spring
Urban fiscal problems and public goods provision in state and local governments. Prerequisites: a course in microeconomics; instructor approval.

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

Department of Visual Communication Design

www.asu.edu/caed/SOD
480/965-8947
AED 162

Mookesh Patel, Chair

Associate Professors: Patel, Sanft

Assistant Professors: Brungart, Schoenhoff

Clinical Associate Professor: Weed

ORGANIZATION

Programs in the Department of Visual Communication Design are organized by the faculty of the department under the direction and administration of the chair, and standing committees of the faculty.

DEGREES

The faculty in the Department of Visual Communication Design offers the Bachelor of Science in Design degree with a major in Graphic Design.

GRAPHIC DESIGN

The Graphic Design program places an emphasis on strategic communication developed through a design process that includes research, analysis, conceptualization, planning, and realization. The process leads to innovative visual communication design solutions for contemporary design problems that are local to global in scope.

Students integrate design theories and methodologies, cultural and contextual studies, environmental and human factors, traditional and contemporary technologies, and visual aesthetics to develop comprehensive design strategies. These strategies are then employed to give experiential and interactive form to physical artifacts (books, brochures, packaging, etc.), virtual artifacts (Web sites, CD-ROMs, kiosks, interfaces, etc.), and environments (exhibits, sign systems, etc.) Faculty professes the objective of valuable and appropriate graphic design that informs, educates, directs, and communicates effectively.

Studio projects prepare students not only for the graphic design profession but also for graduate studies. Studio projects allow students to think critically, both as individuals and as members of multidisciplinary teams. Some Graphic Design students collaborate with Industrial Design students and participate in a program that focuses on integrated innovation, an educational initiative that provides an interdisciplinary experience with academic partners in the schools of business and engineering at ASU. Third-year students perform internships either in a corporation or a consulting firm. Fourth-year students complete their undergraduate studies with a public exhibition, a unique tradition that has earned professional admiration for more than a decade.

Based on a very diversified portfolio upon graduation, students opting for the graphic design profession gain employment in brand and corporate identity, interaction and interface design, broadcast (TV graphics), museum/exhibit, publication, and advertising. Students may also pursue graduate studies leading to careers in design education and other fields of professional endeavor in design. The Graphic Design program is actively involved with the American Institute of Graphic Arts, playing a critical role in the development and facilitation of national and regional initiatives.

Students interested in videography, video games, animation/ film production, cartoon design, illustration, styling, and photography should consult with the School of Art.

MINORS

Design Studies

Students interested in design who do not wish to major in graphic design can earn a minor in Design Studies. The courses may also appeal to students not accepted to the upper-division of graphic design but who wish to pursue the study of design within the Bachelor of Interdisciplinary Studies degree.

Courses selected must satisfy the minimum requirement of 18 semester hours for the minor. In addition, student must take 12 semester hours in upper-division course work.

To enhance understanding of the subject matter, some of the designated courses are sequential in nature and require certain prerequisites. Consequently, students should carefully note the semester in which these particular courses are

offered. All designated courses for the minor in design studies are lecture courses.

To pursue the minor in Design Studies, students must have a minimum cumulative GPA of 2.50.

Designated Courses for the Minor

Design

DSC 101 Design Awareness *HU, G* 3
DSC 236 Introduction to Computer Modeling *CS* 3
GRA 440 Finding Purpose 3

Graphic Design

GRA 111 Graphic Design History I *HU* 3
GRA 112 Graphic Design History II 3
GRA 225 Communication/Interaction Design Theory 3
GRA 345 Design Rhetoric *L* 3

Industrial Design

IND 236 Introduction to Computer Modeling for Industrial Design 3
IND 242 Materials and Design 3
IND 243 Process and Design 3
IND 316 20th-Century Design I *HU, H* 3
IND 317 20th-Century Design II *HU, H* 3
IND 344 Human Factors in Design 3
IND 354 Principles of Product Design 3
IND 470 Professional Practice for Industrial Design *L* 3

Interior Design

INT 111 Interior Design Issues and Theories *HU* 3
INT 121 Introduction to Computer Modeling for Interior Design *CS* 3
INT 131 Design and Human Behavior *SB* 3
INT 238 Introduction to Computer-Aided Design of Built Environments 3
INT 310 History of Interior Design I *HU, H* 3
INT 311 History of Interior Design II *HU, H* 3
INT 412 History of Decorative Arts in Interiors *HU* 3
INT 413 History of Textiles in Interior Design 3

BIS CONCENTRATIONS

A concentration in design 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 139.

GRADUATE PROGRAMS

The College of Design offers a Master of Science in Design (MSD) degree with concentrations in industrial design, interior design, and graphic design. The faculty also participates in a collegewide, interdisciplinary PhD degree in Environmental Design and Planning with concentrations in design; history, theory, and criticism; and planning. For more information, see the *Graduate Catalog*.

ADMISSION

Lower-Division Program. New and transfer students who have been admitted to the university and who have selected Graphic Design as a major are admitted to the lower-division program. Transfer credits for the lower-division program are reviewed by the college and evaluated for applicability to this curriculum. To be applicable, transfer courses must be equivalent in both content and level of offering. A review of samples of work is required for studio classes. Consult a college academic advisor for further information.

Completion of lower-division requirements does not ensure acceptance to an upper-division professional program.

Upper-Division Program. When students have completed the lower-division curriculum requirements, they may apply for acceptance to the upper-division program in Graphic Design. The limited spaces available each year are awarded to applicants with the highest promise for professional success, as determined by each program. The faculty of the Department of Visual Communication Design retains the right to admit any meritorious student who may be deficient in a published department criterion. Such admission requires an extraordinary review of the applicant by the program's admissions committee. Should the faculty choose to admit such an applicant, the student is placed automatically on a provisional admission status with stipulations as to what is required to be removed from probation. See "Application to Upper-Division Programs," on this page.

Students not admitted to upper-division programs are not dismissed from the university and may reapply or transfer to other programs. Students who intend to reapply should meet with a college academic advisor.

APPLICATION TO UPPER-DIVISION PROGRAMS

Upper-Division Application Procedures. Students should write to a college academic advisor for the application form well in advance of the application deadline. For more information on portfolios, students should ask a college academic advisor for a copy of the application and portfolio guidelines. The following dates and procedures are for students applying to 2007–2008 upper-division programs.

Upper-Division Application Deadlines. The following dates and procedures apply to the Graphic Design program.

April 16, 2007. Portfolio and application documents are due in AED 162 by 5 P.M.

June 1, 2007. If the spring 2007 semester includes transfer course work (i.e., course work taken at an institution other than ASU), a student must submit his or her transcripts to the Academic Advising/Student Services office, ARCH 115, no later than June 1. These transcripts may be unofficial copies. A second set of official transcripts must be sent to the University Registrar's office. Application is not complete until the university receives official transcripts for transfer course work. For those transfer students whose academic term ends in June rather than May, this deadline may be extended upon the written request of the applicant.

July 2, 2007. Acceptance notices are mailed no later than July 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 93.

Return of Letter of Acceptance. A signed receipt of acceptance of admission must be received by the school by the date indicated on the Notice of Acceptance. Alternates may be accepted at a later date if space becomes available.

Matriculation. An accepted student is expected to begin his or her upper-division professional program at the beginning of the immediate fall term. There is no spring admission to the upper-division program, and deferrals are not allowed.

Graphic Design Application Requirements. Individual applicants are responsible for obtaining the Graphic Design Application Packet by visiting the College of Design Academic Advising Office in ARCH 115. Application materials are submitted in a portfolio organized by the individual applicant. The student's name must be affixed to the outside, with completed materials appearing in the following order:

1. application to the Graphic Design upper-division program;
2. "Commonly Asked Questions" form; and
3. the Graphic Design Aptitude Test.

The packet contains complete instructions for completing the standard test. This test requires the completion of five problems, which are reviewed by the faculty and which become part of the portfolio of materials considered for admission to the upper-division program.

Return of Portfolios. Application documents (pages 1 to 5) remain the property of the College of Design. However, the remainder of the portfolio is returned after the admissions review, provided the applicant encloses a self-addressed return mailer with sufficient prepaid postage. Portfolios may be claimed in person after July 2, 2007. If the applicant provides written permission, another person may claim the portfolio. After one year, unclaimed portfolios are discarded. While care is taken in handling the portfolios, no liability for lost or damaged materials is assumed by the college or school.

ADVISING

Advising for the lower-division curricula is through a college academic advisor in ARCH 115. Advising for the upper-division curricula is provided by the department's academic advisor in AED 162.

DEGREE REQUIREMENTS

The Bachelor of Science in Design degree requires a minimum of 120 semester hours for a major in Graphic Design. The program may include required field trips. Students are responsible for these additional costs. Foreign study opportunities are available for students. An internship is a required part of the program.

Graphic Design

The curriculum in Graphic Design is divided into a preprofessional (first and second years) and a professional program (third and fourth years):

Preprofessional program	61
Professional program	59
Total	120

The preprofessional curriculum balances a foundation in academic subjects such as English, numeracy, and psychology with design courses that include history and theory, as well as studio courses in drawing and design fundamentals as they relate to conceptual design. Students apply for entry into the professional program after fulfilling two years of the preprofessional program. The upper-division curriculum includes studio work in graphic design and its relationship to problem solving at multiple scales. Projects are intended to educate students to think critically as individuals and as team participants in small and large corporate facilities. A formal eight-week summer internship is required in the professional program. The internship is coordinated by the faculty. Students intern in a variety of settings, including in-house corporate design, publication design, and advertising design agencies.

General Studies Requirement. The following curriculum includes sufficient approved course work to fulfill the General Studies requirement. See "General Studies," page 93, for requirements and a list of approved courses. Note that all three General Studies awareness areas are required. Consult an advisor for an approved list of courses.

Graduation Requirements. In addition to fulfilling college and major requirements for this degree, students must meet all university graduation and college degree requirements. See "University Graduation Requirements," page 89, and "College Degree Requirements," page 315.

Graphic Design—BSD

First Year

Fall

DSC	101	Design Awareness *HU, G*	3
ENG	101	First-Year Composition	3
		or ENG 105 Advanced First-Year Composition if qualified (3)	
GRA	111	Graphic Design History I *HU*	3
GRA	121	Principles for Graphic Design I*	3
MA elective			3
Total			15

Spring

ARS	102	Art from Renaissance to Present *HU, H*	3
ENG	102	First-Year Composition	3
		or elective if ENG 105 is taken (3)	
GRA	112	Graphic Design History II	3
GRA	122	Principles for Graphic Design II*	3
Computer science elective			3
Total			15

Second Year

Fall

GRA	220	Design Drawing I*	3
GRA	221	Letterform*	3
GRA	222	Visual Communication I*	3
GRA	225	Communication/Interaction Design Theory	3
L, C elective			3
Total			15

Spring

GRA	223	Typography*	3
GRA	224	Visual Communication II*	3

PGS 101 Introduction to Psychology *SB* 3
Elective 3
SQ elective 4
Total 16

Preprofessional program total 61

Third Year

Fall
GRA 321 Technology for Design I 3
GRA 440 Finding Purpose 3
GRA 361 Visual Communication III* 5
SQ, SG elective 4
Total 15

Spring
GRA 322 Technology for Design II 3
GRA 345 Design Rhetoric *L* 3
GRA 362 Visual Communication IV* 5
SB upper-division elective 3
Total 14

Summer
GRA 484 Internship: Graphic Design 2
Total 2

Fourth Year

Fall
GRA 421 Exhibit Design 3
GRA 422 Motion Graphics and Interaction Design 3
GRA 461 Visual Communication V* 5
Cultural Awareness elective 3
Total 14

Spring
GRA 423 Advanced Interaction Design 3
GRA 424 Advanced Media 3
GRA 462 Visual Communication VI* 5
Elective 3
Total 14

Professional program total 59

BSD minimum total 120

* Transfer credits for the lower-division program must be equivalent in both content and level of offering. Samples of studio work to be accepted for credit must be submitted for evaluation through the college's Academic Advising Office, ARCH 115. Most studio courses and some lecture courses are sequential. They must be taken in, and may be offered only during, the semester noted.

INQUIRIES

For more information, call a college academic advisor at 480/965-3584, send e-mail to caed.advising@asu.edu, or write

ACADEMIC ADVISING/STUDENT SERVICES OFFICE
COLLEGE OF DESIGN
ARIZONA STATE UNIVERSITY
PO BOX 871905
TEMPE AZ 85287-1905

GRAPHIC DESIGN (GRA)

M GRA 481 Visual Communication V. (3)
Effective through fall 2006
Studio problems with emphasis on analysis, problem solving, and professional portfolio preparation. 6 hours a week. Fee.

M GRA 482 Visual Communication VI. (3)
Effective through spring 2007
Individual and group projects with outside clients. All projects culminate in an exhibit. 6 hours a week. Fee. Prerequisite: GRA 481.

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

GRAPHIC DESIGN (GRA)
New Curriculum
Effective Fall 2004

M GRA 111 Graphic Design History I. (3)
fall
Surveys development of visual communication from its origins to the 20th century. Investigates significant technological, industrial, and social influences.
General Studies: HU

M GRA 112 Graphic Design History II. (3)
spring
Surveys contemporary and 20th-century graphic design. Investigates relationships between gra[phic design and related disciplines, technological, industrial, and social influences. Prerequisite: GRA 111.

M GRA 121 Principles for Graphic Design I. (3)
fall
Graphic design as a language and process for creative thinking and realization. Studio. Prerequisite: Graphic Design major. Corequisite for Graphic Design majors: GRA 111.

M GRA 122 Principles for Graphic Design II. (3)
spring
Continued exploration of graphic design as a language and process for creative thinking and realization. Studio. Prerequisite: GRA 121. Corequisite for Graphic Design majors: GRA 112.

M GRA 194 Special Topics. (1–4)
selected semesters

M GRA 220 Design Drawing I. (3)
fall
Drawing as language to explore and communicate ideas. Development of drawing aptitude as language and process for graphic design thinking. Studio. Prerequisite: GRA 122.

M GRA 221 Letterform. (3)
fall
Drawing of letterforms with focus on proportion and structure. Introduces letterform nomenclature and classifications. 6 hours a week. Fee. Prerequisites: GRA 122. Corequisite: GRA 222.

M GRA 222 Visual Communication I. (3)
fall
Theoretical and applied studies in shape, drawing, and color. 6 hours a week. Fee. Prerequisite: GRA 122. Corequisite: GRA 221.

M GRA 223 Typography. (3)
spring
Theoretical exercises in spatial and textural qualities of type. Problems in tension, activation, and balance. Exercises in simple typographical applications. 6 hours a week. Fee. Prerequisite: GRA 221. Corequisite: GRA 224.

M GRA 224 Visual Communication II. (3)
spring
Transition from theoretical to applied problems. Emphasizes refinement of visual skills. 6 hours a week. Fee. Prerequisite: GRA 222. Corequisite: GRA 223.

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 93.

M GRA 225 Communication/Interaction Design Theory. (3)
fall
Theory related to the design of communication artifacts and interaction within various media environments. Prerequisite: GRA 122 or instructor approval.

M GRA 294 Special Topics. (1–4)
selected semesters

M GRA 321 Technology for Design I. (3)
fall
Explores the process of technology in design. Projects interface with GRA 361. Prerequisite: admission to upper-division program. Corequisite: GRA 361.

M GRA 322 Technology for Design II. (3)
spring
Emphasizes advanced technology in design problems. Projects interface with GRA 362. Prerequisite: GRA 321. Corequisite: GRA 362.

M GRA 345 Design Rhetoric. (3)
fall and spring
Develops critical thinking and expression of ideas in concise and persuasive written and spoken form. Prerequisites: ENG 101, 102. *General Studies: L*

M GRA 361 Visual Communication III. (5)
fall
Explores methodologies of strategic communication, development of visual systems, and information design ideation processes leading to applied projects in print and digital media. Studio. Fee. Prerequisites: GRA 223, 224; admission to upper-division program. Corequisite: GRA 321.

M GRA 362 Visual Communication IV. (5)
spring
Comprehensive studio projects with emphasis on production processes leading to multidisciplinary applied projects in print, 3-D space, and digital media. Studio. Fee. Prerequisite: GRA 361. Corequisite: GRA 322.

M GRA 394 Special Topics. (1–4)
selected semesters

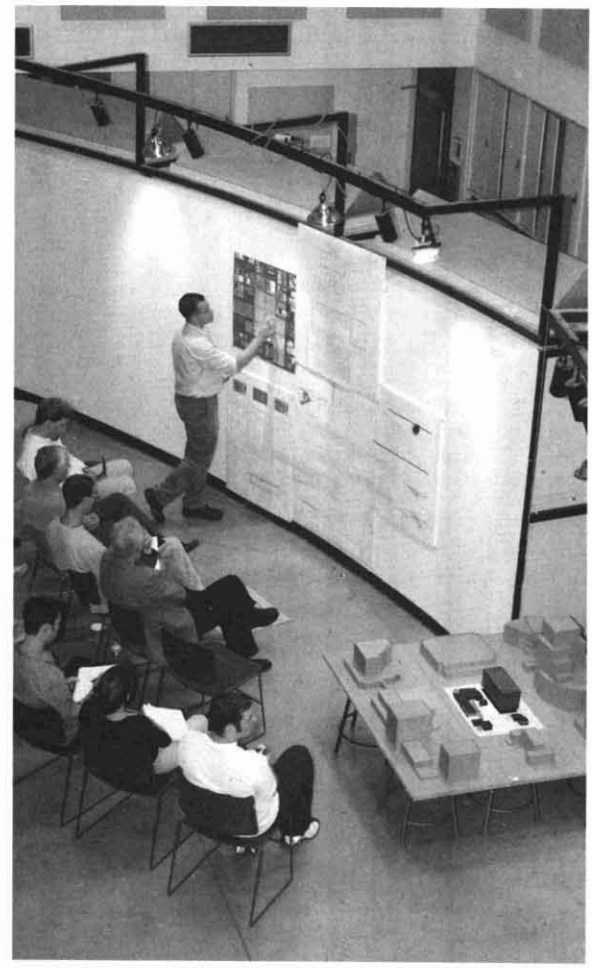
M GRA 421 Exhibit Design. (3)
fall
Familiarization with the processes associated with the design of exhibits, especially visual communication in 3-D. Studio. Prerequisite: GRA 362 or instructor approval.

M GRA 422 Motion Graphics and Interaction Design. (3)
fall
Discusses and explores theory related to the design of motion graphics and interaction through lectures and studio projects. Studio. Prerequisite: GRA 322 or instructor approval.

M GRA 423 Advanced Interaction Design. (3)
spring
Advanced discussion and exploration of theory related to the design of interaction. Prerequisite: GRA 422 or instructor approval.

M GRA 424 Advanced Media. (3)
spring
Advanced exploration of digital media for communication. Studio. Prerequisite: GRA 422. Corequisite for Graphic Design majors: GRA 462.

M GRA 440 Finding Purpose. (3)
fall and spring
Career orientation in the creative professions, including value clarification, decision making, lifestyle planning, goal setting, and expression of individual talents.



The College of Design offers seven undergraduate degree programs. John Buchholz photo

M GRA 461 Visual Communication V. (5)
Effective fall 2007
Comprehensive studio projects with emphasis on design processes, including research, writing, critical thinking, practice, presentation, and analysis. Studio. Fee. Prerequisite: GRA 362.

M GRA 462 Visual Communication VI. (5)
Effective spring 2008
Comprehensive studio projects pursued in cooperation with a public organization or private enterprise. All projects culminate in an exhibit. Studio. Fee. Prerequisite: GRA 461.

M GRA 484 Internship: Graphic Design. (1–3)
Effective summer 2007
Full-time summer internship under supervision of practitioners in the Phoenix area or other locales. Students must register for GRA 484 in the fall semester following their summer internship. Prerequisite: GRA 362.

M GRA 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.

College of Education

coe.asu.edu

Eugene E. Garcia, PhD, Vice President for University-School Partnerships and Dean

Curriculum and Instruction, Division of 363
Educational Leadership and Policy Studies, Division of. 368
Psychology in Education, Division of 369

PURPOSE

For students, choosing a professional college is an important step because it establishes the foundation on which a career will be built. The College of Education provides a stimulating, challenging forum where scholars and practitioners interact in the discovery and mastery of the science and art of educational endeavors. This balanced approach, in which research and practice are viewed as essential and complementary, enables the college to produce superior educators.

The purposes of the faculty of the College of Education are as follows:

1. to engage in the scholarly, scientific, and professional study of education;
2. to prepare competent professionals who will serve in a variety of critical educational roles;
3. to develop productive scholars who will make significant contributions to the educational literature and to the quality of educational practice; and
4. to serve the education profession at the local, national, and international levels.

In accord with these purposes, the College of Education is committed to producing quality scholarship and research and to excellence in teaching.

Information about the college can be found on the Web at coe.asu.edu.

ORGANIZATION

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

Division of Curriculum and Instruction

The Initial Teacher Certification program is the largest program in the college, designed to prepare students for teaching positions in bilingual education, early childhood education, elementary education, English as a second language, secondary education, and special education. The program is a blend of on-campus and school-based methods courses. All programs involve professional school-based internships with experienced teachers. For specific program descriptions, see "Degrees," page 352.

Division of Educational Leadership and Policy Studies

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

Division of Psychology in Education

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

In addition to divisions, administrative units and centers provide services to students and the community. These administrative units and centers are listed below.

Beginning Educator Support Team. Beginning Educator Support Team (BEST) is a quality research-based comprehensive teacher induction and mentoring program that promotes professional growth and development for the ultimate support of student learning. BEST partners with school districts and with individual teachers to provide support in strengthening effective teaching practices and aligning practice to the teaching standards. BEST includes four program components: BEST for Beginning Teachers, BEST Visitation Coaching, BEST Standards in Teaching and BEST for Mentor Teachers. For more information, call 480/965-4339, send e-mail to best@asu.edu, or access the Web site at coe.asu.edu/oss/best.

Bureau of Educational Research and Services. The Bureau of Educational Research and Services (BERS) is a liaison unit of the ASU College of Education. BERS is dedicated to fostering and connecting the human and material resources of the college to the needs in the field of education. BERS engages in information dissemination and service about transforming education and the roles of

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 93.

learners and leaders. BERS provides professional development opportunities, seminars for superintendents, roundtable discussion groups, conference and meeting planning, consulting services, and executive search services. For more information, call 480/965-3538, or access the Web site at bers.asu.edu. BERS is located in ED 140.

Center for Indian Education. See "Center for Indian Education," page 42.

Counselor Training Center. The Counselor Training Center provides counseling for ASU students, staff, and the community at large regarding personal, relationship, and career development issues. Counseling is conducted by graduate students in counseling and counseling psychology under the supervision of licensed psychologists. For more information, call 480/965-5067, or access the Web site at coe.asu.edu/ctc.

CRESMET. See "Center for Research on Education in Science, Mathematics, Engineering, and Technology," page 39.

Education Policy Studies Laboratory. See "Education Policy Studies Laboratory," page 42.

Office of Professional Field Experiences. Part of the Division of Curriculum and Instruction, the Office of Professional Field Experiences places all teacher preparation students in public schools and similar institutions for internships and student teaching. To meet the requirements of school districts applicants to the Initial Teacher Certification programs are required to provide a copy of their fingerprint clearance from the Department of Public Safety. This office monitors students' progress in their field experiences, provides assistance for pre-service teachers who need intervention to improve performance, sponsors courses for mentor teachers, and conducts research on student teacher performance in the field. For more information, call 480/965-6255, or access the Web site at coe.asu.edu/pfe.

Office of Student Services. The Office of Student Services (OSS) is committed to providing a quality, service-oriented environment to promote the development and growth of the education community. The OSS assists undergraduate and postbaccalaureate students interested in entering and completing a teacher preparation program. Services offered by the OSS include high school outreach and recruitment, community college articulation and recruitment, a living and learning community in Manzanita Hall, academic advising, Initial Teacher Certification professional program admissions and retention, scholarships and financial aid, teacher placement, and certification assistance. Students should contact the OSS with questions regarding Declaration of Graduation, program agreements, student petitions, and the Arizona Educators Proficiency Assessment (AEPA) exam.

For more information about services, or to schedule an appointment with an advisor, call 480/965-5555, or access the Web site at coe.asu.edu/oss.

Southwest Center for Education Equity and Language Diversity. See "Southwest Center for Education Equity and Language Diversity," page 42.

Other Units. Other units within the college offering specialized research and educational services include the College of Education Preschool and Technology-Based Learning and Research. For more information about the preschool, call 480/965-2510, or access the Web site at asu.edu/educ/preschool. For more information about Technology-Based Learning and Research, call 480/965-3322, or access the Web site at tblr.ed.asu.edu.

TEACHER EDUCATION

Programs that prepare students for teacher certification by the state are available to both the undergraduate pursuing a first degree and the individual with a college degree in a noneducation field (postbaccalaureate).

Undergraduate students interested in teacher certification in art, music, or dance enroll through programs offered by the Katherine K. Herberger College of Fine Arts. These students must also meet the same eligibility requirements for admission to the Initial Teacher Certification (ITC) program for certification, and a formal application must be submitted to the ITC program. For more information, see "Initial Teacher Certification Professional Program Admission," on this page.

Undergraduate programs leading to the Bachelor of Arts in Education degree are described in the text that follows. Information about postbaccalaureate certification programs can be obtained by either visiting the Office of Student Services, EDB L1-13, or by accessing the Web site at coe.asu.edu/oss. For descriptions of graduate degree programs, see the *Graduate Catalog*. For more information, see the "College of Education Graduate Degrees and Majors," page 362.

ADMISSION

Preprofessional Admission

All newly admitted students to the ASU College of Education are admitted as preprofessional education majors. Preprofessional students are advised by a team of academic advisors whose primary focus is on preparing students for admission into the Initial Teacher Certification (ITC) program during their junior year. Admission to ASU with preprofessional status in the College of Education does not guarantee admission to the ITC program. Admission to the ITC is a separate, competitive process. Preprofessional students are strongly encouraged to meet each semester with the preprofessional team of advisors to ensure proper progression through their chosen major. It is crucial that all applicants seeking application to the ITC program gain valuable experience with the population of students they intend to teach; the Office of Student Services can provide information on various opportunities to gain such experience. To schedule an appointment with a preprofessional advisor, call 480/965-5555.

Initial Teacher Certification Professional Program Admission

Undergraduate students are eligible for admission consideration into the Initial Teacher Certification (ITC) program if they meet the following criteria:

1. They must have admission to the Tempe campus as a degree-seeking student. Application information is available at www.asu.edu/admissions. Students planning to begin the ITC program in the spring should submit ASU admission materials in May. Students planning to begin the ITC program in the fall should submit admission materials in October.
2. They must have a minimum 2.50 cumulative GPA (ASU GPA and transfer GPA combined) (verified one month before program start date).
3. They must have a minimum 2.50 cumulative ASU GPA by the time the student begins the ITC program (verified one month before program start date).
4. They must have completed at least 56 semester hours (verified one month before program start date).
5. They must have completed the following prerequisites (or be completing them): ENG 101 and 102, the Mathematics (MA) requirement, and the Literacy and Critical Inquiry (L) requirement or the Natural Science (SQ or SG) requirement. Proof of in-progress course work (transcripts) must be submitted within the student's ITC Application Portfolio. The above courses must be completed with grades of "C" (2.00) or higher by the time the student begins the ITC program (verified one month before program start date). For more information regarding courses that satisfy these requirements, consult with an Office of Student Services (OSS) advisor. Students from out-of-state institutions or students from outside of the Arizona public community college and university system need to have course equivalency approval before submitting an application.
6. They must have demonstrated experience with children/adolescents. Individuals who wish to become teachers need to have demonstrated a commitment to working with children in a way that helps children/adolescents learn a new skill, acquire knowledge, reinforce concepts, or expand their talents. The applicant's interactions with children/adolescents need to be observed by a supervisor and referred to in the letters of recommendation.
7. They must have a fingerprint clearance card (verified one month before the program start date).
8. They must have made formal application to the ITC program by February 1 for fall admission or September 1 for spring admission.

Note: Secondary Education students must complete a portion of their academic specialization before submitting application materials. See an advisor for more details.

Admission is a selective, competitive process and is not guaranteed to all who satisfy the minimum admission requirements. The ITC application is available online at coe.asu.edu/oss/admission before application deadlines.

Some ITC programs have additional admission requirements; consequently, students should consult with an OSS academic advisor as they prepare to apply to the ITC program of their choice, to verify what additional requirements must be met. Students may also attend an Initial Advising Session (IAS), offered through the OSS, to learn more about the ITC application and admission process. To schedule an IAS appointment, call the OSS at 480/965-5555.

Professional Program Application Deadlines

The College of Education has three admission cycles. Priority application deadlines for most ITC programs are February 1 for fall admission and September 1 for spring admission. An additional application deadline of June 1 applies to students seeking spring admission to the Apprentice Teacher Program (ATP) or fall admission to the Integrated Certification in Teacher Education (INCITE) and the Teacher Education and Certification Highway + Master in Education option (TEACH+ME) postbaccalaureate programs. Spring admission to INCITE follows the regular September 1 deadline. For the most updated admission dates, access the ITC admission Web site at coe.asu.edu/oss/admission.

Transfer Students

To be considered for admission to the ITC program, transfer students must first be formally admitted to ASU. For more information, see "Transfer Students or Readmission Students," page 67.

Note: Once students receive notification of ASU admission, all education transfer students must attend an Initial Advising Session (IAS) as their first step in securing academic advising from the college. These sessions are conducted by academic advisors and are provided in groups according to the student's desired degree program (early childhood, elementary, secondary, special education, multilingual/multicultural). During the IAS, students are given an overview of the various ITC programs available, application requirements are discussed, and individualized degree audits (through the Degree Audits Reporting System) are provided to each student. Course selection, degree requirements, and general education requirements are also covered during these sessions. To sign up for an IAS, call the Office of Student Services at 480/965-5555. ASU Undergraduate Admissions should receive the application for admission to ASU, transcripts, and other required information at least five months before the ITC application deadline for the desired ITC admission semester.

Students who are considering transferring to ASU and the College of Education, who are not yet committed to ASU as their school of choice, may schedule an appointment with the transfer recruitment specialist by calling 480/965-5555.

Transfer students from Arizona institutions should access the ASU Education Transfer guides for optimal course selection on the Web at asu.edu/provost/articulation.

Postbaccalaureate Students

Postbaccalaureate programs prepare students for certification by the state and are designed for those students who hold a bachelor's degree in an area other than education. The college offers postbaccalaureate programs in early childhood education, elementary education, multilingual/multicultural education, secondary education, and special

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 93.

education. Information on postbaccalaureate programs is available through the Office of Student Services, EDB L1-13 (480/965-5555). The office provides academic advising and information regarding requirements, procedures, and deadline dates.

A student who wishes to be considered for admission to the ITC program must meet the following College of Education admission requirements for postbaccalaureate programs:

1. be admitted to ASU as a nondegree graduate student;
2. have earned a bachelor's degree from an accredited institution;
3. possess a junior/senior cumulative GPA of 2.50 or higher on a 4.00 scale; and
4. have submitted a completed application form and supporting materials by the appropriate deadline dates during the semester before admission.

Note: Students in the secondary education program must complete academic specialization requirements. Visit the Office of Student Services, EDB L1-13, for this form. INCITE applicants must submit passing scores on the Arizona Educator Proficiency Assessment subject knowledge portion at time of application. INCITE and TEACH+ME programs require concurrent admission to the Division of Graduate Studies. Applicants must also meet Division of Graduate Studies eligibility requirements.

Admission is competitive and not guaranteed to all who satisfy the minimum admission criteria.

Some academic units have additional requirements. Students seeking admission to ITC programs should consult the Office of Student Services in the College of Education (480/965-5555) to determine if there are additional admission requirements for their teaching fields.

Information on deadline dates and applications can be downloaded via the Web at coe.asu.edu/oss/admission.

ADVISING

All new students are required to meet with an academic advisor before registering for their first semester. To further assist and support freshmen in their first year, these students are also required to meet with an advisor before registering for their second semester. Each fall, freshmen are notified of "Welcome Week." Freshmen should take advantage of this time to meet with their advisors. This is an opportunity to consult with advisors regarding academic difficulties, avenues for student involvement in campus activities, and preparation of spring schedules. To schedule an appointment with an advisor, call 480/965-5555.

DEGREES

Bachelor of Arts in Education

The College of Education offers five Bachelor of Arts in Education (BAE) degree programs. See the "College of Education Baccalaureate Degrees and Majors" table, page 353, for more information on these degrees and their concentrations. Candidates for the BAE degree must complete the Initial Teacher Certification program in their major as offered by the College of Education. Graduates of this program demonstrate proficiency in specified knowledge areas or skills, including the following:

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

Initial Teacher Certification Programs

The Initial Teacher Certification (ITC) program is the largest program in the College of Education. It consists of the following areas of academic study: early childhood education, elementary education, secondary education, multilingual/multicultural education, and special education. Within these five degree areas, multiple teacher education programs exist in order to meet the diverse interests and circumstances of students. Students apply to one of the 12 ITC programs, based on their unique interests and needs. The ITC programs offered through the college are as follows:

1. Apprentice Teacher Program (ATP) (K–8);
2. Diné Teacher Education Program (DTEP) (K–8);
3. Early Childhood Interprofessional Program (ECD) (birth–grade 3);
4. Elementary Education Partnership Program (EEPP) (K–8);
5. Indigenous Teacher Preparation Program (ITP);
6. Integrated Certification in Teacher Education (INCITE) (secondary education—postbaccalaureate only);
7. Multilingual/Multicultural Education Program (MLMC) (K–8);
8. Secondary Education (SED) (7–12);
9. Special Education (SPE) (K–12);
10. Summer Certification Institute in Secondary Mathematics (SCISM) (7–12);
11. Teacher Education and Certification Highway + Masters in Education option (TEACH+ME) (elementary education—postbaccalaureate only); and
12. Teacher Education for Arizona Mathematics and Science (TEAMS) (secondary education—postbaccalaureate only).

For more information about these ITC programs, call 480/965-5555, or access the Office of Student Services Web site at coe.asu.edu/oss.

Apprentice Teacher Program. Apprentice Teacher Program (ATP) is a concentrated elementary education program that is completed in one calendar year, January through December, with all course work field experiences and student teaching based in participating schools. The

College of Education Baccalaureate Degrees and Majors

Major	Degree	Concentration[1]	Administered By
Early Childhood Education	BAE	—	Division of Curriculum and Instruction
Elementary Education	BAE	Optional: indigenous teacher preparation program or multilingual/multicultural education[1]	Division of Curriculum and Instruction
Secondary Education	BAE	Academic specializations: biological sciences, business, chemistry, Chicana and Chicano Studies,[2] economics, English, family and human development,[2] French, geography, German, history, Japanese, mathematics, physics, political science, social studies, or Spanish	Division of Curriculum and Instruction
Selected Studies in Education[2]	BAE	—	College of Education
Special Education	BAE	—	Division of Curriculum and Instruction

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

[2] Applications are not being accepted at this time.

program conforms to the public school calendar, thus extending the academic year for ASU students by eight weeks. Students are engaged in K–5 classroom experiences and ASU classes from 8 A.M. to 4 P.M., Monday through Friday for 46 weeks. The theoretical premise that undergirds the ATP program might be called "practice informed by theory," as students are immersed in both "school" and "teacher" cultures throughout the program. Admission is for spring semester only, with a June 1 priority deadline and a September 1 final deadline.

Diné Teacher Education Program. The Diné Teacher Education Program (DTEP) is a collaborative effort between Diné College and the ASU College of Education. All course work is done at the Diné College campus (Tsaile, Arizona) and all field placements are in Navajo bilingual classrooms in Navajo schools. The program is designed to prepare Navajo teachers to teach in Navajo communities of the Navajo Nation. This program meets the requirements for an initial teaching certificate for elementary education and an Arizona endorsement in bilingual education. For more information, call 928/724-6819.

Early Childhood Interprofessional Program (Birth–Grade 3). The early childhood program (ECD) has a core focus on interprofessional education that includes cross-training. Students work with members of other disciplines and collaborate between and across community programs and university departmental structures to promote broad-based professional preparation. Students participate in schools and community agencies that also operate cross-professionally. The early childhood faculty and its community partners work from a child-sensitive, or constructivist approach that emphasizes constructivist theory, multiple points of view, emergent learning, and a developmental, integrative approach to classroom practice. The program includes course work for a provisional English as a second language endorsement, and is a birth–grade 3 certification program. For course requirements, see "Course Requirements," page 356.

Elementary Education Partnership Program (K–8). Students in the Elementary Education Partnership Program (EEPP) work in three different elementary schools, one each semester, before their student teaching. Each semester, or block, includes methods courses that are taught on an elementary school campus through an internship of six hours each week. Students become an integral part of the life of the elementary school, and assignments link the classroom observations and experiences to the content of the methods courses. Faculty from each of the school sites coordinate assignments and activities to ensure a wide range of learning experiences; some assignments are continued across semesters. Course content is in place to qualify all students in this program for a provisional English as a second language endorsement. A fast track option is available, but it is a highly competitive process. Consult with an academic advisor in the Office of Student Services for application deadlines and criteria. For course requirements, see "Course Requirements," page 357.

Indigenous Teacher Preparation Program. Through the commitment of the College of Education and with the collaborative efforts of the ASU Center for Indian Education, the Indigenous Teacher Preparation Program (ITP) intends to meet the unique educational and culturally related academic needs of indigenous children. ITP has developed a program focusing on cultural knowledge and sensitivity; it emphasizes pedagogy and strategies that are most effective for indigenous learners. ITP strives to prepare high quality beginning teachers for elementary certification, provide a developmental and responsive curriculum focused on Indian

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 93.

education, foster knowledge and values of the indigenous community, and promote leadership in teaching and teacher education. The program benefits teaching candidates through a cohort for support, an apprentice model for field experiences, and numerous university resources.

Integrated Certification in Teacher Education. INCITE is a flexible program that prepares working adults to become secondary education teachers. All course work is offered during the evening and on weekends except for secondary education methods courses, which may be offered only during daytime hours depending on the corresponding college's schedule. Daytime field experience internship hours are required. INCITE is designed for postbaccalaureate students only.

Multilingual/Multicultural Program. The MLMC program is a four-semester sequence offered in "blocks" with focused field requirements in selected elementary schools that offer bilingual and/or ESL settings. The bilingual education option prepares teachers to teach elementary students whose primary language is Spanish or a Native American language spoken in Arizona. The ESL option prepares teachers to teach elementary school students from any language background who are still acquiring English as an additional language. Methods courses are often divided into BLE or ESL sections, although some course work is planned together to promote collaboration. The program meets Arizona requirements for an elementary education teaching certificate with an endorsement in bilingual education or English as a second language. For course requirements, see "Course Requirements," page 358.

Secondary Education (7–12). In order to integrate teacher education preparation with the secondary education requirement for an academic specialization, the College of Education maintains connections with academic departments across the university. Each program semester requires an internship in the schools, and some courses are taught in the field. Graduates are eligible for secondary certification in grades 7–12 in one of 15 active academic specializations, and have the option of adding a middle school endorsement. In addition to these 15 active secondary education programs, three additional specializations are available through the Herberger College of Fine Arts, including Music Education (choral-general or instrumental music), Art Education, and Dance Education. Fine Arts majors receive a recommendation for a K–12 endorsement. Students with a major in Secondary Education have two academic advisors: one in the college and department of the academic specialization and one in the Office of Student Services in the College of Education. For course requirements, see "Course Requirements," page 360.

Special Education. The special education program (SPE) leads to the BAE degree in Special Education and to certification in K–12 special education for children with learning disabilities, mild mental retardation, or emotional/behavioral disorders. This program provides preparation in each of the three disability areas; however, the student only qualifies for a teaching certificate in one area, which is determined by the area of student teaching placement. A school internship is required for each semester. For course requirements, see "Course Requirements," page 360.

Summer Certification Institute for Secondary Mathematics. The Summer Certification Institute for Secondary Mathematics (SCISM) program is designed to increase the pool of secondary mathematics teachers defined as highly qualified under the No Child Left Behind legislation. This goal is accomplished by recruiting high performing mathematics majors in the spring of their junior year and making it possible for them to complete the requirements of a BA or BS in mathematics and a BAE with mathematics certification in a timely, convenient, and affordable manner. Field experience is offered in the Phoenix Union High School District. The program consists of six-week sessions of classroom and field experiences during the two summers surrounding the senior year, and an academic year field experience with a learning community. Students do their student teaching in the fall following their senior year.

Teacher Education and Certification Highway + Masters in Education option. Teacher Education and Certification Highway + Masters in Education (TEACH+ME) is a self-paced postbaccalaureate program geared toward working adults interested in achieving elementary (K–8) teaching certification or current teaching professionals who do not possess elementary education certification. The program offers students an array of experiences. Students learn the most recent teaching strategies and become an interactive force in the development of a professional teacher education model. Students also participate in teaching experiences with a mentor teacher and students in designated urban schools.

Teacher Education for Arizona Mathematics and Science. Teacher Education for Arizona Mathematics and Science (TEAMS) is a 10-month program, with course work leading to 7–12 certification and an optional middle school endorsement. It is a combined postbaccalaureate/master's program specializing in mathematics, science, and technology, and is based on technology, field-based experiences, internships, and course work. Students attend classes full-time during daytime hours.

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 89.

DEGREE REQUIREMENTS

A minimum of 120 semester hours is required for the Bachelor of Arts in Education (BAE) degree. The BAE degree consists of four areas:

1. General Studies;
2. College of Education core requirements;
3. academic specialization (Secondary Education only); and
4. Initial Teacher Certification (ITC) program courses.

The College of Education expects degree candidates to meet individual course assessment standards, field-experience observation criteria, courses required for teacher certification, and other proficiency standards and performance criteria required to demonstrate knowledge and skill in the areas listed under "Bachelor of Arts in Education," page 352.

The degree program also includes courses and academic content required for teacher certification by the State of Arizona. Students seeking certification in one of the fine arts must complete degree requirements in the Katherine K. Herberger College of Fine Arts and specified courses through the ITC program.

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 as described in "General Studies," page 93. Note that all three General Studies awareness areas are required. General Studies courses are listed in "General Studies Courses" table, page 96, in the course descriptions, in the *Schedule of Classes,* and in the *Summer Sessions Bulletin.*

Preprofessional students should complete as many of the General Studies courses as possible before admission to the ITC program. Students are encouraged to consult with an academic advisor to ensure they comply with all necessary requirements.

College of Education Core Requirements

The Initial Teacher Certification program prepares students for teacher certification and requires students to complete semester hours selected from specific core courses pertinent to the teaching area. Courses listed under this portion of the academic major are governed by the general ASU "Guidelines for Determination of Catalog Year."

For more information, see "Guidelines for Determination of Catalog Year," page 89.

Initial Teacher Certification Program Courses

The Initial Teacher Certification (ITC) program is a sequential program consisting of 36 to 55 semester hours. Ranging from nine to 19 hours per semester, the courses for one semester must be completed before enrolling in the next semester. In other words, courses for one semester usually may not be taken at the same time as those scheduled for another semester. In addition to ITC courses, students continue completing the General Studies requirement and core requirements or academic specialization requirements through the third semester of the program (except for students applying to the Apprentice Teacher Program in Elementary Education). Courses listed under this portion of the academic major are governed under an alternative catalog year, and students should consult with an academic advisors before applying to the ITC program of their choice, to determine the ITC courses for their designated admission date.

Declaration of Graduation

Undergraduate students must file a declaration of graduation during the first semester of enrollment in the ITC program. Preprofessional students completing 87 hours (the university limit for registering without a program of study) who have not been admitted to the ITC program must meet with an advisor to obtain a registration waiver by the College of Education. See "University Graduation Requirements," page 89.

Field Experience Requirements

In addition to course work, students admitted to the ITC program are required to participate in directed field experiences during each of the four semesters of the program. The field experiences progress from short-term observation and participation to long-term supervised practice teaching. School districts require fingerprint clearance of all adults working in classrooms. Subsequently, such clearance is required in the professional programs.

Students should expect these field experiences to be above and beyond the class times listed in the *Schedule of Classes* for each semester. Such field experiences typically take place in schools throughout the greater Phoenix area. Regular attendance is required during all field experiences. Students should plan extra travel time and expect to confer with placement teachers and field facilitators before or after scheduled field experiences. To meet field experience requirements, students must plan to have their own transportation and *be available during regular school hours.*

Teaching is a highly demanding and extraordinarily complex profession. Students desiring to become teachers must maintain academic standards and demonstrate requisite qualifications for successful teaching, including effective interpersonal skills, basic communication skills, appropriate professional conduct, and satisfactory performance during field experience assignments.

Observation and participation assignments in the schools during first, second, and third semester field experience placements are designed to prepare students for the highly demanding performance-based student teaching during semester four.

School districts require fingerprint clearance of all adults working in their classrooms. Therefore, fingerprint clearance is required of students in the professional programs.

Student Teaching. The culminating field experience, called *student teaching,* occurs in the final semester of the ITC program and is a full-day, full-semester obligation. Student teaching takes place only during fall and spring semesters.

Student teaching is a full-time, 15 week, commitment under the supervision of a mentor teacher. To be eligible for a student teaching placement, individuals must apply by the deadline determined each semester by the Office of Professional Field Experiences. Students must complete all program requirements before beginning a student teaching assignment. Student teachers must adhere to the calendar, regulations, and philosophy of the schools in which they are placed. Beginning and ending dates for student teaching are determined by the Office of Professional Field Experiences in cooperation with the participating school. Because student teaching is on a full-day schedule, 8 A.M. to 4 P.M. Monday through Friday for 15 consecutive weeks, student

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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 93.

Academic Specializations

Academic Specialization	Page
Art education[1]	448
Biological sciences	603
Business	289
Chemistry	529
Dance education[1]	466
Economics	536
English	538
Family and human development[2]	544
French	584
Geography	549
German	584
History	558
Japanese	584
Mathematics	615
Music education[3]	472
Physical education	229
Physics	626
Political science	631
Social studies	558
Spanish	584

[1] Art education and dance education concentrations are under corresponding BFA majors.

[2] Applications are not being accepted at this time.

[3] Students pursue a BM degree with a major in Music Education.

teachers are strongly encouraged to avoid extra activities and outside employment that would interfere with the heavy demands placed upon them while student teaching.

For course requirements for each academic specialization, refer to the location shown in the "Academic Specializations" table, on this page.

For approval to student teach, ITC students must

1. have attained a high level of professional standards in previous field experience assignments;
2. be in good standing as defined in the ITC Retention and Continuation Policy;
3. have a Fingerprint Clearance Card on file when submitting a student teaching application;
4. not have an incomplete grade in any ITC course;
5. complete all ITC courses (with a "C" [2.00] or higher);
6. have all General Studies, College of Education, and academic specialization course work completed (If student teaching in fall, a student must complete all courses by the end of the first summer session; if in spring, by the end of the fall semester.); and
7. have an approved Declaration of Graduation (undergraduates) or Program Agreement (postbaccalaureates) on file.

Students may be provisionally approved to start the paperwork for a student teaching placement if final course work is in progress. Provisional approval is not given if courses are outstanding (not in progress). Students may not take any courses while student teaching unless approved by the College of Education Standards Committee. For more information, contact an academic advisor in the Office of Student Services.

MAJOR REQUIREMENTS

Early Childhood 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

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

College of Education Requirements[1]

ECD 210 The Developing Child: Theory into Practice: Birth–Pre–K	3
ECD 214 The Developing Child: Theory into Practice: K–3	3
ECD 220 Nutrition, Health, and Safety for Young Children[2]	2
MCE 446 Understanding the Culturally Diverse Child *C*	3
MTE 180 Theory of Elementary Mathematics	3
MTE 181 Theory of Elementary Mathematics	3
RDG 334 Children's Literature and Elementary School Curriculum	3
or EED 334 Children's Literature and Elementary School Curriculum (3)	
SPE 311 Orientation to Education of Exceptional Children *SB, C*	3
Fine arts requirements	6
Total	29

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

[2] This course can be taken before beginning ECD ITC program or completed by start of Block 2.

ITC Program Courses[1]

Semester I

ECD 300 Principles of Interprofessional Collaboration	3
ECD 315 Classroom Organization and Guidance in the Early Years	2
ECD 394 ST: Technology, Media, and Community-Based Education for Young Children	1
ECD 400 Inquiry into Teaching and Learning	3
ECD 496 Field Experience	1
EDT 300 Computers in Education	1
SPF 401 Theory and Practice in Education	1
Total	12

Semester II

BLE 408 SEI for Linguistically Diverse Learners	3
ECD 406 Assessment: Birth–Age 8	3

ECD 476 Integrated Curriculum: Birth–Pre-K 3
ECD 494 ST: Apprenticeship: Pre-K or Infant-Toddler[2] 4
Total 13

Semester III[3]
ECD 401 Integrated Curriculum and Assessment: Social Studies and Creative Arts 3
ECD 404 Teaching Reading and Language Arts in Early Childhood 3
ECD 420 Integrated Curriculum and Assessment: Science 3
ECD 480 Integrated Curriculum and Assessment: Mathematics .. 3
ECD 496 Field Experience 1
Total 13

Semester IV
ECD 478 Student Teaching in Early Childhood K–3[4] 8–10
ECD 479 Early Childhood Education Student Teaching Seminar 1
ECD 481 Issues and Practices in Early Childhood Education 1
SPE 416 Quality Practices in the Collaborative Classroom[5] 3
Total 13–15

ITC program course total 52–54

[1] A minimum grade of "C" (2.00) is required in all courses.
[2] Apprenticeship is for nine weeks, four half days per week.
[3] These methods courses may be team-taught in pairs for seven weeks plus one Saturday session.
[4] Student teaching, K–3, during Block 4, is for 12 weeks. Each week requires four full days per week, with the fifth day for course meetings.
[5] SPE 416 may be taken before Block 4 and may be tailored for early childhood.

Elementary Education (Partnership Program)—BAE

The Partnership program includes three semesters of field placement in classroom settings, drawing on the rich resources of the Phoenix metropolitan area. The fourth semester is a 15-week, full-time student teaching capstone experience. Course content is in place to qualify all students in this program for a provisional ESL endorsement.

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*

EDP 303 Human Development *L/SB* 3
or CDE 232 Human Development *SB* (3)
or ECD 314 The Developing Child: Theory into Practice: K–3) (3)
or EDP 313 Childhood and Adolescence (3)
EDP 310 Educational Psychology *SB* 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 9
Total 27

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

ITC Program Courses*

Semester I
EED 433 Language Arts Methods, Management, and Assessment in the Elementary School 3
EED 496 Field Experience 1
EED 498 PS: Integrated Children's Literature 1
RDG 415 Teaching Phonics 3
RDG 494 ST: Teaching Reading/Practicum Grades K–3 3
SPE 416 Quality Practices in the Collaborative Classroom 1
SPF 401 Theory and Practice in Education 1
Total 13

Semester II
BLE 408 SEI for Linguistically Diverse Learners 3
EDT 300 Computers in Education 1
EED 455 Social Studies Methods, Management, and Assessment in the Elementary School 3
EED 496 Field Experience 1
EED 498 PS: Integrated Children's Literature 1
RDG 494 ST: Teaching Reading/Practicum Grades 4–8 3
SPE 416 Quality Practices in the Collaborative Classroom 1
Total 13

Semester III
EED 420 Science 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 2
SPE 416 Quality Practices in the Collaborative Classroom 1
SPF 301 Culture and Schooling *L* 3
Total 12

Semester IV
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 (Apprentice Teacher Program)—BAE

Offered jointly with local school districts, the Apprentice Teacher Program (ATP) is a concentrated, full-time, daytime certification program option that is completed in one calendar year, with all course work based in the participating schools. This full-immersion program begins each January and leads to K–8 teacher certification.

Course Requirements. The Initial Teacher Certification (ITC) program is completed in one calendar year, spring admission only. All course work (General Studies 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 93.

College of Education requirements) not included in the ATP program, must be completed before beginning the program. Additionally, undergraduate students must complete 70 semester hours by the start of the program. The program schedule conforms to the public school calendar rather than the ASU calendar, thereby extending the academic year by eight weeks. The program is intense but efficient. Students are actively engaged in classroom experiences or ASU course work for at least seven hours every day (Monday–Friday) for 46 weeks. 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	9–14

College of Education Requirements*

EDP 310 Educational Psychology *SB*	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	9
Total	21

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

ITC Program Courses*

Semester I: Spring

EDP 303 Human Development *L/SB*	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 language proficiency to the Office of Student Services before an Institutional Recommendation is provided to the student. English as a Second Language guidelines are available on the Arizona Department of Education Web site.

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
MTE 180 Theory of Elementary Mathematics	3
MTE 181 Theory of Elementary Mathematics	3
RDG 334 Children's Literature and Elementary School Curriculum	3
SPE 311 Orientation to Education of Exceptional Children *SB, C*	3
Fine arts requirements	6
Language proficiency[2]	0–6
Total	21–27

[1] A minimum grade of "C" (2.00) is required in all courses. MCE 446 Understanding the Culturally Diverse Child (3) is strongly recommended as an elective.

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

ITC Program Courses[1]

Semester I: Living the Scholarly Life of a Multicultural Citizen

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
MCE	447	Diversity in Families and Communities in Multicultural Settings	3
SPF	401	Theory and Practice in Education	1
Total			11

Semester II: Living the Scholarly Life of Science and Math

BLE	408	SEI for Linguistically Diverse Learners	3
BLE	420	Science Methods, Management, and Assessment in BLE/ESL Settings	3
BLE	480	Mathematics Methods, Management, and Assessment in Elementary BLE/ESL Settings	3
BLE	496	Field Experience	1
EDT	300	Computers in Education	1
SPE	416	Quality Practices in the Collaborative Classroom	3
Total			14

Semester III: Living the Scholarly Life of Literacy/Biliteracy

BLE	335	Language Diversity in Classrooms	3
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
Total			13

Semester IV

BLE	478	Student Teaching in the Elementary School[2]	12
ITC program course total			50

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

[2] Student teaching requires students to student teach in multicultural, multilingual school settings—without exception. Multicultural/multilingual school faculty identify classrooms that meet the above requirement.

Elementary Education (Indigenous 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

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 356.

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 93.

Course Requirements. All methods courses (including SED 403) must be taken with a field experience. SED 403 must 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/SB*	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]

BLE 407 SEI for Secondary Students	3
or BLE 408 SEI for Linguistically Diverse Learners[2] (3)	
MTE 180 Theory of Elementary Mathematics	3
MTE 181 Theory of Elementary Mathematics	3
Fine arts requirements	6
Total	15

[1] A minimum grade of "C" (2.00) is required in all courses.
[2] Students may choose between the secondary or elementary version of SEI. BLE 407 and 408 can be taken in semester I, II, or III, but *not* with student teaching in semester IV.

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 314 Introduction to Bilingual/Multicultural Special Education	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 Instructional Management and Strategies: Reading and Writing	3
SPE 415 Classroom and Behavior Management	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.

SCHOOL OF EXTENDED EDUCATION

The university-wide School 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 "School of Extended Education," page 134, 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.

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.

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 139.

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 362, 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 93.

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,[2] curriculum studies, early childhood education, elementary education,[2] English as a second language,[2] Indian education,[2] language and literacy, mathematics education, science education, secondary education, or social studies education[2]	Division of Curriculum and Instruction
	PhD	Art education,[3] curriculum studies, early childhood education, elementary education, English education, language and literacy, mathematics 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] Applications are not being accepted at this time.

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

Division of Curriculum and Instruction

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

James Middleton, Director

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

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

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

Clinical Associate Professors: P. Garcia, Mathur

Clinical Assistant Professor: Christine

Lecturers: Atkinson, Cocchiarella, Esch, Fain, Harrison, Rabe, 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)
Summer Certification Institute in Secondary Mathematics (SCISM)
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 362, and the *Graduate Catalog.*

BILINGUAL EDUCATION (BLE)

For more BLE courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M 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.

M 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.

M 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.

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

M 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.

M 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.

M 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.

M 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.

M 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.

M 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.

M 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.

M 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.

M 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.

M 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.

M 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)

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

M 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. Prerequisite: ITC admission.

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/catalog 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)

For more DCI courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M DCI 396 Field Experience. (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.

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

M 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/catalog 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)

For more ECD courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M ECD 210 The Developing Child: Theory into Practice: Birth–Pre-K. (3)
fall and spring or summer
Organizing, planning, and implementing developmentally appropriate educational practices to provide optimal learning environments for infants and toddlers in group settings.

M ECD 214 The Developing Child: Theory into Practice: K–3. (3)
fall and spring or summer
Examines all aspects of development of children, kindergarten through age eight, with implications for teachers and parents. Requires classroom observation and participation.

M 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.

M 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.

M 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.

M ECD 394 Special Topics. (1–4)
selected semesters
- Technology, Media, and Community-Based Education for Young Children

M 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.

M 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.

M 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.

M 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.

M 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.

M 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.

M ECD 406 Assessment: Birth–Age 8. (3)
fall and spring or summer
Assessment and evaluation principles, techniques, and issues related to children birth through eight years. Test construction and interpretation. Lecture, discussion. Prerequisite: ITC admission.

M 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.

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

M ECD 476 Integrated Curriculum: Birth–Pre-K. (3)
fall and spring or summer
Introduction to teaching children birth through pre-K, including classroom organization, curriculum, and professional relationships. Lecture, demonstrations. Prerequisite: ITC admission.

M ECD 477 Apprenticeship: Pre-K or Infant/Toddler. (4)
fall and spring or summer
Supervised practicum in a pre-K or infant/toddler, school-or center-based program. Practicum. Prerequisite: ITC admission. Corequisite: ECD 476.

M ECD 478 Student Teaching in Early Childhood (K–3). (3–15)
fall and spring
Supervised teaching in the K–3 classroom setting. Synthesized experience in curriculum, instruction, classroom organization, and guidance of young children. May be repeated for credit. Practicum. Prerequisites: ITC admission; minimum 2.50 GPA; PFE office approval.

M ECD 479 Early Childhood Education Student Teaching Seminar. (1)
fall and spring or summer
Concurrent course with the student teaching experience that provides support, content, and critical evaluation opportunities directly related to teaching practices. Discussion. Prerequisite: ITC admission. Corequisite: ECD 478.

M ECD 480 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.

M ECD 481 Issues and Practices in Early Childhood Education. (1)
fall and spring or summer
Stakeholder analysis of teacher education experiences applicable to preparation that leads to increased educational opportunity and success for diverse children. Lecture, discussion. Prerequisite: ITC admission.

M ECD 494 Special Topics. (1–4)
selected semesters
- Apprenticeship: Pre-K or Infant/Toddler

M ECD 496 Field Experience. (0–3)
fall and spring or summer
Applies course content in diverse birth–3rd grade settings through observation, planning child-sensitive curriculum, implementing learning strategies, and assessment. May be repeated for credit. Practicum. Fee. Prerequisite: ITC admission.

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/catalog 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)

For more EED courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M 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.

M 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.

M 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.

M 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.

M 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.

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 93.

M 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.

M 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.

M 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.

M 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/catalog 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)

M 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.

M 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.

M 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

M 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

M 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.

M 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.

M 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.

M 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

M 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.

M 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.

M 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

M 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.

M 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

M 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

M 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.
General Studies: HU/SB, C, H

M 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.

M 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.

M 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)

M 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

M 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)

For more RDG courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M 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.

M 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.

M 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.

M 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.

M 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.

M 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.

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

SECONDARY EDUCATION (SED)

For more SED courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M 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.

M 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.

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

M SED 494 Special Topics. (1–4).
selected semesters
Topics may include the following:
- Methods of Teaching Science. (3)

M 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/catalog 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)

For more SPE courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

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

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

M 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

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 93.

M 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.

M 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.

M 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.

M 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.

M 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.

M 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.

M 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.

M 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.

M SPE 414 Instructional Management and Strategies: Reading and Writing. (3)
fall and spring
Organization and delivery of instruction, including formative evaluation techniques. Instructional techniques of reading and writing. Requires regular participation in a field experience. Prerequisite: ITC admission.

M SPE 415 Classroom and Behavior Management. (3)
fall and spring
Analysis and intervention into social behavior problems of exceptional populations. Requires regular participation in a field experience. Prerequisite: ITC admission.

M 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.

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

M 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.

M SPE 419 Instruction in Content Areas: Science and Social Studies. (3)
fall and spring
Develops and implements instructional methods and learning strategies for students with special needs related to science and social studies. Prerequisite: ITC admission.

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

M 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.

M 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.

M SPE 498 Pro-Seminar. (1–7)
fall and spring
Small-group study and research for advanced students within 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/catalog 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/elps
480/965-6357
ED 120

Terrence G. Wiley, Director

Regents' Professors: Berliner, Glass, Smith

Professors: Appleton, Barone, Beaulieu, Bernstein, González, McCarty, Molnar, Ovando, Swadener, Tobin, Turner, Valverde, Webb, Wiley

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

Assistant Professors: Begaye, 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

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 362, 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/catalog 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)

M 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

M 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.

M 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, Kinnier, Klein, Moore, Robinson Kurpius, Strom, Sullivan, Tracey

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

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

Clinical Associate Professors: Caterino, Glidden-Tracey, Horner, 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 362, and the *Graduate Catalog*.

COUNSELOR EDUCATION (CED)

For more CED courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M 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

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 93.

M 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

M 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)

M 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 a 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 the classroom of McClintock Residence Hall. Open to freshmen through senior undergraduates; all majors welcome.

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

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

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

M 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)

For more EDP courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M 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.

M 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/SB

M EDP 310 Educational Psychology. (1–6)
fall, spring, summer
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.)

M EDP 313 Childhood and Adolescence. (3)
fall, spring, summer
Principles underlying total development of pre- and early-adolescent children. Emphasizes physical, intellectual, social, and emotional development with practical implications for teachers.

M 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)

For more EDT courses, see the "Course Prefixes" table, or access www.asu.edu/aad/catalogs/courses. The campus designation—D (Downtown Phoenix), E (Polytechnic), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M EDT 300 Computers in Education. (1)
fall, spring, summer
Introduces general computer applications, electronic portfolios, educational software, and World Wide Web to integrate computer technology with teaching and instruction.

M EDT 321 Computer Literacy. (3)
fall, spring, summer
Surveys the role of computers in business, industry, education, and personal life. Lab experience with word processing, spreadsheet, and presentation software as well as Internet research and the creation of a personal Web site. 2 hours lecture, 2 hours lab.
General Studies: CS

M 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

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

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

M 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.

Ira A. Fulton School of Engineering

www.fulton.asu.edu

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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/studentaffairs/studentlife/judicial/academic_integrity.htm.

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

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 93.

Fulton School Admission Requirements for Freshmen and Transfer Students

Student	Admission Level	Admission Criteria		
Freshmen	Preprofessional	Minimum transfer GPA of 3.00 if any No minimum number of transfer hours No high school math or science deficiency	*and*	Class ranking in upper 25% *or* ABOR GPA of 3.00 minimum *or* ACT minimum combined score of 24 *or* SAT minimum combined math and verbal score of 1140
	Professional	Minimum transfer GPA of 3.50 if any No minimum number of transfer hours No high school math or science deficiency	*and*	ACT minimum combined score of 32 *or* SAT minimum combined math and verbal score of 1400
Transfer students	Preprofessional	Minimum transfer GPA of 3.00 24 transfer hours or more No high school math or science deficiency	*or*	Minimum transfer GPA of 3.00 Less than 24 transfer hours No high school math or science deficiency *and* Class ranking in upper 25% *or* ABOR GPA of 3.00 minimum *or* ACT minimum combined score of 24 *or* SAT minimum combined math and verbal score of 1140

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 certification 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 Fulton School is home to a number of rigorous professional programs. To help ensure student success in these programs the Fulton School has higher admission requirements than those for the university. High school students are expected to have completed a college preparation curriculum including math through precalculus and at least three years of high school lab science preferably in biology, chemistry, and physics. Transfer students are likewise expected to have performed well in their postsecondary work. 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.

All the programs within the Fulton School are divided into two parts. The freshmen and sophomore years of the program are designated as the preprofessional portion while the junior and senior years are designated as the professional portion. Students in the preprofessional program are only permitted to register for lower-division (100- and 200-level) classes within the school. Promotion from preprofessional to professional status is competitive and not automatic (see "Promotion to Professional Status," page 373).

The following material defines the admission standards for different categories of students.

Direct Admission at the Professional Level. A few high performing freshmen are admitted directly to the professional level. These students will still take the freshmen and sophomore courses but will not have to compete for promotion. If a directly admitted student fails to maintain acceptable academic performance the student may be demoted back to the preprofessional level. Direct admission at the professional level is reserved for freshmen who have completed a college preparation curriculum, have scored 1400 or higher for the sum of the verbal and math portions of the SAT or 32 or higher for the combined ACT, and, if any post secondary transfer work exists, have a transfer GPA of at least 3.50, as shown in the "Fulton School Admission Requirements for Freshmen and Transfer Students" table, on this page.

Freshmen. Most freshmen are admitted to the preprofessional level. Admission to the Fulton School requires high school students to have completed a college preparation curriculum, to have a transfer GPA of 3.00 or higher (if any transfer courses exist) and to satisfy at least one of the high school performance criteria (see "Fulton School Admission Requirements for Freshmen and Transfer Students" table, on this page). Freshmen who are not initially qualified for admittance may still gain admission to the school via the transfer student or change of major route.

Transfer Students. All transfer students are initially admitted to the preprofessional level but some may be eligible to apply for promotion to professional level (see "Promotion to Professional Status," on this page). The admission standards have been set to select students who are ready for one of the professional programs (e.g., demonstrated math and science competency) and who have demonstrated the ability to succeed in a postsecondary environment (at least 24 hours of work with a GPA of 3.00 or higher). Transfer students with less than 24 transfer hours must also satisfy one of the high school performance criteria. Upon admission to one of the school's programs it is highly recommended that transfer students make an appointment to meet with the program's academic advisor to assess their status and develop a plan for success.

International Students. Foreign nationals must meet the same admission requirements shown in the "Fulton School Admission Requirements for Freshmen and Transfer Students" table, page 372 with the possible additional requirement of a minimum TOEFL score. If the university requires a TOEFL score (see "TOEFL," page 73) then admission to the Fulton School requires a minimum TOEFL score of 550 (paper based), 213 (computer based), 79 on iBT (internet based) or a minimum IELTS score of 6.5.

General Education Development. Students admitted to the university after successful completion of the General Education Development examination are admitted as preprofessional students within their major provided they meet the minimum ACT or SAT score required for admission as listed in the"Fulton School Admission Requirements for Freshmen and Transfer Students" table, page 372.

Admission by Change of Major. Students moving into the Fulton School from an ASU program outside of the school are admitted at the preprofessional level. Students who are changing majors must meet the admission standards established for transfer students. Students interested in changing majors are encouraged to make an appointment with an advisor in the program of interest to discuss the probability of success and to develop a plan of action to ensure successful promotion. Change of major is not guaranteed and may be denied based on lack of evidence that the student can successfully complete the program.

Readmission. Students who have been gone from the university for one or more semesters and want to return to the school will need to have a cumulative ASU GPA of 3.00 or higher. Students returning to the same program in Fulton are readmitted to the program at the same level (preprofessional or professional) they had before leaving the school. Students returning to a new program in Fulton are readmitted at the preprofessional level. Returning students who have a cumulative GPA of less than 3.00 may request review by the Office of the Associate Dean of Academic Affairs. As with transfer students it is strongly recommended that each readmitted student consult with an advisor in the program they plan on pursuing to determine the likelihood of being promoted to the professional level.

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.

PROMOTION TO PROFESSIONAL STATUS

Promotion from the preprofessional to the professional level is competitive. All programs within the school use the same general process but the particular requirements are program specific and are listed under each department. Promotion is based on a combination of factors defined by each program but as a minimum consists of the cumulative GPA (ASU and transfer courses if any) for a set of specific courses (referred to as the skill-set). Some programs augment the skill-set criterion with other materials (e.g., a cumulative ASU GPA, essay, exam, etc.). The minimum GPA required for promotion is program specific.

The skill-set for each program has the following characteristics:

1. courses are all lower division (100- and 200-level) courses required by the program for graduation;
2. courses give some prediction of success in the upper-division courses;
3. set includes at least 24 semester hours of course work; 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 93.

4. courses are all included within the first three semesters of a program as shown in the "Typical Four-Year Sequence" (see departmental material).

Students must apply for promotion and are only permitted to request promotion in the program in which they are currently enrolled. The application period is open for the entire semester and closes with the beginning of final exams. The earliest semester a student can apply for promotion is during the semester they are completing a program's skill-set. A typical promotion sequence would be

1. student completes skill-set during third semester;
2. student applies for promotion during third semester;
3. student enrolls for fourth semester course work during third semester;
4. student's request for promotion is processed during the early part of the fourth semester; and
5. student (if successful) is promoted to professional level and registers for fifth semester (first semester of upper-division Fulton course work).

Students completing some of the skill-set courses at institutions other than ASU will need to have course results transferred to ASU before their application for promotion can be considered.

The skill-set courses for each program can be found in the departmental write-ups or at www.eas.asu.edu/fulton/transfers/professional_programs_general.php.

ADVISING

Successful completion of a program in the Fulton School requires careful planning. While final responsibility for becoming familiar with and understanding academic degree requirements lies with the student, each department employs professional academic advisors who 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 the school's sources of academic support. Students may also work with a faculty advisor familiar with the chosen field of specialization. Students should consult with an advisor before registering each semester.

Earning promotion in a timely manner requires careful planning. Normally promotion requests are made during the third semester and promotion decisions are made during the fourth semester of a typical four-year sequence of classes. This ensures that the student has classes they can take while the promotion decision is being made. All students are encouraged to meet with a program advisor when they are admitted to a program to discuss promotion and how best to proceed.

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.

Advisors and staff in the Office of the Associate Dean for Academic Affairs in the school are available to assist individual students with many different types of advising issues. They 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; hear grade grievances; and assist with other administrative matters. For more information, access the school's Web site at fulton.asu.edu/fulton.

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. Generally the special permits are not issued until after grades have been posted (see, "Probation," page 377 for details).

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 74.

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.

Ira A. Fulton School of Engineering Baccalaureate Degrees and Majors

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

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

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

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, on this page. 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 376. 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*.

SCHOOL OF EXTENDED EDUCATION

The university-wide School 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 "School of Extended Education," page 134, 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 89). A well-planned program of study enables students to meet all requirements in a timely fashion. 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 93.

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	Executive embedded systems	Ira A. Fulton School of Engineering
	PhD	Materials science and engineering	Department of Chemical and Materials 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.

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 96, 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 89. 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.

ACADEMIC STANDARDS

The school has developed and enforces a number of academic standards, these are designed to support students who are struggling academically and to insure the quality of the school's graduates.

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.

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 ensure that they get the necessary help. There are many reasons why students fail to make satisfactory progress and meeting with a program academic advisor to work out a program for success is crucial. Students may be required to reduce their course load (13 semester hours maximum), retake courses, or even take courses outside of the program if the advisor judges these measures will help bring the student back to good standing.

Registration for Next Semester Classes. Before students on probation can register for classes in the next semester they must receive advising in their department and then obtain a special permit from an advisor in the Office of the Associate Dean for Academic Affairs. Permits are also required for summer school registration. Generally permits are not issued until final grades for the current semester have been recorded by the registrar but the school may issue the permits immediately following preregistration to some eligible students. Student on probation should check with their department's academic advisor to see if they are eligible for an early permit.

Conditions for Probation. A student is placed on probation when specific academic expectations are not met. Some conditions trigger an automatic placement on probation whereas others trigger an automatic review of the student's case to determine if probation is warranted. When a probation review is triggered, the final decision is made by the student's department, which also determines any conditions of probation.

Automatic probation is triggered by any of the following:

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; and
3. an ASU Cumulative GPA below 2.00 (for more than 55 semester hours).

Automatic review is triggered by any one of the following:

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

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

Disqualification. Students who are on academic probation and fail to meet the school's retention standards become ineligible to continue working toward a degree within the school. Disqualification occurs if the probationary student

1. does not attain a semester GPA of 2.25 or higher; or
2. has a cumulative GPA below 2.00 at the end of the probationary semester; or
3. has been placed on probation for two consecutive semesters.

Students who have been disqualified are subject to the following limitations:

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.

Students who have been disqualified are encouraged to consider these options:

1. They may be eligible to change their major to another college if they have an acceptable cumulative GPA. The acceptable GPA level depends on the number of hours completed course work. Students should check with an advisor in the Office of the Associate Dean of Academic Affairs to determine if they are eligible.
2. They may take nonengineering courses during summer and winter sessions.
3. They 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 3.00 or higher, and a cumulative GPA of 2.50 or higher for all courses completed.

SPECIAL PROGRAMS

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 BS or BSE degree. Interested students should contact their major department for details.

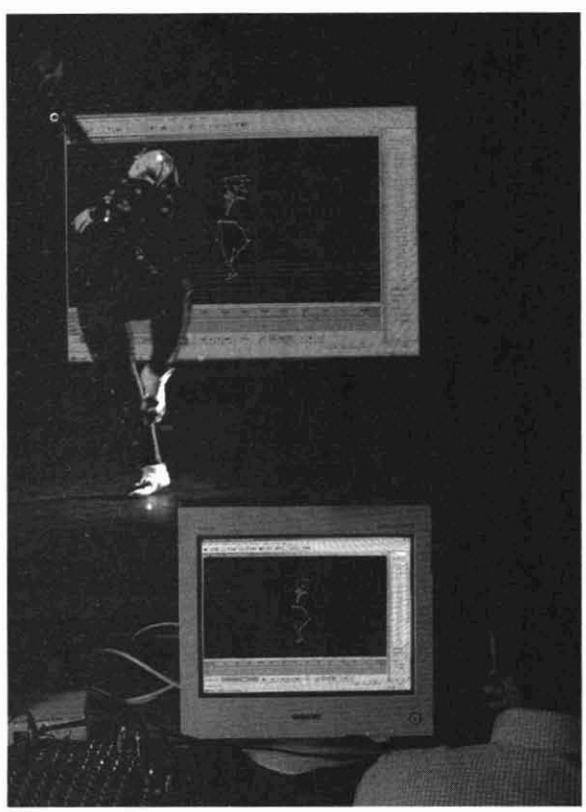
Undergraduate Research. The Fulton Undergraduate Research Initiative (FURI) program allows undergraduate students to participate in university-level research. Students, in collaboration with mentors, make proposals to FURI to fund the research work they want to perform. Students are eligible to apply after only one semester of work. Projects range from one semester to several years. A research poster symposium is held each semester to present the results of

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 93.

the research. For more information, access the school's Web site at eas.asu.edu/fulton/departments/furi/index.php.

Certificate Program in Technology Entrepreneurship. Engineers and scientists around the globe launch high-tech companies to move their ideas to the market. Studies show that the majority of innovative products and services in the economy evolve from entrepreneurial ventures. By providing knowledge and skills important to the creation and leadership of such startups, the certificate program in Technology Entrepreneurship aims to train the founders and leaders of tomorrow's high-tech ventures. The certificate program is designed specifically for engineers. Courses are approached from the perspective of the student whose primary interest is in technological innovation, whose primary concentration is on engineering, and who has little or no prior business education. For more information, call 480/965-9480.

Science Math Engineering Competition Awards (SMECA) Scholarships. The school has a limited number of scholarships available to students who competed during high school in regional or national science, mathematics or engineering competitions (e.g., National Science Fair, FIRST). The scholarship is renewable up to five years. Interested students should access the school's Web site at www.fulton.asu.edu/fulton/students/sas/scholarships.php for details.



The Arts, Media, and Engineering program is offered collaboratively by the Katherine K. Herberger College of Fine Arts and the Ira A. Fulton School of Engineering.

Tim Trumble photo

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 by invitation; students winning a SMECA scholarship receive automatic membership.

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/sa/fa_website.

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.

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 FSE 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 145.

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 fulton.asu.edu/fulton/students/sas/scholarships.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.

Del E. Webb School of Construction

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

James J. Ernzen, Interim Director

Professors: Badger, Kashiwagi

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

Assistant Professors: Fiori, Mitropoulos, Sullivan

Senior Lecturer: Knutson

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 sciences courses on which students may build defined concentrations to suit individual backgrounds, aptitudes, and objectives. These

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 93.

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.

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, the Construction Women's Alliance, and the Mechanical Contractors Association of America.

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 372; and "Degree Requirements," page 381. Students applying to the program will be admitted to either the professional or preprofessional category depending upon their qualifications. For more information about the Fulton School of Engineering, see "Admission," page 372.

Vocational and craft-oriented courses taught at community colleges are not accepted for credit toward a bachelor's degree in Construction.

The Preprofessional Program. Each student admitted to the Del E. Webb School of Construction preprofessional program will follow the freshman and sophomore sequence of courses listed in the section "Typical First Two Year Course Sequence," page 382. Students should follow the recommendations of their staff and faculty academic advisors in completing the prescribed background and skill courses in preparation for passage to the professional program. The skill courses are

COM	225	Public Speaking *L*	3
CON	221	Applied Engineering Mechanics: Statics	3
CON	243	Heavy Construction Equipment, Methods, and Materials	3
CON	251	Microcomputer Applications for Construction	3
CON	252	Building Construction Methods, Materials, and Equipment	3
ECN	212	Microeconomic Principles *SB*	3
ENG	102	First-Year Composition	3
MAT	294	ST: Calculus for Engineers I	3
PHY	111	General Physics *SQ*[1]	3
PHY	113	General Physics Laboratory *SQ*[1]	1
STP	226	Elements of Statistics *CS*	3
Total			31

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

The Professional Program. The junior and senior years constitute the professional program of the undergraduate curriculum. Admission to the professional program is competitive and limited by available resources. Admission is awarded to those applicants demonstrating the highest promise for professional success. The admissions committee considers overall transfer GPA and ASU GPA as well as grades achieved in the skill courses listed above. Students seeking professional status must have completed all of the skill courses before applying. Students who wish to apply to the Del E. Webb School of Construction professional program must submit an application during one of the three annual application periods. Candidates are strongly encouraged to visit with their faculty and staff academic advisors at the beginning of the semester in which they wish to apply to obtain information regarding academic qualifications, admissions criteria, and application deadlines. The application form can be found on the department's Web site at construction.asu.edu. All applicants must be admitted to ASU by the time they submit their professional program application and must provide official SAT or ACT scores and must have completed all the skill-set classes.

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 89) 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. Participation in a summer management internship is required for all students between the third and fourth year 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 120 semester hours with at least 45 hours at the upper-division level is required for graduation from the program. 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 93, and all university graduation requirements as noted in "University Graduation Requirements," page 89. Note that all three General Studies awareness areas are required. Consult an advisor for an approved list of courses.

SCHOOL COURSE REQUIREMENTS

First Year Composition Requirements[1]

Choose one of the following combinations 6

ENG 101 First-Year Composition (3)
ENG 102 First-Year Composition[2] (3)

— or —

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

— or —

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

First year composition total 6

General Studies[3]

Humanities and Fine Arts/Social and Behavioral Sciences

CON 101 Construction and Culture: A Built Environment *HU, G, H* 3
ECN 211 Macroeconomic Principles *SB* 3
ECN 212 Microeconomic Principles *SB*[2] 3
HU/SB and awareness area course 3
HU/SB (upper division) and awareness area course 3

HU/SB awareness area subtotal 15

Literacy and Critical Inquiry

COM 225 Public Speaking *L*[2] 3
CON 496 Construction Contract Administration *L* 3

L, C awareness subtotal 6

Natural Sciences

PHY 111 General Physics *SQ*[2, 4] 3
PHY 113 General Physics Laboratory *SQ*[2, 4] 1
Physical science elective *SQ/SG* 4

SQ awareness subtotal 8

Mathematical Studies

MAT 294 ST: Calculus for Engineers I[2] 3
STP 226 Elements of Statistics *CS*[2] 3

MA, CS awareness subtotal 6

General Studies/school requirements total 35

Courses in Major Requirements Common to All Concentrations

ACC 394 ST: Financial Analysis and Accounting for Small Businesses 3
CON 221 Applied Engineering Mechanics: Statics[2] 3
CON 223 Strength of Materials 3
CON 241 Surveying 3
CON 243 Heavy Construction Equipment, Methods, and Materials[2] 3
CON 251 Microcomputer Applications for Construction[2] 3
CON 252 Building Construction Methods, Materials, and Equipment[2] 3
CON 296 Field Internship 1
CON 371 Construction Management and Safety 3
CON 383 Construction Estimating 4
CON 389 Construction Cost Accounting and Control *CS* 3
CON 394 ST: Biological Considerations in Construction 1
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 495 Construction Planning and Scheduling *CS* 3
LES 305 Legal, Ethical, and Regulatory Issues in Business 3

Courses in common requirements subtotal 52

Concentration requirements subtotal[5] 27
Major total 79

Program total 120

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

[2] This is a skill-set course.

[3] Students are encouraged to select HU/SB courses to complement their technical program. For more information, see "General Studies," page 93.

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

[5] For details on concentration requirements, see "Concentrations," on this page.

Concentrations

There are four concentrations available in construction, the course requirements are given below.

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 93.

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	194	ST: Introduction to Construction 1
CON	273	Electrical Construction Fundamentals 3
CON	310	Testing of Materials for Construction 3
CON	345	Mechanical Systems 3
CON	472	Development Feasibility Reports *L* 3
CON	483	Advanced Building Estimating 3
CON	494	ST: Leadership, Management, and Entrepreneurship in Construction 2
PUP	432	Planning and Development Control Law 3
REA	380	Real Estate Fundamentals 3
Upper-division elective 3		
Total 27		

Concentration in Heavy Construction. The heavy construction concentration prepares students for careers related to the public works discipline. Typical projects in which they are involved are highways, railroads, airports, power plants, rapid transit systems, process plants, harbor and waterfront facilities, pipelines, dams, tunnels, bridges, canals, sewerage and water works, and mass earthwork.

Requirements

CON	194	ST: Introduction to Construction 1
CON	273	Electrical Construction Fundamentals 3
CON	310	Testing of Materials for Construction 3
CON	345	Mechanical Systems 3
CON	486	Heavy Construction Estimating 3
CON	494	ST: Heavy Construction Project Management 3
CON	494	ST: Leadership, Management, and Entrepreneurship in Construction 2
Upper-division electives 9		
Total 27		

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	194	ST: Introduction to Construction 1
CON	273	Electrical Construction Fundamentals 3
CON	310	Testing of Materials for Construction 3
CON	345	Mechanical Systems 3
CON	377	Residential Construction Production Procedures 3
CON	477	Residential Construction Business Practices 3
CON	494	ST: Leadership, Management, and Entrepreneurship in Construction 2
MKT	382	Advertising and Marketing Communication 3
PUP	432	Planning and Development Control Law 3
REA	380	Real Estate Fundamentals 3
Total 27		

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	194	ST: Introduction to Construction 1
CON	273	Electrical Construction Fundamentals 3
CON	310	Testing of Materials for Construction 3
CON	345	Mechanical Systems 3
CON	468	Mechanical and Electrical Estimating 3
CON	471	Mechanical and Electrical Project Management 3
CON	494	ST: Cleanroom Construction 3
CON	494	ST: Leadership, Management, and Entrepreneurship in Construction 2
Upper-division electives 6		
Total 27		

Typical First Two Year Course Sequence

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 120 semester hours required for the degree. The course work for the first two years is similar for all concentrations.

First Semester

CON	101	Construction and Culture: A Built Environment *HU, G, H* 3
CON	194	ST: Introduction to Construction 1
ECN	211	Macroeconomic Principles *SB* 3
ENG	101	First-Year Composition 3
MAT	294	ST: Calculus for Engineers I 3
PHY	111	General Physics *SQ*[1] 3
PHY	113	General Physics Laboratory *SQ*[1] 1
Total 17		

Second Semester

COM	225	Public Speaking *L* 3
CON	252	Building Construction Methods, Materials, and Equipment 3
ECN	212	Microeconomic Principles *SB* 3
ENG	102	First-Year Composition 3
HU/SB and awareness area course 3		
Total 15		

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

CON	223	Strength of Materials 3
CON	241	Surveying 3
Construction elective from concentration 3		
HU/SB and awareness area course 3		
SQ elective with lab[2] 4		
Total 16		

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

[2] Physical science elective with lab required to secure SQ credit.

CONSTRUCTION (CON)

M 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

M CON 194 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Introduction to Construction. (1)

M 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 (or 294 ST: Calculus for Engineers I); PHY 111, 113.

M 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.

M CON 241 Surveying. (3)
fall, spring, summer
Theory and field work in construction and land surveys. Cross-listed as CEE 281. Credit is allowed for only CEE 281 or CON 241. Fee. Lecture, lab. Prerequisite: MAT 270 (or 294 ST: Calculus for Engineers I).

M 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.

M 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. Lab. Fee.

M 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."

M 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.

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

M 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.

M 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.

M 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.

M 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.

M 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.

M 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

M CON 394 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Biological Considerations in Construction
- Gender, Race, Class in the Construction Industry Workforce
- Megaprojects: Their Impacts on Society

M 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.

M 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.

M 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 212.

M 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.

M 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: CON 273, 345, 383.

M 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.

M 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

M CON 477 Residential Construction Business Practices. (3)
spring
Topics addressed include development, marketing, financing, legal issues, and sales. Prerequisites: CON 389; MKT 382.

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M 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.

M 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.

M CON 486 Heavy Construction Estimating. (3)
fall
Methods analysis and cost estimation for construction of highways, bridges, tunnels, dams, and other engineering works. Lecture, field trips. Prerequisites: CON 241, 383.

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

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

M CON 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Cleanroom Construction. (3)
  fall
- Heavy Construction Project Management. (3)
- Leadership, Management, and Entrepreneurship in Construction. (2)

M 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

M 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; senior standing.
General Studies: L

M 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/catalog 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 BS or BSE; and
4. those who wish to take certain electives in engineering while pursuing another program in the university.

ADMISSION

All engineering and computer science programs are divided into two parts: a preprofessional program and a professional program. Students are generally admitted into one of the preprofessional programs. For information regarding requirements for admission, transfer, retention, disqualification, and reinstatement in the Fulton School of Engineering, see "Admission," page 372 and "Academic Standards," page 376. For information regarding the professional programs see ""Promotion to Professional Status," page 373 or departmental material.

Students who are beginning their initial college work in engineering should have completed a rigorous university preparation curriculum in secondary school. Such a curriculum would generally consist of four years of English; four years of mathematics through at least precalculus, including a course with trigonometry; and three years of lab science, including chemistry and physics. Biology, calculus, and computer programming are recommended. Students who do not meet subject matter requirements may be required to complete additional university course work to meet the prerequisites for required courses. One or more of the following courses may be required to satisfy omissions or deficiencies upon admission: CHM 113 General Chemistry, CSE 180 Computer Literacy, CSE 181 Applied Problem Solving with Visual BASIC, MAT 170 Precalculus, and PHY 105 Basic Physics.

DEGREES

The Bachelor of Science in Engineering (BSE) degree and the BS degree in Computer Science consist 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, fine arts and design; social and behavioral sciences; mathematical studies; and natural sciences (see "General Studies," page 93). 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 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). 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 and computer science study are the preprofessional years and are intended to develop the foundation upon which the professional program is built. The preprofessional courses include a number of the university general studies courses as well as the skill-set courses that are used to help determine if a student can be promoted to the professional program. The final two years of the program are the professional years during which depth and breadth in the major is achieved.

The semester-by-semester selection of courses varies from one field to another and is determined by the student in consultation with a faculty or professional advisor. See the "Typical Four-Year Sequence" tables in each of the department sections of this catalog for example courses for a full-time student.

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 15 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 120 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 and computer science 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 89), and the literacy and critical inquiry component (see "Five Core Areas," page 93) 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. *Fulton requirements.* To help ensure its students achieve the school's aspirations for its graduates (see "The Fulton Aspirations," page 371) all engineering programs are required to have an Introduction to Engineering course; a course with significant biological content, and a course that exposes students to current business practice. Each program uses a different selection of courses that are scattered throughout the four years. In addition to these three specific courses, the programs have included leadership development modules within some of their courses.
4. *Specific engineering discipline.* This area provides a depth of understanding of a 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

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 93.

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.

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
111 MARKET PLACE, SUITE 1050
BALTIMORE MD 21202-4012

The commission may be called at 410/347-7700.

The BS program in Computer Science is accredited by the Computer Science Accreditation Commission of ABET.

FULTON SCHOOL OF ENGINEERING (FSE)

M FSE 105 College Adjustment and Survival. (1)
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.

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

M FSE 200 Elements of Engineering Design. (3)
fall and spring
Advanced version of introduction to engineering for students who have not taken an introduction to engineering course. Credit is allowed for only FSE 200 or various program introduction to engineering courses. Lecture, lab. Prerequisites: ENG 101 (or 105); MAT 270 (or 294 ST: Calculus for Engineers I); PHY 121, 122. Pre- or corequisite: CHM 113 or 114 or 116.
General Studies: CS

M FSE 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.

M FSE 494 Special Topics. (1–4)
fall

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

Harrington Department of Bioengineering

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

Eric J. Guilbeau, Chair

CORE FACULTY

Olin Endowed Professor: Guilbeau
Professors: Akay, Garcia, He, Towe
Associate Professors: Abbas, Iasemidis, Joshi, Jung, Massia, Pizziconi, Steinmetz
Assistant Professors: Buneo, Caplan, Helms-Tillery, Muthuswamy, Vernon
Research Professors: Brophy, Herman, Panitch
Assistant Research Professors: Furnish, Shimansky
Senior Research Professional: Brandon
Research Scientists: Ehteshami, Pauken
Assistant Research Scientist: La Belle
Senior Lecturer: Coursen

AFFILIATED FACULTY

Electrical Engineering
Professor: Kozicki

Electronics and Computer Engineering Technology (Polytechnic Campus)
Associate Professor: Macia

Kinesiology
Associate Professor: Santello
Assistant Professor: Dounskaia

The faculty in the Harrington Department of Bioengineering offer the BSE degree in Bioengineering. The major builds on a broad base of knowledge in mathematics and science. 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 434.

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*.

ADMISSION REQUIREMENTS

The Preprofessional Program. All students admitted to the Harrington Department of Bioengineering are granted preprofessional status. During the time students are in the preprofessional program, they will follow the sequence of first- and second-year courses shown in the Typical Four Year Sequence for bioengineering students. Promotion from the preprofessional program to the professional program is not automatic and a separate application procedure is required.

Promotion is based on performance in a collection of skill-set courses all of which are included in the typical first three semesters of the program. The skill-set courses are as follows:

Skill Courses

BME	100	Introduction to Bioengineering *CS* 3
Choose one of the following combinations 4		
	BME 111	Engineering Perspectives on Biological Systems (3)
	BME 194	ST: Biology for Engineering Laboratory (1)
		— or —
	BIO 188	General Biology II[1] *SQ* (4)
BME	294	ST: Conservation Principles in Bioengineering 3
CHM	114	General Chemistry for Engineers *SQ* 4
		or CHM 116 General Chemistry II *SQ*[2] (4)
MAT	294	ST: Calculus for Engineers I 3
MAT	294	ST: Calculus for Engineers II 3
MAT	294	ST: Calculus for Engineers III 3
PHY	121	University Physics I: Mechanics *SQ*[3] 3
PHY	122	University Physics Laboratory I *SQ*[3] 1
PHY	131	University Physics II: Electricity and Magnetism *SQ*[4] 3
PHY	132	University Physics Laboratory II *SQ*[4] 1
Total 31		

[1] To fulfill medical school admission requirements, premedical students should choose BIO 188. Note that BIO 187 is required by many medical schools in addition to BIO 188. BIO 187 cannot be used as a technical elective.

[2] To fulfill medical school admission requirements, premedical students generally should choose CHM 116. Note that CHM 113 is required by many medical schools in addition to CHM 116. CHM 113 cannot be used for degree 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.

The Professional Program. Admission to the professional program is competitive. All students seeking admission to the professional program must follow the application procedure described in the Harrington Department of Bioengineering Web site. Admission is granted to those applicants who have demonstrated high promise for professional success. Transfer students who have completed the equivalent required lower-division skill-set courses may also apply to the professional program. While only students who have been admitted to the Bioengineering program are eligible to apply to the professional program, prior attendance at ASU is not required. Completion of the specified preprofessional course work does not guarantee admission to the professional program.

DEGREE REQUIREMENTS

A minimum of 120 semester hours is necessary for the BSE degree in Bioengineering. A minimum of 45 upper-division semester hours is required. Students must attain a GPA of at least 2.00 for upper-division courses in the major.

GRADUATION REQUIREMENTS

In addition to fulfilling school and major requirements, students must satisfy all university graduation requirements. See "University Graduation Requirements," page 89.

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

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 93.

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)

First-year composition total 6

General Studies/Program Requirements

Humanities and Fine Arts/Social and Behavioral Sciences
HU/SB and awareness area courses 15

HU/SB and awareness area courses subtotal 15

Literacy and Critical Inquiry
Six semester hours of literacy and critical inquiry credit is satisfied by course work in the major.

Natural Sciences/Basic Sciences
Choose one of the following combinations 4
BME 111 Engineering Perspectives on Biological Systems (3)
BME 194 ST: Biology for Engineering Laboratory (1)
—or—
BIO 188 General Biology II *SQ*[1] (4)
CHM 114 General Chemistry for Engineers *SQ* 4
or CHM 116 General Chemistry II *SQ*[2] (4)
Choose one of the following course groups 4
CHM 231 Elementary Organic Chemistry *SQ*[3] (3)
CHM 235 Elementary Organic Chemistry Laboratory *SQ*[3] (1)
—or—
CHM 233 General Organic Chemistry I[4, 5] (3)
CHM 237 General Organic Chemistry Laboratory I[4, 5] (1)
PHY 121 University Physics I: Mechanics *SQ*[6] 3
PHY 122 University Physics Laboratory I *SQ*[6] 1
PHY 131 University Physics II: Electricity and Magnetism *SQ*[7] 3
PHY 132 University Physics Laboratory II *SQ*[7] 1

Natural sciences/basic sciences subtotal 20

Mathematical Studies
CSE 100 Principles of Programming with C++ CS 3
MAT 275 Modern Differential Equations *MA* 3
MAT 294 ST: Calculus for Engineers I 3
MAT 294 ST: Calculus for Engineers II 3
MAT 294 ST: Calculus for Engineers III 3
MAT 343 Applied Linear Algebra 3

Mathematical studies subtotal 18

General Studies/school requirements total 53

Lower-Division Engineering Courses
BME 100 Introduction to Bioengineering *CS* 3
BME 235 Physiology for Engineers 4
BME 294 ST: Conservation Principles in Bioengineering 3
EEE 202 Circuits I 4
IEE 280 Probability and Statistics for Engineering Problem Solving *CS* 3
MAE 212 Engineering Mechanics 4

Lower-division courses total 21

Upper-Division Courses in Major
BME 300 Bioengineering Product Design 3
BME 318 Biomaterials 4
BME 331 Bioengineering Transport Phenomena 3
BME 350 Signals and Systems for Bioengineers 3
BME 370 Microcomputer Applications in Bioengineering 3
BME 413 Biomedical Instrumentation *L*[8] 3
BME 417 Biomedical Engineering Capstone Design I 4
BME 423 Biomedical Instrumentation Laboratory *L*[8] 1
BME 434 Applications of Bioengineering Transport Phenomena 3
or BME 416 Biomechanics (3)
or BME 419 Biocontrol Systems (3)
BME 490 Biomedical Engineering Capstone Design II 4
CHM 341 Elementary Physical Chemistry 3
Technical electives 6

Upper-division course total 40

Program total 120

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[1] To fulfill medical school admission requirements, premedical students generally should choose BIO 188. Note that BIO 187 is required by many medical schools in addition to BIO 188. BIO 187 cannot be used as a technical elective.

[2] To fulfill medical school admission requirements, premedical students generally should choose CHM 116. Note that CHM 113 is required by many medical schools in addition to CHM 116. CHM 113 cannot be used for degree credit.

[3] Both CHM 231 and CHM 235 must be taken to secure SQ credit

[4] To fulfill medical school admission requirements, premedical students generally should choose CHM 233/237. Note that CHM 234/238 are required by many medical schools in addition to CHM 233/237.

[5] If CHM 233/237 are taken to satisfy the natural science requirement, these courses are not eligible to be applied as technical electives.

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

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

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

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 major sequence course:

BME 434 Applications of Bioengineering Transport Phenomena 3

Students should choose 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
CHM 234 General Organic Chemistry II 3

CHM 238 General Organic Chemistry Laboratory II 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, medical instrumentation, neural engineering, or electrophysiology should consider this area of study. Students must take the following major sequence course:

BME 419 Biocontrol Systems 3

Students should choose technical electives from the following:

EEE 203 Signals and Systems I 3
EEE 230 Computer Organization and Assembly Language Programming 3
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 major sequence course:

BME 434 Applications of Bioengineering Transport Phenomena 3

Students should choose technical electives from the following:

BME 494 ST: Biopolymeric Drug Delivery 3
MSE 353 Introduction to Materials Processing and Synthesis 3
MSE 355 Materials Structure and Microstructure 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 major sequence 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
KIN 412 Biomechanics of the Skeletal System 3
MAE 404 Finite Elements in Engineering 3

* This course may be applied as a technical elective if not already taken as the major sequence course.

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 must take the following major sequence course:

BME 419 Biocontrol Systems 3

Students should choose technical electives from the following:

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 must take the following major sequence course:

BME 419 Biocontrol Systems 3

Students should choose technical electives from the following:

BME 434 Applications of Bioengineering Transport Phenomena* 3
EEE 480 Feedback Systems 4
MAE 318 Sensors and Controls 5
MAE 404 Finite Elements in Engineering 3
MAE 417 Control System Design 3

* This course may be applied as a technical elective if not already taken as the major sequence course.

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 must take the following major sequence course:

BME 434 Applications of Bioengineering Transport Phenomena 3

Students should choose 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)
BIO 353 Cell Biology 3
BME 451 Cell Biotechnology Laboratory 3
BME 494 ST: Introduction to Molecular, Cellular, and Tissue Engineering 3
CHE 475 Biochemical Engineering 3

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. Students must take the following courses:

CHM 234 General Organic Chemistry II 3
CHM 238 General Organic Chemistry Laboratory II 1

Students should choose one major sequence course from the following:

BME 416 Biomechanics* 3
BME 419 Biocontrol Systems* 3
BME 434 Applications of Bioengineering Transport Phenomena* 3
BME 494 ST: Biopolymeric Drug Delivery 3
BME 494 ST: Introduction to Molecular, Cellular, and Tissue Engineering 3

* This course may be applied as a technical elective if not already taken as the major sequence course.

Note: 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
BME 100 Introduction to Bioengineering *CS* 3
CHM 114 General Chemistry for Engineers *SQ* 4
or CHM 116 General Chemistry II *SQ*[1] (4)
ENG 101 First-Year Composition 3
MAT 294 ST: Calculus for Engineers I 3
Total 13

Second Semester
ENG 102 First-Year Composition 3
Choose from one of the following groups 4
BME 111 Engineering Perspectives on Biological Systems (3)
BME 194 ST: Biology for Engineering Laboratory (1)
— or —
BIO 188 General Biology II *SQ*[2] (4)
MAT 294 ST: Calculus for Engineers II 3
PHY 121 University Physics I: Mechanics *SQ*[3] 3
PHY 122 University Physics Laboratory I *SQ*[3] 1
Total 14

Second Year

First Semester
BME 294 ST: Conservation Principles in Bioengineering 3
Choose from one of the following groups 4
CHM 231 Elementary Organic Chemistry *SQ*[4] (3)
CHM 235 Elementary Organic Chemistry Laboratory *SQ*[4] (1)
— or —
CHM 233 General Organic Chemistry I[5, 6] (3)
CHM 237 General Organic Chemistry Laboratory I[5, 6] (1)
CSE 100 Principles of Programming with C++ *CS* 3
MAT 294 ST: Calculus for Engineers III 3
PHY 131 University Physics II: Electricity and Magnetism *SQ*[7] . 3
PHY 132 University Physics II Laboratory *SQ*[7] 1
Total 17

Second Semester
BME 235 Physiology for Engineers 4
EEE 202 Circuits I 4
IEE 280 Probability and Statistics for Engineering Problem Solving *CS* 3
MAT 275 Modern Differential Equations *MA* 3
HU/SB and awareness area course[8] 3
Total 17

Third Year

First Semester
BME 318 Biomaterials 4
CHM 341 Elementary Physical Chemistry 3
MAE 212 Engineering Mechanics 4
MAT 343 Applied Linear Algebra 3
HU/SB and awareness area[8] 3
Total 17

Second Semester
BME 300 Bioengineering Product Design 3
BME 331 Bioengineering Transport Phenomena 3
BME 350 Signals and Systems for Bioengineers 3
BME 370 Microcomputer Applications in Bioengineering 3
HU/SB and awareness area course[8] 3
Total 15

Fourth Year

First Semester

BME 413 Biomedical Instrumentation L^9	3
BME 417 Biomedical Engineering Capstone Design I	4
BME 423 Biomedical Instrumentation Laboratory L^9	1
BME 434 Applications of Bioengineering Transport Phenomena or BME 416 Biomechanics (3) or BME 419 Biocontrol Systems (3)	3
HU/SB and awareness area course[8]	3
Total	14

Second Semester

BME 490 Biomedical Engineering Capstone Design II	4
HU/SB awareness area[8]	3
Technical electives	6
Total	13

Total degree requirements 120

[1] To fulfill medical school admission requirements, premedical students generally should choose CHM 116. Note that CHM 113 is required by many medical schools in addition to CHM 116. CHM 113 cannot be used for degree credit.

[2] To fulfill medical school admission requirements, premedical students generally should choose BIO 188. Note that BIO 187 is required by many medical schools in addition to BIO 188. BIO 187 cannot be used as a technical elective.

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

[4] Both CHM 231 and CHM 235 must be taken to secure SQ credit.

[5] To fulfill medical school admission requirements, premedical students generally should choose CHM 233/237. Note that CHM 234/238 are required by many medical schools in addition to CHM 233/237.

[6] If CHM 233/237 are taken to satisfy the natural science requirement, these courses are not eligible to be applied as technical electives.

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

[8] Engineering students may not use Aerospace Studies (AES) or Military Science (MIS) courses to fulfill HU or SB requirements.

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

BIOENGINEERING (BME)

M BME 100 Introduction to Bioengineering. (3)
fall and spring
Introduces profession of bioengineering: bioengineering design process, teaming, computer models in bioengineering, communications skills, career planning. Fee. Prerequisites: high school computing and physics and algebra courses (or their equivalents); BME major (or department approval). Pre- or corequisite: ENG 101 or 105 or 107.
General Studies: CS

M 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).

M BME 111 Engineering Perspectives on Biological Systems. (3)
fall and spring
Biological concepts for the emerging engineer. Introduces biological and earth systems engineering, materials, structures, fluid mechanics, bioelectricity, and the dynamic, nonlinear nature of nature.

M BME 112 Engineering Perspectives on Biological Systems Laboratory. (1)
fall and spring
Introduces biological concepts for the emerging engineer in a lab setting: biological and earth systems engineering, materials, structures, fluid mechanics, bioelectricity, and the dynamic, nonlinear nature of nature. Lab. Prerequisite: BME 111.

M BME 194 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Biology for Engineering Lab.oratory. (1)

M BME 200 Conservation Principles in Bioengineering. (3)
fall and spring
Applies bioengineering analysis and problem solving of mass, energy, and charge balances to medical and biological systems. Prerequisite: CHM 114 or 116. Pre- or corequisites: PHY 131, 132.

M 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: ECN 211 (or 212); ENG 102 (or 105).
General Studies: L/HU

M 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.

M BME 294 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Conservation Principles in Bioengineering. (3)

M BME 300 Bioengineering Product Design. (3)
fall and spring
The fundamentals of financial and organizational structure of business and how it influences bioengineering analysis, design, and decision making; biomedical ethics and device and drug regulation; and fundamentals of business and technical management. Prerequisites: BME 100; ENG 102 (or 105 or 108); junior standing.

M BME 318 Biomaterials. (4)
fall and spring
Material properties of natural and artificial biomaterials. Tissue and blood biocompatibility. Uses of materials to replace body parts. Prerequisite with a grade of "C" (2.00) or higher: BME 235.

M BME 331 Bioengineering Transport Phenomena. (3)
fall and spring
Transport phenomena with emphasis on momentum, energy, and mass transport in living systems, medical devices, and other therapeutic/diagnostic applications. Prerequisites: CHM 341; MAE 212; MAT 274 (or 275).

M BME 350 Signals and Systems for Bioengineers. (3)
fall and spring
Applies principles of calculus and ordinary differential equations to analysis and computer processing of biosignals and linear modeling of biosystems. Prerequisites: EEE 202; MAT 274 (or 275). Pre- or corequisite: MAT 343.

M BME 370 Microcomputer Applications in Bioengineering. (3)
fall and spring
Uses microcomputers for real-time data collection, analysis, and control of experiments involving actual and simulated physiological systems. Lecture, lab. Fee. Prerequisite with a grade of "C" (2.00) or higher: BME 235, 350.

M 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.

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 93.

M 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.

M BME 413 Biomedical Instrumentation. (3)
fall and spring
Principles of medical instrumentation. Studies of medical diagnostic instruments and techniques for the measurement of physiologic variables in living systems. Prerequisites with a grade of "C" (2.00) or higher: BME 235. 350. Corequisite: BME 423.
General Studies: L (if credit also earned in BME 423)

M 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.

M 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: MAE 212. Prerequisite with a grade of "C" (2.00) or higher: BME 318.

M BME 417 Biomedical Engineering Capstone Design I. (4)
fall
Technical, regulatory, economic, legal, social, and ethical aspects of medical device systems engineering design. Lecture, field trips. Prerequisite with a grade of "C" (2.00) or higher: BME 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, 370, 413; CHM 341; IEE 280.

M 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. Prerequisite with a grade of "C" (2.00) or higher: BME 350 (or its equivalent).

M BME 423 Biomedical Instrumentation Laboratory. (1)
fall
Laboratory experience with problems, concepts, and techniques of biomedical instrumentation in static and dynamic environments. Lab. Fee. Prerequisite: EEE 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)

M BME 434 Applications of Bioengineering Transport Phenomena. (3)
spring
Develops mathematical models of transport phenomena in physiological systems, medical devices, and pharmacokinetic analysis. Prerequisite: IEE 280. Prerequisite with a grade of "C" (2.00) or higher: BME 331.

M 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.

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

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

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

M 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)

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

M 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/catalog 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

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

Subhash Mahajan, Chair

Regents' Professor: Mayer

Professors: Adams, Alford, Dey, Jabbour, Krause, Lin, Mahajan, Newman, Raupp, Sieradzki, Van Schilfgaarde, Wang, Zenhausern

Associate Professors: Beckman, Burrows, Chawla, Rivera, Sierks

Assistant Professors: Allen, Friesen, Heys, Park

Research Professor: Picraux

Associate Research Professors: Kotani, Mitkova, Singh

Assistant Research Professors: Chowdhury, Dillner

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.
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.

ADMISSION REQUIREMENTS

The Preprofessional Program. Each student admitted to the Chemical Engineering program is designated a preprofessional student. Students follow the first-year sequence of courses listed in the curriculum outline. Included in the first two semester schedules are all skill-set courses or equivalents:

CHE	194	ST: Introduction to Chemical Engineering *CS*	3
CHM	113	General Chemistry I *SQ*	4
CHM	116	General Chemistry II *SQ*	4
ENG	101	First-Year Composition	3
ENG	102	First-Year Composition	3
MAT	294	ST: Calculus for Engineers I	3
MAT	294	ST: Calculus for Engineers II	3
PHY	121	University Physics I: Mechanics *SQ**	3
PHY	122	University Physics Laboratory I *SQ**	1
Total			27

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

The Professional Program. Admission to the professional program is competitive and granted to those applicants demonstrating the promise for professional success in Chemical Engineering. The admissions committee considers overall transfer and ASU GPA numbers as well as the transfer and ASU GPA numbers in Chemical Engineering skill-set courses. All students seeking professional status must be in the process of completing all of the skill-set courses and then follow the application procedure as described on 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 93.

Chemical 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 encouraged to visit the Chemical Engineering undergraduate advising office before beginning the application process. All applications materials can be found on the Web at fulton.asu.edu/~cme.

DEGREE REQUIREMENTS

A minimum of 120 semester hours is necessary for the BSE degree in Chemical Engineering. A minimum of 45 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 89.

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

HU/SB and awareness area courses[1] 15

Total 15

Literacy and Critical Inquiry

Six hours of literacy and critical inquiry credit is satisfied by courses in the major.

Natural Sciences/Basic Sciences

CHM 113 General Chemistry I *SQ* 4
CHM 116 General Chemistry II *SQ* 4
CHM 233 General Organic Chemistry I 3
CHM 234 General Organic Chemistry II 3
CHM 237 General Organic Chemistry Laboratory I 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
Bioscience electives[4] 3

Total 25

Mathematical Studies

MAT 242 Elementary Linear Algebra 2
MAT 275 Modern Differential Equations *MA* 3
MAT 294 ST: Calculus for Engineers I 3
MAT 294 ST: Calculus for Engineers II 3
MAT 294 ST: Calculus for Engineers III 3

Total 14

General Studies/program requirements total 54

Major

CHE 194 ST: Introduction to Chemical Engineering *CS* 3
CHE 211 Introduction to Chemical Processing 3
CHE 231 Introduction to Transport Phenomena I: Fluids 3
CHE 334 Introduction to Transport Phenomena II: Heat and Mass Transfer 3
CHE 342 Introduction to Applied Chemical Thermodynamics 3
CHE 352 Transport Laboratories 3
CHE 432 Principles of Chemical Engineering Design 3
CHE 433 Modern Separations 3
CHE 442 Introduction to Chemical Reactor Design 3
CHE 451 Chemical Engineering Laboratory 3
CHE 461 Process Dynamic Control *CS* 3
CHE 462 Process Design *L* 3
IEE 220 Business and Industrial Engineering 3
MAE 384 Numerical Methods for Engineers 3
Engineering elective (200 level) 3
Technical electives[5] 15

Major courses total 60

Program total 120

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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.

4 See "Bioscience Electives," on this page for a list of electives.

5 Students must complete a total of 15 semester hours of upper-division technical electives in the natural sciences, math, or engineering. These must include at least six hours of CHE courses and at least six hours of advanced chemistry content. Courses with advanced chemistry content include CHM, BCH, and approved CHE courses.

Bioscience Electives

BCH 361 Principles of Biochemistry (3)
BCH 461 General Biochemistry (3)
BCH 463 Biophysical Chemistry (3)
BIO 188 General Biology II (4)
BME 235 Physiology for Engineers (4)
BME 318 Biomaterials (4)
BME 411 Biomedical Engineering I (3)
MBB 245 Cellular and Molecular Biology *SQ* (4)
MBB 247 Applied Biosciences: Biotechnology (4)
MIC 205 Microbiology *SG* (3)
MIC 220 Biology of Microorganisms (3)
CHE 475 Biochemical Engineering (3)

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 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 4

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

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 4
CHE 458 Semiconductor Material Processing 3
EEE 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 238 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 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 to 4
EEE 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
CHE 194 ST: Introduction to Chemical Engineering 3
CHM 113 General Chemistry I *SQ* 4
ENG 101 First-Year Composition 3
MAT 294 ST: Calculus for Engineers I 3
HU/SB and awareness area course 3
Total 16

Second Semester
CHM 116 General Chemistry II *SQ* 4
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 93.

MAT 294 ST: Calculus for Engineers II	3
PHY 121 University Physics I: Mechanics *SQ*[1]	3
PHY 122 University Physics Laboratory I *SQ*[1]	1
Total	14

Second Year

First Semester

CHE 211 Introduction to Chemical Processing	3
MAT 242 Elementary Linear Algebra	2
MAT 275 Modern Differential Equations *MA*	3
PHY 131 University Physics II: Electricity and Magnetism *SQ*[2]	3
Engineering elective (200 level)	3
Total	14

Second Semester

CHE 231 Introduction to Transport Phenomena I: Fluids	3
MAE 384 Numerical Methods for Engineers	3
MAT 294 ST: Calculus for Engineers III	3
HU/SB and awareness area courses	6
Total	15

Third Year

First Semester

CHE 334 Introduction to Transport Phenomena II: Heat and Mass Transfer	3
CHE 342 Introduction to Applied Chemical Thermodynamics	3
CHM 233 General Organic Chemistry I	3
CHM 237 General Organic Chemistry Laboratory I	1
Bioscience elective[3]	3
Technical Elective	3
Total	16

Second Semester

CHE 352 Transport Laboratories	3
CHE 433 Modern Separations	3
CHE 442 Introduction to Chemical Reactor Design	3
CHM 234 General Organic Chemistry II	3
IEE 220 Business and Industrial Engineering	3
Total	15

Fourth Year

First Semester

CHE 432 Principles of Chemical Engineering Design	3
CHE 451 Chemical Engineering Laboratory	3
CHE 461 Process Dynamic Control *CS*	3
HU/SB and awareness area course	3
Technical elective	3
Total	15

Second Semester

CHE 462 Process Design *L*	3
HU/SB and awareness area course	3
Technical electives	9
Total	15
Total degree requirements	120

[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] See "Bioscience Electives," page 394 for a list of electives.

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.

ADMISSION REQUIREMENTS

The Preprofessional Program. Each student admitted to the Materials Science and Engineering Program is designated a preprofessional student. Students follow the first- and second-year sequence of courses listed in the curriculum outline. Included in the first three semester schedules are all skill-set courses or equivalents:

CHM 114 General Chemistry for Engineers *SQ*	4
MAT 294 ST: Calculus for Engineers I	3
MAT 294 ST: Calculus for Engineers II	3
MAT 294 ST: Calculus for Engineers III	3
MSE 100 Introduction to Materials Engineering *CS*	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	24

[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 promise for professional success in Materials Science and Engineering. The admissions committee considers overall transfer and ASU GPA numbers as well as the transfer and ASU GPA numbers in Materials Science and Engineering skill-set courses. All students seeking professional status must be in the process of completing all of the skill-set courses and then follow the application procedure as described on the Materials 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 encouraged to visit the Materials Science and Engineering undergraduate advising office before beginning the application process.
All applications materials can be found on the Web at fulton.asu.edu/~cme.

DEGREE REQUIREMENTS

A minimum of 120 semester hours is necessary for the BSE degree in Materials Science and Engineering. A minimum of 45 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 89.

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

HU/SB and awareness area courses	15
HU/SB subtotal	15

Literacy and Critical Inquiry

Six semester hours of literacy and critical inquiry credit is satisfied by courses in the major.

Natural Sciences/Basic Sciences

CHM 114 General Chemistry for Engineers *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
Math or science elective	3
Natural science/basic sciences subtotal	15

Mathematical Studies

MAT 275 Modern Differential Equations *MA*	3
MAT 294 ST: Calculus for Engineers I	3
MAT 294 ST: Calculus for Engineers II	3
MAT 294 ST: Calculus for Engineers III	3
MAT 343 Applied Linear Algebra	3
Mathematical studies subtotal	15
General Studies/school requirements total	45

Major

BME 111 Engineering Perspectives on Biological Systems	3
IEE 220 Business and Industrial Engineering	3
MSE 100 Introduction to Materials Engineering *CS*	3
MSE 211 Introduction to Mechanics of Materials	3
MSE 215 Materials Synthesis	3
MSE 250 Structure and Properties of Materials	3
MSE 315 Mathematical and Computational Methods in Materials	3
MSE 330 Thermodynamics of Materials	3
MSE 335 Materials Kinetics and Processing	3
MSE 355 Materials Structure and Microstructure	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 93.

MSE	356	Materials Structure and Microstructure Lab 1
MSE	358	Introduction to Electronic, Magnetic, and Optical Properties 3
MSE	420	Physical Metallurgy 3
MSE	421	Physical Metallurgy Laboratory 1
MSE	440	Mechanical Properties of Solids 3
MSE	450	Introduction to Materials Characterization 3
MSE	451	Introduction to Materials Characterization Lab 1
MSE	470	Polymers and Composites 3
MSE	471	Introduction to Ceramics 3
MSE	482	Materials Engineering Design *L* 3
MSE	490	Capstone Design Project 3
Select two 300- or 400-level science courses from biology, chemistry, geology, or physics 6		
Technical electives 6		
Total 69		
Program total 120		

[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 Areas of Study

Technical electives may be selected from one or more of the following areas. A student may select a general area or a set of courses from engineering, mathematics, or science 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 4
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.

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	233	General Organic Chemistry I 3
CHM	234	General Organic Chemistry II 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	342	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 *L* 3
IEE	369	Work Analysis and Design *L* 3
IEE	431	Engineering Administration 3
IEE	437	Human Factors Engineering 3
IEE	461	Production Control 3
IEE	463	Computer-Aided Manufacturing and Control *CS* 3
MAE	322	Mechanics of Materials 4
MAE	342	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	322	Mechanics of Materials 4
MAE	342	Principles of Design 3
MAE	415	Vibration Analysis 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	233	General Organic Chemistry I 3
CHM	234	General Organic Chemistry II 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	114	General Chemistry for Engineers *SQ* 4

ENG 101 First-Year Composition 3
MAT 294 ST: Calculus for Engineers I 3
MSE 100 Introduction to Materials Engineering *CS* 3
HU/SB and awareness area course[1] 3
Total 16

Second Semester
ENG 102 First-Year Composition 3
MAT 294 ST: Calculus for Engineers II 3
MSE 250 Structure and Properties of Materials 3
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 16

Second Year

First Semester
BME 111 Engineering Perspectives on Biological Systems 3
MAT 294 ST: Calculus for Engineers III 3
MSE 215 Materials Synthesis 3
PHY 131 University Physics II: Electricity and Magnetism *SQ*[3] 3
PHY 132 University Physics Laboratory II *SQ*[3] 1
Total 13

Second Semester
MAT 275 Modern Differential Equations *MA* 3
MAT 343 Applied Linear Algebra 3
MSE 211 Introduction to Mechanics of Materials 3
HU/SB awareness area course[1] 3
Science or mathematics elective 3
Total 15

Third Year

First Semester
IEE 220 Business and Industrial Engineering 3
MSE 315 Mathematical and Computer Methods in Materials 3
MSE 330 Thermodynamics of Materials 3
MSE 355 Materials Structure and Microstructure 3
MSE 356 Materials Structure and Microstructure Lab 1
HU/SB awareness area course[1] 3
Total 16

Second Semester
MSE 335 Materials Kinetics and Processing 3
MSE 358 Introduction to Electronic, Magnetic, and Optical Properties 3
MSE 420 Physical Metallurgy 3
MSE 421 Physical Metallurgy Laboratory 1
MSE 450 Introduction to Materials Characterization 3
MSE 451 Introduction to Materials Characterization Lab 1
Total 14

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
Advanced science elective 3
Total 15

Second Semester
MSE 490 Capstone Design Project 3
Advanced science elective 3
HU/SB awareness area course[1] 3
Technical elective 6
Total 15

Total degree requirements 120

[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.

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)

M CHE 100 Introduction to Chemical Engineering. (3)
fall
Introduces design in chemical engineering, teaming, chemical engineering profession, computer models, communication skills, quality and customer satisfaction. Fee. Prerequisites: high school algebra and computing and physics courses (or their equivalents). *General Studies: CS*

M CHE 211 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 (or 294 ST: Calculus for Engineers II).

M CHE 231 Introduction to Transport Phenomena I: Fluids. (3)
spring
Transport phenomena, with emphasis on fluid systems. Credit is allowed for only CHE 231 or 501. Prerequisites: CHE 211; MAT 271 (or 294 ST: Calculus for Engineers II).

M CHE 334 Introduction to Transport Phenomena II: Heat and Mass Transfer. (3)
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 231.

M CHE 342 Introduction to Applied Chemical Thermodynamics. (3)
fall
Applies conservation and accounting principles with nonideal property estimation techniques. Credit is allowed for only CHE 342 or 504. Prerequisite: CHE 211. Pre- or corequisite: MAT 272 or 294 ST: Calculus for Engineers III.

M CHE 352 Transport Laboratories. (3)
spring
Introduces engineering lab equipment, data collection, and analysis; strengthens ability to generate written reports and oral presentations; reinforces teamwork skills; strengthens and extends the understanding of earlier technical contents in the curriculum. Integrated lecture/lab. Fee. Prerequisite: CHE 334.

M CHE 432 Principles of Chemical Engineering Design. (3)
fall
Multicomponent distillation, engineering economics, equipment sizing and costs, plant operation economics, and simulation and optimization techniques. Prerequisites: CHE 334, 342.

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

M 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.

M CHE 451 Chemical Engineering Laboratory. (3)
fall
Operation, control, and design of experimental and industrial process equipment; independent research projects. Integrated lecture/lab. Fee. Prerequisites: CHE 334, 352; MAE 384.

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

M CHE 461 Process Dynamic Control. (3)
fall
Process dynamics, instrumentation, and feedback applied to automatic process control. Integrated lecture/lab. Fee. Prerequisites: MAE 384; MAT 274.
General Studies: CS

M 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

M CHE 469 Air Quality Engineering. (3)
selected semesters
Chemical and physical processes by which air pollutants are generated and controlled with an emphasis on urban air quality. Cross-listed as CEE 469. Credit is allowed for only CHE 469 or CEE 469. Prerequisite: CEE 361 or CHE 334.

M 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.

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

M 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.

M 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.

M CHE 478 Industrial Water Quality Engineering. (3)
fall
Chemical treatment processing, quality criteria and control, system design, and water pollutants. Prerequisites: CHE 231; senior standing.

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

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

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

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

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

M 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)

M MSE 100 Introduction to Materials Engineering. (3)
fall
Engineering design process, concepts about materials, and the materials engineering profession, including teaming, computer models, communication, and societal impact. Fee. Prerequisites: high school algebra and computing and physics courses (or their equivalents).
General Studies: CS

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

M MSE 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 MSE 208 or PHS 208. Fee. Prerequisite: college-level science course or instructor approval.
General Studies: SQ

M MSE 211 Introduction to Mechanics of Materials. (3)
spring
Topics include stress, strain, elasticity, axial loading, torsion, bending, yield criteria, fracture, general energy methods and Castigliano's Theorem. Prerequisites: PHY 121, 122. Pre- or corequisite: MAT 272 (or 294 ST: Calculus for Engineers III).

M MSE 215 Materials Synthesis. (3)
fall
Introduces contemporary techniques for synthesizing both traditional and novel materials and the corresponding correlation to synthesized materials properties. Lecture, lab. Prerequisites: CHM 114 (or 116); MSE 250.

M MSE 250 Structure and Properties of Materials. (3)
fall, spring, summer session 1
Basic concepts of material structure and its relation to properties. Application to engineering problems. Prerequisites: CHM 114 or 116.

M MSE 308 Sensing the World. (4)
fall and spring
Project-oriented science course develops critical thinking and technical skill using Internet modules on the five senses. Integrated lecture/lab. Prerequisite: college-level science course or instructor approval.

M MSE 315 Mathematical and Computer Methods in Materials. (3)
fall
Mathematical, computational, and statistical methods and computer programming used to model materials science phenomena and materials engineering applications. Prerequisites: preferably MAT 275 (or 274); MSE 250.