JUS 494 Special Topics. (1–3)
once a year
Topics chosen from various fields of justice studies. Lecture, discussion. See JUS Note 2.

JUS 498 Pro-Seminar. (1–3)
fall, spring, summer
Small group study and research for advanced students. May be repeated for credit for a total of 9 hours, of which a maximum of 3 are applied to the major. See JUS Note 2. Prerequisites: major status; minimum cumulative GPA of 2.75; minimum GPA in JUS courses of 3.00; instructor approval.

JUS 499 Individualized Instruction. (1–3)
fall, spring, summer
Original study or investigation in the advanced student's field of interest under the supervision of a faculty member. May be repeated for credit for a total of 6 hours, all applicable to the major. Readings, conferences, tutorials. Prerequisites: major status; minimum cumulative GPA of 2.75; minimum GPA in JUS courses of 3.00; 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.

Department of Kinesiology

www.asu.edu/clas/kines
480/965-3875
PEBW 218

Lawrence Mandarino, Chair

Regents' Professor: Daniel Landers

Professors: Darst, Matt, Stelmach

Associate Professors: Etnier, Hinrichs, Santello, Willis

Assistant Professors: Dounskaia, Kulinna, Ringenbach

Senior Lecturer: Donna Landers

Lecturers: Broman, Orlowicz

KINESIOLOGY—BS

The BS degree in Kinesiology consists of 42 semester hours, including 21 semester hours of required KIN core courses (KIN 110 may be repeated for credit). The remaining 21 semester hours of KIN and other courses are prescribed by the specific concentration the student selects.

Each KIN 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
MAT 170 Precalculus *MA* 3
or MAT 119 Finite Mathematics *MA* (3)
or MAT 210 Brief Calculus *MA* (3)
or a higher level mathematics course
PGS 101 Introduction to Psychology *SB* 3
PHY 111 General Physics *SQ** 3
Total 21

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

The required KIN core courses are as follows:

KIN 110 Movement Analysis Laboratory 6
KIN 200 Introduction to Kinesiology 2
KIN 335 Biomechanics 3
KIN 340 Physiology of Exercise 3
KIN 345 Motor and Developmental Learning 3
KIN 352 Psychosocial Aspects of Physical Activity *SB, C* 3
KIN 498 PS: Kinesiology and the Future 1
Total 21

All prerequisite and KIN courses must be completed with a minimum grade of "C" (2.00). The requirements for the specific concentrations are described below.

Majors must elect either the exercise science, movement science, or teacher preparation concentration.

Concentrations

Each concentration requires 21 semester hours.

Exercise Science. This concentration is designed for the student interested in more applied aspects of exercise and sport performance, e.g., strength and conditioning, sports medicine, sport skill acquisition, exercise physiology, biomechanical techniques in exercise and sport, and sport psychology.

Choose from among the courses below 9
KIN 334 Functional Anatomy and Kinesiology (3)
KIN 448 Applied Sport Psychology *L* (3)
KIN 484 Internship (6)
KIN 494 ST: Interpretation of Exercise Performance (3)
Choose from among the courses below 12
KIN 283 Prevention and Care of Athletic Injuries (3)
KIN 348 Psychological Skills for Optimal Performance *SB* (3)
KIN 370 Advanced First Aid (3)
KIN 412 Biomechanics of the Skeletal System (3)
KIN 413 Qualitative Analysis in Sport Biomechanics (3)
KIN 441 Physiology of Women in Sport *L* (3)
KIN 442 Fuel Metabolism (3)
KIN 444 Metabolic Adaptations to Exercise Training (3)
KIN 445 Exercise Physiology for Children and Adolescents (3)
KIN 450 Biopsychosocial Perspectives on Physical Activity and Health (3)
KIN 460 Theory of Strength Training *L* (3)
KIN 485 Advanced Techniques of Athletic Training (3)
KIN 494 ST: Environmental Exercise Physiology (3)
KIN 494 ST: Physiological Bases for Exercise and Sport (3)
KIN 494 ST: Sport and Social Issues (3)

Other KIN courses may be substituted with advisor approval.

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

Movement Science. This concentration is designed for students interested in prehealth professions, biomechanical, physiological, motor control, and/or psychological mechanisms underlying human movement performance. Students interested in pursuing postbaccalaureate training in one of several possible professions in the health care industry (e.g., physical therapy, recreational therapy, occupational therapy, physician's assistant, medicine, dentistry, podiatry, chiropractic, etc.) will also find this concentration applicable. Additional course work in the sciences must be completed (consult with the department for a list).

Choose from among the courses below 9
- KIN 484 Internship (6)
- KIN 492 Honors Directed Study: Research (6)
- KIN 493 Honors Thesis (6)
- KIN 494 ST: Research Methods (3)
- KIN 499 Individualized Instruction (1–6)

Choose from among the courses below 12
- KIN 334 Functional Anatomy and Kinesiology (3)
- KIN 370 Advanced First Aid (3)
- KIN 412 Biomechanics of the Skeletal System (3)
- KIN 414 Electromyographic Kinesiology *L* (3)
- KIN 421 Human Motor Control (3)
- KIN 422 Motor Control in Special Populations *L* (3)
- KIN 423 Motor Control and Aging (3)
- KIN 440 Exercise Biochemistry (3)
- KIN 442 Fuel Metabolism (3)
- KIN 443 Exercise Endocrinology *L* (3)
- KIN 445 Exercise Physiology for Children and Adolescents (3)
- KIN 450 Biopsychosocial Perspectives on Physical Activity and Health (3)
- KIN 452 Exercise Psychology *SB* (3)
- KIN 494 ST: Muscle Physiology (3)
- KIN 494 ST: Voluntary and Reflex Control of Movement (3)

MINOR IN KINESIOLOGY

The minor in Kinesiology consists of the core sequence in exercise science and physical education as follows, plus all prerequisite courses:

KIN 110 Movement Analysis Laboratory 4
KIN 200 Introduction to Kinesiology 2
Choose from among the courses below 9
- KIN 335 Biomechanics (3)
- KIN 340 Physiology of Exercise (3)
- KIN 345 Motor and Developmental Learning (3)
- KIN 352 Psychosocial Aspects of Physical Activity *SB, C* (3)

KIN upper-division electives* 6

Total 21

* Excluding KIN 305, 310, 484, 492, and 493

BIS CONCENTRATION

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

GRADUATE PROGRAMS

The faculty in the Department of Kinesiology offer a program leading to the MS degree in Kinesiology. The department also participates with the Division of Graduate Studies in the program leading to the PhD degree in Exercise Science and with the College of Education and the Division of Graduate Studies in the program leading to the PhD degree in Curriculum and Instruction with a concentration in physical education. See the *Graduate Catalog* for requirements.

HEALTH SCIENCE (HES)

HES 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 EXW 100/KIN 100. Credit is allowed for only EXW 100 or HES 100 or KIN 100.
General Studies: SB

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

KINESIOLOGY (KIN)

KIN Note 1. A $5.00 towel and locker fee is required each semester by students using towel and locker facilities for physical education classes and intramural activities.

KIN Note 2. Physical education activity classes (KIN 105, 205, 305, 310) may not be taken for audit. Excessive absences and/or tardiness are considered disruptive behavior.

KIN 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 EXW 100/HES 100. Credit is allowed only for EXW 100 or HES 100 or KIN 100.
General Studies: SB

KIN 105 Physical Education Activity. (1)
fall, spring, summer
Beginning instruction in a wide variety of sports such as aerobics, aquatics, racquet sports, physical conditioning, and golf. 3 hours per week. "Y" grade only. May be repeated for credit. See KIN Notes 1, 2.
- Aerobics
  Fee.
- Archery
  Fee.
- Fencing
  Fee.
- Golf
  Fee.
- Rock Climbing
  Fee.

KIN 110 Movement Analysis Laboratory. (1–2)
fall, spring, summer
Practical application of biomechanical, physiological, psychological, and learning principles in the analysis of skill acquisition and performance. May be repeated for credit. See KIN Note 1.
- Archery
  Fee.
- Fencing
  Fee.
- Golf
  Fee.

Prerequisites: KIN 105 proficiency; Kinesiology major.

KIN 191 First-Year Seminar. (1–3)
fall and spring

KIN 200 Introduction to Kinesiology. (2)
fall, spring, summer
Introduces the disciplines and professions associated with kinesiology, including an overview of historical and philosophical foundations.

KIN 205 Physical Education Activity. (1)
fall, spring, summer
Intermediate levels. Continuation of KIN 105. 3 hours per week. May be repeated for credit. See KIN Notes 1, 2.
- Aerobics
  Fee.
- Archery
  Fee.
- Golf
  Fee.
- Rock Climbing
  Fee.

KIN 283 Prevention and Care of Athletic Injuries. (3)
fall and spring
Taping, injury recognition, emergency care, and observation procedures in athletic training. Prerequisites: BIO 201, 202.

KIN 290 Sports Officiating. (3)
fall
Rules and mechanics of officiating used in football, basketball, and volleyball.

KIN 292 Sports Officiating. (3)
spring
Rules and mechanics of officiating used in softball (slow and fast pitch), baseball, and track and field.

KIN 305 Physical Education Activity. (1)
fall, spring, summer
Advanced levels. Continuation of KIN 205. 3 hours per week. May be repeated for credit. See KIN Notes 1, 2.
- Golf
  Fee.

Prerequisite: instructor approval.

KIN 310 Collegiate Sports. (1)
fall and spring
Participation in men's or women's intercollegiate competition. May be repeated for 4 hours, 1 per year. "Y/E" grade.

KIN 334 Functional Anatomy and Kinesiology. (3)
spring
Muscles, bones, joints, and nerves and how they produce movement. Emphasizes muscle origins, insertions, actions, and innervations. Lecture, lab. Prerequisite: BIO 201.

KIN 335 Biomechanics. (3)
fall, spring, summer
Basic anatomical and mechanical principles applied to human movement. Emphasis placed on kinematic and kinetic concepts. Lecture, recitation, lab. Fee. Prerequisites: BIO 201; MAT 117; PHY 111.

KIN 340 Physiology of Exercise. (3)
fall, spring, summer
Physiological mechanisms of acute responses and chronic adaptations to exercise. Lecture, recitation, lab. Fee. Prerequisites: BIO 201, 202; CHM 101.

KIN 345 Motor and Developmental Learning. (3)
fall, spring, summer
Principles of motor skill acquisition across the life span, focusing on the learner and the learning environment. Lecture, recitation, lab. Fee. Prerequisites: BIO 201; PGS 101.

KIN 348 Psychological Skills for Optimal Performance. (3)
fall and spring
Applies psychological techniques and their use to improve effectiveness and performance in sport and related areas.
General Studies: SB

KIN 352 Psychosocial Aspects of Physical Activity. (3)
fall, spring, summer
Interrelationships between physical activity and psychosocial variables, including socialization, cultural values, aggression, and motivation. Includes the psychological benefits of physical activity and exercise adherence. Lecture, recitation. Prerequisite: PGS 101.
General Studies: SB, C

KIN 361 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.

KIN 370 Advanced First Aid. (3)
selected semesters
Assessment, management, treatment of wounds, injuries, shock, poisoning, burns, sudden illness, emergency rescue, and cardiopulmonary resuscitation. Lecture, lab. Fee.

KIN 376 Physical Education for the Elementary School. (3)
fall and spring
Scope and values of physical education in the elementary school. Methods, materials, and practice in teaching activities for primary, intermediate, and upper grades.

KIN 382 Adaptive and Inclusive Physical Education. (3)
fall and spring
Teaching individuals with handicapping conditions physical skills and activities.

KIN 400 Teaching Physical Activity Concepts. (3)
fall and spring
Analyzes and critiques teaching concepts, principles, and skills outlined in Arizona Physical Activity Standards. Evaluates national guidelines for promoting physical activity. Prerequisites: ENG 101 (or 107), 102 (or 108); KIN 200 (or its equivalent).
General Studies: L

KIN 412 Biomechanics of the Skeletal System. (3)
fall
Biomechanics of tissues, structures, and major joints of the musculoskeletal system. Discussion of injury mechanisms. Lecture, discussion, some labs. Prerequisite: KIN 335 or instructor approval.

KIN 413 Qualitative Analysis in Sport Biomechanics. (3)
spring
Develops systematic approach for detecting and correcting errors in human performance using anatomical and mechanical principles. Lecture, lab. Prerequisite: KIN 335.

KIN 414 Electromyographic Kinesiology. (3)
spring
Muscular contributions to human movement, muscle mechanics, electrophysiological basis, and practical application of electromyography. Lecture, discussion. Fee. Prerequisites: KIN 335, 340; instructor approval.
General Studies: L

KIN 421 Human Motor Control. (3)
spring
Focuses on understanding how the human central nervous system controls, regulates, and learns movements. Prerequisite: KIN 345 or instructor approval.

KIN 422 Motor Control in Special Populations. (3)
spring
Discusses principles of motor control theories and related practical applications for certain special developmental populations. Lecture, discussion. Cross-listed as PSY 422. Credit is allowed for only KIN 422 or PSY 422. Prerequisite: KIN 345.
General Studies: L

KIN 423 Motor Control and Aging. (3)
spring
Functional and behavioral changes to the motor control system as humans age, how specifically it impacts motor control and learning. Prerequisite: KIN 345 or instructor approval.

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

KIN 440 Exercise Biochemistry. (3)
fall
Study of bioenergetics and metabolism of cellular (skeletal muscle, heart, and liver) organelles and proteins during exercise. Prerequisite: KIN 340.

KIN 441 Physiology of Women in Sport. (3)
fall
Physiological aspects of women engaging in physical activity. Emphasizes factors affecting performance and health throughout life. Prerequisite: KIN 340.
General Studies: L

KIN 442 Fuel Metabolism. (3)
fall
Discusses current research concerning the metabolism of carbohydrate, fat, and protein during exercise. Credit is allowed for only KIN 442 or 536. Prerequisite: KIN 340 or instructor approval.

KIN 443 Exercise Endocrinology. (3)
spring
Discusses current research and theory concerning hormonal changes during exercise. Lecture, discussion. Prerequisite: KIN 340 or instructor approval.
General Studies: L

KIN 444 Metabolic Adaptations to Exercise Training. (3)
summer
Examines physiologic adaptations to exercise training as they relate to metabolism and tissue functions. Prerequisite: KIN 340.

KIN 445 Exercise Physiology for Children and Adolescents. (3)
spring
Understanding the influence of physical growth and maturation on the development of the functional capacities of the exercising child. Credit is allowed for only KIN 445 or 535. Lecture, discussion. Prerequisite: KIN 340 or 530 or instructor approval.

KIN 448 Applied Sport Psychology. (3)
fall, spring, summer
Psychological theories and techniques applied to a sport to enhance the performance and personal growth of athletes and coaches. Lecture, discussion. Prerequisite: KIN 352 (or its equivalent).
General Studies: L

KIN 450 Biopsychosocial Perspectives on Physical Activity and Health. (3)
fall
Uses a biopsychosocial perspective to examine the interrelationships on physical activity and health (physical and mental). Prerequisite: KIN 352.

KIN 452 Exercise Psychology. (3)
spring
Contemporary research and theory as related to human behavior and health in an exercise setting. Prerequisite: KIN 352.
General Studies: SB

KIN 460 Theory of Strength Training. (3)
fall
Research and theories on developing muscular strength; programs for developing muscular strength. Lecture, discussion. Prerequisites: KIN 335, 340.
General Studies: L

KIN 478 Student Teaching in Secondary Schools. (3–12)
fall and spring
Practice of teaching. Relationship of practice and theory in teaching. Fee. Prerequisite: two complete semesters of block (or its equivalent).

KIN 480 Methods of Teaching Physical Education. (3)
fall and spring
Methods of instruction, organization, and presentation of appropriate content in elementary and secondary physical education. Prerequisites: KIN 361, 376. Corequisite: student teaching or instructor approval.

KIN 484 Internship. (6)
selected semesters

KIN 485 Advanced Techniques of Athletic Training. (3)
spring
Advanced course in athletic training designed for students seeking NATA certification. Emphasizes therapeutic modalities and rehabilitation procedures. Prerequisites: KIN 283, 370; CPR certification.

KIN 492 Honors Directed Study: Research. (1–6)
selected semesters

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

KIN 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Administration of Athletics. (3)
- Environmental Exercise Physiology. (3)
- Interpretation of Exercise Performance. (3)
- Motivation in Exercise and Sport. (3)
- Muscle Physiology. (3)
- Physiological Bases for Exercise and Sport. (3)
- Research and Teaching in Physical Education. (3)
- Research Methods. (3)
- Sport and Social Issues. (3)
- Voluntary and Reflex Control of Movement. (3)

KIN 498 Pro-Seminar. (1–7)
selected semesters
Topics may include the following:
- Kinesiology and the Future. (1)

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

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

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

Department of Languages and Literatures

www.asu.edu/languages
480/965-6281
LL 440

Pier R. Baldini, Chair

Regents' Professors: Foster, Keller

Professors: Alexander, Baldini, Ballon-Aguirre, Chambers, Croft, Carlos, Garcia-Fernández, Horwath, B. Lafford, Losse, M. Sanchez, Volek, West, Wetsel, Williams, T. Wong

Associate Professors: Acereda, Candela, Canovas, Choi, Colina, Carmen Garcia-Fernández, Hernández-G., Orlich, Ossipov, Reiman, A. Sanchez, Suwarno, Tompkins, Urioste-Azcorra, Vitullo

Assistant Professors: Ali, Cashman, Duncan, George, Gilfillan, Ginsburg, Gruzinska, Haberman, Owen, Siegel-Valdes

Senior Lecturers: Foard, Hendrickson

Lecturers: Deal, Garcia, Lage, Le, Mango, Martinez, Oh, Pang, Petersen, Poudrier, Shimomura, Siriprakob, Stiftel, Walton-Ramirez, E. Wong, Zhang

Associate Research Professional: P. Lafford

Academic Associate: Glessner-Calkins

Research Associate Professor: Sipka

Distinguished Scholars of Spanish: Martinez Assad, Sefchovich

BACHELOR OF ARTS DEGREE

The faculty in the Department of Languages and Literatures offer majors in Asian Languages (Chinese/Japanese), French, German, Italian, Russian, and Spanish. Each major consists of 45 semester hours, of which 30 must be in one language and 15 in a second language or in closely related fields to be approved by the advisor in consultation with the student. Of the 30 hours required for the major, a minimum of 24 hours must be taken at the 300 or 400 level and must include at least nine hours at the 400 level. For French and Spanish, all courses counting for the major must be taken at the upper-division (300 and 400) level. Specific required courses for each major area are shown in this section and in a brochure available in the department. See "College Degree Requirements," page 330. Consult the Languages and Literatures Web site at asu.edu/languages for assessment requirements.

MAJORS

Asian Languages (Chinese/Japanese)—BA

Students majoring in Asian Languages (Chinese/Japanese) may select a course of study that focuses on either language. The major requires 45 semester hours.

Chinese. At least nine semester hours must be at the 400 level. In addition to the courses shown below, the student must meet with an advisor and choose at least 15 semester hours of courses. Choices include six semester hours of JPN prefix courses such as Japanese language and calligraphy, Japanese Literature in Translation (FLA 421), KOR prefix courses such as Korean language and/or Korean culture, three semester hours of approved course work which provides an overview of Chinese history, or six semester hours from appropriate courses in art, humanities, social and behavioral sciences, and business.

Recommended

Two 200-level CHI courses 6

Required

CHI	313	Third-Year Chinese I *G*	3
CHI	314	Third-Year Chinese II *G*	3
CHI	321	Chinese Literature *HU*	3
CHI	322	Chinese Literature *HU, G*	3
		or FLA 420 Foreign Literature in Translation *HU, G* (3)	
CHI	413	Introduction to Classical Chinese *HU*	3
CHI	414	Introduction to Classical Chinese *HU*	3
Total			18

Electives

Choose six semester hours from the courses below 6

CHI	309	Chinese Conversation (2)
CHI	310	Chinese Conversation (2)
CHI	311	Chinese Conversation (2)
CHI	312	Chinese Conversation (2)
CHI	494	Special Topics (1–4)
CHI	499	Individualized Instruction (1–3)

Total 6

Japanese. At least nine semester hours must be taken from FLA 421, and JPN 321 and 414. No more than eight semester hours may be selected from JPN 309, 310, 311, and 312.

Recommended

Two 200-level JPN courses 6

Required

FLA	421	Japanese Literature in Translation *L/HU, G*	3
JPN	313	Third-Year Japanese I *G*	3
JPN	314	Third-Year Japanese II *G*	3
JPN	321	Japanese Literature *L/HU, G*	3
JPN	414	Introduction to Classical Japanese	3
Total			15

Electives

Choose nine semester hours from the courses below 9

JPN	309	Intermediate Japanese Conversation (2)
JPN	310	Intermediate Japanese Conversation (2)
JPN	311	Japanese Conversation and Composition *G* (3)
JPN	312	Japanese Conversation and Composition *G* (3)
JPN	321	Japanese Literature *L/HU, G* (3)
JPN	394	Special Topics (1–4)
JPN	435	Advanced Readings (3)
JPN	485	Problems of Translation (3)
JPN	494	Special Topics (1–4)
JPN	499	Individualized Instruction (1–3)

Total 9

In addition to these courses, the student must meet with an advisor and choose at least 15 semester hours of courses, including six semester hours of CHI prefix courses such as Chinese language and calligraphy, Chinese literature in translation (CHI 321 and 322 and FLA 420) or KOR prefix courses such as Korean language and/or Korean culture. At least three semester hours must be in an approved course that provides an overview of Japanese history. The remaining six hours may consist of appropriate courses in art, humanities, literature, public programs, social and behavioral sciences, business, etc.

French—BA

Required

FRE	311	French Conversation *G*	3
FRE	312	French Composition *G*	3
FRE	321	French Literature *L/HU, H*	3
FRE	322	French Literature *L/HU*	3
Total			12

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

Select 18 semester hours from the following list, including at least 12 semester hours from the 400 level:

FRE 315 French Phonetics 3
FRE 319 Business French *G* 3
FRE 325 Introduction to French Film 3
FRE 394 Special Topics 1–3
FRE 411 Advanced Spoken French *G* 3
FRE 412 Advanced Written French *G* 3
FRE 415 French Civilization I *HU* 3
FRE 416 French Civilization II *HU, G* 3
FRE 421 Structure of French 3
FRE 422 Applied French Linguistics 3
FRE 423 French Syntax 3
FRE 432 Gay Identities in Modern French Literature 3
FRE 441 French Literature of the 17th Century *HU* 3
FRE 442 French Literature of the 17th Century *HU, H* 3
FRE 445 French Literature of the 18th Century *L/HU* 3
FRE 451 French Poetry of the 19th Century 3
FRE 452 French Novel of the 19th Century *HU* 3
FRE 453 Theater of the 19th Century *L/HU* 3
FRE 461 Modern Narrative *HU* 3
FRE 462 Modern Poetry *HU* 3
FRE 471 The Literature of Francophone Africa and the Caribbean *L/HU* 3
FRE 472 Franco-Canadian Civilization 3
FRE 480 Translation Theory and Practice 3
FRE 485 Literary Translation 3
FRE 494 Special Topics 1–4
FRE 499 Individualized Instruction 1–3

In addition to the courses, the student must meet with an advisor and choose at least 15 semester hours of related courses from appropriate social and behavioral sciences, humanities, business courses, and other language courses.

German—BA

Required
Two 200-level GER courses 6
GER 311 German Conversation *G* 3
or GER 312 German Conversation *G* (3)
GER 313 German Composition *G* 3
GER 411 Advanced Grammar and Conversation *G* 3
GER 412 Advanced Grammar and Composition *G* 3
GER 421 German Literature *HU* 3
GER 422 German Literature *L/HU* 3
Choose six semester hours from the courses below 6
GER 319 Business Correspondence and Communication *G* (3)
GER 394 Special Topics (1–4)
GER 415 German Civilization *HU, G, H* (3)
GER 416 German Civilization *HU, G, H* (3)
GER 494 Special Topics (1–4)

Total 30

In addition to these courses, the student must meet with an advisor and choose at least 15 semester hours of related courses from appropriate social and behavioral sciences, humanities, business courses, and other language courses.

Italian—BA

Required
Two 200-level ITA courses 6
ITA 311 Italian Composition and Conversation *G* 3
ITA 312 Italian Composition and Conversation *G* 3
ITA 325 Introduction to Italian Literature *HU* 3

Total 15

Note: ITA 315 Italian for Business may be substituted for either ITA 311 or 312.

Fifteen semester hours are required from the following list, including at least nine semester hours from the 400 level:

ITA 314 Advanced Italian *G* 3
ITA 315 Italian for Business 3
ITA 394 Special Topics 1–4
ITA 415 Italian Civilization *HU, G* 3
ITA 420 Italian Cinema 3
ITA 425 Italian American Culture *L* 3
ITA 430 Italian Literature of the Middle Ages *HU* 3
ITA 441 Dante: *Divina Commedia L/HU* 3
ITA 443 Italian Literature of the Renaissance *HU, H* 3
ITA 446 Italian Literature of the 18th and 19th Centuries *HU* 3
ITA 449 20th-Century Italian Literature *HU, G* 3
ITA 494 Special Topics 1–4
ITA 499 Individualized Instruction 1–3

In addition to the courses shown above, the student must meet with an advisor and choose at least 15 semester hours of related courses from appropriate social and behavioral sciences, humanities, business courses, and other language courses.

Russian—BA

Required
RUS 211 Basic Russian Conversation *G* 3
RUS 212 Basic Russian Conversation *G* 3
RUS 311 Russian Composition and Conversation *G* 3
RUS 312 Russian Composition and Conversation *G* 3
RUS 411 Advanced Composition and Conversation I *G* 3
or RUS 412 Advanced Composition and Conversation II *G* (3)
RUS 498 PS: Senior Seminar* 3
or SLV 498 PS: Senior Seminar (3)
SLV 304 Computational Linguistics of Slavic Languages *CS* 3

Total 21

* RUS 493 may be taken instead.

Note: Heritage speakers and other advanced speakers of Russian are, with permission from the Slavic language section head, admitted into a separate track for completion of the major. That track entails completion of 12 of the above semester hours (six semester hours of RUS 495, RUS 498 [or SLV 498], and SLV 304), to be accompanied by 18 additional semester hours from the list below (excluding RUS 411, 412, and 417). At least 12 of the additional 18 semester hours must be at the 400 level.

Nine semester hours are required from the following list, including at least six semester hours from the 400 level:

RUS 321 Foundations of Russian Literature *HU, H* 3
RUS 322 Great Russian Writers of the 19th Century *L/HU* 3
RUS 323 Modern Russian Literature and the Soviet Legacy *L/HU, G* 3
RUS 411 Advanced Composition and Conversation I *G* 3
RUS 412 Advanced Composition and Conversation II *G* 3
RUS 417 Applied Russian Phonetics 2
RUS 420 Russian Poetry *L/HU* 3
RUS 421 Pushkin *L/HU* 3

RUS 423 Dostoyevsky *L/HU* 3
RUS 424 Tolstoy *L/HU* 3
RUS 425 Chekhov *L/HU* 3
RUS 430 Russian Short Story *L/HU* 3
RUS 441 Survey of Russian Culture *L/HU, G, H* 3
RUS 495 Russian for Heritage Speakers 3
SLV 426 Contemporary East European and Eurasian Literatures *L/HU, G* 3
SLV 440 History of Slavic Languages *SB* 3

In addition to the 30 semester hours of course work required for the major, students majoring in Russian must take 15 additional semester hours from a list of approved courses in related fields, at least six semester hours of which must be taken at the upper-division level. Related fields courses should be chosen in consultation with an advisor. Russian majors are encouraged to take related Slavic/East European language courses in the annual summer Critical Languages Institute (CLI). CLI courses may be applied toward the related field requirements.

Spanish—BA

Required
SPA 313 Spanish Conversation and Composition *G* 3
or SPA 315 Spanish Conversation and Composition for Bilinguals (3)
SPA 314 Spanish Conversation and Composition *G* 3
or SPA 316 Spanish Conversation and Composition for Bilinguals (3)
SPA 325 Introduction to Hispanic Literature *HU* 3
SPA 412 Advanced Conversation and Composition *G* 3
SPA 425 Spanish Literature *HU* 3
Choose two courses below 6
SPA 426 Spanish Literature *HU* (3)
SPA 427 Spanish American Literature *L* (3)
SPA 428 Spanish American Literature *L, G* (3)
Choose one course below 3
SPA 471 Civilization of the Spanish Southwest *HU* (3)
SPA 472 Spanish American Civilization *HU, G, H* (3)
SPA 473 Spanish Civilization *HU/SB, G* (3)
Total 24

Electives
Two upper-division (300–400-level) SPA courses 6

Related Fields
POR 101 Elementary Portuguese 5
POR 201 Intermediate Portuguese *G* 5

In addition to these courses, the student must meet with an advisor and choose at least six semester hours of courses from appropriate social and behavioral sciences, humanities, business, and other romance language courses.

SPA 311 and 312 are not counted toward the major or minor in Spanish.

MINORS

Each minor in Asian Languages (Chinese/Japanese), German, Italian, and Russian consists of 18 semester hours, of which 12 semester hours must be in the upper division. The Spanish and French minors require 18 upper-division semester hours. In addition, specific required courses for each area follow and are in a brochure in the department. Course substitutions are allowed for heritage and advanced speakers of the language.

Chinese

Required
Two CHI 200-level courses 6
CHI 313 Third-Year Chinese I *G* 3
CHI 314 Third-Year Chinese II *G* 3

Consult with the departmental advisor for an additional six hours of Chinese course credit.

French

Required
FRE 311 French Conversation *G* 3
FRE 312 French Composition *G* 3
FRE 321 French Literature *HU, H* 3
or FRE 322 French Literature *L/HU* (3)

Nine hours of upper-division French courses with at least three hours from the 400 level are also required.

German

Required
Two GER 200-level courses 6
GER 311 German Conversation *G* 3
or GER 312 German Conversation *G* (3)
GER 313 German Composition *G* 3
One 400-level GER course 3
Upper-division GER course 3

Italian

Required
ITA 201 Intermediate Italian *G* 3
ITA 202 Intermediate Italian *G* 3
ITA 311 Italian Composition and Conversation *G* 3
or ITA 312 Italian Composition and Conversation *G* (3)
or ITA 315 Italian for Business (3)
ITA 325 Introduction to Italian Literature *HU* 3
One 300 or 400-level ITA course 3
One 400-level ITA course 3

Japanese

Required
Two 200-level JPN courses 6
JPN 313 Third-Year Japanese I *G* 3
JPN 314 Third-Year Japanese II *G* 3

Consult with the departmental advisor for additional JPN courses.

Russian

Required
RUS 211 Basic Russian Conversation *G* 3
RUS 212 Basic Russian Conversation *G* 3
RUS 311 Russian Composition and Conversation *G* 3
RUS 312 Russian Composition and Conversation *G* 3

Six semester hours of upper-division RUS courses are also required.

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

Spanish

The minor in Spanish requires a minimum of 18 upper-division semester hours.

Required

SPA 313 Spanish Conversation and Composition *G* 3
or SPA 315 Spanish Conversation and Composition for Bilinguals (3)
SPA 314 Spanish Conversation and Composition *G* 3
or SPA 316 Spanish Conversation and Composition for Bilinguals (3)
SPA 325 Introduction to Hispanic Literature *HU* 3
SPA 412 Advanced Conversation and Composition *G* 3
SPA 471 Civilization of the Spanish Southwest *HU* 3
or SPA 472 Spanish American Civilization *HU, G, H* (3)
or SPA 473 Spanish Civilization *HU/SB, G* (3)
One elective course (SPA 319 or above) 3

SPA 311 and 312 are not counted toward the major or minor in Spanish.

CERTIFICATES AND EMPHASES

The following are certificate programs or emphases offered in the Department of Languages and Literatures. For more information, see "Certificate Programs and Areas of Emphasis," page 336.

Asian Studies Certificate. Foreign language students majoring in Asian Languages (Chinese/Japanese) may elect to pursue an Asian Studies Certificate combining courses from the major with selected outside courses of predominantly Asian content.

Classical Studies. Any undergraduate major can earn a certificate in classical studies.

Latin American Studies Certificate. Foreign language students majoring in Spanish may elect to pursue a Latin American Studies Certificate combining courses from the major with selected outside courses of wholly Latin American content.

Russian and East European Studies Certificate. Any undergraduate major can earn a Russian and East European Studies Certificate by successfully completing one of the options mentioned in the section on "Russian and East European Studies," page 341.

Scandinavian Studies Certificate. Any undergraduate major can earn a Scandinavian Studies Certificate.

Southeast Asian Studies Certificate. To earn a Southeast Asian Studies Certificate, a student must complete a minimum of 40 semester hours of course work related to Southeast Asia, including two years (20 semester hours) of a Southeast Asian language.

Translation Certificate (Spanish/English). The Translation Certificate program is designed to provide the advanced training required for professional translation in both public and private sectors, preparation for the rigorous examinations required by national and international agencies, and training as an ancillary skill for professional fields, such as international business, public health and medicine, and law, in accordance with guidelines recommended by the American Translators' Association. The certificate is a nondegree program consisting of 15 semester hours of course work and two hours of in-service practicum primarily into the receptor language of English from the source language of Spanish. It may be taken simultaneously with course work leading to an undergraduate degree, as a related area sequence, or as the sole program of study for members of the community who meet the admission requirements of the certificate program and are enrolled in the university. A complete brochure is available at the Department of Languages and Literatures in LL 440.

Admission Requirements. Since entrance to professional translation is through work, cultural experience, and examination, the entrance requirements to this certificate program are (1) a written proficiency examination in the source and the receptor languages at the level of completion of an advanced composition course in Spanish (SPA 412) and English (ENG 301), and (2) an academic year at a university in both a Spanish-speaking country and an English-speaking country, extensive work experience using Spanish and English, or demonstrated bilingual writing competence in English and Spanish.

Certificate Requirements. The certificate program consists of the following requirements:

Prerequisites

FLA 400 Linguistics *SB* 3
or SPA 400 Introduction to Spanish Linguistics (3) or equivalent
SPA 494 ST: Lexicography 3

Required

FLA 401 Translation Theory and Practice 3
SPA 412 Advanced Conversation and Composition *G* 3

In-Service Practicum

FLA 484 Internship 2

Also required are nine hours of applied translation electives in specialized areas chosen from the following courses:

FLA 481 Technical and Scientific Translation 3
FLA 482 Business and Financial Translation 3
FLA 483 Medical and Legal Translation 3
FLA 485 Problems of Literary Translation 3

BIS CONCENTRATIONS

Students seeking to focus on a language as one of their concentration areas for the Bachelor of Interdisciplinary Studies degree may choose from Chinese, French, German, Italian, Japanese, Russian, Spanish, and translation (Spanish/English). They may also choose from any of the approved certificate programs. The requirements for the Bachelor of Interdisciplinary Studies (BIS) concentrations are the same as for the minor in that language. See "Minors," page 407, for specific course requirements. For more information, see "School of Interdisciplinary Studies," page 124.

SECONDARY EDUCATION—BAE

This degree is offered through the Initial Teacher Certification (ITC) program in the College of Education. Students

pursuing a major in Secondary Education (French, German, Japanese or Spanish) have an advisor in the College of Education and an advisor within the Department of Languages and Literatures.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

French, German, Japanese, and Spanish. Each of the major teaching fields in French, German, Japanese, and Spanish consists of 45 semester hours, of which 30 must be in one language and 15 in a second language or in closely related fields to be approved by the department advisor in consultation with the student. Of the 30 hours required for the academic specialization, a minimum of 24 hours must be taken at the 300 or 400 level and must include at least nine hours at the 400 level. Specific required courses for each major area are listed in curriculum check sheets of the individual language areas available in the department or in the College of Education. FLA 479 Introduction to Teaching Foreign Languages and FLA 480 Methods of Teaching Foreign Languages are required courses.

GRADUATE PROGRAMS

The faculty in the Department of Languages and Literatures offer programs leading to the MA degree in French, German, and Spanish and the PhD degree in Spanish. See the *Graduate Catalog* for requirements.

FOREIGN LANGUAGES FOR INTERNATIONAL PROFESSIONS

The sequence of two semesters, listed under numbers 107 and 207 in two languages (French and Spanish), integrates an accelerated study, a functional approach to course design, and preparation for international professions (e.g., business, diplomacy, international political economy). It is parallel to the traditional sequence of 101 through 202 and also satisfies the college's foreign language requirement. The sequence differs from traditional basic language programs in that all aspects of the language—vocabulary, grammar, and skill development—are practiced within the context of authentic communication for social and professional purposes in the target culture. Classes meet eight hours weekly, for eight semester hours in each of two semesters.

Students who have had success in learning one foreign language are encouraged to join this program in a second language. Students should contact the Department of Languages and Literatures before registration.

FOREIGN LANGUAGE REQUIREMENT

The College of Liberal Arts and Sciences requires knowledge of one foreign language equivalent to the completion of two years' study at the college level. This normally includes a sequence of courses numbered 101 and 102 and 201 and 202 *or* 107 and 207. However, important exceptions exist in Greek, Latin, Portuguese, and Romanian.

Greek. To satisfy the foreign language requirement, students must take GRK 301 and 302.

Latin. Students must take LAT 201 before entering LAT 202 or must have completed at least three years of high school Latin before entering LAT 202 to satisfy the College of Liberal Arts and Sciences foreign language requirement.

Portuguese. To satisfy the foreign language requirement, students must take POR 314 or a higher numbered POR course.

Romanian. To satisfy the foreign language requirement, students must complete ROM 314.

FOREIGN LANGUAGE PLACEMENT

Students who transfer from other postsecondary institutions with foreign language credits below the 202 level are placed in a course at the level directly above the work completed.

Students who have completed their secondary education at a school in which the language of instruction was not English are considered to have satisfied the foreign language requirement. Certification of this status is made at the time of admission to ASU.

Questions should be addressed to the International Admissions program within Undergraduate Admissions. For more information, call 480/965-2688, or visit the Web site at www.asu.edu/admissions.

The foreign language requirement can be met in languages not taught at ASU either by transferring credit from another institution or by passing a proficiency examination. When possible, the Department of Languages and Literatures recommends to the college an appropriate source for such examinations and proctors them. Grading is done by the institution that provides the examination, and the student pays any costs incurred. The examination can be used only to demonstrate proficiency; it does not produce semester hours of credit.

Students desiring placement above the 101-level course in French, German, or Spanish should take the placement exam for that language in the Computer Language Laboratory in LL 65.

Ordinarily, no placement or proficiency examination is administered to students who wish to continue studying languages for which high school credits have been earned. Students should be guided by the following principles of equivalency: (1) one unit (one academic year) of high school-level study is considered, for placement purposes only, to equal one semester of study of the same language at the university level. Thus, students with one year of high school study would enroll in the second semester course (102); students with two years of high school study, in the third semester course (201), and so on. (2) Students who feel that their high school language preparation was inadequate may choose to place themselves in a lower level, but not lower

than 111 with two or three years of high school study and 201 with four years of high school study.

Students with prior knowledge of a language may meet the college foreign language requirement in any one of the following ways:

1. by satisfactory results in a nonrepeatable college-approved proficiency examination;
2. by achieving a grade of at least "C" (2.00) in the last course of the required sequence; or
3. by achieving a grade of at least "C" (2.00) in a course taught in the language for which the last course of the required sequence is a prerequisite.

Students are expected to follow the progressive sequence of 100, 200, 300, or 400 level. Once a grade of "C" (2.00) or higher is earned in a 300-level class in a language, students may not earn lower-division credit in that language. Moreover, once a grade of "C" (2.00) or higher is earned in a 200-level language course, students may not earn credit in any 100-level course in that language.

First-year foreign language courses taught by the Department of Languages and Literatures are not open to students who have spent one or more years in a country where that language is the predominant language. Individual language areas may have different policies. Students with questions about this policy should check with the appropriate language coordinator in the department.

If transfer students are uncertain about course equivalencies, they should contact the Department of Languages and Literatures.

LANGUAGE LABORATORY REQUIREMENT

All students enrolled in 101, 102, 201, and 202 language courses are expected to spend a minimum of one hour per week in the language laboratory or in other assigned audio-lingual tape exercises in addition to the regular class periods.

FOREIGN LANGUAGES (FLA)

FLA Note 1. Completion of the First-Year Composition requirement (ENG 101 and 102 [or 105] or ENG 107 and 108 with a grade of "C" [2.00] or higher) is a prerequisite for all English courses above the 100 level.

FLA Note 2. A term paper or equivalent out-of-class written work is required in all upper-division (300- and 400-level) ENG courses.

FLA Note 3. English majors and minors are expected to have completed ENG 200 before taking 400-level literature courses.

FLA 150 Introduction to East Asian Culture. (3)
spring
Introduces the cultures of China, Japan, and Korea.
General Studies: HU, G

FLA 323 Survey of Literature of the Soviet Era in Translation. (3)
fall and spring
Surveys main literary movements, prominent authors, most significant works of prose, poetry, and drama of the Soviet period, 1917–1991.
General Studies: L/HU, G

FLA 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Career Development for Language Students
- Introduction to Teaching Foreign Languages

FLA 400 Linguistics. (3)
spring
Introduces the analysis of language and its use in social contexts. Topics: morphology, phonology, pragmatics, semantics, syntax, and variation. Prerequisites: junior standing; instructor approval.
General Studies: SB

FLA 401 Translation Theory and Practice. (3)
selected semesters
Translation theories and professional practices and ethics; bibliography, computer technology, and sample texts for natural and social sciences and humanities. Prerequisite: 4th-year composition or instructor approval in respective language area.

FLA 415 Bilingualism and Languages in Contact. (3)
fall
Analyzes linguistic aspects of bilingualism, e.g., pidgins and creoles, code-switching, and other contact phenomena; simultaneous/sequential bilingual language acquisition. Prerequisite: FLA 400 (or its equivalent) or instructor approval.

FLA 420 Foreign Literature in Translation. (3)
fall and spring
Not for language majors (except in Asian languages and Russian); open to language majors as a related-area course. Graduate students by permission. Topics may include the following:
- Brazilian
- Chinese
- French
- German
- Greek
- Italian
- Latin
- Portuguese
- Russian
- Soviet
- Spanish
- Spanish American

General Studies: HU, G

FLA 421 Japanese Literature in Translation. (3)
fall and spring
Readings selected by theme or genre or period from various works of Japanese literature in English translation. May be repeated when topics vary. Graduate students by permission. Prerequisite: a General Studies L course.
General Studies: L/HU, G

FLA 461 Feminist Political Writing in Contemporary Europe. (3)
selected semesters
Examines the discourse of gender-politics in Central Eastern Europe before and after Soviet hegemony. Cross-listed as ENG 429. Credit is allowed for only ENG 429 or FLA 461. See FLA Notes 1, 2, 3.

FLA 464 Politics of Drama in 20th-Century Europe. (3)
selected semesters
Interdisciplinary examination of European drama before and after WWII. Cross-listed as ENG 429. Credit is allowed for only ENG 429 or FLA 464. See FLA Notes 1, 2, 3.

FLA 472 Literature and Politics in Pre- and Post-Communist Europe. (3)
selected semesters
Interdisciplinary examination of the cultures of Eastern Europe from WWI to the present. Cross-listed as ENG 429. Credit is allowed for only ENG 429 or FLA 472. See FLA Notes 1, 2, 3.

FLA 476 Literature and Film in 20th-Century Eastern Europe. (3)
selected semesters
Evaluates literary texts and films as a massive propaganda machine of the totalitarian state. Cross-listed as ENG 429. Credit is allowed for only ENG 429 or FLA 476. See FLA Notes 1, 2, 3.

FLA 479 Introduction to Teaching Foreign Languages. (3)
fall
Introduces teaching methodologies, language learning, and current best practice in teaching foreign languages in U.S. middle and high schools. Lecture, discussion, reading, micro-teaching practice. Prerequisite: admission to ITC program in College of Education or instructor approval.

FLA 480 Methods of Teaching Foreign Languages. (3)
fall
Teaching foreign languages and literatures at secondary and college levels. Does not meet the Liberal Arts and Sciences General Studies requirement for humanities and fine arts. Required for admission to SED 478. Prerequisite: 12 hours of upper-division courses in 1 foreign language.

FLA 481 Technical and Scientific Translation. (3)
selected semesters
Resources, practices, strategies, and lexicon for translation of professional texts in subjects such as engineering, architecture, agriculture, computer technology, electronics, and physical and biological sciences. Prerequisite: FLA 401.

FLA 482 Business and Financial Translation. (3)
selected semesters
Resources, practices, strategies, and lexicon for translation of professional texts in subjects such as economics, finance, insurance, management, marketing, accounting, advertising, and real estate. Prerequisite: FLA 401.

FLA 483 Medical and Legal Translation. (3)
selected semesters
Resources and strategies for translation of professional texts in subjects such as medicine, nursing, public health, criminal justice, and international law. May be repeated for a total of 6 semester hours. Prerequisite: FLA 401.

FLA 484 Internship. (1–12)
selected semesters

FLA 485 Problems of Literary Translation. (3)
selected semesters
Theory and practice with emphasis on application through individual translation projects. May be repeated for a total of 6 semester hours. Prerequisite: FLA 401 or instructor approval in the respective language area.

FLA 494 Special Topics. (1–4)
selected semesters
Various topics.

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

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

ARABIC (ARB)

ARB 101 Elementary Arabic. (4)
fall and summer
Reading, writing, speaking, and understanding basic Arabic. 4 hours lecture, 1 hour lab. Fee.

ARB 102 Elementary Arabic. (4)
spring and summer
Reading, writing, speaking, and understanding basic Arabic. 4 hours lecture, 1 hour lab. Fee. Prerequisite: ARB 101 (or its equivalent).

ARB 201 Intermediate Arabic. (4)
fall
Review of Arabic grammar with emphasis on the development of the skills of listening comprehension, reading, speaking, and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: ARB 102 (or its equivalent).
General Studies: G

ARB 202 Intermediate Arabic. (4)
spring
Review of Arabic grammar with emphasis on the development of the skills of listening comprehension, reading, speaking, and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: ARB 201 (or its equivalent).
General Studies: G

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

SERBO-CROATIAN (BCS)

BCS 101 Elementary Serbo-Croatian. (4)
fall and summer
Structural grammar, basic vocabulary; introduction and reinforcement of aural/oral, reading, and writing skills. 4 hours lecture, 1 hour lab. Lecture, lab, group activities.

BCS 102 Elementary Serbo-Croatian. (4)
spring and summer
See BCS 101. Lecture, lab, group activities. Prerequisite: BCS 101 (or its equivalent).

BCS 201 Intermediate Serbo-Croatian. (4)
fall and summer
Systematic review of grammar. Development of vocabulary through reading and writing. Drill in aural/oral skills. 4 hours lecture, 1 hour lab. Lecture, lab, group activities. Prerequisite: BCS 102 (or its equivalent).

BCS 202 Intermediate Serbo-Croatian. (4)
spring and summer
See BCS 201. Lecture, lab, group activities. Prerequisite: BCS 201 (or its equivalent).

BCS 298 Serbo-Croatian Practicum. (2)
summer
On-site summer practicum in Yugoslavia following intensive summer Serbo-Croatian language study in the ASU Critical Languages Institute. Lecture, lab, group activities. Prerequisite: BCS 102 (or its equivalent).

BCS 495 Serbo-Croatian for Heritage Speakers. (1–6)
selected semesters
Generates professional proficiency by developing communicative and written competency in standard literary Serbo-Croatian. Lecture, lab, tutorial. Prerequisite: instructor approval.

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

CHINESE (CHI)

CHI 101 First-Year Chinese I. (5)
fall and spring
Pronunciation, grammar, elementary conversation, and development of basic reading and writing skills. Standard dialect. 5 class hours. Fee.

CHI 102 First-Year Chinese II. (5)
fall and spring
See CHI 101. Fee. Prerequisite: CHI 101 (or its equivalent).

CHI 201 Second-Year Chinese I. (5)
fall and spring
Systematic review of grammar. Development of vocabulary through reading and writing. Drill in aural/oral skills. 5 class hours. Fee. Prerequisite: CHI 102 (or its equivalent).
General Studies: G

CHI 202 Second-Year Chinese II. (5)
spring
See CHI 201. Fee. Prerequisite: CHI 201 (or its equivalent).
General Studies: G

CHI 205 Chinese Calligraphy. (1)
fall and spring
Introduces styles and techniques of Chinese writing. Requires no knowledge of Chinese or Japanese.

CHI 309 Chinese Conversation. (2)
fall
Aural/oral drills using contemporary stories, articles, and essays. For students with lower-level proficiency. Prerequisite: CHI 202.

CHI 310 Chinese Conversation. (2)
spring
See CHI 309. Prerequisite: CHI 202.

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

CHI 311 Chinese Conversation. (2)
fall
Intensive aural/oral practice in modern Chinese. For students who have lived in China or a Chinese-speaking environment. *Discussion*, drill. Prerequisite: CHI 202.

CHI 312 Chinese Conversation. (2)
spring
See CHI 311. Discussion, drill. Prerequisite: CHI 202.

CHI 313 Third-Year Chinese I. (3)
fall
Expansion of proficiency in listening comprehension, speaking, reading, and writing. Lecture, 3 hours discussion, drill. Prerequisite: CHI 202 (or its equivalent).
General Studies: G

CHI 314 Third-Year Chinese II. (3)
spring
Continuation of CHI 313. Prerequisite: CHI 313 (or its equivalent).
General Studies: G

CHI 321 Chinese Literature. (3)
fall
Masterworks of the tradition from the 6th century BCE through the 13th century. Readings, lectures, and examinations are in English.
General Studies: HU

CHI 322 Chinese Literature. (3)
spring
Masterpieces from the later tradition and its transition to modern times. Readings, lectures, and examinations are in English.
General Studies: HU, G

CHI 345 Chinese Film and Civilization. (3)
once a year
Screening and discussion of recent films from China, Taiwan, and Hong Kong in the context of modern Chinese civilization. Lecture, discussion, screening.

CHI 413 Introduction to Classical Chinese. (3)
fall
Reading in various genres of pre-20th century literature (wen-yen), with analysis of the structure of the classical writings. Prerequisite: CHI 314 or instructor approval.
General Studies: HU

CHI 414 Introduction to Classical Chinese. (3)
spring
Continuation of CHI 413. Prerequisite: CHI 413.
General Studies: HU

CHI 494 Special Topics. (1–4)
selected semesters

CHI 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.

FRENCH (FRE)

FRE 101 Elementary French. (4)
fall, spring, summer
Intensive aural/oral drill in class and laboratory; basic grammar supplemented by simple prose readings. Credit is allowed for only FRE 101 or 111. 4 hours lecture, 1 hour lab. Fee.

FRE 102 Elementary French. (4)
fall, spring, summer
See FRE 101. Credit is allowed for only FRE 102 or 111. Fee. Prerequisite: FRE 101 (or its equivalent).

FRE 107 French for International Professions I. (8)
fall
Accelerated alternative to FRE 101 and 102 or FRE 111. Functional approach. Emphasizes communicative competence for international professions. Credit is allowed for only FRE 107 or 111. Fee.

FRE 111 Fundamentals of French. (4)
fall and spring
Primarily for students with two years of high school French who need review to enter second year study. Credit is allowed for only FRE 111 or 101 or 102 or 107. 4 hours lecture, 1 hour lab. Fee.

FRE 201 Intermediate French I. (4)
fall, spring, summer
Grammar review, with emphasis on development of skills of speaking, reading, writing, and listening comprehension. 4 hours lecture; 1 hour lab. Fee. Prerequisite: FRE 102 or 111 (or its equivalent).
General Studies: G

FRE 202 Intermediate French II. (4)
fall, spring, summer
Continuation of grammar review with emphasis on development of skills in speaking, reading, writing, and listening comprehension. 4 hours lecture, 1 hour lab. Fee. Prerequisite: FRE 201 (or its equivalent).
General Studies: G

FRE 205 Readings in French Literature. (3)
fall, spring, summer
Designed to teach reading with facility and comprehension. Vocabulary building and textual analysis of literary genres are major elements. Prerequisite: FRE 202 (or its equivalent).
General Studies: G

FRE 207 French for International Professions II. (8)
spring
Continuation of FRE 107, alternative to FRE 201, 202 sequence. Expansion of communicative proficiency in specific areas of international professions. Fee. Prerequisite: FRE 107 or instructor approval.
General Studies: G

FRE 311 French Conversation. (3)
fall and spring
Further practice in speaking French, emphasizing current usage and promoting facility in the expression of ideas. Prerequisite: 8 hours of 200-level French (or its equivalent).
General Studies: G

FRE 312 French Composition. (3)
fall and spring
Further practice in writing French, emphasizing current usage and promoting facility in the expression of ideas. Prerequisite: 8 hours of 200-level French (or its equivalent).
General Studies: G

FRE 315 French Phonetics. (3)
fall
Practice and theory of French pronunciation. Emphasizes standard French, although an overview of regional varieties is offered. Lecture, lab. Prerequisite: FRE 311 (or its equivalent).

FRE 319 Business French. (3)
spring
Introduces the structure, vocabulary, and practices of the French business world. Prerequisite: FRE 312 or instructor approval.
General Studies: G

FRE 321 French Literature. (3)
fall and spring
Representative masterpieces and significant movements of French literature of the Middle Ages through the 18th century. Prerequisite: FRE 205 (or its equivalent).
General Studies: L/HU, H

FRE 322 French Literature. (3)
fall and spring
Literature of the 19th and 20th centuries. Prerequisite: FRE 205 (or its equivalent).
General Studies: L/HU

FRE 325 Introduction to French Film. (3)
spring
Studies French artistic contribution from 1895 to present, with emphasis on recent films starting with the New Wave. Short lecture before film, discussion after. Prerequisite for French majors: FRE 202.

FRE 394 Special Topics. (1–4)
selected semesters

FRE 411 Advanced Spoken French. (3)
fall and spring
Improvement of spoken French. Prerequisites: FRE 311 and 6 hours of 300-level French (or their equivalents).
General Studies: G

FRE 412 Advanced Written French. (3)
fall and spring
Improvement of composition skills. Prerequisites: FRE 312 and 6 hours of 300-level French (or their equivalents).
General Studies: G

FRE 415 French Civilization I. (3)
spring
Political, intellectual, social, economic, and artistic development of France from its origins to the end of the 17th century. Prerequisite: 6 hours of upper-division French.
General Studies: HU

FRE 416 French Civilization II. (3)
spring
Political, intellectual, social, economic, and artistic development of France from the 18th century to present. Prerequisite: 6 hours of upper-division French.
General Studies: HU, G

FRE 421 Structure of French. (3)
fall
Phonology, morphology, syntax, semantics, and varieties of French. Prerequisites: both FRE 311 and 312 or only instructor approval.

FRE 422 Applied French Linguistics. (3)
spring
Applies linguistic theory and second language acquisition theory to teaching of French. Prerequisite: ASB 480 or ENG 213 or FLA 400.

FRE 423 French Syntax. (3)
spring
Analyzes French syntactic structure by contemporary theoretical models. Prerequisite: ASB 480 or ENG 213 or FLA 400.

FRE 432 Gay Identities in Modern French Literature. (3)
spring
Examines the representation of homosexuals as well as the emergence of homosexuality as a theme in modern French literature. Lecture, discussion. Prerequisites: both FRE 322 and 6 hours of 300-level French or only instructor approval.

FRE 441 French Literature of the 17th Century. (3)
fall
From 1600 to 1660. Prerequisites: both FRE 321 and 6 hours of 300-level French or only instructor approval.
General Studies: HU

FRE 442 French Literature of the 17th Century. (3)
spring
From 1660 to 1700. Prerequisites: both FRE 321 and 6 hours of 300-level French or only instructor approval.
General Studies: HU, H

FRE 445 French Literature of the 18th Century. (3)
selected semesters
Contributions of the philosophers and the development of the novel and drama. Prerequisites: both FRE 321 and 6 hours of 300-level French or only instructor approval.
General Studies: L/HU

FRE 451 French Poetry of the 19th Century. (3)
spring
From Romanticism to Parnassian poetry to Symbolism. Prerequisites: both FRE 322 and 6 hours of 300-level French or only instructor approval.

FRE 452 French Novel of the 19th Century. (3)
fall
From Constant, Hugo, Balzac, Stendhal, and Sand to Flaubert and Zola, with emphasis on major literary movements. Prerequisites: both FRE 322 and 6 hours of 300-level French or only instructor approval.
General Studies: HU

FRE 453 Theater of the 19th Century. (3)
spring
From Romantic drama to the Symbolist Theater. Representative plays of Hugo, Musset, Vigny, Dumas, Becque, Rostand, Feydeau, and Mirbeau. Prerequisites: both FRE 322 and 6 hours of 300-level French or only instructor approval.
General Studies: L/HU

FRE 461 Modern Narrative. (3)
fall
Representative authors from Gide to the new Nouveau Roman. Prerequisites: both FRE 322 and 6 hours of 300-level French or only instructor approval.
General Studies: HU

FRE 462 Modern Poetry. (3)
spring
Representative authors from Mallarme to Bonnefoy. Lecture, discussion. Prerequisites: both FRE 322 and 6 hours of 300-level French or only instructor approval.
General Studies: HU

FRE 471 The Literature of Francophone Africa and the Caribbean. (3)
fall
Selected prose, poetry, and drama of black authors from Africa and the Caribbean. Prerequisites: both FRE 322 and 6 hours of 300-level French or only instructor approval.
General Studies: L/HU

FRE 472 Franco-Canadian Civilization. (3)
spring
Study of the civilization of Quebec in particular through its history, language, literature, music, and customs. Prerequisite: 9 hours of 300-level French or instructor approval.

FRE 480 Translation Theory and Practice. (3)
spring
Theoretical and practical approaches to the fundamentals of meaning-based translation. Lecture, seminar. Prerequisite: FRE 412 or instructor approval.

FRE 485 Literary Translation. (3)
spring
Theory and practice of literary translation with emphasis on application through individual translation project. Prerequisite: FRE 480.

FRE 494 Special Topics. (1–4)
selected semesters

FRE 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.

GERMAN (GER)

GER 101 Elementary German. (4)
fall, spring, summer
Reading, writing, speaking, and understanding of basic German, with emphasis on pronunciation and grammar. Credit is allowed for only GER 101 or 111. 4 hours lecture, 1 hour lab. Fee.

GER 102 Elementary German. (4)
fall, spring, summer
See GER 101. Credit is allowed for only GER 102 or 111. Fee. Prerequisite: GER 101 (or its equivalent).

GER 111 Fundamentals of German. (4)
fall and spring
Primarily for students with two years of high school German who need review to enter second-year study. Credit is allowed for only GER 111 or both GER 101 and 102. 4 hours lecture, 1 hour lab. Fee.

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

GER 201 Intermediate German. (4)
fall, spring, summer
Intensive review of grammar, with emphasis on the development of the skills of speaking, listening comprehension, reading, and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: GER 102 or 111 (or its equivalent).
General Studies: G

GER 202 Intermediate German. (4)
fall, spring, summer
See GER 201. Fee. Prerequisite: GER 201 (or its equivalent).
General Studies: G

GER 311 German Conversation. (3)
fall
Expansion of idiom through oral practice dealing with contemporary articles, essays, and stories. 3 semester hours limit for majors. Prerequisite: GER 202 (or its equivalent).
General Studies: G

GER 312 German Conversation. (3)
spring
See GER 311. Prerequisite: GER 202 (or its equivalent).
General Studies: G

GER 313 German Composition. (3)
spring
Intensive practice in writing, emphasizing style and grammar. Prerequisite: GER 202 (or its equivalent).
General Studies: G

GER 319 Business Correspondence and Communication. (3)
selected semesters
Organization and presentation of clear, effective business communications; vocabulary applicable to modern business usage. Prerequisite: GER 313 or instructor approval.
General Studies: G

GER 394 Special Topics. (1–4)
selected semesters

GER 411 Advanced Grammar and Conversation. (3)
fall
Improvement of diction and idiom through intensive oral review. Prerequisite: GER 311 or 312 (or its equivalent).
General Studies: G

GER 412 Advanced Grammar and Composition. (3)
spring
Improvement of writing ability. Prerequisite: GER 313 (or its equivalent).
General Studies: G

GER 415 German Civilization. (3)
spring
Aspects of political, social, and cultural life of the German-speaking world from the beginning through 1600. Prerequisite: a 300-level course in German or instructor approval.
General Studies: HU, G, H

GER 416 German Civilization. (3)
fall
From 1600 through 1945. Prerequisite: a 300-level course in German or instructor approval.
General Studies: HU, G, H

GER 421 German Literature. (3)
fall
From the beginning to Classicism. Prerequisite: 6 hours of 300-level German.
General Studies: HU

GER 422 German Literature. (3)
spring
From Romanticism to the present. Prerequisite: 6 hours of 300-level German.
General Studies: L/HU

GER 453 German Literary Masterpieces on Film. (3)
fall, spring, summer
Film and literature in their correlation to each other and to cultural, political, and social trends in German-speaking countries. Special arrangements for graduate students and those without a knowledge of German. Lecture, discussion.
General Studies: HU, G

GER 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.

ANCIENT GREEK (GRK)

GRK 101 Elementary Ancient Greek. (4)
fall
Ancient Greek grammar and vocabulary with an emphasis on developing reading skills. For beginning students only.

GRK 201 Intermediate Ancient Greek. (4)
spring
Continuation of GRK 101. Ancient Greek syntax and grammar. Prerequisite: GRK 101.

GRK 301 Ancient Greek Literature I. (3)
fall
Readings in ancient Greek prose; advanced grammar. May be repeated for credit. Prerequisite: GRK 201.
General Studies: HU

GRK 302 Ancient Greek Literature II. (3)
spring
Continuation of GRK 301. Readings in ancient Greek poetry. Prerequisite: GRK 301.
General Studies: HU

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

HEBREW (HEB)

HEB 101 Elementary Modern Hebrew. (4)
fall
Reading, writing, speaking, and understanding of basic modern Hebrew, with emphasis on pronunciation and grammar. 4 hours lecture, 1 hour lab. Fee.

HEB 102 Elementary Modern Hebrew. (4)
spring
Reading, writing, speaking, and understanding of basic modern Hebrew, with emphasis on pronunciation and grammar. 4 hours lecture, 1 hour lab. Fee. Prerequisite: HEB 101 (or its equivalent).

HEB 201 Intermediate Modern Hebrew. (4)
fall
Intensive review of grammar, with emphasis on the development of the skills of speaking, listening comprehension, reading, and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: HEB 102 (or its equivalent).
General Studies: G

HEB 202 Intermediate Modern Hebrew. (4)
spring
Intensive review of grammar, with emphasis on the development of the skills of speaking, listening comprehension, reading, and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: HEB 201 (or its equivalent).
General Studies: G

HEB 313 Advanced Modern Hebrew. (4)
fall
Continued development of ability to communicate orally and in writing. Reading of selected literary works. Prerequisite: HEB 202 (or its equivalent).

HEB 314 Advanced Modern Hebrew. (4)
spring
Continued development of ability to communicate orally and in writing. Reading of selected literary works. Prerequisite: HEB 313 (or its equivalent).

HEB 375 Contemporary Culture of Israel. (3)
fall and spring
Intense study of aspects of historical, social, political, and cultural modern life in Israel. Beginning of Zionism to present day. Lecture, discussion.
General Studies: HU, G

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

INDONESIAN (IDN)

IDN 101 Elementary Indonesian I. (5)
fall
Basic communication, reading, and writing skills. Intensive oral/aural classroom drill supplemented by prose reading. 4 hours lecture, 1 hour lab. Fee.

IDN 102 Elementary Indonesian II. (5)
spring
Basic communication, reading, and writing skills. Intensive oral/aural classroom drill supplemented by prose reading. 4 hours lecture, 1 hour lab. Fee. Prerequisite: IDN 101 (or its equivalent).

IDN 201 Intermediate Indonesian I. (5)
fall
Systematic review of grammar. Continued development of communication skills with increased emphasis on reading and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: IDN 102 (or its equivalent).
General Studies: G

IDN 202 Intermediate Indonesian II. (5)
spring
Systematic review of grammar. Continued development of communication skills with increased emphasis on reading and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: IDN 201 (or its equivalent).
General Studies: G

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

ITALIAN (ITA)

ITA 101 Elementary Italian. (5)
fall, spring, summer
Aural/oral drill in class and laboratory. Basic grammar supplemented by simple prose readings. 5 hours lecture, 1 hour lab. Fee.

ITA 102 Elementary Italian. (5)
fall, spring, summer
Aural/oral drill in class and laboratory. Basic grammar supplemented by simple prose readings. 5 hours lecture, 1 hour lab. Fee. Prerequisite: ITA 101 (or its equivalent).

ITA 201 Intermediate Italian. (3)
fall, spring, summer
Systematic review of grammar. Development of vocabulary through reading, listening, speaking, and writing. 3 hours lecture, 1 hour lab. Fee. Prerequisite: ITA 102 (or its equivalent).
General Studies: G

ITA 202 Intermediate Italian. (3)
fall, spring, summer
Systematic review of grammar. Development of vocabulary through reading, listening, speaking, and writing. 3 hours lecture, 1 hour lab. Fee. Prerequisite: ITA 201 (or its equivalent).
General Studies: G

ITA 311 Italian Composition and Conversation. (3)
fall and spring
Development of writing ability and oral expression. Prerequisite: ITA 202 (or its equivalent).
General Studies: G

ITA 312 Italian Composition and Conversation. (3)
fall and spring
See ITA 311. Prerequisite: ITA 202 (or its equivalent).
General Studies: G

ITA 314 Advanced Italian. (3)
selected semesters
Advanced grammar and composition with readings of selected literary works. Prerequisite: ITA 202 or instructor approval.
General Studies: G

ITA 315 Italian for Business. (3)
fall
Conversation and composition course in Italian; focuses on business, culture, and communication in Italy. Readings, discussion, research, lab (computer and audio-video), Blackboard support. Prerequisite: ITA 202 or instructor approval.

ITA 325 Introduction to Italian Literature. (3)
fall
Italian literature through the interpretation of representative works in drama, poetry, and novel. Prerequisite: ITA 202 or instructor approval.
General Studies: HU

ITA 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Commercial Italian. (3)

ITA 415 Italian Civilization. (3)
selected semesters
General survey of history, literature, art, and music, emphasizing Italy's cultural contribution to Western civilization. Prerequisites: ITA 311, 312 (or 314).
General Studies: HU, G

ITA 420 Italian Cinema. (3)
fall
Major trends of Italian cinema from the post-war period to the present.

ITA 425 Italian American Culture. (3)
selected semesters
Analyzes representations of Italian American history and culture in several media, including literature, film, and television. Lecture, discussion.
General Studies: L

ITA 430 Italian Literature of the Middle Ages. (3)
selected semesters
Emphasizes "Stil Novo," Dante's minor works, Petrarch, and Boccaccio. Prerequisite: ITA 325 or instructor approval.
General Studies: HU

ITA 441 Dante: *Divina Commedia*. (3)
selected semesters
Critical reading of the three *Cantiche (Inferno, Purgatorio, and Paradiso)*. Prerequisite: ITA 325.
General Studies: L/HU

ITA 443 Italian Literature of the Renaissance. (3)
selected semesters
Emphasizes Lorenzo de'Medici, Poliziano Castiglione, Machiavelli, Ariosto, and Tasso. Prerequisite: ITA 325 or instructor approval.
General Studies: HU, H

ITA 446 Italian Literature of the 18th and 19th Centuries. (3)
selected semesters
Goldoni, Parini, Alfieri, the poetry of Foscolo and Leopardi, and the sociohistorical novels of Foscolo, Manzoni, and Verga. Prerequisite: ITA 325 or instructor approval.
General Studies: HU

ITA 449 20th-Century Italian Literature. (3)
selected semesters
Major works, figures, and movements of contemporary Italian literature. Prerequisite: ITA 325.
General Studies: HU, G

ITA 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Italian/American Culture. (3)

ITA 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.

JAPANESE (JPN)

JPN 101 First-Year Japanese I. (5)
fall and spring
Communication skills and basic skills in grammar, reading, and writing, including hiragana, katakana, and about 75 kanji. 5 hours per week. Fee.

JPN 102 First-Year Japanese II. (5)
fall and spring
Continuation of JPN 101. Additional 99 kanji. Continued development of communication skills in speaking, listening, reading, writing, and culture. Fee. Prerequisite: JPN 101 (or its equivalent).

JPN 201 Second-Year Japanese I. (5)
fall and spring
Continued development of communication skills. Increased emphasis on reading and writing. Review of fundamentals of structure to increase abilities in composition and translation. 5 hours per week. Fee. Prerequisite: JPN 102 (or its equivalent).
General Studies: G

JPN 202 Second-Year Japanese II. (5)
fall and spring
Continuation of JPN 201. Fee. Prerequisite: JPN 201 (or its equivalent).
General Studies: G

JPN 206 Calligraphy. (1)
selected semesters
Introduces the practice of calligraphy in Japan, with emphasis on the derivation of Japanese kana syllabaries from Chinese characters. Prerequisite: CHI 205 or JPN 101.

JPN 309 Intermediate Japanese Conversation. (2)
fall
Practice in current usage in expression of ideas. Recommended especially for those who have not had the opportunity to practice Japanese in Japan. Prerequisite: JPN 202.

JPN 310 Intermediate Japanese Conversation. (2)
spring
Continuation of JPN 309. Prerequisite: JPN 309.

JPN 311 Japanese Conversation and Composition. (3)
fall
Intensive aural/oral practice leading toward conversational fluency. Practice in writing Japanese, emphasizing current usage. Prerequisite: JPN 202.
General Studies: G

JPN 312 Japanese Conversation and Composition. (3)
spring
See JPN 311. Prerequisite: JPN 202.
General Studies: G

JPN 313 Third-Year Japanese I. (3)
fall
Continued development of basic skills with greater emphasis on reading. JPN 313 and 314 must be taken in sequence. Prerequisite: JPN 202 (or its equivalent).
General Studies: G

JPN 314 Third-Year Japanese II. (3)
spring
Continued development of basic skills with continued emphasis on reading. JPN 313 and 314 must be taken in sequence. Prerequisite: JPN 313 or instructor approval.
General Studies: G

JPN 321 Japanese Literature. (3)
selected semesters
Readings in modern literature, changing yearly. May be repeated for credit. Prerequisite: preferably JPN 314 (or 313) or instructor approval.
General Studies: L/HU, G

JPN 394 Special Topics. (1–4)
selected semesters

JPN 414 Introduction to Classical Japanese. (3)
spring
Readings from various genres of pre-20th-century literature, with analysis of the structure of the classical language. Prerequisite: JPN 313 or instructor approval.

JPN 435 Advanced Readings. (3)
selected semesters
Readings in history, art, religious studies, economics, or other fields. Lecture, discussion. Prerequisite: JPN 314 (or its equivalent).

JPN 485 Problems of Translation. (3)
selected semesters
Theories and practice of translation: strategies for handling a variety of Japanese texts. Lecture, discussion. Prerequisite: JPN 314 (or its equivalent).

JPN 494 Special Topics. (1–4)
selected semesters

JPN 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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KOREAN (KOR)

KOR 101 First-Year Korean I. (5)
fall
Pronunciation, grammar, elementary conversation, and development of basic reading and writing skills, including Han'gul. Lecture, recitation.

KOR 102 First-Year Korean II. (5)
spring
Continuation of KOR 101. Lecture, recitation. Prerequisite: KOR 101 (or its equivalent).

KOR 201 Second-Year Korean I. (5)
fall
Continual development of communication skills. Increased emphasis on reading and writing, vocabulary building, and review of fundamentals. Lecture, recitation. Prerequisite: KOR 102 (or its equivalent).
General Studies: G

KOR 202 Second-Year Korean II. (5)
spring
Continuation of KOR 201. Lecture, recitation. Prerequisite: KOR 201 (or its equivalent).
General Studies: G

KOR 250 Korean Culture and Society. (3)
fall
Survey of Korean culture and society, covering history, religious traditions, gender, and popular culture. Lecture, discussion.
General Studies: HU, G

KOR 313 Third-Year Korean I. (3)
fall
Continued development of ability to communicate orally and in writing. Exposure to a variety or Korean written styles. Reading, writing, discussion. Prerequisite: KOR 202 (or its equivalent).

KOR 314 Third-Year Korean II. (3)
spring
Continuation of KOR 313. Reading, writing, discussion. Prerequisite: KOR 313 (or its equivalent).

KOR 347 Korean Film and Literature. (3)
spring
Introduces aspects of Korean history, culture, and society through Korean film and literature. Lecture, discussion.
General Studies: HU

KOR 350 Women of Korea. (3)
spring
Examines the changing role and status of women in modern Korea in relation to political and cultural changes. Lecture, discussion.
General Studies: H

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

LATIN (LAT)

LAT 101 Elementary Latin. (4)
fall and spring
Basic Latin grammar with an emphasis on developing reading skills. For beginning students only.

LAT 102 Elementary Latin. (4)
fall and spring
Continuation of LAT 101. Prerequisite: LAT 101 (or its equivalent).

LAT 201 Intermediate Latin I. (4)
fall and spring
Final semester of grammar. Prerequisite: LAT 102 or instructor approval.
General Studies: HU

LAT 202 Intermediate Latin II. (4)
fall and spring
Beginning reading of Latin authors. Prerequisite: LAT 201 (or its equivalent) or instructor approval.
General Studies: HU

LAT 421 Roman Literature. (3)
fall
Readings in the Latin masterpieces. Authors read change each year in accordance with needs of the class. May be repeated for credit. Prerequisite: LAT 202 or instructor approval.
General Studies: HU

LAT 422 Roman Literature. (3)
spring
See LAT 421. Prerequisite: LAT 202 or instructor approval.
General Studies: HU

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

MACEDONIAN (MAK)

MAK 101 Elementary Macedonian. (4)
summer
Structural grammar, basic vocabulary; introduction and reinforcement of aural/oral, reading, and writing skills. 4 hours lecture, 1 hour lab. Lecture, lab, group activities.

MAK 102 Elementary Macedonian. (4)
summer
See MAK 101. Lecture, lab, group activities. Prerequisite: MAK 101 (or its equivalent).

MAK 201 Intermediate Macedonian. (4)
summer
Systematic review of grammar. Development of vocabulary through reading and writing. Drill in aural/oral skills. 4 hours lecture, 1 hour lab. Lecture, lab, group activities. Prerequisite: MAK 102 (or its equivalent).

MAK 202 Intermediate Macedonian. (4)
summer
See MAK 201. Lecture, lab, group activities. Prerequisite: MAK 201 (or its equivalent).

MAK 298 Macedonian Practicum. (2)
summer
On-site summer practicum in Macedonia following intensive summer Macedonian language study in the ASU Critical Languages Institute. Lecture, lab, group activities. Prerequisite: MAK 102 (or its equivalent).

MAK 311 Macedonian Composition and Conversation. (1–8)
once a year
Advanced communicative proficiency and writing development. Intended for students enrolled in "ASU Study Abroad University of Ss. Kiril and Metodij." Tutorial. Prerequisite: MAK 202 (or its equivalent).

MAK 312 Macedonian Composition and Conversation. (1–8)
once a year
Advanced communicative proficiency and writing development. Intended for students enrolled in "ASU Study Abroad University of Ss. Kiril and Metodij." Tutorial. Prerequisite: MAK 202 (or its equivalent).

MAK 411 Advanced Macedonian Composition and Conversation. (1–8)
once a year
Improves self-expression in oral and written skills, emphasizing vocabulary building and use of newspapers and other materials published in Macedonia. Tutorial. Prerequisite: MAK 312 (or its equivalent).

MAK 412 Advanced Macedonian Composition and Conversation. (1–8)
once a year
Improves self-expression in oral and written skills, emphasizing vocabulary building and use of newspapers and other materials published in Macedonia. Tutorial. Prerequisite: MAK 411 (or its equivalent).

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

NORWEGIAN (NOR)

NOR 101 Elementary Norwegian. (4)
fall
Reading, writing, speaking, and understanding of basic Norwegian. 4 hours lecture, 1 hour lab. Fee.

NOR 102 Elementary Norwegian. (4)
spring
Reading, writing, speaking, and understanding of basic Norwegian. 4 hours lecture, 1 hour lab. Fee. Prerequisite: NOR 101 (or its equivalent).

NOR 201 Intermediate Norwegian. (4)
fall
Reviews Norwegian grammar with emphasis on the development of the skills of speaking, listening comprehension, reading, and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: NOR 102 (or its equivalent).

NOR 202 Intermediate Norwegian. (4)
spring
Reviews Norwegian grammar with emphasis on the development of the skills of speaking, listening comprehension, reading, and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: NOR 201 (or its equivalent).

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

PORTUGUESE (POR)

POR 101 Elementary Portuguese. (5)
fall and spring
Basic grammar with intensive drills in class and laboratory directed toward conversational fluency. 5 hours lecture, 1 hour lab. Fee. Prerequisite: 1 year of Spanish or French or Italian or instructor approval.

POR 201 Intermediate Portuguese. (5)
fall and spring
Continuation of POR 101. Intensive drill of fundamentals in class and laboratory directed toward conversational fluency. 5 hours lecture, 1 hour lab. Fee. Prerequisite: POR 101 or instructor approval.
General Studies: G

POR 313 Portuguese Composition and Conversation. (3)
fall
Develops skill in written Portuguese and corrected oral expression. Must be taken in sequence. Prerequisite: POR 201 or instructor approval.
General Studies: G

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

POR 314 Portuguese Composition and Conversation. (3)
spring
Continuation of POR 313. Prerequisite: POR 313 or instructor approval.
General Studies: G

POR 321 Luso-Brazilian Literature. (3)
selected semesters
Representative masterpieces of Portuguese and Brazilian literature from the beginning to the present. Prerequisite: POR 313 or instructor approval.
General Studies: HU

POR 472 Luso-Brazilian Civilization. (3)
selected semesters
Lectures, readings, and discussion of important aspects of Luso-Brazilian civilization. Topics from music, art, folklore, literature, history, and politics. Prerequisite: POR 313 or instructor approval.
General Studies: HU, G

POR 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Advanced Portuguese Composition and Conversation. (3)
- Brazilian Film. (3)

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

ROMANIAN (ROM)

ROM 101 Elementary Romanian. (5)
fall and spring
Basic grammar with intensive drills in class and laboratory directed toward conversational fluency. 5 hours lecture, 1 hour lab.

ROM 201 Intermediate Romanian. (5)
fall and spring
Continuation of ROM 101. Intensive drill of fundamentals in class and laboratory directed toward conversational fluency. 5 hours lecture, 1 hour lab. Prerequisite: ROM 101 or instructor approval.

ROM 313 Romanian Composition and Conversation. (3)
fall and spring
Develops skills in written Romanian and correct oral expression. Must be taken in sequence with ROM 314. Prerequisite: ROM 201 or instructor approval.

ROM 314 Romanian Composition and Conversation. (3)
spring
Continuation of ROM 313. Develops skills in written Romanian and correct oral expression. Must be taken in sequence. Prerequisite: ROM 313 or instructor approval.

ROM 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.

RUSSIAN (RUS)

RUS 101 Elementary Russian. (4)
fall, spring, summer
Structural grammar and basic vocabulary. Introduces and reinforces aural/oral reading and writing skills. 4 hours lecture, 1 hour lab. Fee.

RUS 102 Elementary Russian. (4)
spring and summer
See RUS 101. Fee. Prerequisite: RUS 101 (or its equivalent).

RUS 201 Intermediate Russian. (4)
fall and summer
Systematic review of grammar. Develops vocabulary through reading and writing. Drill in aural/oral skills. 4 hours lecture, 1 hour lab. Fee. Prerequisite: RUS 102 (or its equivalent).
General Studies: G

RUS 202 Intermediate Russian. (4)
spring and summer
See RUS 201. Fee. Prerequisite: RUS 201 (or its equivalent).
General Studies: G

RUS 211 Basic Russian Conversation. (3)
fall
Intensive aural/oral drill to supplement reading and grammatical skills acquired in RUS 101, 102, 201, and 202. Required of Russian majors. Fee. Prerequisite: RUS 102.
General Studies: G

RUS 212 Basic Russian Conversation. (3)
spring
See RUS 211. Fee. Prerequisite: RUS 102.
General Studies: G

RUS 311 Russian Composition and Conversation. (3)
fall
Develops writing ability and oral expression. Prerequisite: RUS 202.
General Studies: G

RUS 312 Russian Composition and Conversation. (3)
spring
See RUS 311. Prerequisite: RUS 202.
General Studies: G

RUS 321 Foundations of Russian Literature. (3)
selected semesters
Literary movements, prose, poetry, and drama from early Kievan writings to 19th-century works of Pushkin, Lermontov, Gogol. Open to nonmajors. Prerequisite: readings in translation.
General Studies: HU, H

RUS 322 Great Russian Writers of the 19th Century. (3)
selected semesters
Surveys the great age of prerevolutionary Russian prose, including works of Gogol, Turgenev, Dostoevski, Tolstoy, and Chekhov. Open to nonmajors. Prerequisite: readings in translation.
General Studies: L/HU

RUS 323 Modern Russian Literature and the Soviet Legacy. (3)
selected semesters
See also FLA 323. 20th-century Russian writers: their prose, poetry, drama; problems of the writer in Soviet and post-Soviet society. Open to nonmajors. Prerequisite: readings in translation.
General Studies: L/HU, G

RUS 411 Advanced Composition and Conversation I. (3)
fall
Improves aural discrimination and self-expression in oral and written skills, emphasizing vocabulary building. Subject materials drawn from current post-Soviet-Russian publications. Prerequisite: RUS 312.
General Studies: G

RUS 412 Advanced Composition and Conversation II. (3)
spring
See RUS 411. Prerequisite: RUS 312.
General Studies: G

RUS 417 Applied Russian Phonetics. (2)
selected semesters
General improvement in language skills through aural/oral training in Russian phonology and an analysis of Russian orthography. Prerequisite: RUS 102.

RUS 420 Russian Poetry. (3)
selected semesters
Development of Russian poetry from its beginnings to the present, including both native and émigré poets. Topics in criticism and the study of poetics. Prerequisite: RUS 312 or instructor approval.
General Studies: L/HU

RUS 421 Pushkin. (3)
selected semesters
Pushkin's poetry, plays, and prose fiction, including *Eugene Onegin, The Little Tragedies, Tales of Belkin, Queen of Spades,* and *The Captain's Daughter.* Taught in English. Does not satisfy the Liberal Arts and Sciences language requirement for BA degree.
General Studies: L/HU

RUS 423 Dostoyevsky. (3)
selected semesters
Dostoyevsky's major works of fiction, including *Crime and Punishment* and *Brothers Karamazov.* Taught in English. Does not satisfy the Liberal Arts and Sciences language requirement for BA degree.
General Studies: L/HU

RUS 424 Tolstoy. (3)
selected semesters
Tolstoy's major works, including *War and Peace* and *Anna Karenina*. Taught in English. Does not satisfy the Liberal Arts and Sciences language requirement for BA degree.
General Studies: L/HU

RUS 425 Chekhov. (3)
selected semesters
Chekhov's major works, representative short stories and major plays, including *The Cherry Orchard* and *Three Sisters*. Taught in English. Does not satisfy the Liberal Arts and Sciences language requirement for BA degree.
General Studies: L/HU

RUS 430 Russian Short Story. (3)
selected semesters
Detailed study of representative works of the Russian short story genre. Includes authors from both Imperial and Soviet Russia. Prerequisite: RUS 312 or instructor approval.
General Studies: L/HU

RUS 441 Survey of Russian Culture. (3)
selected semesters
Interplay of artistic, social, and political forces in the development of Russian culture from the Kievan period to the present. Exclusive use of Russian language source materials. Prerequisite: RUS 312 or instructor approval.
General Studies: L/HU, G, H

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

RUS 494 Special Topics. (1–4)
selected semesters

RUS 495 Russian for Heritage Speakers. (1–6)
selected semesters
Generates professional proficiency by developing advanced communicative and written competency in standard literary Russian. Lecture, lab, tutorial. Prerequisite: instructor approval.

RUS 498 Pro-Seminar. (1–7)
selected semesters
Topics may include the following:
- Senior Seminar. (3)

RUS 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.

SCANDINAVIAN (SCA)

SCA 250 Introduction to Scandinavian Culture. (3)
spring
Scandinavian identity from an interdisciplinary perspective with historic overview. Lecture, discussion.
General Studies: HU, G, H

SCA 315 Old Norse. (3)
fall and spring
Readings and study of grammatical structures of Medieval Scandinavian with emphasis on the Sagas and Edda poetry and historical writings.

SCA 316 Scandinavian Cinema. (3)
fall and spring
Presents Scandinavian films, with English subtitles, as representatives of contemporary and historical culture.
General Studies: HU, G

SCA 450 Masterpieces of Scandinavian Literature. (3)
spring
Scandinavian literature in translation in its cultural and historical contexts.
General Studies: L/HU

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

SLAVIC (SLV)

SLV 304 Computational Linguistics of Slavic Languages. (3)
spring
Information technology and Slavic languages, including Web design, digitalized resources, information retrieval, math/statistical analysis, and PERL. Lecture, lab.
General Studies: CS

SLV 426 Contemporary East European and Eurasian Literatures. (3)
selected semesters
Readings in non-Russian literatures and literary criticism from Eastern Europe and Eurasia: Milosz, Mrozek, Kis, Andric, Kadare, Ajtmatov. Lecture, discussion.
General Studies: L/HU, G

SLV 440 History of Slavic Languages. (3)
selected semesters
Comparative evolution of East Slavic, West Slavic, and South Slavic languages from the earliest record to the standardizing of national languages in the 19th and 20th centuries. Lecture, discussion.
General Studies: SB

SLV 498 Pro-Seminar. (1–7)
selected semesters
Topics may include the following:
- Senior Seminar. (3)

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

SPANISH (SPA)

SPA Note 1. Students who have completed their secondary education in a school where Spanish was the official language of instruction should begin their studies at the 325 level or above. No student who has completed more than two years of high school in a Spanish-speaking country, where Spanish is the medium of instruction in the school, is allowed to register in a Spanish language class below the 400 level.

SPA 101 Elementary Spanish. (4)
fall, spring, summer
Fundamentals of the language. Emphasizes listening, speaking, reading, and writing. Credit is allowed for only SPA 101 or 111. 4 hours lecture, 1 hour lab. Fee. See SPA Note 1.

SPA 102 Elementary Spanish. (4)
fall, spring, summer
See SPA 101. Credit is allowed for only SPA 102 or 111. Fee. See SPA Note 1. Prerequisite: SPA 101 (or its equivalent).

SPA 107 Spanish for International Professions I. (8)
fall
Accelerated program alternative to SPA 101, 102 sequence. Functional approach to needs of international professions. Fee. See SPA Note 1.

SPA 111 Fundamentals of Spanish. (4)
fall and spring
Primarily for students with two years of high school Spanish who need review to enter second-year study. Credit is allowed for only SPA 111 or both SPA 101 and 102. 4 hours lecture, 1 hour lab. Fee. See SPA Note 1.

SPA 201 Intermediate Spanish. (4)
fall, spring, summer
Continuation of fundamentals. Emphasizes the development of the skills of reading, listening comprehension, speaking, writing, and culture. 4 hours lecture, 1 hour lab. Fee. See SPA Note 1.
Prerequisite: SPA 102 or 111.
General Studies: G

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

SPA 202 Intermediate Spanish. (4)
fall, spring, summer
See SPA 201. Fee. See SPA Note 1. Prerequisite: SPA 201 (or its equivalent).
General Studies: G

SPA 203 Intermediate Spanish for Bilinguals. (4)
fall
For Spanish-speaking students, in lieu of SPA 201. Composition, literature, conversation, grammar fundamentals. 4 hours lecture, 1 hour lab. Fee. See SPA Note 1. Prerequisite: SPA 102 or 111 or placement examination.
General Studies: G

SPA 204 Intermediate Spanish for Bilinguals. (4)
spring
For Spanish-speaking students, in lieu of SPA 202. Composition, literature, conversation, grammar fundamentals. 4 hours lecture, 1 hour lab. See SPA Note 1. Prerequisite: SPA 203 (or its equivalent).
General Studies: G

SPA 207 Spanish for International Professions II. (8)
spring
Continuation of SPA 107, alternative to SPA 201, 202 sequence. Expansion of communicative proficiency in specific areas of international professions. Fee. See SPA Note 1. Prerequisite: SPA 107 or instructor approval.
General Studies: G

SPA 311 Spanish Conversation. (3)
fall and spring
Designed primarily for nonmajors to promote vocabulary building and communicative expression in Spanish through discussions based on cultural readings. See SPA Note 1. Prerequisite: SPA 202 (or its equivalent).

SPA 312 Spanish Conversation. (3)
fall and spring
See SPA 311. See SPA Note 1. Prerequisite: SPA 311 (or its equivalent).

SPA 313 Spanish Conversation and Composition. (3)
fall, spring, summer
Designed to develop skill and accuracy in spoken and written Spanish. Required of majors; SPA 313 and 314 must be taken in sequence. See SPA Note 1. Prerequisite: SPA 202 (or its equivalent).
General Studies: G

SPA 314 Spanish Conversation and Composition. (3)
fall, spring, summer
See SPA 313. See SPA Note 1. Prerequisite: SPA 313 (or its equivalent).
General Studies: G

SPA 315 Spanish Conversation and Composition for Bilinguals. (3)
fall
Emphasizes comparing standard Spanish with regional Southwest Spanish. May be taken in lieu of SPA 313 and 314. See SPA Note 1. Prerequisite: SPA 202 or 204 or instructor approval.

SPA 316 Spanish Conversation and Composition for Bilinguals. (3)
spring
See SPA 315. See SPA Note 1. Prerequisite: SPA 315 (or its equivalent).

SPA 319 Business Correspondence and Communication. (3)
selected semesters
Organization and presentation of clear, effective business communications; vocabulary applicable to modern business usage. See SPA Note 1. Prerequisite: SPA 314 or 316 or instructor approval.
General Studies: G

SPA 325 Introduction to Hispanic Literature. (3)
fall and spring
Critical approach to and analysis of literary types, including poetry, drama, short story, and novel. Required of all majors. See SPA Note 1. Prerequisite: SPA 313.
General Studies: HU

SPA 400 Introduction to Spanish Linguistics. (3)
fall
Introduces the discipline and methods of linguistics through the study of Spanish data. Prerequisite: SPA 412 (or its equivalent).

SPA 412 Advanced Conversation and Composition. (3)
fall and spring
Oral and written Spanish communication skills, with particular attention given to developing fluency and facility. Required of majors. Prerequisite: SPA 314 or 316 or instructor approval.
General Studies: G

SPA 413 Advanced Spanish Grammar. (3)
fall
Intensive analysis of the Spanish language. Required of teaching majors. Prerequisite: SPA 314 or 316 or instructor approval.
General Studies: G

SPA 417 Spanish Phonetics and Phonology. (3)
fall
Introduces the theory and practice of Spanish phonetics and phonology. Prerequisite: SPA 412.

SPA 420 Applied Spanish Linguistics. (3)
spring
Applies linguistic principles to the teaching of Spanish. Prerequisites: FLA 400 (or its equivalent); SPA 412.
General Studies: L

SPA 421 Spanish in the Southwest. (3)
fall
Discussion and linguistic analysis of Southwest Spanish. Prerequisite: SPA 412.
General Studies: L/SB, C

SPA 422 Spanish Lexicology and Lexicography. (3)
fall
Explores the linguistic theory and methodology related to the defining of meanings of words in Spanish dictionaries. Prerequisite: SPA 412 or instructor approval.

SPA 425 Spanish Literature. (3)
fall and spring
Surveys Spanish literature from its beginning to 1700. Prerequisite: SPA 325.
General Studies: HU

SPA 426 Spanish Literature. (3)
fall and spring
Surveys Spanish literature from 1700 to the present. Prerequisite: SPA 325.
General Studies: HU

SPA 427 Spanish American Literature. (3)
fall and spring
Surveys major works, figures, and movements from Colonial period to 1880. Prerequisite: SPA 325.
General Studies: L

SPA 428 Spanish American Literature. (3)
fall and spring
Surveys major works, figures, and movements from 1880 to the present. Prerequisite: SPA 325.
General Studies: L, G

SPA 429 Mexican Literature. (3)
selected semesters
Selected readings from pre-Columbian writers/poets (e.g., Macuilxóchitl) through the novel of the Revolution to the present. Prerequisite: SPA 325.

SPA 434 Drama of the Golden Age. (3)
spring
Dramatic works of Lope de Vega, Calderón de la Barca, and their contemporaries. Prerequisite: SPA 325.

SPA 435 Cervantes—*Don Quijote*. (3)
fall
Don Quijote and the development of the novel. Prerequisite: SPA 325.

SPA 454 19th-Century Spanish American Narrative. (3)
fall
Principal works in the novel, short story, narrative fiction, and narrative (Gauchesque) poetry. Prerequisite: SPA 325.

SPA 456 20th-Century Spanish American Fiction. (3)
spring
Major works and movements. Prerequisite: SPA 325.

SPA 464 Mexican American Literature. (3)
fall
Representative literature in Spanish and English by Mexican Americans, emphasizing sociocultural as well as literary values. Prerequisite: SPA 325.
General Studies: HU

SPA 471 Civilization of the Spanish Southwest. (3)
spring
Political, intellectual, social, economic, and artistic development of the Spanish-speaking people of the Southwest. Prerequisite: SPA 314 or 316 or instructor approval.
General Studies: HU

SPA 472 Spanish American Civilization. (3)
fall
Growth of the institutions and cultures of Spanish American people. Prerequisite: SPA 314 or 316 or instructor approval.
General Studies: HU, G, H

SPA 473 Spanish Civilization. (3)
spring
Political, intellectual, social, economic, and artistic development of the Spanish nation from its origin to the present. Prerequisite: SPA 314 or 316 or instructor approval.
General Studies: HU/SB, G

SPA 474 Mexican Culture. (3)
fall and spring
Examines diverse aspects of Mexican culture since the 1910 Revolution. Lecture, discussion. Prerequisite: SPA 325.

SPA 485 Mexican American Short Story. (3)
selected semesters
Critical study of contemporary short stories by Mexican American authors, with emphasis on their Spanish-language writings. Prerequisite: SPA 325 or instructor approval.
General Studies: L

SPA 486 Mexican American Novel. (3)
selected semesters
Social and literary contexts of representative novelists, emphasizing their Spanish-language writings. Prerequisite: SPA 325 or instructor approval.

SPA 487 Mexican American Drama. (3)
selected semesters
Representative dramatic works, with emphasis on the history and development of this genre from its regional origins to the present. Prerequisite: SPA 325 or instructor approval.

SPA 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Lexicography. (3)
- Introduction to Hispanic Linguistics. (3)

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

SWEDISH (SWE)

SWE 101 Elementary Swedish. (4)
fall
Reading, writing, speaking, and understanding of basic Swedish. 4 hours lecture, 1 hour lab. Fee.

SWE 102 Elementary Swedish. (4)
spring
Reading, writing, speaking, and understanding of basic Swedish. 4 hours lecture, 1 hour lab. Fee. Prerequisite: SWE 101 (or equivalent).

SWE 201 Intermediate Swedish. (4)
fall
Reviews Swedish grammar with emphasis on the development of the skills of speaking, listening comprehension, reading, and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: SWE 102 (or equivalent).

SWE 202 Intermediate Swedish. (4)
spring
Reviews Swedish grammar with emphasis on the development of the skills of speaking, listening comprehension, reading, and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: SWE 201 (or equivalent).

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

THAI (THA)

THA 101 Elementary Thai I. (5)
fall
Basic communication, reading, and writing skills. Intensive oral/aural classroom drill supplemented by prose readings in Thai script. 4 hours lecture, 1 hour lab. Fee.

THA 102 Elementary Thai II. (5)
spring
Basic communication, reading, and writing skills. Intensive oral/aural classroom drill supplemented by prose reading. 4 hours lecture, 1 hour lab. Fee. Prerequisite: THA 101 (or its equivalent).

THA 201 Intermediate Thai I. (5)
fall
Systematic review of grammar. Continued development of communication skills with increased emphasis on reading and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: THA 102 (or equivalent).
General Studies: G

THA 202 Intermediate Thai II. (5)
spring
Systematic review of grammar. Continued development of communication skills with increased emphasis on reading and writing. 4 hours lecture, 1 hour lab. Fee. Prerequisite: THA 201 (or equivalent).
General Studies: G

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

VIETNAMESE (VTN)

VTN 101 Elementary Vietnamese I. (5)
fall
Basic skills in modern conversational Vietnamese and development of basic reading and writing skills, with special emphasis on tones. 4 hours lecture, 1 hour lab.

VTN 102 Elementary Vietnamese II. (5)
spring
Basic skills in modern conversational Vietnamese and development of basic reading and writing skills, with special emphasis on tones. 4 hours lecture, 1 hour lab. Prerequisite: VTN 101 (or its equivalent).

VTN 201 Intermediate Vietnamese I. (5)
fall
Improves speaking, listening, reading, and writing competence through dialogues, reading passages, pattern drill, and grammar and communicative exercises. 4 hours lecture, 1 hour lab. Prerequisite: VTN 102 (or its equivalent).
General Studies: G

VTN 202 Intermediate Vietnamese II. (5)
spring
Improves speaking, listening, reading, and writing competence through dialogues, reading passages, pattern drill, and grammar and communicative exercises. 4 hours lecture, 1 hour lab. Prerequisite: VTN 201 (or its equivalent).
General Studies: G

VTN 321 Advanced Vietnamese and Literature I. (3)
fall
Readings from modern, contemporary, and folk literatures and current periodicals. Lecture, discussion, Internet, student presentations, debate. Prerequisite: VTN 202 (or equivalent) or instructor approval.

VTN 322 Advanced Vietnamese and Literature II. (3)
spring
Continuation of VTN 321. Readings from modern, contemporary, and folk literatures and current periodicals. Lecture, discussion, Internet, student presentations, debate. Prerequisite: VTN 321 (or equivalent) or instructor approval.

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

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

School of Life Sciences

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LSC 226

Robert E. Page, Director

Ronald L. Rutowski,
Associate Director for Undergraduate Programs

Andrew N. Webber,
Associate Director for Graduate Programs

Willem F. J. Vermaas,
Associate Director for Research Initiatives

Regents' Professors: Alcock, Arntzen, Maienschein, Pyne

Ullman Professors: Collins, Hedrick

Professors: Briggs, Burke, Capco, Chandler, Church, Clark-Curtiss, Creath, Curtiss, Day, Deviche, Dowling, Elser, Faeth, Fisher, Frasch, Grimm, Harrison, Hölldobler, B. Jacobs, M. Jacobs, Klopatek, Lawson, Misra, Moore, Mossman, Nash, Page, Rutowski, Sarewitz, Schmidt, Smith, Sommerfeld, Trelease, Vermaas, Walsberg, Webber, Wu, Young

Associate Professors: Armendt, Chang, Clark, Escalante, Fewell, Fouquette, Garcia-Pichel, Goldstein, Hoffman, Hogue, Kinzig, Kumar, Mason, McGregor, Neuer, Orchinik, Pigg, Ramakrishna, Rawls, Roberson, Slater, Stout, Stromberg, Szarek, Towill

Assistant Professors: Anderies, Chen, Crook, DeNardo, Gadau, Gerber, Laubichler, Liebig, McGraw, Minteer, Mor, Newfeld, Rhoads, Robert, Rosenberg, Sabo, Touchman, Verrelli, Wilson-Rawls, Wojciechowski

Clinical Professors: Downs, Mass

Clinical Associate Professor: Roberts

Clinical Assistant Professor: Lefevre

Research Professors: Bertram, Cardineau, Davidson, Mahoney, Pearson

Associate Research Professors: Lopez, Pettit

Assistant Research Professors: Hope, Hu, Walmsley

Senior Research Scientists: Bingham, Landrum, LoBrutto

Curator: Gill

Senior Research Professional: Kazilek

BIOLOGY—BS

The major in Biology consists of a minimum of 37 semester hours in biology, and a minimum of 17 semester hours in related fields, plus a three-semester-hour calculus course, and a three-semester-hour statistics course. One upper-division PLB or MIC course is also required. A minimum grade of "C" (2.00) is required for all course work in the major and related fields. Required major courses are

BIO 187 General Biology I *SG*	4
BIO 188 General Biology II *SQ*	4
Choose one of the courses below	3–4
BIO 320 Fundamentals of Ecology (3)	
BIO 331 Animal Behavior (3)	
BIO 370 Vertebrate Zoology (4)	
BIO 385 Comparative Invertebrate Zoology (4)	
MIC 220 Biology of Microorganisms (3) and MIC 206 Microbiology Laboratory *SG** (1)	
PLB 300 Comparative Plant Diversity *L/SG* (4)	
BIO 340 General Genetics or BIO 341 Genetic Analysis (5)	4
BIO 345 Organic Evolution	3
Choose one of the courses below	3–4
BIO 351 Developmental Anatomy (3)	
BIO 353 Cell Biology (3)	
BIO 360 Animal Physiology (3)	
MIC 360 Bacterial Physiology (3)	
PLB 308 Plant Physiology (4)	
Total	21–24

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

The remaining hours to bring the total to 37 are selected from among upper-division courses, approved for major credit, in BIO, MIC, PLB, and approved BCH courses, in consultation with an advisor. The major must include at least three upper-division laboratory courses. Required courses in related fields plus math proficiency are

CHM 113 General Chemistry *SQ*	4
CHM 115 General Chemistry with Qualitative Analysis *SQ* or CHM 116 General Chemistry *SQ* (4)	5
Choose between the combinations of organic chemistry courses below	4 or 8
CHM 231 Elementary Organic Chemistry *SQ*[1] (3)	
CHM 235 Elementary Organic Chemistry Laboratory *SQ*[1] (1)	
— or —	
CHM 331 General Organic Chemistry (3)	
CHM 332 General Organic Chemistry (3)	
CHM 335 General Organic Chemistry Laboratory (1)	
CHM 336 General Organic Chemistry Laboratory (1)	
MAT 251 Calculus for Life Sciences *MA* or MAT 210 Brief Calculus *MA* (3) or any other calculus course approved by an advisor	3
Choose between the combinations of introduction to physics courses below	4 or 8
PHY 101 Introduction to Physics *SQ* (4)	
— or —	
PHY 111 General Physics *SQ*[2] (3)	
PHY 112 General Physics *SQ*[2] (3)	
PHY 113 General Physics Laboratory *SQ*[2] (1)	
PHY 114 General Physics Laboratory *SQ*[2] (1)	
STP 226 Elements of Statistics *CS* or STP 294 ST: Statistics for Biosciences (3)	3
Total	23–31

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

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

Concentration in Biology and Society

The major in Biology with a concentration in biology and society is intended for students with a strong interest in life sciences and in the interaction between life sciences and the society within which science is done. This option consists of a minimum of 44 semester hours in life sciences and societal interface courses, and 11 hours in related fields, plus a three-semester-hour mathematics proficiency. A minimum grade of "C" (2.00) is required in all course work in the major or related fields. Required courses are as follows:

BIO	187	General Biology I *SG*	4
BIO	188	General Biology II *SQ*	4
BIO	311	Biology and Society	3
BIO	314	Research Colloquium in Biology and Society I *L**	2
BIO	320	Fundamentals of Ecology	3
		or BIO 345 Organic Evolution (3)	
BIO	340	General Genetics	4
		or BIO 341 Genetic Analysis (5)	
BIO	414	Research Colloquium in Biology and Society II* *L*	1
BIO	493	Honors Thesis *L*	3
		or BIO 495 Undergraduate Thesis (3)	
		or BIO 499 Individualized Instruction (3)	
		or approved hours in research (3)	
MAT	251	Calculus for Life Sciences *MA*	3
		or MAT 210 Brief Calculus *MA* (3)	
		or any other calculus	
Total			27

* Both BIO 314 and 414 must be taken to secure L credit.

The remaining courses to complete the major are determined by the student in consultation with an advisor and must be distributed in the following areas:

1. 12 hours of upper-division electives from BIO, MIC, PLB;
2. 12 hours of upper-division interface courses from an approved list. At least three semester hours in each of these areas: ethics, history and philosophy of science, and contemporary societal issues;
3. 11 hours of physical sciences (CHM recommended); and
4. three to four hours of an approved course in statistics.

CLINICAL LABORATORY SCIENCES—BS

The Clinical Laboratory Sciences degree program prepares individuals to practice in the field of clinical laboratory sciences, which includes the major disciplines of clinical chemistry, hematology, immunohematology, immunology, and microbiology. Employment opportunities exist in hospital, private, physician, and research laboratories and in government, sales, management, and education. After obtaining a BS degree in Clinical Laboratory Sciences, the graduate is eligible for national certification by examination.

A major in Clinical Laboratory Sciences consists of 40 semester hours in clinical laboratory sciences courses. A minimum grade of "C" (2.00) is required in all course work in the major or related fields. Also required are the following courses:

BCH	361	Principles of Biochemistry	3
BIO	360	Animal Physiology	3
CHM	113	General Chemistry *SQ*	4
CHM	231	Elementary Organic Chemistry *SQ*[1]	3
MIC	205	Microbiology *SG*[2]	3
		or MIC 220 Biology of Microorganisms (3)	
MIC	206	Microbiology Laboratory *SG*[2]	1
Total			17

[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.

Equivalent courses may be substituted upon approval of an advisor. Students must consult with the clinical laboratory sciences advisor to select general electives courses. Completion of the degree is dependent upon acceptance of the student into the accredited professional study program, which consists of 40 hours of clinical laboratory sciences courses. The university does not guarantee all students to be accepted into the professional study program due to space limitations at the clinical affiliates and restrictions of program accreditation. For more information on acceptance procedures and program standards, contact the school for a program brochure. For proper course planning, students must meet with a clinical laboratory sciences advisor.

CONSERVATION BIOLOGY—BS

The major in Conservation Biology consists of a minimum of 41 semester hours in the required major courses and a minimum of 16 hours in related fields, plus a three-semester-hour calculus course and a three-semester-hour statistics course. A minimum grade of "C" (2.00) is required for all course work in the major and related fields. Required courses are as follows:

BIO	187	General Biology I *SG*	4
BIO	188	General Biology II *SQ*	4
BIO	317	Conservation Biology	3
BIO	320	Fundamentals of Ecology	3
BIO	340	General Genetics	4
		or BIO 341 Genetic Analysis (5)	
BIO	360	Animal Physiology	3
BIO	410	Techniques in Wildlife Conservation Biology *L*	3
BIO	411	Advanced Conservation Biology I	3
BIO	412	Advanced Conservation Biology II	3
Total			30 or 31

The remaining hours to bring the total to 41 are selected from among relevant upper-division courses in BIO and PLB courses or in related departments, in consultation with an advisor. Required courses in related fields plus math proficiency are as follows:

CHM	113	General Chemistry *SQ*	4
CHM	115	General Chemistry with Qualitative Analysis *SQ*	5
		or CHM 116 General Chemistry *SQ* (4)	
Choose between the combinations of organic chemistry courses below			4 or 8
		CHM 231 Elementary Organic Chemistry *SQ** (3)	
		CHM 235 Elementary Organic Chemistry Laboratory *SQ** (1)	

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

— *or* —
CHM 331 General Organic Chemistry (3)
CHM 332 General Organic Chemistry (3)
CHM 335 General Organic Chemistry Laboratory (1)
CHM 336 General Organic Chemistry Laboratory (1)
MAT 251 Calculus for Life Sciences *MA* 3
or MAT 210 Brief Calculus *MA* (3)
or any other calculus
STP 226 Elements of Statistics *CS* 3
or STP 294 ST: Statistics for Biosciences (3)
Total ..... 19 or 23

* Both CHM 231 and 235 must be taken to secure SQ credit.

MICROBIOLOGY—BS

The BS degree in Microbiology consists of a minimum of 41 semester hours in microbiology and 17 hours in approved related fields. A minimum grade of "C" (2.00) is required for all course work in the major and related fields. Required courses are as follows:

BIO 187 General Biology I *SG* 4
BIO 188 General Biology II *SQ* 4
BIO 340 General Genetics 4
Choose between the course combinations below 8
BCH 361 Principles of Biochemistry (3)
BCH 367 Elementary Biochemistry Laboratory (1)
CHM 231 Elementary Organic Chemistry *SQ*[1] (3)
CHM 235 Elementary Organic Chemistry Laboratory *SQ*[1] (1)
— *or* —
CHM 331 General Organic Chemistry (3)
CHM 332 General Organic Chemistry (3)
CHM 335 General Organic Chemistry Laboratory (1)
CHM 336 General Organic Chemistry Laboratory (1)
MIC 206 Microbiology Laboratory *SG*[2] 1
MIC 220 Biology of Microorganisms 3
MIC 302 Advanced Bacteriology Laboratory *L*[3] 2
MIC 360 Bacterial Physiology 3
MIC 401 Research Paper *L*[3] 1
Total 30

[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 MIC 302 and 401 must be taken to secure L credit.

A minimum of 11 semester hours of upper-division electives in microbiology or approved life science fields must be taken. These elective hours must include two courses chosen from the following:

MIC 421 Experimental Immunology 2
MIC 442 Bacterial Genetics Laboratory 1
MIC 446 Techniques in Molecular Biology/Genetics Lab 2
MIC 470 Bacterial Diversity and Systematics 4
MIC 484 Internship 3
MIC 494 ST: Clinical Bacteriology Laboratory 3
MIC 495 Undergraduate Research 2

In addition, students are required to fulfill the university mathematical studies requirements with MAT 210 (or 251, 270) as their MA course and BIO 406, STP 226, STP 294 (or any CSE course that meets the CS requirement). The required supplemental courses are as follows:

CHM 113 General Chemistry *SQ* 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* 5
or CHM 116 General Chemistry *SQ* (4)
PHY 111 General Physics *SQ** 3
PHY 112 General Physics *SQ** 3
PHY 113 General Physics Laboratory *SQ** 1
PHY 114 General Physics Laboratory *SQ** 1
Total 17

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

MOLECULAR BIOSCIENCES AND BIOTECHNOLOGY—BS

The BS degree in Molecular Biosciences and Biotechnology is designed to prepare students for productive careers in rapidly expanding areas within the life sciences, such as biotechnology, medicine, and biomedical research or any area of biology at the molecular and cellular level. Courses and faculty are drawn primarily from the School of Life Sciences and the Department of Chemistry and Biochemistry.

The major in Molecular Biosciences and Biotechnology consists of a minimum of 59 semester hours of course work plus two courses in mathematics specifically designed for this program. A minimum grade of "C" (2.00) is required for all course work in the major. The required major courses (30 total semester hours) are as follows:

BIO 340 General Genetics 4
MBB 245 Cellular and Molecular Biology *SQ*[1] 3
MBB 246 Cellular and Molecular Biology Laboratory *SQ*[1] 1
MBB 247 Applied Biosciences: Biotechnology 3
MBB 248 Applied Biosciences: Biotechnology Laboratory 1
MBB 343 Genetic Engineering and Society *L* 4
MBB 484 Internship 6
or MBB 499 Individualized Instruction (6)
MBB 490 Capstone: Issues in Biotechnology *L* 4
MIC 206 Microbiology Laboratory *SG*[2] 1
MIC 220 Biology of Microorganisms 3
Total 30

[1] Both MBB 245 and 246 must be taken to secure SQ credit.
[2] Both MIC 205 and 206 must be taken to secure SG credit.

Choose at least one of the following courses (or combinations) for a minimum of three to four semester hours. Although only one advanced lab course is required, students are encouraged to take two:

BIO 451 Cell Biotechnology Laboratory 4
MBB 350 Applied Genetics 4
MBB 445 Techniques in Molecular Biology/Genetics 2
MBB 446 Techniques in Molecular Biology/Genetics Lab[1] 2
MIC 420 Immunology: Molecular and Cellular Foundations 3
MIC 421 Experimental Immunology[2] 2
MIC 441 Bacterial Genetics 3
MIC 442 Bacterial Genetics Laboratory[3] 1

[1] MBB 446 is taken with MBB 445.
[2] MIC 421 is taken with MIC 420.
[3] MIC 442 is taken with MIC 441.

Required supplemental courses in biology, chemistry, mathematics and physics (28 total semester hours) are as

follows (a minimum grade of "C" (2.00) is required for all course work):

BCH 361 Principles of Biochemistry 3
BCH 367 Elementary Biochemistry Laboratory 1
CHM 113 General Chemistry *SQ* 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* 5
Choose between the organic chemistry course combinations below ..... 4 or 8
CHM 231 Elementary Organic Chemistry *SQ*[1] (3)
CHM 235 Elementary Organic Chemistry Laboratory *SQ*[1] (1)
— *or* —
CHM 331 General Organic Chemistry (3)
CHM 332 General Organic Chemistry (3)
CHM 335 General Organic Chemistry Laboratory (1)
CHM 336 General Organic Chemistry Laboratory (1)
MAT 251 Calculus for Life Sciences *MA* 3
PHY 111 General Physics *SQ*[2] 3
PHY 112 General Physics *SQ*[3] 3
PHY 113 General Physics Laboratory *SQ*[2] 1
PHY 114 General Physics Laboratory *SQ*[3] 1
Total 28–32

[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.

Satisfaction of the university computer/statistics/quantitative applications requirement is met with MAT 351 Mathematical Methods for Genetic Analysis (3), in which a minimum grade of "C" (2.00) is required.

Additional courses are available in the life or physical sciences for elective credit.

PLANT BIOLOGY—BS

The School of Life Sciences offers three options to meet the needs of students whose interests are in the rapidly expanding areas within plant biology. Students may choose the general program option which allows the opportunity to develop strength in one area or discipline. Others may choose to design a more specific, but interdisciplinary, program in one of the following two optional concentrations: environmental science and ecology; plant biochemistry and molecular biology.

Each concentration promotes interaction between diverse groups and captures the growing interdisciplinary nature of scientific investigations. When one of these options is chosen, the title will appear on transcripts and other university documents.

The three curricular options prepare students for careers in technical, industrial, and educational fields as well as professional degree programs in medicine or research and postgraduate education in the life sciences.

General Program

The BS degree in Plant Biology consists of a minimum of 38 semester hours in plant biology and approved life science and physical science courses. A minimum grade of "C" (2.00) is required for all course work in the major and related fields. Required courses are as follows:

BIO 320 Fundamentals of Ecology 3
or BIO 340 General Genetics (4)
BIO 353 Cell Biology 3
PLB 200 Biology of Plants *SQ** 3
PLB 201 Biology of Plants Laboratory *SQ** 1
PLB 306 Plant Anatomy 4
PLB 308 Plant Physiology 4
PLB 484 Internship 3
or PLB 499 Individualized Instruction (3)
Total 21–22

* Both PLB 200 and 201 must be taken to secure SQ credit.

The remaining hours to bring the total to 38 are selected from among relevant courses in plant biology, other life sciences, and physical sciences.

Required supplemental courses in chemistry and mathematics are as follows (a minimum grade of "C" [2.00] is required for all course work):

CHM 113 General Chemistry *SQ* 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* 5
Choose between the organic chemistry course combinations below ..... 4 or 8
CHM 231 Elementary Organic Chemistry *SQ** (3)
CHM 235 Elementary Organic Chemistry Laboratory *SQ** (1)
— *or* —
CHM 331 General Organic Chemistry (3)
CHM 332 General Organic Chemistry (3)
CHM 335 General Organic Chemistry Laboratory (1)
CHM 336 General Organic Chemistry Laboratory (1)
MAT 251 Calculus for Life Sciences *MA* 3
Total ..... 16 or 20

* Both CHM 231 and 235 must be taken to secure SQ credit.

One of the following courses is also required:

PLB 430 Statistical Analyses in Environmental Science *CS* 3
or PLB 432 Computer Applications in Biology *CS* (3)
or BIO 415 Biometry *CS* (4)

Special Concentration Programs

Two special concentration programs are optional. Students who wish to pursue the general program in Plant Biology are not obligated to choose one of these specific programs. Each special concentration program is expected to be interdisciplinary and contain course work outside both Plant Biology and the College of Liberal Arts and Sciences. Each concentration includes hands-on technical training.

Environmental Science and Ecology. The BS degree in Plant Biology with a concentration in environmental science and ecology consists of a minimum of 44 semester hours in plant biology and approved life science and physical science courses. A minimum grade of "C" (2.00) is required for all course work in the major and related fields. Required courses are as follows:

BIO 320 Fundamentals of Ecology 3
Choose between the geology course combinations below 4
GLG 101 Introduction to Geology I (Physical) *SQ, G*[1] (3)
GLG 103 Introduction to Geology I—Laboratory *SQ*[1] (1)
— *or* —

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

GLG 110 Geologic Disasters and the Environment *SG, G*[2] (3)
GLG 111 Geologic Disasters Laboratory *SG*[2] (1)
— *or* —
GPH 111 Introduction to Physical Geology *SQ* (4)
PLB 200 Biology of Plants *SQ*[3] 3
PLB 201 Biology of Plants Laboratory *SQ*[3] 1
PLB 310 The Flora of Arizona 4
PLB 322 Environmental Science (Major) 3
PLB 420 Plant Ecology: Organisms and Populations 3
or PLB 421 Plant Ecology: Communities and Ecosystems (3)
PLB 484 Internship 3
or PLB 499 Individualized Instruction (3)
Total 24

[1] Both GLG 101 and 103 must be taken to secure SQ credit.
[2] Both GLG 110 and 111 must be taken to secure SG credit.
[3] Both PLB 200 and 201 must be taken to secure SQ credit.

The remaining hours to bring the total to 44 are selected from among relevant courses in plant biology, other life sciences, and physical sciences.

CHM 113 General Chemistry *SQ* 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* 5
CHM 231 Elementary Organic Chemistry *SQ** 3
CHM 235 Elementary Organic Chemistry Laboratory *SQ** 1
MAT 251 Calculus for Life Sciences *MA* 3
Total 16

* Both CHM 231 and 235 must be taken to secure SQ credit.

One of the following courses is also required:

PLB 430 Statistical Analyses in Environmental Science *CS* 3
or PLB 432 Computer Applications in Biology *CS* (3)
or BIO 415 Biometry *CS* (4)
or STP 420 Introductory Applied Statistics *CS* (3)

Plant Biochemistry and Molecular Biology. The BS degree in Plant Biology with a concentration in biochemistry and molecular biology consists of 56 semester hours. A minimum grade of "C" (2.00) is required for all course work in the major and related fields.

The required major courses are as follows:

BIO 353 Cell Biology 3
MBB 245 Cellular and Molecular Biology *SQ** 3
MBB 246 Cellular and Molecular Biology Laboratory *SQ** 1
PLB 308 Plant Physiology 4
PLB 350 Applied Genetics 4
PLB 444 Plant Growth and Development 3
PLB 484 Internship 3
or PLB 499 Individualized Instruction (3)
Total 21

* Both MBB 245 and 246 must be taken to secure SQ credit.

Required supplemental courses in biochemistry, chemistry, mathematics, and physics are as follows (a minimum grade of "C" (2.00) is required for all course work):

Choose between the course combinations below ..... 4 or 9
BCH 361 Principles of Biochemistry (3)
BCH 367 Elementary Biochemistry Laboratory (1)
— *or* —
BCH 461 General Biochemistry (3)
BCH 462 General Biochemistry (3)
BCH 467 Analytical Biochemistry Laboratory *L* (3)
CHM 113 General Chemistry *SQ* 4
CHM 115 General Chemistry with Qualitative Analysis *SQ* 5
CHM 231 Elementary Organic Chemistry *SQ*[1] 3
CHM 235 Elementary Organic Chemistry Laboratory *SQ*[1] 1
MAT 251 Calculus for Life Sciences *MA* 3
PHY 111 General Physics *SQ*[2] 3
PHY 112 General Physics *SQ*[3] 3
PHY 113 General Physics Laboratory *SQ*[2] 1
PHY 114 General Physics Laboratory *SQ*[3] 1
Total ..... 28 or 33

[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.

The remaining hours to bring the total to 56 are selected from among relevant courses in plant biology, other life sciences, and physical sciences.

One of the following courses is also required:

BIO 406 Computer Applications in Biology *CS* 3
or MAT 351 Mathematical Methods for Genetic Analysis *CS* (3)

CERTIFICATE IN HISTORY AND PHILOSOPHY OF SCIENCE

The School of Life Science offers an undergraduate History and Philosophy of Science Certificate. The certificate program is designed to give students an understanding of both traditional philosophic issues surrounding science and the historical development of concrete scientific theories and ideas. The philosophic questions, of the belief-worthiness and interpretation of scientific claims as well as norms within or about science, both enrich and are enriched by their combination with historical study. Such philosophic and historical study will also often include the examination of contemporary sciences and their place within the larger society.

The certificate requires 18 semester hours bearing a HPS or PHI prefix of which 12 semester hours must be upper-division. Included with the 18 semester hours, at least nine must bear the HPS prefix. HPS 314 or PHI 314 Philosophy of Science is also required. All courses counting toward the certificate must be approved for this purpose by a School of Life Sciences academic advisor and passed with a grade of "C" (2.00) or higher.

MINORS

Biological Sciences

The Biological Sciences minor is designed to provide students interested in biology with a flexible curriculum that can be tailored to their interests. The minor consists of 24 semester hours, including BIO 187 General Biology I and BIO 188 General Biology II. PLB 200 Biology of Plants and PLB 201 Biology of Plants Laboratory or MIC 206 Microbiology Laboratory and MIC 220 Biology of Microorganisms may together be substituted for BIO 187 or 188. Alternatively, MBB 245 Cellular and Molecular Biology and MBB 246 Cellular and Molecular Biology Laboratory may be substituted for BIO 188. The remaining 16 hours are selected by the student with the approval of an advisor. At

least 12 of these 16 hours must be in upper-division courses in the life sciences. Courses not available for credit in the Life Science majors cannot be used for the minor (e.g., BIO 100 The Living World and BIO 201 Human Anatomy and Physiology I). This minor is not available to students majoring in the life sciences.

Any one of these combinations may be used:

1. BIO 187 and BIO 188,
2. BIO 187 and PLB 200 and 201,
3. BIO 188 and PLB 200 and 201,
4. BIO 187 and MIC 206 and 220,
5. BIO 188 and MIC 206 and 220, or
6. BIO 187 and MBB 245 and 246.

BIS CONCENTRATIONS

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

SECONDARY EDUCATION—BAE

This degree is offered through the Initial Teacher Certification (ITC) program in the College of Education. Students pursuing a major in Secondary Education (Biological Sciences) have an advisor in the College of Education and an advisor within the School of Life Sciences.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

Academic Specialization ITC Admission Requirements. The following courses must be completed with a grade of "C" (2.00) or higher before applying to the ITC professional program:

BIO	187	General Biology I *SG*	4
BIO	188	General Biology II *SQ*	4

In addition, at least 12 hours of biology course work from the major teaching field may be in progress when applying to the ITC but must be completed before starting the program.

Biological Sciences. The academic specialization requires 61 hours, and six hours in teaching methods. A minimum grade of "C" (2.00) is required for all course work in the major and related fields. Required major courses are as follows:

BIO	187	General Biology I *SG*	4
BIO	188	General Biology II *SQ*	4
BIO	320	Fundamentals of Ecology	3
BIO	340	General Genetics	4
BIO	345	Organic Evolution	3
BIO	360	Animal Physiology	3
BIO	370	Vertebrate Zoology	4
		or BIO 385 Comparative Invertebrate Zoology (4)	
		or PLB 300 Comparative Plant Diversity *L/SG* (4)	
		or PLB 310 The Flora of Arizona (4)	
MIC	205	Microbiology *SG*[1]	3
		or MIC 220 Biology of Microorganisms (3)	
MIC	206	Microbiology Laboratory *SG*[1]	1
PLB	308	Plant Physiology	4
Electives[2]			6
Total			39

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

[2] Should be selected from BIO, MIC, and PLB courses. BIO 100, 201, 202, 241, 300, and 319, or PLB 108 and 320 cannot be used to fulfill the elective requirement.

Required supporting courses are as follows:

BIO	316	History of Biology: Conflicts and Controversies *H*	3
		or HPS 330 History of Biology: Conflicts and Controversies *H* (3)	
CHM	113	General Chemistry *SQ*	4
CHM	115	General Chemistry with Qualitative Analysis *SQ*	5
		or CHM 116 General Chemistry *SQ* (4)	
GLG	102	Introduction to Geology II (Historical) *SG,*[1] *H*	3
		or GLG 300 Geology of Arizona (3)	
MAT	170	Precalculus *MA*	3
PHY	101	Introduction to Physics *SQ*	4
		or PHY 111, 112 General Physics *SQ*[2] (6)	
		and PHY 113, 114 General Physics Laboratory *SQ*[2] (2)	
Minimum total			22

[1] Both GLG 102 and 104 must be taken to secure SG credit.

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

Teaching Methods

BIO	480	Methods of Teaching Biology	3
BIO	482	Advanced Methods of Teaching Biology	3
Total			6

Graduate Programs

The School of Life Sciences offers programs leading to the degrees of Master of Natural Sciences, MS, and PhD See the *Graduate Catalog* for requirements. A combined BS-MS degree in Biology is also available.

MOLECULAR AND CELLULAR BIOLOGY

The school participates in the interdisciplinary program for the MS and PhD degrees in Molecular and Cellular Biology as well.

The interdisciplinary MS and PhD degrees with a major in Molecular and Cellular Biology are administered by the Interdisciplinary Committee on Molecular and Cellular Biology. The participating faculty are drawn primarily from the School of Life Sciences and the Department 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 92.

Chemistry and Biochemistry, with additional faculty from the Departments of Anthropology and Physics and Astronomy.

For more information, contact the director or see the *Graduate Catalog.*

BIOLOGY (BIO)

BIO 100 The Living World. (4)
fall, spring, summer
Principles of biology. Cannot be used for major credit in the biological sciences. 3 hours lecture, 3 hours lab.
General Studies: SQ

BIO 187 General Biology I. (4)
fall, spring, summer
Biological concepts emphasizing principles and interplay of structure and function at the organismal, population, and community levels; includes ecology, evolution. Lecture, lab. Fee. Prerequisite: life science or health-related sciences major.
General Studies: SG

BIO 188 General Biology II. (4)
fall, spring, summer
Biological concepts emphasizing principles and interplay of structure and function at the molecular, cellular, and organismal levels; includes genetics, cell biology, physiology. Lecture, lab. Fee. Prerequisite: BIO 187 recommended.
General Studies: SQ

BIO 193 The Nature of Biological Science. (4)
selected semesters
Creative and critical thinking skills in biological research; nature of biological knowledge; role of experimentation, predictions, hypotheses, theories, values. Lecture, lab, discussion. Fee. Prerequisite: high school biology.
General Studies: SQ

BIO 201 Human Anatomy and Physiology I. (4)
fall, spring, summer
Structure and dynamics of the human mechanism. Cannot be used for major credit in the biological sciences. 3 hours lecture, 3 hours lab. Fee.
General Studies: SG

BIO 202 Human Anatomy and Physiology II. (4)
fall, spring, summer
Continuation of BIO 201. Cannot be used for major credit in the biological sciences. 3 hours lecture, 3 hours lab. Fee. Prerequisite: BIO 201 or instructor approval.

BIO 241 Human Genetics. (4)
fall
Introduces basic concepts in genetics as they are applied to human heredity. Cannot be used for major credit in the biological sciences. 3 hours lecture, 3 hours lab. Prerequisite: a course in the life sciences.
General Studies: SG

BIO 300 Natural History of Arizona. (3)
selected semesters
Plant and animal communities of Arizona. Cannot be used for major credit in the biological sciences. Prerequisite: junior standing.

BIO 301 Field Natural History. (1)
selected semesters
Organisms and their natural environment. Cannot be used for major credit in the biological sciences. 2 weekend field trips, field project. Fee. Pre- or corequisite: BIO 300.

BIO 302 Cancer and Heart Disease. (3)
fall
Incidence and mortality statistics for cancer and heart disease; host and environmental risk factors; diagnosis, treatment and prevention strategies. Cannot be counted toward a Biology major. Prerequisites: a combination of CHM 231 (or its equivalent) and 12 hours in life sciences and a General Studies L course or only instructor approval.
General Studies: L

BIO 303 Radiation and Life. (3)
spring
Benefits and risks of radiation exposure in society; medical applications, food irradiation, nuclear power, solar UV, population health effects. Cannot be counted toward a Biology major. Prerequisites: a combination of CHM 231 (or its equivalent) and 12 hours in life sciences and a General Studies L course or only instructor approval.
General Studies: L

BIO 304 Radiation Medicine and Biology. (3)
fall
Uses of radiation in medicine, including CT, diagnostic x rays, MRI, nuclear medicine, ultrasound; biological effects of radiation with emphasis on cancer. Prerequisites: a combination of PHY 112 and 12 hours in life sciences and a General Studies L course or only instructor approval.
General Studies: L

BIO 310 Special Problems and Techniques. (1–3)
fall and spring
Qualified undergraduates may investigate a specific biological problem under the direction of a faculty member. May be repeated for a total of 6 semester hours. Prerequisites: formal conference with the instructor; approval of the problem by the instructor and department chair.

BIO 311 Biology and Society. (3)
fall
Explores interactions between biological sciences and society, e.g., biomedical, environmental, ethical, historical, legal, philosophical, political, and social issues. Lecture, discussion. Cross-listed as HPS 340. Credit is allowed for only BIO 311 or HPS 340. Prerequisites: both BIO 187 and 188 or only BIO 193 (or 100).

BIO 314 Research Colloquium in Biology and Society I. (2)
spring
Develops critical thinking abilities, research methods, and writing skills for research in the interactions between biological sciences and society. Lecture, discussion. Prerequisite: BIO 311 or instructor approval.
General Studies: L (if credit also earned in BIO 414)

BIO 316 History of Biology: Conflicts and Controversies. (3)
selected semesters
Focuses on 19th and 20th centuries, considering biology as a discipline. Evolution, problems of heredity, development, and cell theory. Cross-listed as HPS 330. Credit is allowed for only BIO 316 or HPS 330.
General Studies: H

BIO 317 Conservation Biology. (3)
fall
Scientific and technical means for management, maintenance, protection, and restoration of biological resources on this planet. Prerequisite: 8 hours in biology.

BIO 318 History of Medicine. (3)
once a year
Scientific study of the human body, changing theories of disease, evolution of practical opinions on treatment, and the emerging institutionalization of medical practice. Cross-listed as HPS 331. Credit is allowed for only BIO 318 or HPS 331.
General Studies: H

BIO 319 Environmental Science (Nonmajor). (3)
fall
Environmental and biological concepts used to understand ecological systems with specific references to problems caused by humans. Cannot be used for major credit in the biological sciences. Cross-listed as PLB 320. Credit is allowed for only BIO 319 or PLB 320.
General Studies: G

BIO 320 Fundamentals of Ecology. (3)
fall and spring
Organization, functioning, and development of ecological systems; energy flow; biogeochemical cycling; environmental relations; population dynamics. Prerequisite: BIO 187 or instructor approval.

BIO 321 Introductory Ecology Laboratory. (3)
once a year
Laboratory and field observations and experiments to test current concepts and theories in ecology. Lab. Fee. Pre- or corequisite: BIO 320.
General Studies: L

BIO 331 Animal Behavior. (3)
fall
Evolutionary, genetic, physiological, and ecological bases of animal behavior. Prerequisite: BIO 187 (or its equivalent).

BIO 336 Sociobiology. (3)
selected semesters
Survey of animal and human social behavior examined from an evolutionary perspective. Suitable for nonmajors. Prerequisite: BIO 331 recommended.

BIO 340 General Genetics. (4)
fall, spring, summer
Science of heredity and variation. 3 hours lecture, 1 hour recitation. Prerequisite: BIO 187.

BIO 341 Genetic Analysis. (5)
selected semesters
General genetics: science of heredity and variation using critical inquiry. Not open to students with credit for BIO 340. 3 hours lecture, 6 hours lab. Prerequisites: BIO 187 and 193 (or their equivalents).

BIO 342 General Genetics Laboratory. (2)
fall
Explores general principles of inheritance with special reference to Mendelian, molecular, and computational genetics via laboratory experiments. Lab. Pre- or corequisite: BIO 340.

BIO 343 Genetic Engineering and Society. (4)
fall
Introduces genetic engineering, with emphasis on applications (gene therapy, DNA fingerprinting, bioremediation, transgenic animals and plants). 3 hours lecture, 3 hours lab. Cross-listed as MBB 343. Credit is allowed for only BIO 343 or MBB 343. Fee. Prerequisites: preferably both MBB 245 and 246 or only BIO 188 (or its equivalent).
General Studies: L

BIO 344 Origins, Evolution, and Creation. (3)
selected semesters
Examines scientific, mythic, and religious ideas relating to origins (particularly human). Place of antievolutionism and "scientific creationism" in American culture. Lecture, discussion. Cross-listed as HPS 311/HUM 371/REL 383. Credit is allowed for only BIO 344 or HPS 311 or HUM 371 or REL 383.

BIO 345 Organic Evolution. (3)
spring
Processes of adaptive change and speciation in sexual populations. Prerequisite: BIO 187.

BIO 346 The Darwinian Revolution. (3)
selected semesters
Intellectual and cultural history of Darwinism and modern evolutionary theory and their impact on 19th- and 20th-century thought. Lecture, discussion. Cross-listed as HPS 332/HUM 372. Credit is allowed for only BIO 346 or HPS 332 or HUM 372.

BIO 351 Developmental Anatomy. (3)
fall
General developmental biology (embryology) and comparative structure of organ systems, illustrated mainly by vertebrate examples. Prerequisite: BIO 187.

BIO 352 Laboratory in Vertebrate Developmental Anatomy. (2)
fall
Morphology of representative embryonic and adult vertebrates. 2 3-hour labs. Fee. Prerequisites: BIO 187; BIO 351 recommended.

BIO 353 Cell Biology. (3)
fall, spring, summer
Survey of major topics in cell biology, including structural, biochemical, and molecular aspects of cell function. Prerequisite: BIO 187.

BIO 360 Animal Physiology. (3)
fall and spring
Physiological mechanisms of the higher vertebrates. Prerequisites: BIO 187; CHM 115; MAT 117.

BIO 361 Animal Physiology Laboratory. (2)
fall and spring
Experimental laboratory studies of physiological mechanisms in animals and model systems. Lab, recitation. Fee. Prerequisites: CHM 115; MAT 117. Pre- or corequisite: BIO 360.

BIO 370 Vertebrate Zoology. (4)
fall and spring
Characteristics, classification, evolution, and natural history of the major groups of vertebrate animals. 3 hours lecture, 3 hours lab. Fee. Prerequisite: BIO 187.

BIO 385 Comparative Invertebrate Zoology. (4)
fall
Characteristics, life cycles, adaptations, and evolution of invertebrate animals. 3 hours lecture, 3 hours lab. Fee. Prerequisite: BIO 187 or instructor approval.

BIO 386 General Entomology. (4)
selected semesters
Form, activities, and classification of insects. 3 hours lecture, 3 hours lab. Fee. Prerequisite: BIO 187.

BIO 390 Medical/Dental Field Placement. (3)
fall, spring, summer
Field placement for students exploring a career in a health profession. Requires classroom sessions and field work. Lecture, lab. Prerequisites: application; instructor approval.

BIO 394 Special Topics. (2–3)
selected semesters
Topics of current or special interest in one or more aspects of biology. Topics may include the following.
- Introduction to Computational Molecular Biology
  Fee.

Prerequisite: junior standing.

BIO 406 Computer Applications in Biology. (3)
fall
Computer analysis techniques in biology emphasizing data entry, management and analysis, and graphic portrayal. Employs mainframe and microcomputers. 2 hours lecture, 3 hours lab. Cross-listed as PLB 432. Credit is allowed for only BIO 406 or PLB 432. Fee.
Prerequisites: both BIO 187 and MAT 117 (or 210) or only instructor approval.
General Studies: CS

BIO 410 Techniques in Wildlife Conservation Biology. (3)
fall
Field and analytical techniques used in evaluating population structure, viability and environmental impacts. Lecture, lab. Fee.
Prerequisites: both BIO 317 and 320 or only instructor approval.
General Studies: L

BIO 411 Advanced Conservation Biology I. (3)
selected semesters
Principles of conservation science, biology of threatened species, management principles that meet conservation goals, emphasizing North American ecosystems. Prerequisites: BIO 317, 320.

BIO 412 Advanced Conservation Biology II. (3)
spring
Global biodiversity patterns, processes, and conservation; global environmental change; sustainable use of natural resources; emphasizing international approaches to conservation biology.
Prerequisites: BIO 317, 320.

BIO 414 Research Colloquium in Biology and Society II. (1)
spring
Further develops critical thinking abilities, research methods, and writing skills for research in the interactions between biological sciences and society. Lecture, discussion. Prerequisites: both BIO 311 and 314 or only instructor approval.
General Studies: L (if credit also earned in BIO 314)

BIO 415 Biometry. (4)
fall
Statistical methods applied to biological problems, design of experiments, estimation, significance, analysis of variance, regression, correlation, chi square, and bioassay; the use of computers. Does not satisfy laboratory requirements for the College of Liberal Arts and Sciences' General Studies program. 3 hours lecture, 3 hours lab. Fee. Prerequisite: MAT 210 (or its equivalent).
General Studies: CS

BIO 416 Professional Values in Science. (3)
once a year
Considers issues related to values in science such as collaboration, finances, legal issues, media, mentoring, ownership of ideas, scientific

integrity. Discussion, student projects. Cross-listed as HPS 410. Credit is allowed for only BIO 416 or HPS 410.
General Studies: L

BIO 417 Experimental Design. (3)
spring
Fixed, random, mixed models; crossed and nested factorial designs; balanced and unbalanced data; completely randomized, blocked, repeated measure designs; ANCOVA. Prerequisite: BIO 415 (or its equivalent).

BIO 420 Field Zoology. (3)
selected semesters
Experience in zoological field techniques. Weekend or longer field trips. Prerequisite: instructor approval.

BIO 423 Population and Community Ecology. (3)
selected semesters
Organization and dynamics of population and communities, emphasizing animals. Theoretical and empirical approaches. Prerequisite: BIO 320 or instructor approval.

BIO 424 Mathematical Models in Ecology. (4)
selected semesters
Mathematical modeling of populations, communities, and ecosystems, including case studies and student-designed projects. 3 hours lecture, 3 hours lab. Prerequisites: BIO 320; a course in calculus.

BIO 425 Animal Ecology. (3)
selected semesters
Physiological and behavioral adaptations of individual animals to both abiotic and biotic environments. Prerequisite: BIO 320.

BIO 426 Limnology. (4)
selected semesters
Structure and function of aquatic ecosystems, with emphasis on freshwater lakes and streams. 3 hours lecture, 3 hours lab or field trip. Fee. Prerequisite: BIO 320 or instructor approval.
General Studies: L

BIO 427 Fire. (3)
spring in odd years
Interdisciplinary survey of fire on Earth—its history, ecology, and management. Prerequisite: BIO 187.

BIO 428 Biogeography. (3)
fall
Environmental and historical processes determining distributional patterns of animals and plants, emphasizing terrestrial life. Prerequisites: BIO 187 (or its equivalent); junior standing.
General Studies: L

BIO 431 Human Development and Fertility. (3)
selected semesters
Global influences of human population development on the human environment, including understanding human fertility and clinical influences on fertility. Discussion, presentation. Prerequisite: general biology.

BIO 435 Research Techniques in Animal Behavior. (3)
selected semesters
Experimental and field studies of animal behavior; description and quantification of animal behavior and interpretation of behavior within an evolutionary framework. 1 hour lecture, 6 hours lab. Prerequisite: BIO 331.

BIO 441 Cytogenetics. (3)
selected semesters
Chromosomal basis of inheritance. Cross-listed as PLB 412. Credit is allowed for only BIO 441 or PLB 412. Prerequisite: BIO 340.

BIO 442 Cytogenetics Laboratory. (2)
selected semesters
Microscopic analysis of meiosis, mitosis, and aberrant cell division. 6 hours lab. Cross-listed as PLB 413. Credit is allowed for only BIO 442 or PLB 413. Pre- or corequisite: BIO 441 or PLB 412.

BIO 446 Principles of Human Genetics. (3)
once a year
Molecular and cellular analysis of the human genome. Prerequisite: BIO 340.
General Studies: L

BIO 450 Advanced Developmental Biology. (3)
spring
Current concepts and experimental methods involving differentiation and biosynthetic activities of cells and organisms, with examples from microorganisms, plants, and animals. Prerequisite: BIO 351.

BIO 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 BME 451. Credit is allowed for only BIO 451 or BME 451. Prerequisites: BIO 353; instructor approval.

BIO 453 Animal Histology. (4)
selected semesters
Microscopic study of animal tissues. 3 hours lecture, 3 hours lab. Fee. Prerequisite: BIO 187 or instructor approval.

BIO 460 Astrobiology. (3)
fall and spring
Origin, early evolution, distribution, and future of life on Earth and elsewhere in the cosmos. May be repeated for credit. Lecture, discussion, video conferences, possible field trips. Cross-listed as AST 460/CHM 483/GLG 460/MIC 475. Credit is allowed for only AST 460 or BIO 460 or CHM 483 or GLG 460 or MIC 475. Prerequisite: instructor approval.

BIO 464 Photobiology. (3)
selected semesters
Principles underlying the effects of light on growth, development, and behavior of plants, animals, and microorganisms. Cross-listed as PLB 440. Credit is allowed for only BIO 464 or PLB 440. Prerequisites: CHM 231 (or 331); 12 hours in life sciences.

BIO 465 Neurophysiology. (3)
spring in even years
Detailed treatment of cellular and organismal neurophysiology and nervous system function. Prerequisite: BIO 360.

BIO 466 Neurophysiology Laboratory. (2)
selected semesters
Intracellular and extracellular electrophysiological recording techniques, histological preparations, and dye-filling techniques. 6 hours lab. Pre- or corequisite: BIO 465.

BIO 470 Systematic Zoology. (4)
spring in odd years
Philosophy, theory, practice of interpreting animal diversity, including species concepts speciation, nomenclature, and evolutionary and phylogenetic classification emphasizing phylogenetics. 3 hours lecture, 3 hours lab. Prerequisites: junior standing; 18 hours in life sciences.
General Studies: L

BIO 471 Ornithology. (3)
spring in odd years
Biology of birds. 2 hours lecture, 3 hours lab, weekend field trips. Fee. Prerequisite: BIO 370 or instructor approval.

BIO 472 Mammalogy. (4)
fall in odd years
Classification, structure, habits, ecology, and distribution of mammals, emphasizing North American forms. 3 hours lecture, 3 hours lab or field trip, weekend field trips. Fee. Prerequisite: BIO 370 or instructor approval.

BIO 473 Ichthyology. (3)
spring in odd years
Systematics and biology of recent and extinct fishes. 2 hours lecture, 3 hours lab or field trip, weekend field trips. Fee. Prerequisites: both BIO 370 and 425 or only instructor approval.

BIO 474 Herpetology. (3)
spring in even years
Systematics and biology of recent and extinct reptiles and amphibians. 2 hours lecture, 3 hours lab or field trip. Fee. Prerequisite: BIO 370.

BIO 480 Methods of Teaching Biology. (3)
spring
Methods of instruction, experimentation, organization, and presentation of appropriate content in biology. Prerequisite: 20 hours in the biological sciences.

BIO 482 Advanced Methods of Teaching Biology. (3)
fall in odd years
Design, delivery, and evaluation of student-centered, inquiry-based lessons for high school biology students. Learning cycle. Prerequisite: BIO 480.

BIO 484 Internship. (3)
selected semesters

BIO 490 Surgical Field Placement. (3)
fall, spring, summer
Advanced field placement for students exploring a career in a health profession. Requires classroom sessions and field work. May be repeated for credit. Lecture, lab. Prerequisites: application; instructor approval. Pre- or corequisite: BIO 390.

BIO 493 Honors Thesis. (1–6)
fall, spring, summer
General Studies: L

BIO 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Advanced Study Practicum. (1–3)

BIO 495 Undergraduate Thesis. (3)
fall, spring, summer
Guided research culminating in the preparation of an undergraduate thesis based on supervised research done in this and previous semesters. Prerequisites: at least 3 hours of BIO 310 (or 499); formal conference with instructor; instructor and department chair approval.

BIO 499 Individualized Instruction. (1–3)
fall and spring

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

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.

CLINICAL LABORATORY SCIENCES/ MEDICAL TECHNOLOGY (CLS)

CLS 100 Introduction to Clinical Laboratory Sciences. (1)
fall
Introduces the field of clinical laboratory sciences. Required for Clinical Laboratory Sciences majors.

CLS 310 Principles of Clinical Chemistry I. (6)
spring
Theory and application of principles of clinical chemistry, with emphasis on laboratory techniques, pathophysiology, methods of analysis, and assessment of procedure. 3 hours lecture, 9 hours lab. Fee. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.

CLS 320 Principles of Clinical Microbiology I. (6)
spring
Theory and application of principles of clinical microbiology with emphasis on isolation and identification of medically significant fungi and bacteria. 3 hours lecture, 9 hours lab. Fee. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.

CLS 330 Principles of Clinical Hematology I/Body Fluids. (3)
fall
Theory and application of principles in hematology, with emphasis on techniques to evaluate blood dyscrasias and analyze body fluids. 2 hours lecture, 3 hours lab. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.

CLS 410 Principles of Clinical Chemistry II. (2)
summer
Continuation of CLS 310 with emphasis on principles of advanced clinical chemistry. 1 hour lecture, 3 hours lab. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.

CLS 411 Advanced Applications of Clinical Chemistry. (4)
fall
Clinical application of theory/techniques from CLS 310 and 410. Emphasizes operation of common laboratory instrumentation and clinical correlation. Minimum 180 hours practicum. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.

CLS 420 Principles of Microbiology II. (2)
summer
Disease mechanisms and identification of medically significant parasites, Mycobacteria, Actinomycetes, Chlamydia, Rickettsia, Mycoplasma, and viruses. 1 hour lecture, 3 hours lab. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.

CLS 421 Advanced Applications of Clinical Microbiology. (4)
spring
Practical laboratory application of the principles of specimen collection, processing, detection, identification, and antimicrobial testing of medically significant bacteria, fungi, and parasites. Minimum 180 hours practicum. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.

CLS 430 Principles of Clinical Hematology II/Hemostasis. (3)
fall
Theory and applications of principles in hematology with emphasis on etiology, pathophysiology, clinical manifestations, and treatment of blood dyscrasias/hemostatic defects. 2 hours lecture, 3 hours lab. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.

CLS 431 Advanced Applications of Clinical Hematology. (4)
spring
Practical laboratory application of methods/techniques used to evaluate and diagnose blood dyscrasias/hemostatic defects. Applied techniques in body fluid analysis. Minimum 180 hours practicum. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.

CLS 440 Principles of Clinical Immunology/Immunohematology. (4)
fall
Theoretical and practical application of clinical immunology and immunohematology. Emphasizes serological techniques that aid disease diagnosis and blood donor selection. 3 hours lecture, 3 hours lab. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.

CLS 441 Advanced Applications of Clinical Immunology/Immunohematology. (3)
spring
Practical laboratory application of the principles of serological methods used in diagnosing disease and selecting blood components for transfusion therapy. Minimum 135 hours practicum. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.

CLS 450 Principles of Clinical Laboratory Administration. (2)
fall and spring
Principles of management, with emphasis on the clinical laboratory. Basic management process, personnel supervision, identification, and allocation of resources. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.
General Studies: L (if credit also earned in CLS 460)

CLS 460 Principles of Clinical Laboratory Education. (1)
spring
Principles of learning, with application to the development of instructional objectives, strategies, and evaluation for teaching-learning situations in the laboratory. Prerequisite: admission to the Clinical Laboratory Sciences professional study program.
General Studies: L (if credit also earned in CLS 450)

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

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

HISTORY AND PHILOSOPHY OF SCIENCE (HPS)

HPS 311 Origins, Evolution, and Creation. (3)
selected semesters
Examines scientific, mythic, and religious ideas relating to origins (particularly human). Place of antievolutionism and "scientific creationism" in American culture. Lecture, discussion. Cross-listed as BIO 344/HUM 371/REL 383. Credit is allowed for only BIO 344 or HPS 311 or HUM 371 or REL 383.

HPS 314 Philosophy of Science. (3)
once a year
Structure and justification of scientific theories, explanation, and theory change. Roles of observation and laws, theoretical concepts and entities, reduction, probability, confirmation, space and time, and causation. Cross-listed as PHI 314. Credit is allowed for only HPS 314 or PHI 314.
General Studies: HU

HPS 322 History of Science. (3)
once a year
Development and application of scientific thinking from ancient times through the 17th century.
General Studies: HU, H

HPS 323 History of Science. (3)
selected semesters
Development and application of scientific thinking from the 18th century to the present.
General Studies: HU, H

HPS 325 Chinese Science and Medicine. (3)
selected semesters
Explores development of Chinese traditions dealing with the natural world, science, and medicine. Lecture, discussion. Cross-listed as HST 385. Credit is allowed for only HPS 325 or HST 385.
General Studies: HU, G, H

HPS 330 History of Biology: Conflicts and Controversies. (3)
selected semesters
Focuses on 19th and 20th centuries, considering biology as a discipline. Evolution, problems of heredity, development, and cell theory. Cross-listed as BIO 316. Credit is allowed for only BIO 316 or HPS 330.
General Studies: H

HPS 331 History of Medicine. (3)
once a year
Scientific study of the human body, changing theories of disease, evolution of practical opinions on treatment, and the emerging institutionalization of medical practice. Cross-listed as BIO 318. Credit is allowed for only BIO 318 or HPS 331.
General Studies: H

HPS 332 The Darwinian Revolution. (3)
selected semesters
Intellectual and cultural history of Darwinism and modern evolutionary theory and their impact on 19th- and 20th-century thought. Lecture, discussion. Cross-listed as BIO 346/HUM 372. Credit is allowed for only BIO 346 or HPS 332 or HUM 372.

HPS 336 Exploration and Science. (3)
fall
500-year survey of exploration as a historical process and cultural activity of Western civilization, with emphasis on its links with modern science.
General Studies: SB, H

HPS 340 Biology and Society. (3)
fall
Explores interactions between biological sciences and society, e.g., biomedical, environmental, ethical, historical, legal, philosophical, political, and social issues. Lecture, discussion. Cross-listed as BIO 311. Credit is allowed for only BIO 311 or HPS 340. Prerequisites: both BIO 187 and 188 or only BIO 193 (or 100).

HPS 377 Nature in Context. (3)
fall
Explores perspectives on the nature of nature, the history of ecology, and the rise of environmentalism. Seminar. Cross-listed as HON 377. Credit is allowed for only HON 377 or HPS 377.
General Studies: L/HU

HPS 402 Technology, Society, and Human Values. (3)
once a year
Values that motivate humankind to create technology. Areas of conflict and resolution of conflict between values and technology. Readings and discussions with visiting lecturers. Prerequisite: junior standing.

HPS 410 Professional Values in Science. (3)
once a year
Considers issues related to values in science such as collaboration, finances, legal issues, media, mentoring, ownership of ideas, scientific integrity. Discussion, student projects. Cross-listed as BIO 416. Credit is allowed for only BIO 416 or HPS 410.
General Studies: L

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

MOLECULAR BIOSCIENCES/BIOTECHNOLOGY (MBB)

MBB 245 Cellular and Molecular Biology. (3)
fall
Concepts that underlie relationships between cellular and subcellular structure and function, and integration of major metabolic and genetic processes. Prerequisite: life science major or preprofessional student in health-related sciences.
General Studies: SQ (if credit also earned in MBB 246)

MBB 246 Cellular and Molecular Biology Laboratory. (1)
fall
Experiments that illustrate relationships between structure, function, and genetic processes at the cellular and molecular level. Lab. Prerequisite: MBB 245.
General Studies: SQ (if credit also earned in MBB 245)

MBB 247 Applied Biosciences: Biotechnology. (3)
spring
Applies concepts of molecular and cellular biology of bacteria, animals, and plants to real-world problems. Prerequisite: MBB 245, 246. Corequisite: MBB 248.

MBB 248 Applied Biosciences: Biotechnology Laboratory. (1)
spring
Applies concepts of molecular and cellular biology of bacteria, animals, and plants to real-world problems. Lab. Fee. Prerequisite: MBB 245, 246. Corequisite: MBB 247.

MBB 343 Genetic Engineering and Society. (4)
fall
Introduces genetic engineering, with emphasis on applications (gene therapy, DNA fingerprinting, bioremediation, transgenic animals and plants). 3 hours lecture, 3 hours lab. Cross-listed as BIO 343. Credit is allowed for only BIO 343 or MBB 343. Fee. Prerequisites: preferably both MBB 245 and 246 or only BIO 188 (or its equivalent).
General Studies: L

MBB 350 Applied Genetics. (4)
spring
Introduces molecular genetics with emphasis on application of genetics in solving biological questions and engineering organisms in biotechnology. 2 hours lecture, 6 hours lab. Cross-listed as PLB 350. Credit is allowed for only MBB 350 or PLB 350. Fee. Prerequisites: preferably both MBB 245 and 246 or only BIO 188 (or its equivalent).

MBB 445 Techniques in Molecular Biology/Genetics. (2)
fall and spring
Molecular genetic principles: plasmid construction, purification, and characterization; PCR; mutageneses; hybridization and sequence analysis; protein quantitation, immunologic detection, and electrophoresis. Cross-listed as MIC 445. Credit is allowed for only MBB 445 or MIC 445. Prerequisites: both BIO 340 and MIC 302 or only instructor approval.

MBB 446 Techniques in Molecular Biology/Genetics Lab. (2)
fall and spring
Molecular genetic techniques; plasmid construction, purification, and characterization; PCR; mutageneses; hybridization and sequence analysis; protein quantitation; immunologic detection and electrophoresis. Cross-listed as MIC 446. Credit is allowed for only MBB 446 or MIC 446. Pre- or corequisite: MBB 445 or MIC 445.

MBB 484 Internship. (3)
selected semesters

MBB 490 Capstone: Issues in Biotechnology. (2)
fall and spring
Integrates science and humanities within problem-solving exercises dealing with intellectual property, ethics, regulatory issues, business practices, and commercialization. May be repeated for credit. Prerequisite: Molecular Biosciences/Biotechnology major or instructor approval.
General Studies: L (must be taken twice to secure L credit)

MBB 499 Individualized Instruction. (3)
selected semesters

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

MOLECULAR AND CELLULAR BIOLOGY (MCB)

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.

MICROBIOLOGY (MIC)

MIC 205 Microbiology. (3)
fall, spring, summer
Basic course for students without credit in BIO 188, emphasizing general principles; role of microorganisms in health, ecology, and applied fields. May not be used for Microbiology major credit unless a diagnostic test is passed. Prerequisites: both BIO 100 (or PLB 108) and CHM 101 or only instructor approval.
General Studies: SG (if credit also earned in MIC 206)

MIC 206 Microbiology Laboratory. (1)
fall, spring, summer
Principles and laboratory techniques used in identifying and handling microorganisms. 3 hours lab. Fee. Pre- or corequisite: MIC 205 or 220.
General Studies: SG (if credit also earned in MIC 205)

MIC 220 Biology of Microorganisms. (3)
fall and spring
Basic course for students with credit in BIO 188. Detailed study of microbial cells, their structure, genetics, physiology, and taxonomy. Corequisites: BIO 187; CHM 115.

MIC 302 Advanced Bacteriology Laboratory. (2)
fall and spring
Advanced laboratory techniques in bacterial growth, physiology, genetics, and microscopy. Required of Microbiology majors. 4 hours lab. Fee. Prerequisites: completion of General Studies L requirement and either (a) MIC 206 and 220 or (b) MIC 205 and 206 and instructor approval.
General Studies: L (if credit also earned in MIC 401)

MIC 360 Bacterial Physiology. (3)
fall and spring
Mechanisms and control of cell metabolism, structures, and functions. Prerequisite: MIC 220. Pre- or corequisite: BCH 361 or instructor approval.

MIC 380 Medical Parasitology. (3)
fall
Parasitic diseases of humans, including life cycle events and clinical manifestations. Prerequisite: MIC 205 or 220.

MIC 381 Pathogenic Microbes. (3)
spring
Host-microbial interactions in infectious disease, with emphasis on pathogenesis, host defenses, and molecular mechanisms of microbial virulence. Prerequisite: MIC 360 or 6 hours in microbiology with instructor approval.

MIC 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- HIV Disease and AIDS in America
- Medical Immunology

MIC 401 Research Paper. (1)
fall, spring, summer
Paper of 15 or more pages based on library or laboratory research in collaboration with a faculty member. Required of all Microbiology majors. Prerequisites: MIC 302; completion of General Studies L requirement.
General Studies: L (if credit also earned in MIC 302)

MIC 402 Service Learning. (3)
fall and spring
K–12 tutoring internship; learning activities employed were originally developed as part of the Bio Reach Program. Requires weekly reflective writing. May be repeated for credit. Internship. Fee. Pre- or corequisite: BIO 181 or 188.

MIC 420 Immunology: Molecular and Cellular Foundations. (3)
fall
Molecular and cellular foundations of immunology. Antibody/antigen interactions, cellular response, cytokines, immunogenetics, immunoregulation, autoimmunity, psychoneuroimmunology research/medical perspectives. Prerequisites: both CHM 231 (or 331) and MIC 205 (or 220) or only instructor approval.

MIC 421 Experimental Immunology. (2)
fall and spring
Introduces the basic techniques, methods, and assays used in immunology. 6 hours lab. Fee. Prerequisites: a combination of CHM 231 and 331 and MIC 302 or only instructor approval.

MIC 425 Advanced Immunology. (3)
selected semesters
Survey of recent advances in immunology, including lymphocyte membranes, lymphokines/biochemistry, molecular genetics, theoretical immunology, immunoregulation, neuroimmunology, and immunologic diseases. Prerequisite: MIC 420 or instructor approval.

MIC 428 Immunophilosophy. (3)
selected semesters
Integrates immunology and philosophy, including psychoneuroimmunology and the mind-body problem, and immunologic/psychologic perspectives on self and self-identity. Discussion, original literature readings and written assignments. Cross-listed as PHI 428. Credit is allowed for only MIC 428 or PHI 428. Pre- or corequisite: MIC 420 or PHI 317 or instructor approval.

MIC 441 Bacterial Genetics. (3)
spring
Survey of genetic exchange and regulatory processes in bacteria and their viruses. Bacteria and viruses as tools in genetic engineering. Prerequisites: both BIO 340 and MIC 205 (or 220) or only instructor approval.

MIC 442 Bacterial Genetics Laboratory. (1)
fall
Techniques of mutagenesis, mapping, and strain and genetic library construction. 4 hours lab. Prerequisites: MIC 206, 302. Pre- or corequisite: MIC 441.

MIC 445 Techniques in Molecular Biology/Genetics. (2)
fall and spring
Molecular genetic principles: plasmid construction, purification, and characterization; PCR; mutageneses; hybridization and sequence analysis; protein quantitation; immunologic detection and electrophoresis. Cross-listed as MBB 445. Credit is allowed for only MBB 445 or MIC 445. Prerequisites: both BIO 340 and MIC 302 or only instructor approval.

MIC 446 Techniques in Molecular Biology/Genetics Lab. (2)
fall and spring
Molecular genetic techniques; plasmid construction, purification, and characterization; PCR; mutageneses; hybridization and sequence analysis; protein quantitation; immunologic detection and electrophoresis. Cross-listed as MBB 446. Credit is allowed for only MBB 446 or MIC 446. Pre- or corequisite: MBB 445 or MIC 445.

MIC 461 Geomicrobiology. (3)
spring
Past and present interactions among microbial life, geological materials, and biogeochemical cycles involving carbon, sulfur, phosphate, nitrogen, and metals. Cross-listed as GLG 461. Credit is allowed for only GLG 461 or MIC 461. Prerequisites: introductory

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

courses in chemistry and microbiology (or geological sciences); instructor approval.

MIC 470 Bacterial Diversity and Systematics. (4)
selected semesters
Biology, classification, and enrichment culture of the nonpathogenic bacteria. 2 hours lecture, 6 hours lab. Fee. Prerequisite: MIC 302.

MIC 475 Astrobiology. (3)
fall and spring
Origin, early evolution, distribution, and future of life on Earth and elsewhere in the cosmos. May be repeated for credit. Lecture, discussion, video conferences, possible field trips. Cross-listed as AST 460/BIO 460/CHM 483/GLG 460. Credit is allowed for only AST 460 or BIO 460 or CHM 483 or GLG 460 or MIC 475. Prerequisite: instructor approval.

MIC 484 Internship. (1–12)
fall, spring, summer

MIC 485 General Virology. (3)
fall
Fundamental nature of viruses, their replication, pathogenesis, and ecology. Prerequisites: both BIO 340 and CHM 331 or only instructor approval.

MIC 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Clinical Bacteriology Laboratory. (3)
- Service Learning (Bioreach). (3)

MIC 495 Undergraduate Research. (1–6)
fall, spring, summer
Supervised research in microbiology. May be repeated for credit. Lab. Prerequisites: MIC 206, 220, 302; 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.

PLANT BIOLOGY (PLB)

PLB 108 Concepts in Plant Biology. (4)
fall, spring, summer
Introduces concepts of plant biology that are of human relevance using commercially important, edible, and medicinal plants as examples. Not for majors in the biological sciences. 3 hours lecture, 3 hours lab. Fee.
General Studies: SQ

PLB 200 Biology of Plants. (3)
fall, spring, summer
Analyzes the structure/function interaction for plant cells and tissues and properties that emerge in whole plants. Prerequisites: high school biology and chemistry.
General Studies: SQ (if credit also earned in PLB 201)

PLB 201 Biology of Plants Laboratory. (1)
fall, spring, summer
Lab/field experiments to teach techniques and protocols of the scientific process; reinforces concepts from lecture by asking questions and solving problems. Lab. Prerequisites: high school biology and chemistry.
General Studies: SQ (if credit also earned in PLB 200)

PLB 300 Comparative Plant Diversity. (4)
fall
Surveys major plant groups and other photosynthetic organisms. Emphasizes comparative data analysis, evolutionary inference, and phylogenetic methods. 3 hours lecture, 3 hours lab. Fee. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent).
General Studies: L/SG

PLB 302 Plants and Civilization. (3)
fall
Plants and plant products used by people throughout the world. Cultivation, processing, and uses in modern life (beverages, fibers, foods, medicinals, and perfumes). Prerequisites: preferably both PLB 200 and 201 (or 108) or only BIO 187 (or its equivalent).

PLB 304 Biology of Algae and Fungi. (3)
selected semesters
Ecology, economics, and evolutionary diversity of the algae and fungi. Traditional and modern biotechnological uses. 2 hours lecture, 3 hours lab. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent).

PLB 305 Desert Annuals and Cacti. (3)
fall
Adaptive biology of select plants. Analyzes diverse traits permitting survival in deserts: reproduction, structure, and physiology. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent).

PLB 306 Plant Anatomy. (4)
fall
Development and mature structure of tissues of vascular plants; patterns and modifications of the leaf, stem, root, and flower. 3 hours lecture, 3 hours lab. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent).

PLB 308 Plant Physiology. (4)
spring
Concepts of plant function: carbon metabolism, energy acquisition, regulation of growth and development, stress responses, and water and nutrient uptake. Fee. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent); CHM 101 (or 115 or 231).

PLB 310 The Flora of Arizona. (4)
spring
Principles of taxonomy; identification of Arizona plants. 2 hours lecture, 6 hours lab. Fee. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent).

PLB 400 Lichenology. (3)
spring in odd years
Chemistry, ecology, physiology, and taxonomy of lichens. 2 hours lecture, 3 hours lab. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent).

PLB 401 Mycology. (3)
spring
Fungal morphology and systematics with an introduction to fungal cell biology, ecology, economic significance, and growth and development. 2 hours lecture, 3 hours lab. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent) or only MIC 206.

PLB 402 Service Learning. (3)
fall and spring
K–12 tutoring and mentoring internship related to academic course work in plant biology; requires weekly reflective reading and writing. May be repeated for credit. Internship. Fee. Pre- or corequisite: BIO 187 or PLB 108 (or 200 and 201).

PLB 404 Phycology. (4)
spring
Algae (both fresh water and marine forms), emphasizing field collection and identification of local representatives. Morphological, ecological, and economic aspects of the algae. 3 hours lecture, 3 hours lab. Fee. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent).

PLB 407 Plant Fossils and Evolution. (4)
spring in odd years
Broad survey of plant life of the past, including the structure of plant fossils, their geologic ranges, geographic distribution, and paleoenvironment. 3 hours lecture, 3 hours lab or field trip. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent).

PLB 410 Angiosperm Taxonomy. (3)
spring
Principles underlying angiosperm phylogeny. 2 hours lecture, 3 hours lab. Prerequisite: PLB 310 or instructor approval.

PLB 411 Trees and Shrubs of Arizona. (3)
fall
Identification of woody plants from desert, chaparral, and forest habitats in Arizona. 1 hour lecture, 3 hours lab, field trips. Fee. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent) or only instructor approval.

PLB 412 Cytogenetics. (3)
selected semesters
Chromosomal basis of inheritance. Cross-listed as BIO 441. Credit is allowed for only BIO 441 or PLB 412. Prerequisite: BIO 340.

PLB 413 Cytogenetics Laboratory. (2)
selected semesters
Microscopic analysis of meiosis, mitosis, and aberrant cell division. 6 hours lab. Cross-listed as BIO 442. Credit is allowed for only BIO 442 or PLB 413. Pre- or corequisite: BIO 441 or PLB 412.

PLB 414 Plant Pathology. (3)
spring
Identification and control of biotic and abiotic factors that cause common disease problems to plants. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent) or only instructor approval.
General Studies: L

PLB 416 Medical Botany. (4)
summer
Explores plants affecting human health: modern- and folk-usage medicinal plants. Quality control, clinical evidence, plant chemistry, and ethnopharmacology. 3 hours lecture, 3 hours lab. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 (or its equivalent) or only instructor approval.

PLB 484 Internship. (1–12)
selected semesters
Topics may include the following:
- Plant Biology Internship. (3)
  fall and spring
  Applies a simplified version of PLB 108 to teach fifth-grade children by planting gardens and conducting indoor plant experiments.
- Service Learning
  fall, spring, summer
  Fee.

PLB 498 Pro-Seminar. (1–7)
fall and spring

PLB 499 Individualized Instruction. (3)
selected semesters

Environmental Science and Ecology

PLB 320 Environmental Science (Nonmajor). (3)
fall
Environmental and biological concepts used to understand ecological systems with specific references to problems caused by humans. Cannot be used for major credit in the biological sciences. Cross-listed as BIO 319. Credit is allowed for only BIO 319 or PLB 320.
General Studies: G

PLB 322 Environmental Science (Major). (3)
fall
Nature of environmental and biological interaction: historical and modern examples, regional and global issues. Participation in environmental problem-solving activities. Lecture, lab. Prerequisites: preferably both PLB 200 and 201 or both GLG 110 and 111 or only GPH 111.

PLB 420 Plant Ecology: Organisms and Populations. (3)
spring in odd years
Factors and controls on the physiological ecology and organization of plants and plant populations using empirical and theoretical approaches. 2 hours lecture, 3 hours lab. Fee. Prerequisite: BIO 320 or PLB 322 (or its equivalent).

PLB 421 Plant Ecology: Communities and Ecosystems. (3)
spring in even years
Plant community organization, field sampling techniques, and the structure and function of terrestrial ecosystems emphasizing the role of vegetation. 2 hours lecture, 3 hours lab. Fee. Prerequisite: BIO 320 or PLB 322 (or its equivalent).

PLB 422 Plant Geography. (3)
selected semesters
Plant communities of the world and their interpretation, emphasizing North American plant associations. Cross-listed as GPH 422. Credit is allowed for only GPH 422 or PLB 422. Prerequisites: preferably both PLB 200 and 201 or only BIO 187 or only GPH 111.

PLB 430 Statistical Analyses in Environmental Science. (3)
spring
ANOVAS, 1-way classification of factorial and partially hierarchic designs; introductory multivariate statistics. Fee. Prerequisite: MAT 210 (or its equivalent).
General Studies: CS

PLB 432 Computer Applications in Biology. (3)
fall
Computer analysis techniques in biology emphasizing data entry, management and analysis, and graphic portrayal. Employs mainframe and microcomputers. 2 hours lecture, 3 hours lab. Cross-listed as BIO 406. Credit is allowed for only BIO 406 or PLB 432. Fee. Prerequisites: both BIO 187 and MAT 117 (or 210) or only instructor approval.
General Studies: CS

PLB 434 Landscape Ecological Analysis and Modeling. (3)
spring in odd years
Technical methods of landscape ecological analyses. Includes mathematical and statistical examination and modeling of landscape ecological patterns and processes. Prerequisites: both BIO 320 and 406 or only PLB 432 (or its equivalent).

Plant Biochemistry and Molecular Biology

PLB 350 Applied Genetics. (4)
spring
Introduces molecular genetics with emphasis on application of genetics in solving biological questions and engineering organisms in biotechnology. 2 hours lecture, 6 hours lab. Cross-listed as MBB 350. Credit is allowed for only MBB 350 or PLB 350. Fee. Prerequisites: preferably both MBB 245 and 246 or only BIO 188 (or its equivalent).

PLB 440 Photobiology. (3)
selected semesters
Principles underlying the effects of light on growth, development, and behavior of plants, animals, and microorganisms. Cross-listed as BIO 464. Credit is allowed for only BIO 464 or PLB 440. Prerequisites: CHM 231 (or 331); 12 hours in life sciences.

PLB 444 Plant Growth and Development. (3)
spring
Molecular basis of development, role of signal transduction pathways/gene regulation in control of organ formation, pollination, germination, and growth. Prerequisite: BIO 353.

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

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

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

Department of Mathematics and Statistics

math.la.asu.edu
480/965-3951
PS A216

Andrew Bremner, Chair

Professors: Armbruster, Barcelo, Bremner, Castillo-Chavez, Gardner, Ihrig, Z. Jackiewicz, Kadell, Kawski, Kierstead, Kostelich, Kuang, Kuiper, Lai, Lohr, Lopez, Mahalov, Mittelmann, Nicolaenko, Quigg, Renaut, Ringhofer, Smith, Suslov, Thieme, Young

Associate Professors: Baer, Blount, Carlson, Childress, Farmer, Gelb, Hurlbert, D. Jones, J. Jones, Kaliszewski, McCarter, Moore, Nikitin, Prewitt, Spielberg, Taylor, Welfert

Assistant Professors: Crook, Czygrinow, Oehrtman, Zandieh

Senior Lecturers: Abramson, Isom, Kolossa, Miller, Odish, Rody, Ruedemann, Surgent, Trapuzzano, Vaz, Zhu

Lecturers: Arce, Ashbrook, Coombs, D' Alesandro, Downs, E. Jackiewicz, E. Jones, Kellgren, Kim, Maris, Martin, Masilamani, Pecuch-Herrero, Reynolds, Tracogna, Turner, Ward, Williams

The Department of Mathematics and Statistics offers the BA and BS degrees in Mathematics. Students who plan to attend graduate school in mathematics or statistics should choose the BS degree.

The department also offers the BS degree in Computational Mathematical Sciences.

The department also offers a minor in Mathematics and an academic specialization in mathematics for students pursuing the BAE degree in Secondary Education.

MATHEMATICS—BA

The BA degree in Mathematics requires a minimum of 36 semester hours of course work in mathematics and statistics, and additional course work in closely related fields, for a total of 51 semester hours. A grade of "C" (2.00) or higher is required in all courses taken for the major. MAT 370 and 371 may not both be used to satisfy these degree requirements. The required course work has the following components:

Core Courses

MAT	270	Calculus with Analytic Geometry I *MA* 4
MAT	271	Calculus with Analytic Geometry II *MA* 4
MAT	272	Calculus with Analytic Geometry III *MA* 4
MAT	300	Mathematical Structures *L* 3
		or MAT 243 Discrete Mathematical Structures (3)
MAT	342	Linear Algebra 3
		or MAT 343 Applied Linear Algebra (3)
		or both MAT 242 and MAT 294 ST: Sophomore Problem Seminar
MAT	370	Intermediate Calculus 3
		or MAT 371 Advanced Calculus I (3)
Total		 21

Computer Science Requirement

CSE	100	Principles of Programming with C++ *CS* 3
		or CSE 110 Principles of Programing Java *CS* (3)
		or CSE 200 Concepts of Computer Science *CS* (3)
Total		 3

Additional Course Work in Mathematics and Statistics[1]

Five additional courses in mathematics and statistics are also required 15

Related Field Course Work[2]

Course work in mathematics, statistics, or related fields 12

1 Acceptable mathematics courses are MAT 243, 274, and upper-division MAT courses, with the exception of MAT 362, 485, and MAT 411. Acceptable statistics courses are upper-division STP courses.

2 For a list of related field course work, see an advisor in PSA 211, or access math.la.asu.edu/~undergrd/underprog/degree/related-fields.html.

MATHEMATICS—BS

The Department of Mathematics and Statistics has three avenues for earning a BS degree. The BS requirements are similar to the BA requirements, but they require more extensive courses in advanced mathematics. The program is flexible enough to allow students to focus their studies on mathematics, applied mathematics, or statistics. The statistics concentration offers extensive preparation in applied and theoretical statistics. The requirements for the BS degree with the statistics concentration are a subset of those for the BS degree. The requirements for the BS degree and for the BS degree with the computational mathematical sciences concentration are distinct; neither is a subset of the other.

BS Requirements. The BS degree in Mathematics requires a minimum of 42 semester hours of course work in mathematics and statistics, and additional course work in closely related fields, for a total of 55 semester hours. A grade of "C" (2.00) or higher is required in all courses taken for the major. MAT 370 and 371 may not both be used to satisfy these degree requirements. Credit may not be earned for both MAT 274 and 275 or for both MAT 342 and 343. The required course work has the following components:

Core Courses

MAT	270	Calculus with Analytic Geometry I *MA* 4
MAT	271	Calculus with Analytic Geometry II *MA* 4
MAT	272	Calculus with Analytic Geometry III *MA* 4
MAT	300	Mathematical Structures *L* 3
MAT	342	Linear Algebra 3
		or MAT 343 Applied Linear Algebra (3)
MAT	371	Advanced Calculus I 3
Total		 21

Computer Science Requirement
CSE 200 Concepts of Computer Science *CS* 3
Total 3

Depth Requirement
Two courses chosen from the following list of advanced courses 6
MAT 415 Introduction to Combinatorics (3)
MAT 416 Introduction to Graph Theory (3)
MAT 423 Numerical Analysis I *CS* (3)
MAT 425 Numerical Analysis II *CS* (3)
MAT 442 Advanced Linear Algebra (3)
MAT 444 Intermediate Abstract Algebra (3)
MAT 472 Intermediate Real Analysis I (3)
MAT 473 Intermediate Real Analysis II (3)
MAT 475 Differential Equations (3)
MAT 476 Partial Differential Equations (3)
STP 421 Probability (3)
STP 427 Mathematical Statistics (3)

Advanced Courses in Mathematics and Statistics[1]
Two courses from the following list, both preferably taken from the same grouping 6

Algebra, Topology, and Number Theory
MAT 410 Introduction to General Topology (3)
MAT 442 Advanced Linear Algebra (3)
MAT 443 Introduction to Abstract Algebra (3)
MAT 444 Intermediate Abstract Algebra (3)
MAT 445 Theory of Numbers (3)

Analysis and Applications
MAT 372 Advanced Calculus II (3)
MAT 461 Applied Complex Analysis (3)
MAT 472 Intermediate Real Analysis I (3)

Applied Mathematics and Dynamics
MAT 451 Mathematical Modeling *CS* (3)
MAT 452 Introduction to Chaos and Nonlinear Dynamics (3)
MAT 455 Introduction to Fractals and Applications (3)

Computational Mathematics
MAT 420 Scientific Computing (3)
MAT 421 Applied Computational Methods *CS* (3)
MAT 423 Numerical Analysis I *CS* (3)
MAT 425 Numerical Analysis II *CS* (3)
MAT 427 Computer Arithmetic *CS* (3)

Differential Equations
MAT 462 Applied Partial Differential Equations (3)
MAT 475 Differential Equations (3)
MAT 476 Partial Differential Equations (3)

Discrete Mathematics
MAT 415 Introduction to Combinatorics (3)
MAT 416 Introduction to Graph Theory (3)
MAT 419 Introduction to Linear Programming *CS* (3)

Statistics and Probability
STP 420 Introductory Applied Statistics *CS* (3)
STP 421 Probability (3)
STP 425 Stochastic Processes (3)
STP 427 Mathematical Statistics (3)
STP 429 Experimental Statistics *CS* (3)

Additional Course Work in Mathematics and Statistics[2]
Three courses in mathematics and statistics 9

Related Fields Course Work[3]
Course work in mathematics, statistics, or related fields 10

[1] Students who contemplate graduate work in mathematics should choose additional courses listed under the depth requirement to satisfy the advanced courses requirement.

[2] Acceptable mathematics courses are MAT 243, 274, and upper division MAT courses, with the exception of MAT 310, 362, 485, and MAT 411. Acceptable statistics courses are 400-level STP courses.

[3] For a list of related field course work, see an advisor in PSA 211, or access math.la.asu.edu/~undergrd/underprog/degree/related-fields.html.

COMPUTATIONAL MATHEMATICAL SCIENCES—BS

The BS degree in Computational Mathematical Sciences curriculum strives to provide students with a background in computer science and the natural or physical sciences in addition to a core of course work in mathematics. The requirements for the BS degree in Computational Mathematical Sciences and for the BS degree in Mathematics are distinct; neither is a subset of the other. A minimum grade of "C" (2.00) is required in all courses taken for the major.

The BS degree in Computational Mathematical Sciences requires a minimum of 32 semester hours of course work in mathematics and statistics, a minimum of 12 to 14 semester hours in science, nine hours in computer science, and a three hour advanced science course or internship/research credit. This adds up to a minimum of 56 to 58 semester hours of study related to the major.

Core Courses
MAT 243 Discrete Mathematical Structures 3
or MAT 300 Mathematical Structures *L* (3)
MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
Total 11

Core Courses in Computational Mathematics
MAT 275 Modern Differential Equations *MA** 3
or MAT 274 Elementary Differential Equations *MA* (3)
MAT 343 Applied Linear Algebra* 3
or MAT 342 Linear Algebra (3)
MAT 420 Scientific Computing 3
MAT 421 Applied Computational Methods *CS* 3
Total 12

* MAT 275 and 343 are recommended.

Advanced Courses in Mathematics and Statistics
Choose one course from group one and two from group two 9

Group One
MAT 362 Advanced Mathematics for Engineers and Scientists (3)
MAT 370 Intermediate Calculus (3)
MAT 371 Advanced Calculus I (3)
MAT 460 Vector Calculus (3)

Group Two
MAT 351 Mathematical Methods for Genetic Analysis *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 92.

MAT 415 Introduction to Combinatorics (3)
MAT 416 Introduction to Graph Theory (3)
MAT 419 Introduction to Linear Programming *CS* (3)
MAT 423 Numerical Analysis I *CS* (3)
MAT 425 Numerical Analysis II *CS* (3)
MAT 447 Cryptography (3)
MAT 451 Mathematical Modeling *CS* (3)
MAT 452 Introduction to Chaos and Nonlinear Dynamics (3)
MAT 455 Introduction to Fractals and Applications (3)
MAT 461 Applied Complex Analysis (3)
MAT 462 Applied Partial Differential Equations (3)
MAT 475 Differential Equations (3)
MAT 476 Partial Differential Equations (3)
STP 420 Introductory Applied Statistics *CS* (3)
STP 421 Probability (3)
STP 425 Stochastic Processes (3)
STP 427 Mathematical Statistics (3)
STP 429 Experimental Statistics *CS* (3)

Computer Science Requirement
CSE 200 Concepts of Computer Science *CS* 3
CSE 210 Object-Oriented Design and Data Structures *CS* 3
CSE 240 Introduction to Programming Languages 3
or CSE 310 Data Structures and Algorithms (3)
Total 9

Science Requirement. Two one-year science course and lab sequences (for a total of 14 to 17 hours) are required. Upon advisor approval, two advanced courses for which the first one-year science and lab sequence is a prerequisite may be substituted for the second one-year science and lab sequence. Allowable one-year sequences include the following:

Astrophysics
Astrophysics sequence 8
AST 113 Astronomy Laboratory I *SQ*[1] (1)
AST 114 Astronomy Laboratory II *SQ*[1] (1)
AST 321 Introduction to Planetary and Stellar Astrophysics *SQ*[1] (3)
AST 322 Introduction to Galactic and Extragalactic Astrophysics *SQ*[1] (3)

Biology
Choose one of the following sequences 8
BIO 187 General Biology I *SG* (4)
BIO 188 General Biology II *SQ* (4)
— *or* —
BIO 188 General Biology II *SQ* (4)
BIO 193 The Nature of Biological Science *SQ* (4)

Chemistry
Choose one of the following sequences 8–9
CHM 113 General Chemistry *SQ* (4)
CHM 115 General Chemistry with Qualitative Analysis *SQ* (5)
— *or* —
CHM 113 General Chemistry *SQ* (4)
CHM 116 General Chemistry *SQ* (4)
— *or* —
CHM 115 General Chemistry with Qualitative Analysis *SQ*[2] (5)
CHM 117 General Chemistry for Majors I *SQ*[2] (4)
— *or* —
CHM 114 General Chemistry for Engineers *SQ*[3] (4)
CHM 231 Elementary Organic Chemistry *SQ*[4] (3)
CHM 235 Elementary Organic Chemistry Laboratory *SQ*[4] (1)

Geology
Geology sequence 8
GLG 101 Introduction to Geology I (Physical) *SQ*, *G*[4] (3)
GLG 103 Introduction to Geology I—Laboratory *SQ*[4] (1)
GLG 102 Introduction to Geology II (Historical) *SG*, *H*[4] (3)
GLG 104 Introduction to Geology II—Laboratory *SG*[4] (1)

Microbiology and Molecular Biosciences/Biotechnology
Choose one of the following sequences 4
MBB 245 Cellular and Molecular Biology *SQ*[5] (3)
MBB 246 Cellular and Molecular Biology Laboratory *SQ*[5] (1)
— *or* —
MIC 205 Microbiology *SG*[6] (3)
MIC 206 Microbiology Laboratory *SG*[6] (1)
— *or* —
MIC 206 Microbiology Laboratory *SG*[6] (1)
MIC 220 Biology of Microorganisms (3)

Physics
Choose one of the following sequences 8
PHY 121 University Physics I: Mechanics *SQ*[7] (3)
PHY 122 University Physics Laboratory I *SQ*[7] (1)
PHY 131 University Physics II: Electricity and Magnetism *SQ*[7] (3)
PHY 132 University Physics Laboratory II *SQ*[7] (1)
— *or* —
PHY 150 Physics I *SQ* (4)
PHY 151 Physics II *SQ* (4)

Plant Biology
Choose one of the following sequences 4
PLB 200 Biology of Plants *SQ*[8] (3)
PLB 201 Biology of Plants Laboratory *SQ*[8] (1)
— *or* —
MBB 245 Cellular and Molecular Biology *SQ*[6] (3)
MBB 246 Cellular and Molecular Biology Laboratory *SQ*[6] (1)

Internship, Research, or Advanced Science Requirement
Choose one of the following courses 3
MAT 484 Internship[9] (3)
MAT 493 Honors Thesis/Research[10] (3)
MAT 494 ST: Independent Study/Research[9] (3)
One advanced course in science for which a one-year sequence in the same science is required

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[1] Both AST 113 and 321 or both AST 114 and 322 must be taken to secure SQ credit.

[2] CHM 115 and 117 are strongly recommended for qualified students.

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

[4] Both GLG 101 and 103 must be taken to secure SQ credit, and both GLG 102 and 104 must be taken to secure SG credit.

[5] Both MBB 245 and 246 must be taken to secure SQ credit.

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

[7] Both PHY 121 and 122 and both PHY 131 and 132 must be taken to secure SQ credit.

[8] Both PLB 200 and 201 must be taken to secure SQ credit.

[9] This course requires prior department approval.

[10] Enrollment is restricted to students in the Barrett Honors College.

Restrictions: MAT 370 and 371 may not both be counted toward major requirements in Computational Mathematical Sciences. Credit may not be earned for both MAT 274 and 275, or for both MAT 342 and 343.

Statistics Concentration Requirements. The BS degree in Mathematics with the concentration in statistics requires a minimum of 42 semester hours of course work in mathematics and statistics, plus a minimum of 13 semester hours in computer science and related fields, for a minimum of 55 semester hours of course work related to the major. A grade of "C" (2.00) or higher is required in all courses taken for the major. MAT 370 and 371 may not both be used to satisfy these requirements. The course work has the following components:

Core Courses

MAT 270 Calculus with Analytic Geometry I *MA* 4
MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 300 Mathematical Structures *L* 3
MAT 342 Linear Algebra 3
or MAT 343 Applied Linear Algebra (3)
MAT 371 Advanced Calculus I 3
STP 420 Introductory Applied Statistics *CS* 3
STP 421 Probability 3
STP 427 Mathematical Statistics 3
STP 429 Experimental Statistics *CS* 3
Total 33

Computer Science Requirement

CSE 200 Concepts of Computer Science *CS* 3
Total 3

Additional Advanced Courses in Mathematics and Statistics

Three courses from the following list 9
MAT 274 Elementary Differential Equations *MA* (3)
or MAT 275 Modern Differential Equations *MA* (3)
MAT 372 Advanced Calculus II (3)
MAT 423 Numerical Analysis I *CS* (3)
MAT 442 Advanced Linear Algebra (3)
STP 425 Stochastic Processes (3)

Required Related Field Course Work

Statistics/probability, mathematics, or related fields* 10

* For a list of related field course work, see an advisor in PSA 211, or access math.la.asu.edu/~undergrd/underprog/degree/related-fields.html.

Actuarial Science. The faculty in the Department of Mathematics and Statistics offer courses that cover the content of the mathematical examinations of the Society of Actuaries. See the department's actuarial advisor for more information.

Cryptographic Science. The faculty in the Department of Mathematics and Statistics offer courses that prepare students for graduate studies and careers in cryptography. See the department's advisors for more information.

MINORS IN MATHEMATICS AND STATISTICS

The minor in Mathematics consists of a minimum of 20 semester hours. Required courses are as follows:

MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 342 Linear Algebra 3
or MAT 343 Applied Linear Algebra (3)
Total 11

Electives must be upper-division courses in mathematics (MAT) or Statistics and Probability (STP). Students may not apply MAT 485 or a course not offered at the Tempe campus to the minor, unless otherwise approved by a department advisor.

The minor in Statistics consists of a minimum of 20 semester hours. Required courses are the following:

MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 300 Mathematical Structures *L* 3
STP 420 Introductory Applied Statistics *CS* 3
STP 421 Probability 3
STP 427 Mathematical Statistics 3
or STP 429 Experimental Statistics *CS* (3)
Total 20

The minor in Computational Mathematical Sciences consists of a minimum of 20 semester hours. Required courses are the following:

MAT 271 Calculus with Analytic Geometry II *MA* 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
MAT 342 Linear Algebra 3
or MAT 343 Applied Linear Algebra (3)
MAT 420 Scientific Computing 3
MAT 421 Applied Computational Methods *CS* 3
MAT 423 Numerical Analysis I *CS* 3
or MAT 425 Numerical Analysis II *CS* (3)
Total 20

It is recommended that students take MAT 243 Discrete Mathematical Structures.

BIS CONCENTRATIONS

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

SECONDARY EDUCATION—BAE

Mathematics. This degree is offered through the Initial Teacher Certification program in the College of Education. Students pursuing a major in Secondary Education have an advisor in the College of Education and an advisor within the department of their academic specialization area.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

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

The academic specialization consists of the following required courses:

CSE	100	Principles of Programming with C++ *CS*	3
		or CSE 110 Principles of Programming Java (3)	
		or CSE 200 Concepts of Computer Science *CS* (3)	
MAT	270	Calculus with Analytic Geometry I *MA*	4
MAT	271	Calculus with Analytic Geometry II *MA*	4
MAT	272	Calculus with Analytic Geometry III *MA*	4
MAT	300	Mathematical Structures *L*	3
MAT	310	Introduction to Geometry	3
MAT	342	Linear Algebra	3
		or MAT 343 Applied Linear Algebra (3)	
MAT	370	Intermediate Calculus	3
		or MAT 371 Advanced Calculus I (3)	
MAT	443	Introduction to Abstract Algebra	3
		or MAT 445 Theory of Numbers (3)	
		or MAT 447 Cryptography (3)	
MTE	483	Mathematics in the Secondary School	3
STP	420	Introductory Applied Statistics *CS*	3
Total			36

The methods in academic specialization courses for mathematics are MTE 482 Methods of Teaching Mathematics in Secondary School and MTE 494 ST: Advanced Methods of Teaching Secondary Mathematics. They are required as part of the Initial Teacher Certification program but cannot be counted as part of the 36-hour major requirement.

GRADUATE PROGRAMS

The faculty in the Department of Mathematics and Statistics offer programs leading to the degrees of Master of Natural Science, MA, and PhD. See the *Graduate Catalog* for requirements.

MATHEMATICS (MAT)

MAT 106 Intermediate Algebra. (3)
fall, spring, summer
Topics from basic algebra such as linear equations, polynomials, factoring, exponents, roots, and radicals. Credit is allowed for only MAT 106 or 113. Prerequisite: 1 year of high school algebra.

MAT 113 College Algebra Plus. (5)
fall and spring
A union of topics from intermediate algebra and college algebra, including exponents, factoring, graphing, polynomials, logarithmic, and exponential functions. Credit is allowed for only MAT 113 or 106 or 117. Prerequisite: 2 years of high school mathematics.

MAT 117 College Algebra. (3)
fall, spring, summer
Linear and quadratic functions, systems of linear equations, logarithmic and exponential functions, sequences, series, and combinatorics. Credit is allowed for only MAT 117 or 113. Fee (online only). Prerequisite: MAT 106 or 2 years of high school algebra.

MAT 119 Finite Mathematics. (3)
fall, spring, summer
Topics from linear algebra, linear programming, combinatorics, probability, and mathematics of finance. Prerequisite: MAT 113 or 117 (or its equivalent).
General Studies: MA

MAT 142 College Mathematics. (3)
fall, spring, summer
Applies basic college-level mathematics to real-life problems. Appropriate for students whose major does not require MAT 117 or 170. Prerequisite: MAT 106 or 2 years of high school algebra.
General Studies: MA

MAT 170 Precalculus. (3)
fall, spring, summer
Intensive preparation for calculus (MAT 260, 270, and 290). Topics include functions (including trigonometric), matrices, polar coordinates, vectors, complex numbers, and mathematical induction. Prerequisite with a grade of "B" or higher: MAT 106. Prerequisite with a grade of "C" (2.00) or higher: MAT 113 or 117 (or its equivalent) or 2 years of high school algebra.
General Studies: MA

MAT 210 Brief Calculus. (3)
fall, spring, summer
Differential and integral calculus of elementary functions with applications. Not open to students with credit for MAT 260, 270, or 290. Fee (online only). Prerequisite: MAT 113 or 117 (or its equivalent).
General Studies: MA

MAT 211 Mathematics for Business Analysis. (3)
fall, spring, summer
Topics in business analysis, including: Lagrange multipliers, linear programming, linear algebra, intermediate probability, random variables, discrete distributions, and continuous distributions. Prerequisite with a grade of "C" or higher: MAT 210 or instructor approval.

MAT 242 Elementary Linear Algebra. (2)
fall, spring, summer
Introduces matrices, systems of linear equations, determinants, vector spaces, linear transformations, and eigenvalues. Emphasizes development of computational skills. Prerequisite: 1 semester of calculus or instructor approval.

MAT 243 Discrete Mathematical Structures. (3)
fall, spring, summer
Logic, sets, functions, elementary number theory and combinatorics, recursive algorithms, and mathematical reasoning, including induction. Emphasizes connections to computer science. Prerequisite: 1 semester of calculus or computer programming.

MAT 251 Calculus for Life Sciences. (3)
fall and spring
Differential and integral calculus of elementary functions. Introduces differential and difference equations. Emphasizes applications to the life sciences. Not open to students with credit for MAT 210, 260, or 270. Prerequisite: MAT 170 (or its equivalent).
General Studies: MA

MAT 260 Technical Calculus I. (3)
selected semesters
Analytic geometry, differential, and integral calculus of elementary functions, emphasizing physical interpretation and problem solving. Not open to students with credit for MAT 210, 270, or 290. Prerequisite: MAT 170 (or its equivalent).
General Studies: MA

MAT 261 Technical Calculus II. (3)
selected semesters
Continuation of MAT 260. Prerequisite: MAT 260 or instructor approval.
General Studies: MA

MAT 262 Technical Calculus III. (3)
selected semesters
Infinite series, an introduction to differential equations and elementary linear algebra. Prerequisite: MAT 261 (or its equivalent).
General Studies: MA

MAT 270 Calculus with Analytic Geometry I. (4)
fall, spring, summer
Real numbers, limits and continuity, and differential and integral calculus of functions of 1 variable. Not open to students with credit for MAT 290. The sequence MAT 270 and 271 may be substituted for MAT 290 to satisfy requirements of any curriculum. Fee. Prerequisite with a grade of "C" (2.00) or higher: MAT 170 or satisfactory score on placement examination.
General Studies: MA

MAT 271 Calculus with Analytic Geometry II. (4)
fall, spring, summer
Methods of integration, applications of calculus, elements of analytic geometry, improper integrals, sequences, and series. Not open to students with credit for MAT 291. The sequence MAT 270, 271, 272 may be substituted to satisfy requirements for MAT 290 and 291. Fee.

Prerequisite with a grade of "C" (2.00) or higher: MAT 270 (or its equivalent).
General Studies: MA

MAT 272 Calculus with Analytic Geometry III. (4)
fall, spring, summer
Vector-valued functions of several variables, multiple integration, and introduction to vector analysis. The sequence MAT 270, 271, 272 may be substituted to satisfy requirements for MAT 290 and 291. Fee. Prerequisite with a grade of "C" (2.00) or higher: MAT 271 (or its equivalent).
General Studies: MA

MAT 274 Elementary Differential Equations. (3)
fall and spring or summer
Introduces ordinary differential equations, adapted to the needs of students in engineering and the sciences. Credit is allowed for only MAT 274 or 275 toward a mathematics degree. Prerequisites: MAT 271 (or its equivalent); MAT 272 (or its equivalent) recommended.
General Studies: MA

MAT 275 Modern Differential Equations. (3)
fall and spring
Introduces differential equations, theoretical and practical solution techniques. Applications. Problem solving using Matlab. Credit is allowed for only MAT 275 or 274 toward a mathematics degree. Lecture, computing lab. Fee. Pre- or corequisite: MAT 271 (or its equivalent).
General Studies: MA

MAT 290 Calculus I. (5)
selected semesters
Differential and integral calculus of elementary functions; topics from analytic geometry essential to the study of calculus. Prerequisite: MAT 170 (or its equivalent).
General Studies: MA

MAT 291 Calculus II. (5)
selected semesters
Further applications of calculus, partial differentiation, multiple integrals, and infinite series. Prerequisite: MAT 290 (or its equivalent).

MAT 294 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Sophomore Problem Seminar. (3)

MAT 300 Mathematical Structures. (3)
fall and spring
Logic and set theory, induction, functions, order and equivalence relations, cardinality. Emphasizes writing proofs. Prerequisite: 1 semester of calculus or instructor approval.
General Studies: L

MAT 310 Introduction to Geometry. (3)
spring
Congruence, area, parallelism, similarity and volume, and Euclidean and non-Euclidean geometry. Prerequisite: MAT 272 (or its equivalent).

MAT 340 Theory of Interest. (3)
fall and spring
Compound interest, discount rates, annuities, present values, depreciation, and bond valuations. Prerequisites: MAT 243 (or 300 or instructor approval); 1 semester of calculus.

MAT 342 Linear Algebra. (3)
fall and spring or summer
Linear equations, matrices, determinants, vector spaces, bases, linear transformations and similarity, inner product spaces, eigenvectors, orthonormal bases, diagonalization, and principal axes. Credit is allowed for only MAT 342 or 343 toward a mathematics degree. Pre- or corequisite: MAT 272 (or its equivalent).

MAT 343 Applied Linear Algebra. (3)
fall and spring
Solving linear systems, matrices, determinants, vector spaces, bases, linear transformations, eigenvectors, norms, inner products, decompositions, applications. Problem solving using Matlab. Credit is allowed for only MAT 343 or 342 toward a mathematics degree. Lecture, computing lab. Fee. Prerequisite: MAT 271 (or its equivalent).

MAT 351 Mathematical Methods for Genetic Analysis. (3)
fall and spring
Discrete mathematics, probability, statistics, and associated computer packages. Applications to genomics, bioinformatics, forensics, and DNA/protein sequence patterns. Fee. Prerequisite: MAT 251 or 270 or instructor approval.
General Studies: CS

MAT 362 Advanced Mathematics for Engineers and Scientists. (3)
fall, spring, summer
Vector analysis, Fourier analysis, and partial differential equations. Prerequisites: MAT 272 and 274 (or 275) (or their equivalents).

MAT 370 Intermediate Calculus. (3)
fall and spring
Theory behind basic 1-variable calculus: continuity, derivative, Riemann integral, sequences, and series. Not open to students who have received a "C" (2.00) or higher in MAT 371. Credit is allowed for only MAT 370 or 371 toward a mathematics degree. Prerequisites: MAT 272, 300 (or 243).

MAT 371 Advanced Calculus I. (3)
fall and spring
Real numbers, completeness, sequences/series, continuity, uniform theorems, derivative, Riemann integral, pointwise/uniform convergence, Taylor's theorem. Credit is allowed for only MAT 371 or 370 toward a mathematics degree. Prerequisites: MAT 272, 300.

MAT 372 Advanced Calculus II. (3)
spring
Open, closed, compact sets in R^n continuity, differentiation, partial differentiation, integration in R^n. Inverse/implicit function theorems. Not open to students with credit for MAT 460. Prerequisite: MAT 371. Pre- or corequisite: MAT 342 or 343.

MAT 394 Special Topics. (2–3)
selected semesters
Topics may include the following.
- Introduction to Computational Molecular Biology
  Fee.

Prerequisite: junior standing.

MAT 410 Introduction to General Topology. (3)
once a year
Topological spaces, metric spaces, compactness, connectedness, and product spaces. Prerequisite: MAT 300 or 371 or instructor approval.

MAT 415 Introduction to Combinatorics. (3)
fall
Topics include proof techniques, permutations, combinations; counting techniques, including recurrence relaxations, generating functions, inclusion-exclusion; Ramsey theory and combinatorial designs. Prerequisites: both MAT 300 (or 243) and 342 (or 242 or 343) or only instructor approval.

MAT 416 Introduction to Graph Theory. (3)
spring
Topics include trees, cycles, matchings, planarity, connectivity, hamiltonicity, colorings, graph algorithms, and other advanced topics. Prerequisites: both MAT 300 (or 243) and 342 (or 242 or 343) or only instructor approval.

MAT 419 Introduction to Linear Programming. (3)
spring
Simplex method, duality, and network flows. Applications to game theory, geometry, combinatorics, graph theory, and posets. Prerequisites: a combination of CSE 100 (or 200 or 210) and MAT 300 (or 243) and 342 (or 242 or 343) or only instructor approval.
General Studies: CS

MAT 420 Scientific Computing. (3)
fall
Surveys and applies programming languages, libraries, and scientific visualization tools. Programming assignments emphasize software development skills. Lecture, lab. Fee. Prerequisites: a combination of CSE 200 and MAT 274 (or 275) and 342 (or 343) (or their equivalents) or only instructor approval.

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

MAT 421 Applied Computational Methods. (3)
fall and spring
Numerical methods for quadrature, differential equations, roots of nonlinear equations, interpolation, approximation, linear equations, floating-point arithmetic, and roundoff error. Prerequisites: both MAT 271 (or its equivalent) and fluency in computer programming (preferably FORTRAN) or only instructor approval.
General Studies: CS

MAT 423 Numerical Analysis I. (3)
fall
Analysis and algorithms for numerical solutions linear/nonlinear equations, direct solvers, iterative procedures, optimization. Determination of eigenvalues. Elementary computer arithmetic. Prerequisites: both MAT 342 (or 343) and fluency in computer programming or only instructor approval.
General Studies: CS

MAT 425 Numerical Analysis II. (3)
spring
Analysis of and algorithms for numerical interpolation, integration, and differentiation. Numerical solution of ordinary differential equations, and method of lines. Those seeking a methods survey course should take MAT 421. Prerequisites: both MAT 274 (or 275) and fluency in computer programming or only instructor approval. MAT 371 recommended.
General Studies: CS

MAT 427 Computer Arithmetic. (3)
selected semesters
Number systems, hardware/software arithmetic, overflow, significance, rounding, multiple precision, and automatic error control; impact on languages, architectures, robust programming, and software development. Prerequisite: only CSE 100 (or 200) or both MAT 421 and 423 (or 425) or only instructor approval.
General Studies: CS

MAT 442 Advanced Linear Algebra. (3)
fall
Fundamentals of linear algebra, dual spaces, invariant subspaces, canonical forms, bilinear and quadratic forms, and multilinear algebra. Prerequisites: both MAT 300 and 342 (or 343) or only instructor approval.

MAT 443 Introduction to Abstract Algebra. (3)
fall
Introduces concepts of abstract algebra. Not open to students with credit for MAT 444. Prerequisites: both MAT 300 and 342 (or 343) or only instructor approval.

MAT 444 Intermediate Abstract Algebra. (3)
spring
Basic theory of groups, rings, and fields, including an introduction to Galois theory. Appropriate as preparation for MAT 543. Prerequisite: MAT 443 or graduate standing or instructor approval.

MAT 445 Theory of Numbers. (3)
spring
Prime numbers, unique factorization theorem, congruences, Diophantine equations, primitive roots, and quadratic reciprocity theorem. Prerequisites: both MAT 300 and 342 (or 343) or only instructor approval.

MAT 447 Cryptography. (3)
fall and spring
Block ciphers, stream ciphers, congruence arithmetic, information theory, public key cryptosystems, key exchange, electronic signatures. Prerequisites: CSE 100 (or 110); MAT 242 (or 342 or 343), 300.

MAT 451 Mathematical Modeling. (3)
spring
Detailed study of 1 or more mathematical models that occur in the physical or biological sciences. May be repeated for credit with instructor approval. Prerequisites: both MAT 242 (or 342 or 343) and 274 (or 275) or only instructor approval.
General Studies: CS

MAT 452 Introduction to Chaos and Nonlinear Dynamics. (3)
fall
Properties of nonlinear dynamical systems; dependence on initial conditions; strange attractors; period doubling; bifurcations; symbolic dynamics; Smale-Birkhoff theorem; and applications. Prerequisites: MAT 274 (or 275), 342 (or 242 or 343); MAT 371 is recommended.

MAT 455 Introduction to Fractals and Applications. (3)
spring
Fractals; self-similar structures, fractals with iterated function systems of maps, computing fractals, fractal dimensions, chaotic dynamics on fractals, applications. Prerequisites: MAT 274 (or 275), 342 (or 242 or 343); MAT 371 recommended.

MAT 460 Vector Calculus. (3)
spring
Vectors, curvilinear coordinates, Jacobians, implicit function theorem, line and surface integrals, Green's, Stokes', and divergence theorems. Not open to students with credit for MAT 372. Prerequisites: MAT 242 (or 342 or 343), 272, 274 (or 275).

MAT 461 Applied Complex Analysis. (3)
fall and summer
Analytic functions, complex integration, Taylor and Laurent series, residue theorem, conformal mapping, and harmonic functions. Prerequisite: MAT 272 (or its equivalent).

MAT 462 Applied Partial Differential Equations. (3)
spring
Second-order partial differential equations, emphasizing Laplace, wave, and diffusion equations. Solutions by the methods of characteristics, separation of variables, and integral transforms. Prerequisites: MAT 242 (or 342 or 343), 274 (or 275).

MAT 472 Intermediate Real Analysis I. (3)
fall
Introduces analysis in metric spaces with emphasis on the real line. Appropriate as preparation for MAT 570. Prerequisites: MAT 300, 342 (or 343).

MAT 473 Intermediate Real Analysis II. (3)
spring
Analysis in R^n: implicit function theorem, introduction to manifolds, Lebesque integration, change of variables formula, convergence theorems for integrals. Prerequisite: MAT 472 or instructor approval.

MAT 475 Differential Equations. (3)
fall
Linear and nonlinear ordinary differential equations, asymptotic behavior of solutions, stability, existence and uniqueness, limit sets, Poincar-Bendixson theorem. Prerequisites: MAT 242 (or 342 or 343), 274 (or 275), 370 (or 371) (or their equivalents) or instructor approval.

MAT 476 Partial Differential Equations. (3)
spring
First-order quasilinear, second-order linear (wave, Laplace, heat). Characteristics, harmonic functions, maximum principles, Fourier series, separation of variables. Prerequisites: MAT 242 (or 342 or 343), 274 (or 275 or 475), 370 (or 371) (or their equivalents) or instructor approval.

MAT 484 Internship. (1–12)
selected semesters

MAT 485 History of Mathematics. (3)
selected semesters
Topics from the history of the origin and development of mathematical ideas. Prerequisite: MAT 272 (or its equivalent).

MAT 493 Honors Thesis/Research. (3)
selected semesters

MAT 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Independent Study/Research. (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.

MATHEMATICS EDUCATION (MTE)

MTE 180 Theory of Elementary Mathematics. (3)
fall, spring, summer
Number systems, intuitive geometry, elementary algebra, and measurement. Intended for prospective elementary school teachers. Prerequisites: MAT 113, 142 (or 117 or its equivalent).

MTE 181 Theory of Elementary Mathematics. (3)
once a year
Continuation of MTE 180. Fee. Prerequisite: MTE 180 or instructor approval.

MTE 380 Arithmetic in the Elementary School. (3)
once a year
Historical numeration systems, overview of elementary number theory, including primes, factorization, divisibility, bases, modular systems, linear congruence, and continued fractions. Prerequisite: MTE 181 or instructor approval.

MTE 381 Geometry in the Elementary School. (3)
selected semesters
Informal geometry, including concepts of length, area, volume, similarity, and congruence. Classification of figures, straightedge and compass constructions, and motion geometry. Prerequisite: MTE 380 or instructor approval.

MTE 402 Service Learning. (3)
fall and spring
K–12 tutoring and mentoring internship related to academic course work in mathematics education. Requires weekly reflective reading and writing. May be repeated for credit. Internship. Fee. Pre- or corequisite: MTE 180 or instructor approval.
General Studies: C

MTE 482 Methods of Teaching Mathematics in Secondary School. (3)
fall
Examines secondary school curricular material and analyzes instructional devices. Teaching strategies, evaluative techniques, diagnosis, and remediation and problem solving. Fee. Prerequisite: instructor approval.

MTE 483 Mathematics in the Secondary School. (3)
spring
Topics in geometry, number theory, algebra, and analysis. Emphasizes unifying principles. Prerequisite: MAT 310 or instructor approval.

MTE 484 Internship. (1–12)
selected semesters

MTE 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Advanced Methods of Teaching Secondary Mathematics. (3) Continuation of MTE 482. Prerequisite: MTE 482.

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.

STATISTICS AND PROBABILITY (STP)

STP 220 Conceptual Statistics. (3)
fall and spring
Treats the concepts and vocabulary needed to evaluate statistical reports on health, technology, and society. Aggressively emphasizes understanding over computation. Lecture, teamwork. Prerequisites: MAT 113, 142 (or 117 or its equivalent).
General Studies: CS

STP 226 Elements of Statistics. (3)
fall, spring, summer
Basic concepts and methods of statistics, including descriptive statistics, significance tests, estimation, sampling, and correlation. Not open to majors in mathematics or the physical sciences. Prerequisites: MAT 113, 142 (or 117 or its equivalent).
General Studies: CS

STP 231 Statistics for Biosciences. (3)
fall, spring, summer
Concepts and methods of statistics; display and summary of data, interval estimation, hypothesis testing, correlation, regression. Applications to biological sciences. Prerequisite with a grade of "C" or higher: MAT 113 or 117 or 142 (or their equivalents).

STP 294 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Statistics for Biosciences. (3)

STP 326 Intermediate Probability. (3)
fall and spring
Probability models and computations, joint and conditional distributions, moments, and families of distributions. Topics in stochastic processes, simulation, and statistics. Prerequisite: MAT 210 (or its equivalent).
General Studies: CS

STP 420 Introductory Applied Statistics. (3)
fall, spring, summer
Introductory probability, descriptive statistics, sampling distributions, parameter estimation, tests of hypotheses, chi-square tests, regression analysis, analysis of variance, and nonparametric tests. Prerequisite: MAT 113 or 117 (or its equivalent).
General Studies: CS

STP 421 Probability. (3)
fall
Laws of probability, combinatorial analysis, random variables, probability distributions, expectations, moment-generating functions, transformations of random variables, and central limit theorem. Prerequisite: MAT 272 (or its equivalent).

STP 425 Stochastic Processes. (3)
spring
Markov chains, stationary distributions, pure jump processes, 2-D order processes, and other topics in stochastic processes. Prerequisites: MAT 342; STP 421.

STP 427 Mathematical Statistics. (3)
spring
Limiting distributions, interval estimation, point estimation, sufficient statistics, and tests of hypotheses. Prerequisites: a combination of MAT 371 and STP 420 and 421 or only instructor approval.

STP 429 Experimental Statistics. (3)
spring
Statistical inference for controlled experimentation. Multiple regression, correlation, analysis of variance, multiple comparisons, and nonparametric procedures. Prerequisite: STP 420 (or its equivalent).
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.

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

Department of Military Science

Army ROTC

www.asu.edu/clas/military

480/965-3318

SS 330

Lieutenant Colonel Herbert M. Chong, Chair

Professor: Chong

Assistant Professors: Caryl, Ramer, Ramsey, Ranalli

Instructors: Ringenoldus, Suiter, Utley

PURPOSE

The Department of Military Science curriculum consists of the basic course (MIS 101, 102, 201, and 202) and the advanced course (MIS 301, 302, 401, and 402). The goal of this professional education curriculum is to prepare students with leadership potential to be commissioned as U.S. Army officers. Objectives include developing the following characteristics in students: leadership and managerial skills, the ability to think creatively, the ability to speak and write effectively, appreciation of the requirements for national security, and an understanding of the nature and functions of the U.S. Army. Upon successful completion of the advanced course and graduation, qualified students receive commissions in the Active Army (on a competitive basis), U.S. Army Reserve, or Army National Guard.

In addition to the military science curriculum, courses in the field of national defense studies are both an integral and parallel source of the department's program. Integrally, they provide MIS courses at all levels with topical intensity and highlight professionally related areas.

GENERAL QUALIFICATIONS

Basic Course. Any student who is enrolled in ASU (or approved by the professor of military science) can enter into military science basic classes. It is strongly recommended that the student be in good physical shape because some of the curriculum requires physical exertion.

Advanced Course. To be enrolled in the advanced course and compete for and obtain a commission in the U.S. Army, students must meet the following requirements:

1. be a citizen of the United States (noncitizens may enroll but must obtain citizenship before commissioning);
2. be of sound physical condition and pass the U.S. Army physical fitness test;
3. meet the required professional military educational requirements; and
4. be at least 17 years of age for entrance into the advanced course and be able to complete all commissioning requirements before age 30.

Only those students in the basic and advanced courses who meet the required standards according to military regulations are eligible to receive financial assistance through the U.S. Army. Faculty of the Department of Military Science are available during normal office hours to answer questions or provide counseling.

The following are various options open to students who wish to obtain a commission in the U.S. Army. Contact the Department of Military Science personnel for more information.

Four-Year Program. Students may enroll in Army ROTC during their freshman year. They take the basic course during the first two years, receiving a total of 12 semester hours of credit for four semesters of study. Upon satisfying the requirements and being approved for continuation by the department, they enter the advanced course, where they earn 12 additional semester hours for four semesters of study. Students are also required to attend a five-week Leadership Development and Assessment Course at Fort Lewis, Washington, between their junior and senior years. All commissioned officers must meet certain Professional Military Education requirements by completing courses in English, mathematics, military history, and computer literacy. Selected majors such as nursing, engineering, and architecture, among others, may require an additional semester or two, or summer school, to complete all requirements for a degree and commission without excessive course overloads. Upon successful completion of the advanced course and requirements for a degree, students are commissioned as second lieutenants in the Active Duty Army, U.S. Army Reserve, or Army National Guard.

Two-Year Program. Students must have at least two academic years of college work remaining, either at the undergraduate or graduate level. The student must also have reached academic junior standing. This program is open to all students with the exception of three- and four-year Army ROTC scholarship winners (see "Scholarship Programs," page 445). Students seeking enrollment in the two-year program should make application before the semester of the year in which they desire to enter the program. They must also pass the Army physical fitness test. After successfully completing a paid four-week Leaders Training Course (LTC), students may enroll in the advanced course. (The camp is conducted during June and July at Fort Knox, Kentucky.) Students who have previous military experience or who are currently members of the National Guard or Reserves may be admitted directly into the two-year program, provided they are academic juniors. They then follow the same program and meet the same requirements as stated for advanced course students in the four-year program.

Qualifications for Admittance to the Advanced Course. The following qualifications are required for admittance to the advanced course:

1. successful completion of the basic course for students in the four-year ROTC program; for students

in the two-year program, selection for and completion of the six-week LTC or prior military service;
2. passing of the Army physical examination;
3. attainment of a minimum cumulative GPA of 2.00;
4. attainment of at least junior class standing; and
5. maintenance of full-time student status.

Pay and Allowances. Each advanced course student receives one-half the pay of a second lieutenant during attendance at the five-week NALC. Uniforms, housing, and meals are provided at camp without cost to students, and they are reimbursed at the current mileage rate for travel to and from the camp. Students who attend LTC receive the pay of an army recruit during attendance at basic camp as well as the current mileage rate for travel to and from the camp. All students in the advanced course, regardless of scholarship status, are paid $350 per month (junior year) and $400 per month (senior year).

Simultaneous Membership Program. Under this program, ROTC students may simultaneously be members of the Army Reserve or the National Guard. The combination of advance course allowance and pay for Army Reserve or National Guard participation provides between $550–$1,000 per month.

Scholarship Programs. The Army ROTC offers scholarship programs to outstanding young men and women. These scholarships provide 100 percent tuition and fees. In addition, the scholarship pays $250 per month (freshman year), $300 per month (sophomore year), $350 per month (junior year), and $400 per month (senior year) subsistence allowance and $350 each semester for textbooks and supplies. A scholarship for four years is available to freshmen who enter the four-year program. Applications must be submitted in accordance with a schedule obtained from high school counselors. Scholarships are also available for three- and two-year periods, commencing with the sophomore and junior years of ROTC respectively. Applications are open to all students in good standing with the university; previous ROTC or military experience is not required for application for three- and two-year scholarships. Selection is made by a review board on campus. Acceptance of any of the three scholarship programs requires a service commitment to serve in the Active Army for a period of up to four years after commissioning and graduation.

Active Duty Requirements. Graduates of Army ROTC may serve as officers in the Active Army, Army National Guard, or Army Reserves. Active duty commitments may vary from four years to as little as three months. Scholarship students have up to a four-year active duty commitment.

Graduate and Professional Studies Programs. A delay of up to four years in call to active duty is available to outstanding students who desire to earn graduate or professional degrees. Special programs for graduate and professional studies are available to both active Army appointees and Reserve component appointees in the following areas: medicine, osteopathy, and clinical psychology.

MILITARY SCIENCE (MIS)

MIS 101 Introduction to the Military I. (3)
fall
Overview of mission, organization, and structure of the Army and its role in national defense; discussion of current military issues. 3 hours lecture/conference, 2 hours lab.

MIS 102 Introduction to the Military II. (3)
spring
Introduces problem-solving methods, critical thinking, decision making, and group cohesion as applied in a military environment. 3 hours lecture/conference, 2 hours lab. Prerequisite: MIS 101.

MIS 201 Introduction to Leadership Dynamics I. (3)
fall
Introduces interpersonal dynamics involved in military team operations; theory and application of military leadership principles. 3 hours lecture/conference, 2 hours lab.

MIS 202 Introduction to Leadership Dynamics II. (3)
spring
Continuation of MIS 201. 3 hours lecture/conference, 2 hours lab. Prerequisite: MIS 201.

MIS 205 Leader's Training Course. (4)
summer
6-week training program emphasizing practical hands-on skills and leadership development. Taken in lieu of MIS 101, 102, 201, 202. Conducted at Fort Knox, Kentucky.

MIS 301 Advanced Military Science I. (3)
fall
Theory and dynamics of the individual soldier and military units in offensive combat operations. 3 hours lecture/conference, 2 hours Leadership Practical Application, 1 2-day field exercise. Fee. Prerequisites: MIS 101 and 102 and 201 and 202 (or their equivalents).

MIS 302 Advanced Military Science II. (3)
spring
Theory and dynamics of military units in defensive combat operations. 3 hours lecture/conference, 2 hours Leadership Practical Application, 1 2-day field exercise. Fee. Prerequisites: MIS 101 and 102 and 201 and 202 (or their equivalents).

MIS 303 National Advanced Leadership Camp. (4)
summer
6-week training program emphasizing leadership development and advanced military skills, including tactics, land navigation, and physical training. Conducted at Fort Lewis, Washington. Prerequisites: MIS 301, 302.

MIS 401 Advanced Military Science III. (3)
fall
Military legal system; preparation and conduct of military training; leadership development; ethics and professionalism of the military officer. 3 hours lecture/conference, 2 hours Leadership Practical Application, 1 2-day field exercise. Fee. Prerequisites: MIS 301, 302.

MIS 402 Advanced Military Science IV. (3)
spring
Military correspondence; career planning and personal affairs in service; conduct of training; leadership development; ethics and professionalism of the military officer. 3 hours lecture/conference, 2 hours Leadership Practical Application, 1 2-day field exercise. Fee. Prerequisites: MIS 301, 302.

MIS 410 American Defense Policy I. (3)
fall
Evolution, organization, and execution of U.S. national security policy.
General Studies: SB

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

MIS 412 American Defense Policy II. (3)
spring
Contemporary problems and analytical issues in the formation and implementation of U.S. national security. Prerequisite: MIS 410.
General Studies: SB

MIS 499 Individualized Instruction: Military Science Leadership. (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 Philosophy

www.asu.edu/clas/philosophy
480/965-3394
COOR 3307

Stewart M. Cohen, Chair

Regents' Professor: Murphy

Professors: Cohen, Creath, Fitch, French, Humphrey, White

Associate Professors: Armendt, Blackson, de Marneffe, Guleserian, Kobes, McGregor, Reynolds

Assistant Professor: Devlin

Senior Lecturer: Bolton

PHILOSOPHY—BA

The major in Philosophy consists of 45 semester hours, 33 of which must be upper-division hours. In addition to the 45 semester hours, the mathematics proficiency requirement must be met by completing MAT 117 or higher. In exceptional cases, up to nine semester hours may be in related fields as approved by the undergraduate advisor. Required courses are as follows:

PHI	300 Philosophical Argument and Exposition *L*	3
PHI	301 History of Ancient Philosophy *HU, H*	3
PHI	302 History of Modern Philosophy *HU, H*	3
PHI	305 Ethical Theory *HU*	3
	or PHI 335 History of Ethics *HU* (3)	
PHI	312 Theory of Knowledge *HU*	3
	or PHI 314 Philosophy of Science *HU* (3)	
PHI	316 Metaphysics *HU*	3
	or PHI 317 Philosophy of Mind *HU* (3)	
PHI	333 Introduction to Symbolic Logic	3
Choose two courses below		6
PHI	401 Rationalism (3)	
PHI	402 Empiricism *HU* (3)	
PHI	403 Contemporary Analytic Philosophy *HU* (3)	
PHI	413 Advanced Symbolic Logic (3)	
PHI	420 Topics in Philosophy (3)	
PHI	494 Special Topics (3)	
Total		27

Exceptions are granted by special permission of the chair only. PHI 420 may be repeated for credit.

Students planning to do graduate work in philosophy should consult with an advisor to develop an appropriate selection of courses at the 300 and 400 levels. A minimum grade of "C" (2.00) is necessary for each course used to fulfill the major requirements. See "College Degree Requirements," page 330. (Note: MAT 117 does not satisfy the university MA General Studies requirement.)

History and Philosophy of Science. The faculty in the Department of Philosophy offer courses bearing the HPS prefix. With the consent of the director of undergraduate studies, these courses may be taken to satisfy the requirements of the Philosophy major.

MINOR IN PHILOSOPHY

A minor in Philosophy consists of 18 semester hours, of which at least 12 must be in the upper division and approved by an advisor in the department. All courses must be passed with a minimum grade of "C" (2.00).

CERTIFICATE IN ETHICS

The Ethics Certificate consists of 18 semester hours approved by an advisor in the department. The student must take PHI 305 or 335. At least 15 hours must be chosen from PHI 105, 304, 305, 306, 307, 309, 310, 335, and (when its topic is within ethics) PHI 420. One course outside this list, and perhaps outside the department, may be used with written approval from the director of undergraduate studies. All courses must be passed with a minimum grade of "C" (2.00).

CERTIFICATE IN SYMBOLIC SYSTEMS

The Certificate in Symbolic Systems consists of 28 semester hours approved by an advisor in the Department of Philosophy and divided evenly among computer science and engineering, psychology, and philosophy as follows:

1. CSE 200, 210, and 240;
2. PSY 230 and 290 and either PSY 323, 324, or 437; and
3. either PHI 312 or 314, either PHI 315 or 317, and either PHI 319 or 333.

Students must satisfy the prerequisites for the listed courses. With written approval from the director of undergraduate studies in the Department of Philosophy, one substitution of a course from outside this list may be made. All courses must be passed with a minimum grade of "C" (2.00).

BIS CONCENTRATIONS

Concentrations in ethics and philosophy (with options in history and philosophy of science, and symbolic systems) 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. Students may also choose a concentration from any approved certificate program. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their

career goals. For more information, see "School of Interdisciplinary Studies," page 124.

GRADUATE PROGRAM

The faculty in the Department of Philosophy offer a graduate program leading to the MA and PhD degrees. See the *Graduate Catalog* for requirements.

PHILOSOPHY (PHI)

PHI 101 Introduction to Philosophy. (3)
fall, spring, summer
Explores issues that philosophers have traditionally considered, including morality, reality, and knowledge.
General Studies: HU

PHI 103 Principles of Sound Reasoning. (3)
fall, spring, summer
Fallacies, validity, and soundness of arguments. May include syllogistic, elementary symbolic, inductive logic, and scientific method. Prerequisite: ENG 101 or 105.
General Studies: L/HU

PHI 105 Introduction to Ethics. (3)
once a year
Philosophical examination of such questions as, How should we live? Is morality a social invention? Does anything matter?
General Studies: HU

PHI 300 Philosophical Argument and Exposition. (3)
spring
Develops techniques of philosophical argument and exposition. Frequent written exercises. Course content may vary with instructor. Prerequisites: major; instructor approval.
General Studies: L

PHI 301 History of Ancient Philosophy. (3)
fall
History of Western philosophy from its beginnings through the Hellenistic period.
General Studies: HU, H

PHI 302 History of Modern Philosophy. (3)
spring
History of Western philosophy from the Renaissance through Kant.
General Studies: HU, H

PHI 304 Existentialism. (3)
selected semesters
Covers such topics as absurdity, authenticity, the meaning of life and death, responsibility, and subjectivity. May include readings in phenomenology.
General Studies: HU

PHI 305 Ethical Theory. (3)
once a year
Current theories about the nature of morality (metaethics) and about what is right and wrong (normative ethics). Prerequisite: PHI 105 or 306 or 307 or 309 or 335 or instructor approval.
General Studies: HU

PHI 306 Applied Ethics. (3)
fall, spring, summer
Philosophical discussion of contemporary moral and political issues, such as abortion, euthanasia, animal rights, affirmative action, and sexual rights.
General Studies: HU

PHI 307 Philosophy of Law. (3)
once a year
Nature and source of law and its relation to morality. Legal rights, legal enforcement of morals, civil disobedience, liability and responsibility, punishment, judicial reasoning, justice, property, and differences between theories of natural and positive law.
General Studies: HU

PHI 308 Philosophy of Art. (3)
once a year
Central problems in philosophy of art, e.g., the nature of a work of art, modern and traditional theories of art, aesthetic perception and experience, and objectivity and relativity in art criticism.
General Studies: HU

PHI 309 Social and Political Philosophy. (3)
once a year
Alternative principles and methods relevant to problems of human association and conflict; discusses justice and power, freedom and equality, and autonomy and order. Prerequisite: PHI 105 or 305 or 335 or instructor approval.
General Studies: HU

PHI 310 Environmental Ethics. (3)
once a year
Examines a full range of philosophical positions pertaining to our moral relationship to the natural world; anthropocentrism, individualism, biocentrism.
General Studies: HU

PHI 311 Philosophy in Literature. (3)
once a year
Selected works of literature introducing philosophical problems such as the nature of moral goodness and people's relation to the world and other people.
General Studies: HU

PHI 312 Theory of Knowledge. (3)
once a year
Nature, sources, and limits of human knowledge. Topics may include truth, a priori knowledge, empirical knowledge, perception, induction, and skepticism. Prerequisite: PHI 101 or 103 or 300 or 301 or 302 or 333.
General Studies: HU

PHI 314 Philosophy of Science. (3)
once a year
Structure and justification of scientific theories, explanation, and theory change. Roles of observation and laws, theoretical concepts and entities, reduction, probability, confirmation, space and time, and causation. Cross-listed as HPS 314. Credit is allowed for only HPS 314 or PHI 314.
General Studies: HU

PHI 315 Philosophy of Language. (3)
once a year
Problems pertaining to the nature of language, including meaning, reference, truth, definition, analyticity, translatability, synonymy, and contributions of contemporary linguistics. Prerequisite: PHI 103 or 300 or 333.
General Studies: HU

PHI 316 Metaphysics. (3)
once a year
Problems pertaining to the nature of reality. Topics may include nature of person, minds, substance, universals, space, time, causation, and modality. Prerequisite: PHI 101 or 103 or 300 or 301 or 333.
General Studies: HU

PHI 317 Philosophy of Mind. (3)
once a year
Nature of consciousness. Common sense view of mind, behaviorism, materialism, dualism, functionalism, self-knowledge, and knowledge of other minds. Prerequisite: PHI 101 or 103 or 300 or 301 or 302 or 333.
General Studies: HU

PHI 318 Philosophy of Religion. (3)
once a year
Classical arguments for the existence of God. Argument from evil against the existence of God. Justification of religious belief.
General Studies: HU

PHI 319 Philosophy of Computing. (3)
selected semesters
Philosophical problems surrounding the theory of computation. Turing machines, mind and AI, neural network computing, ethics, and epistemology of computing. Lecture, lab, discussion.
General Studies: CS/HU

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

PHI 320 Bioethics. (3)
once a year
Critical examination of moral questions arising in biomedical contexts, particularly due to new technologies and scientific discoveries.

PHI 325 Philosophy of Social Science. (3)
selected semesters
Philosophical problems surrounding the aims, structure, and methods of the social sciences.
General Studies: HU/SB

PHI 332 19th-Century Philosophy. (3)
selected semesters
History of 19th-century philosophical thought, emphasizing either the German or the British traditions. Prerequisite: PHI 302.
General Studies: HU

PHI 333 Introduction to Symbolic Logic. (3)
once a year
Symbolic techniques, emphasizing deductions and proofs in the propositional and 1st-order predicate calculi.

PHI 335 History of Ethics. (3)
once a year
Major works of moral philosophy, both ancient and modern, such as those by Plato, Aristotle, Hobbes, Hume, Kant, and Mill. Prerequisite: PHI 101 or 105 or 305 or 306 or 307 or 309 or instructor approval.
General Studies: HU

PHI 401 Rationalism. (3)
selected semesters
Examines classical philosophical rationalism, as in Descartes, Spinoza, Malebranche, or Leibniz. Contemporary rationalist thought may also be examined. Prerequisites: PHI 302 and 305 (or 309 or 312 or 316 or 317).

PHI 402 Empiricism. (3)
selected semesters
Examines representatives of either classical or contemporary philosophical empiricism, e.g., Bacon, Hobbes, Locke, Butler, Berkeley, Reid, Hume, Mill, Carnap, and Ayer. Prerequisites: PHI 302 and 305 (or 309 or 312 or 316 or 317).
General Studies: HU

PHI 403 Contemporary Analytic Philosophy. (3)
once a year
Aims and methods of such 20th-century philosophers as Frege, Moore, Russell, Wittgenstein, Carnap, Ayer, Wisdom, Ryle, Austin, Strawson, Quine, and Sellars, with application to metaphysics and epistemology. Prerequisites: PHI 302 and 312 (or 314 or 315 or 316 or 317 or 401 or 402).
General Studies: HU

PHI 413 Advanced Symbolic Logic. (3)
selected semesters
Properties of formal systems axiomatizing propositional and 1st-order predicate logic. May also include modal logic, number theory, and limits of logicism. Prerequisite: PHI 333.

PHI 420 Topics in Philosophy. (3)
once a year
Course descriptions on file in department. May be repeated for credit. Topics may include the following:
- History of Philosophy
- Metaphysics/Epistemology
- Philosophy of Language/Logic
- Philosophy of Science
- Value Theory

Prerequisite: a relevant upper-division PHI course or instructor approval.

PHI 428 Immunophilosophy. (3)
selected semesters
Integrates immunology and philosophy, including psychoneuroimmunology and the mind-body problem, and immunologic/psychologic perspectives on self and self-identity. Discussion, original literature readings and written assignments. Cross-listed as MIC 428. Credit is allowed for only MIC 428 or PHI 428. Pre- or corequisite: MIC 420 or PHI 317 or instructor approval.

PHI 494 Special Topics. (3)
selected semesters

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

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

Department of Physics and Astronomy

phy.asu.edu
480/965-3561
PS F470

Barry G. Ritchie, Chair

Regents' Professors: Smith, Spence, Starrfield

Professors: Alarcon, Bennett, Burstein, Chamberlin, Comfort, Cowley, Doak, Dow, Hester, Lindsay, Menéndez, Ponce, Rez, Ritchie, Sankey, Schmidt, Thorpe, Tillery, Treacy, Tsen, Tsong, Venables, Windhorst

Associate Professors: Culbertson, Drucker, Herbots, Marzke, Morse, Newman

Assistant Professors: Belitsky, Desch, Lebed, Ortiz, Shumway

Distinguished Research Professor: Bauer

PHYSICS—BS

Students majoring in Physics may pursue one of two options.

Option I. Designed for students who wish to pursue physics at the bachelor or graduate degree levels, option I consists of the following required courses:

Choose between the course combinations below.....4
PHY 150 Physics I *SQ* (4)
— *or* —
PHY 121 University Physics I: Mechanics *SQ*[1] (3)
PHY 122 University Physics Laboratory I *SQ*[1] (1)
Choose between the course combinations below.....4
PHY 151 Physics II *SQ* (4)
— *or* —
PHY 131 University Physics II: Electricity and Magnetism *SQ*[2] (3)
PHY 132 University Physics Laboratory II *SQ*[2] (1)
PHY 201 Mathematical Methods in Physics I *CS*.....3
PHY 252 Physics III *SQ*.....4
PHY 302 Mathematical Methods in Physics II.....2
PHY 310 Classical Particles, Fields, and Matter I.....3
PHY 311 Classical Particles, Fields, and Matter II.....3
PHY 314 Quantum Physics I.....3
PHY 315 Quantum Physics II.....3
PHY 333 Electronic Circuits and Measurements.....3

PHY 334 Advanced Laboratory I L^3 2
PHY 412 Classical Particles, Fields, and Matter III 3
PHY 416 Quantum Physics III 3
PHY 441 Statistical and Thermal Physics I 3
PHY 465 Advanced Laboratory II 2
Total 45

[1] Both PHY 121 and 122 must be taken to secure SQ credit.
[2] Both PHY 131 and 132 must be taken to secure SQ credit.
[3] Both PHY 334 and 420 must be taken to secure L credit.

Supporting mathematics courses are as follows:

Choose between the course combinations below ..... 12 or 10
MAT 270 Calculus with Analytic Geometry I *MA* (4)
MAT 271 Calculus with Analytic Geometry II *MA* (4)
MAT 272 Calculus with Analytic Geometry III *MA* (4)
— *or* —
MAT 290 Calculus I *MA* (5)
MAT 291 Calculus II (5)

Additional courses in physics and related fields are selected with the approval of the advisor. French, German, or Russian is strongly recommended to fulfill the foreign language requirement.

Option II. The interdisciplinary option II is designed for students who wish to obtain an undergraduate physics preparation for entry into other professions or graduate programs. A total of 53 hours are required, including the following courses:

Choose between the course combinations below 4
PHY 150 Physics I *SQ* (4)
— *or* —
PHY 121 University Physics I: Mechanics *SQ*[1] (3)
PHY 122 University Physics Laboratory I *SQ*[1] (1)
Choose between the course combinations below 4
PHY 151 Physics II *SQ* (4)
— *or* —
PHY 131 University Physics II: Electricity and Magnetism *SQ*[2] (3)
PHY 132 University Physics Laboratory II *SQ*[2] (1)
PHY 201 Mathematical Methods in Physics I *CS* 3
PHY 252 Physics III *SQ* 4
PHY 302 Mathematical Methods in Physics II 2
PHY 310 Classical Particles, Fields, and Matter I 3
PHY 311 Classical Particles, Fields, and Matter II 3
PHY 314 Quantum Physics I 3
PHY 315 Quantum Physics II 3
PHY 333 Electronic Circuits and Measurements 3
PHY 334 Advanced Laboratory I L^3 2
PHY 412 Classical Particles, Fields, and Matter III 3
PHY 441 Statistical and Thermal Physics I 3
Total 40

[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] Both PHY 334 and 420 must be taken to secure L credit.

The remaining courses are selected from physics and an area of concentration as approved by the student's advisor. Possible areas of concentration are astronomy, astrophysics, materials science, physical chemistry, applied mathematics, geophysics, biological physics, philosophy of science, scientific journalism, and premedical and prelaw programs. French, German, or Russian is strongly recommended to fulfill the foreign language requirement.

Supporting mathematics courses are as follows:

Choose between the course combinations below ..... 12 or 10
MAT 270 Calculus with Analytic Geometry I *MA* (4)
MAT 271 Calculus with Analytic Geometry II *MA* (4)
MAT 272 Calculus with Analytic Geometry III *MA* (4)
— *or* —
MAT 290 Calculus I *MA* (5)
MAT 291 Calculus II (5)

Emphasis in Astronomy

The astronomy faculty offer courses in astronomy both for nonscience majors and for science and physics majors. For an emphasis in astronomy, the following courses (or their equivalents) should be taken:

AST 321 Introduction to Planetary and Stellar Astrophysics *SQ*[1] 3
AST 322 Introduction to Galactic and Extragalactic Astrophysics *SQ*[2] 3
AST 421 Astrophysics I 3
AST 422 Astrophysics II 3
AST 499 Individualized Instruction 3
Total 15

[1] Both AST 113 and 321 must be taken to secure SQ credit.
[2] Both AST 114 and 322 must be taken to secure SQ credit.

MINOR IN ASTRONOMY

The minor in Astronomy consists of a minimum of 24 semester hours. Required courses are as follows:

AST 113 Astronomy Laboratory I *SQ*[1] 1
AST 114 Astronomy Laboratory II *SQ*[2] 1
AST 321 Introduction to Planetary and Stellar Astrophysics *SQ*[1] 3
AST 322 Introduction to Galactic and Extragalactic Astrophysics *SQ*[2] 3
Choose between the course combinations below 4
PHY 150 Physics I *SQ* (4)
— *or* —
PHY 121 University Physics I: Mechanics *SQ*[3] (3)
PHY 122 University Physics Laboratory I *SQ*[3] (1)
Choose between the course combinations below 4
PHY 151 Physics II *SQ* (4)
— *or* —
PHY 131 University Physics II: Electricity and Magnetism *SQ*[4] (3)
PHY 132 University Physics Laboratory II *SQ*[4] (1)
PHY 252 Physics III *SQ* 4
Approved upper-division electives 4
Total 24

[1] Both AST 113 and 321 must be taken to secure SQ credit.
[2] Both AST 114 and 322 must be taken to secure SQ 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.

Electives are chosen with approval of an astronomy advisor from upper-division courses in physics and astronomy.

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

MINOR IN PHYSICS

The minor in Physics consists of a minimum of 29 semester hours. Required courses are as follows:

Choose between the course combinations below....4
- PHY 150 Physics I *SQ* (4)

— or —

- PHY 121 University Physics I: Mechanics *SQ*[1] (3)
- PHY 122 University Physics Laboratory I *SQ*[1] (1)

Choose between the course combinations below....4
- PHY 151 Physics II *SQ* (4)

— or —

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

PHY 201 Mathematical Methods in Physics I *CS*....3
PHY 252 Physics III *SQ*....4
PHY 302 Mathematical Methods in Physics II....2
PHY 310 Classical Particles, Fields, and Matter I....3
PHY 311 Classical Particles, Fields, and Matter II....3
PHY 314 Quantum Physics I....3
Approved electives....3

Total....29

[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.

Electives are chosen with approval of the physics advisor from upper-division courses in physics and astronomy.

BIS CONCENTRATIONS

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

SECONDARY EDUCATION—BAE

Physics. This degree is offered through the Initial Teacher Certification (ITC) program in the College of Education. Students pursuing a major in Secondary Education have an advisor in the College of Education and an advisor within the department of their academic specialization area.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

The following courses must be completed with a grade of "C" (2.00) or higher *before* applying to the ITC program: PHY 150 and 151 or PHY 121, 122, 131, and 132.

This academic specialization consists of 48 semester hours. Required courses are as follows:

MAT 270 Calculus with Analytic Geometry I *MA*....4
MAT 271 Calculus with Analytic Geometry II *MA*....4
MAT 272 Calculus with Analytic Geometry III *MA*....4

Choose between the course combinations below....8
- PHY 150 Physics I *SQ* (4)
- PHY 151 Physics II *SQ* (4)

— or —

- PHY 121 University Physics I: Mechanics *SQ*[1] (3)
- PHY 122 University Physics Laboratory I *SQ*[1] (1)
- PHY 131 University Physics II: Electricity and Magnetism *SQ*[2] (3)
- PHY 132 University Physics Laboratory II *SQ*[2] (1)

PHY 201 Mathematical Methods in Physics I *CS*....3
PHY 252 Physics III *SQ*....4
PHY 302 Mathematical Methods in Physics II....2
PHY 310 Classical Particles, Fields, and Matter I....3
PHY 333 Electronic Circuits and Measurements....3
PHY 361 Introductory Modern Physics....3
or PHY 314 Quantum Physics I (3)
PHY 480 Methods of Teaching Physics....3
or PHY 484 Internship: Physics Teaching (1–4)
Approved electives[3]....10

Minimum total....48

[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] Electives are chosen in physics or other closely related fields, subject to the approval of the advisor.

Teaching Methods

PHY 480 Methods of Teaching Physics....3
PHY 484 Internship: Physics Teaching....3

Total....6

GRADUATE PROGRAMS

The faculty in the department offer programs leading to degrees of Master of Natural Science, MS, and PhD. See the *Graduate Catalog* for requirements.

ASTRONOMY (AST)

AST 111 Introduction to Solar Systems Astronomy. (3)
fall
History, properties of light, instruments, study of solar system and nearby stars. For nonscience majors. Optional lab (AST 113).
General Studies: SQ (if credit also earned in AST 113)

AST 112 Introduction to Stars, Galaxies, and Cosmology. (3)
spring
Structure and evolution of stars, star clusters, galaxies, cosmology. For nonscience majors. Optional lab (AST 114).
General Studies: SQ (if credit also earned in AST 114)

AST 113 Astronomy Laboratory I. (1)
fall
Astronomical observations and experiments designed to increase familiarity with the sky, telescopes, and astronomical measurements. 2.5 hours lab. Fee. Pre- or corequisites: AST 111 (or 321); a working knowledge of high school algebra and geometry.
General Studies: SQ (if credit also earned in AST 111 or 321)

AST 114 Astronomy Laboratory II. (1)
spring
Similar to AST 113, but material chosen to supplement AST 112 and 322. 2.5 hours lab. Fee. Pre- or corequisites: AST 112 (or 322); a working knowledge of high school algebra and geometry.
General Studies: SQ (if credit also earned in AST 112 or 322)

AST 321 Introduction to Planetary and Stellar Astrophysics. (3)
fall
Physical laws; celestial mechanics; properties of planets, the sun, and other stars; formation and evolution of stars and planetary systems. Prerequisites: MAT 270 (or 290); PHY 150.
General Studies: SQ (if credit also earned in AST 113)

AST 322 Introduction to Galactic and Extragalactic Astrophysics. (3)
spring
Evolved stars, introduction to relativity, galaxies and interstellar matter, structure and dynamics of galaxies, cosmology. Prerequisite: AST 321 or instructor approval.
General Studies: SQ (if credit also earned in AST 114)

AST 421 Astrophysics I. (3)
fall
Selected astrophysical topics, including stellar evolution, star formation, interstellar medium, galactic structure, extragalactic astronomy, high-energy astrophysics, and cosmology. Prerequisites: AST 321, 322; PHY 311, 314.

AST 422 Astrophysics II. (3)
spring
Same range of astrophysical topics as for AST 421 but different specific topics are emphasized in a given year. Prerequisites: AST 321, 322; PHY 311, 314.

AST 460 Astrobiology. (3)
fall and spring
Origin, early evolution, distribution, and future of life on Earth and elsewhere in the cosmos. May be repeated for credit. Lecture, discussion, video conferences, possible field trips. Cross-listed as BIO 460/CHM 483/GLG 460/MIC 475. Credit is allowed for only AST 460 or BIO 460 or CHM 483 or GLG 460 or MIC 475. Prerequisite: instructor approval.

AST 499 Individualized Instruction. (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.

PHYSICAL SCIENCES (PHS)

PHS 110 Fundamentals of Physical Science. (4)
fall and spring
One-semester survey of the principles of physics and chemistry. Presumes understanding of elementary algebra. 3 hours lecture, 2 hours lab. Fee.
General Studies: SQ

PHS 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 STE 208. Credit is allowed for only PHS 208 or STE 208. Fee. Prerequisite: a college-level course in science or instructor approval.
General Studies: SQ

PHS 402 Service Learning. (3)
fall and spring
K–12 tutoring and mentoring internship related to academic course work in physical science and physics. Requires weekly reflective reading and writing. May be repeated for credit. Internship. Fee. Pre- or corequisite: only PHS 110 (or 208) or PHY 101 (or 105) or both PHY 111 and 113 or both PHY 121 and 122 or only PHY 150.
General Studies: C

PHS 484 Internship. (1–12)
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.

PHYSICS (PHY)

PHY 101 Introduction to Physics. (4)
fall and spring
Emphasizes applications of physics to life in the modern world. Presumes understanding of elementary algebra. 3 hours lecture, 1 recitation, 2 hours lab.
General Studies: SQ

PHY 105 Basic Physics. (3)
fall
One-semester survey of the principles of physics. Primarily for students who intend to take PHY 121, 131 but have not taken high school physics. 3 hours lecture, 1 recitation. Prerequisites: algebra and trigonometry.

PHY 111 General Physics. (3)
fall, spring, summer
Noncalculus treatment of the principles of physics for nonphysics majors. Students whose curricula require a laboratory course must also register for PHY 113. 3 hours lecture, 1 recitation. Prerequisite: trigonometry.
General Studies: SQ (if credit also earned in PHY 113)

PHY 112 General Physics. (3)
fall, spring, summer
Continuation of PHY 111. Students whose curricula require a laboratory course must also register for PHY 114. Prerequisite: PHY 111.
General Studies: SQ (if credit also earned in PHY 114)

PHY 113 General Physics Laboratory. (1)
fall, spring, summer
Elementary experiments in physics. Requires outside preparation for experiments and report writing. May be taken concurrently with, or subsequent to, PHY 111. 2 hours lab. Fee.
General Studies: SQ (if credit also earned in PHY 111)

PHY 114 General Physics Laboratory. (1)
fall, spring, summer
See PHY 113. May be taken concurrently with, or subsequent to, PHY 112. Fee.
General Studies: SQ (if credit also earned in PHY 112)

PHY 121 University Physics I: Mechanics. (3)
fall, spring, summer
Kinematics; Newton's laws; work, energy, momentum, conservation laws; dynamics of particles, solids, and fluids. 3 hours lecture, 1 hour recitation. Prerequisite: MAT 270 or 290 or instructor approval.
General Studies: SQ (if credit also earned in PHY 122)

PHY 122 University Physics Laboratory I. (1)
fall, spring, summer
Lab accompanying PHY 121. Fee. Pre- or corequisite: PHY 121.
General Studies: SQ (if credit also earned in PHY 121)

PHY 131 University Physics II: Electricity and Magnetism. (3)
fall, spring, summer
Electric charge and current, electric and magnetic fields in vacuum and in materials, and induction. AC circuits, displacement current, and electromagnetic waves. 3 hours lecture, 1 hour recitation.
Prerequisites: MAT 271 (or 291 or instructor approval); PHY 121.
Corequisite: MAT 272 or instructor approval.
General Studies: SQ (if credit also earned in PHY 132)

PHY 132 University Physics Laboratory II. (1)
spring and summer
Lab accompanying PHY 131. Fee. Pre- or corequisite: PHY 131.
General Studies: SQ (if credit also earned in PHY 131)

PHY 150 Physics I. (4)
spring
Introductory physics for majors. Kinematics, Newton's Laws, basic forces, energy, momentum, special relativity. 3 hours lecture, 3 hours lab. Fee. Prerequisite: MAT 270 or 290 (or its equivalent).
General Studies: SQ

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

PHY 151 Physics II. (4)
fall
Continuation of PHY 150. Electromagnetic fields; Ampere's and Faraday's Laws; Maxwell's equations; basic circuit elements. 3 hours lecture, 3 hours lab. Fee. Prerequisites: MAT 271 (or 291 or its equivalent); PHY 121, 122 (or 150).
General Studies: SQ

PHY 190 Seminar: Physics as a Curriculum and a Profession. (1)
fall and spring
Seminar for new Physics majors. Instruction and information on curriculum, departmental functions, and professional preparation. Weekly meetings and excursions. Pass/fail grading.

PHY 201 Mathematical Methods in Physics I. (3)
spring
Differential equations, linear equations, vectors, matrices, Fourier series, and numerical methods. 2 hours lecture, 2 hours lab. Fee. Prerequisites: MAT 272; Physics major. Corequisite: PHY 252.
General Studies: CS

PHY 241 University Physics III. (3)
fall and spring
Thermodynamics, kinetic theory, physical and wave optics, relativity, photons, matter waves, atomic physics. 3 hours lecture, 1 hour recitation. Prerequisites: PHY 131; nonmajor.

PHY 252 Physics III. (4)
spring
Continuation of PHY 151. Wave physics, oscillations, harmonic systems, physical optics, thermodynamics, kinetic theory. 3 hours lecture, 3 hours lab. Fee. Prerequisites: MAT 272 (or its equivalent); PHY 131 and 132 (or 151 or its equivalent). Corequisite: PHY 201.
General Studies: SQ

PHY 302 Mathematical Methods in Physics II. (2)
fall
Continuation of PHY 201. Vector calculus, complex variables, partial differential equations, special functions, numerical methods. 1 hour lecture, 3 hours lab. Fee. Prerequisite: PHY 201 (or its equivalent).

PHY 310 Classical Particles, Fields, and Matter I. (3)
fall
Particle kinematics, mechanics, conservation laws, particle motion in force fields, dynamics of two-body systems, reference frames, rigid body motion, relativity. Fee. Corequisites: both PHY 302 and 314 or only instructor approval.

PHY 311 Classical Particles, Fields, and Matter II. (3)
spring
Electrostatic and gravitational fields, Poisson and Laplace equations, dielectric materials, magnetic fields and materials, magnetic induction, Faraday's Law. Fee. Prerequisites: PHY 302, 310. Corequisite: PHY 315 or instructor approval.

PHY 314 Quantum Physics I. (3)
fall
Photons, models of the atom, wave properties of matter, introduction to wave mechanics, 1-D systems in quantum mechanics. Fee. Prerequisites: PHY 201 and 252 (or their equivalents). Corequisites: both PHY 302 and 310 or only instructor approval.

PHY 315 Quantum Physics II. (3)
spring
General principles of quantum mechanics, 3-D problems, approximation methods, spin, introduction to many-particle systems. Fee. Prerequisites: PHY 302, 310, 314. Corequisite: PHY 311 or instructor approval.

PHY 333 Electronic Circuits and Measurements. (3)
fall and spring
Basic principles of electronic circuit analysis and measurement techniques using modern instrumentation and computer-aided analysis of data. 1 hour lecture, 3 hours lab; required equivalent effort outside of lab. Fee. Corequisite: PHY 201 or instructor approval.

PHY 334 Advanced Laboratory I. (2)
spring
Selected experiments from contemporary physics. Emphasizes modern instrumentation, computer-assisted acquisition and analysis of data, and report form writing. Lecture, lab. Fee. Prerequisites: PHY 310, 314, 333.
General Studies: L (if credit also earned in PHY 420)

PHY 361 Introductory Modern Physics. (3)
fall and spring
Special relativity and introductory quantum theory with applications drawn from atomic, nuclear, and solid-state physics. 3 hours lecture, 1 recitation. Prerequisite: PHY 131.

PHY 412 Classical Particles, Fields, and Matter III. (3)
fall
Electromagnetic fields of moving charges, Maxwell's equations, harmonic phenomena, oscillations, waves, electromagnetic radiation, covariant electromagnetism, introduction to general relativity. Fee. Prerequisites: PHY 311, 333. Corequisite: PHY 416 or instructor approval.

PHY 416 Quantum Physics III. (3)
fall
Introduces the quantum theory of atoms, molecules, solids and nuclei, Dirac's equation. Fee. Prerequisites: PHY 311, 315. Corequisite: PHY 412 or instructor approval.

PHY 420 Research Paper. (1)
fall and spring
Scientific report writing. Culminates in a paper based on library or laboratory research or both. Taken in conjunction with other courses as approved. Conference. Prerequisite: instructor approval.
General Studies: L (if credit also earned in PHY 334)

PHY 441 Statistical and Thermal Physics I. (3)
fall
Statistical and experimental basis of heat, temperature, and entropy. Mechanical and statistical basis of the laws of thermodynamics. Applications of macroscopic thermodynamics. Phase equilibrium. Prerequisites: PHY 311, 315.

PHY 442 Statistical and Thermal Physics II. (3)
spring
Principles and applications of statistical mechanics. Quantum statistics of ideal gases and simple solids. Equilibrium of phases and chemical species. Transport theory. Irreversible processes and fluctuation. Prerequisite: PHY 441.

PHY 452 Physical Optics. (3)
fall
Principles of reflection, refraction, diffraction. Additional topics from contemporary optics may include Fourier transform spectroscopy, linear systems theory, holography. 2 hours lecture, 2 hours lab. Prerequisites: PHY 302, 311, 315. Corequisite: PHY 412.

PHY 462 Subatomic Physics. (3)
spring
Nuclear properties, models, decays and reactions; fundamental forces, field theories, symmetry principles; hadrons, quarks, and leptons; the Standard Model. Prerequisites: PHY 311, 315.

PHY 465 Advanced Laboratory II. (2)
fall and spring
Continuation of PHY 334. Students are encouraged to substitute laboratory research project in consultation with faculty sponsor. Fee. Prerequisite: PHY 334.

PHY 466 Advanced Laboratory III. (1–3)
fall and spring
Continuation of PHY 465. Fee. Prerequisite: PHY 465.

PHY 480 Methods of Teaching Physics. (3)
spring
Evaluation of various approaches to the teaching of high school physics. Preparation of demonstrations and experiments. Organization of a laboratory. Designed for secondary school physics teachers. Prerequisite: instructor approval.

PHY 481 Materials Physics I. (3)
fall
Fundamentals of materials physics: crystal structure, diffraction, elasticity, point defects, dislocations, lattice vibrations, thermal properties, periodic potential, band structure. Credit is allowed for only PHY 481 or 511. Prerequisites: PHY 311, 315.

PHY 482 Materials Physics II. (3)
spring
Electronic behavior of materials: energy bands, electronic properties, metals, semiconductors, insulators, optical properties, magnetic properties, superconductivity, biophysics. Credit is allowed for only PHY 482 or 512. Prerequisite: PHY 481 (or its equivalent).

PHY 484 Internship: Physics Teaching. (1–4)
fall, spring, summer
Preparation for high school physics teaching. Student works closely with a faculty member in the elementary physics program. May be repeated for a total of 6 semester hours. Prerequisite: instructor approval.

PHY 495 Project Research. (1–3)
fall and spring
Supervised project in physics or astrophysics. May be repeated for credit. Prerequisite: instructor approval.

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

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

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

Department of Political Science

www.asu.edu/clas/polisci
480/965-6551
COOR 6801

Patrick J. Kenney, Chair

Professors: Aribise, Ball, Dagger, Fridkin, Guston, Jones, Kenney, Simon, Youngblood

Associate Professors: Ashley, Crittenden, Dantico, Doty, M. Elman, Herrera, Keating, Mitchell, Simhony, Warner

Assistant Professors: Chin, C. Elman, Espino, Goren, Hindman, Hoekstra, Kittilson, Pantoja

POLITICAL SCIENCE—BA

The BA degree in Political Science consists of 42 semester hours, of which 30 must be in political science and 12 in related fields consisting of courses selected from the Departments of Anthropology, Chicana and Chicano Studies, Economics, Geography, History, Psychology, and Sociology, and the African American Studies and the Women and Gender Studies programs. At least 15 hours in political science must be in upper-division courses.

The following courses are required:

POS	101	Political Ideologies *SB*	3
POS	110	Government and Politics *SB*	3
		or POS 310 American National Government *SB* (3)	
POS	150	Comparative Government *SB, G*	3
		or POS 160 Global Politics *SB, G* (3)	
POS	301	Empirical Political Inquiry *SB*	3
Total			12

Students who major in Political Science must have a minimum GPA of 2.00 for all courses that count toward the major. Upper-division courses that count toward the major must have a grade of "C" (2.00) or higher; no more than one "D" (1.00) grade in a lower-division course may be counted in the major. See "College Degree Requirements," page 330. No more than six hours of POS 484 Internship may be applied to the major.

POLITICAL SCIENCE—BS

The BS degree in Political Science consists of 48 semester hours, of which 36 must be in political science and 12 in related fields consisting of courses selected from the Departments of Anthropology, Chicana and Chicano Studies, Economics, Geography, History, Psychology, and Sociology, and the African and African American Studies and the Women and Gender Studies programs. At least 21 hours in political science must be in upper-division courses.

The following courses are required:

POS	101	Political Ideologies *SB*	3
POS	110	Government and Politics *SB*	3
		or POS 310 American National Government *SB* (3)	
POS	150	Comparative Government *SB, G*	3
		or POS 160 Global Politics *SB, G* (3)	
POS	301	Empirical Political Inquiry *SB*	3
POS	401	Political Statistics *CS*	3
Total			15

Students who major in Political Science must have a minimum GPA of 2.00 for all courses that count toward the major. Upper-division courses that count toward the major must have a grade of "C" (2.00) or higher; no more than one "D" (1.00) grade in a lower-division course may be counted in the major. See "College Degree Requirements," page 330. No more than six hours of POS 484 Internship may be applied to the major.

CERTIFICATES

Asian Studies Certificate or Emphasis. Students majoring in Political Science may elect to pursue an Asian Studies Certificate combining courses from the major with selected outside courses of wholly Asian content. See "Asian Studies," page 337, for more information.

Certificate in Civic Education. The Civic Education Certificate is designed to contribute to the preparation of undergraduate students for

1. careers in primary and secondary education (where the teaching of government and civics may be involved);
2. careers or voluntary participation in politics, public service, and civic and social movements; and
3. further education in law, journalism, business, history, sociology, political science, and other fields where an understanding of questions of citizenship, leadership, community, democracy, public responsibility, and ethics is crucial.

The certificate does not substitute for degree requirements in any subject, including Political Science; rather, 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 92.

a complement to the student's chosen major, the certificate program is intended to guide students to a variety of courses whose successful completion indicates their special accomplishment in the area of civic education.

Students majoring in any subject at the university may be awarded the Civic Education Certificate upon completion of the following 15 semester hours of political science courses:

POS 101 Political Ideologies *SB* 3
POS 346 Problems of Democracy *HU* 3
POS 442 American Political Thought *HU* 3
Choose one from the courses below 3
- POS 340 History of Political Philosophy I *HU, H* (3)
- POS 341 History of Political Philosophy II *HU, H* (3)
- POS 443 Topics in Contemporary Political Theory *HU* (3)

Choose one from the courses below 3
- POS 110 Government and Politics *SB* (3)
- POS 150 Comparative Government *SB, G* (3)
- POS 160 Global Politics *SB, G* (3)
- POS 270 American Legal System *SB* (3)
- POS 300 Contemporary Controversies in Global Politics *SB, G* (3)
- POS 313 The Congress *SB* (3)
- POS 314 The American Presidency *SB* (3)
- POS 315 The Supreme Court *SB* (3)
- POS 330 Contemporary Controversies in Domestic Politics *SB* (3)
- POS 332 American Political Parties *SB* (3)
- POS 333 Interest Groups *SB* (3)
- POS 370 Law and Society *SB* (3)
- POS 417 The Arizona Political System *SB* (3)
- POS 435 Women and Politics *SB, C* (3)
- POS 439 Minority Group Politics in America *SB, C* (3)

Total 15

Certificate students must have a minimum GPA of 2.00; only courses in which students have a grade of "C" (2.00) or higher count toward the certificate.

Certificate in International Studies. The International Studies Certificate is designed to prepare students for careers in government agencies, international governmental and nongovernmental organizations, multinational firms and banks, and for graduate studies in International Relations or Political Science. The certificate is not a substitute for degree requirements in any subject, including political science; rather, the required courses add an international and comparative dimension to the student's chosen major.

Requirements for the certificate are intended to provide an understanding of international relations and comparative government, an awareness of global social and political-economic processes, and sensitivity to foreign political systems and cultures. These objectives are met by a sequence of political science courses in the areas of international relations, comparative politics, and area studies.

Students majoring in any subject at the university may be awarded the International Studies Certificate upon completion of the following 15 semester hours of political science courses:

Choose one from the courses below 3
- POS 150 Comparative Government *SB, G* (3)
- POS 160 Global Politics *SB, G* (3)

Choose one from the courses below 3
- POS 361 American Foreign Policy *SB, G* (3)
- POS 364 National Security, Intelligence, and Terrorism *SB* (3)

Choose two from the courses below 6
- POS 300 Contemporary Controversies in Global Politics *SB, G* (3)
- POS 465 International Organization and Law *SB, G* (3)
- POS 467 International Security *SB, G* (3)
- POS 486 International Political Economy *SB, G* (3)

Choose one from the courses below 3
- POS 350 Comparative Politics *SB, G* (3)
- POS 355 Russia and Successor States *SB, G* (3)
- POS 356 European Union *SB, G* (3)
- POS 357 South Asia Politics *SB, G* (3)
- POS 358 Southeast Asia *SB, G* (3)
- POS 359 African Politics and Society *SB, G* (3)
- POS 360 World Politics *SB, G* (3)
- POS 451 China, Japan, and the Koreas *SB, G* (3)
- POS 452 China *SB, G* (3)
- POS 453 South America *SB, G* (3)
- POS 454 Mexico *SB, G* (3)
- POS 455 Central America and the Caribbean *SB, G* (3)
- POS 459 South and Southern Africa *SB, G* (3)
- POS 463 Inter-American Relations *SB, G* (3)
- POS 468 Comparative Asian Foreign Policies *SB, G* (3)

Total 15

Honors students who select an international topic for their theses may apply thesis credit toward the 15 hours of international course work for the certificate.

Depending upon their interests, certificate students are strongly advised to take 12 semester hours or more from appropriate courses in anthropology (ASB), economics (ECN), geography (GCU), history (HST), international business studies (IBS), and sociology (SOC). Knowledge of a modern foreign language equivalent to at least two years of college study is strongly recommended.

Certificate students must have a minimum GPA of 2.00; only courses in which students have a grade of "C" (2.00) or higher count toward the certificate.

Latin American Studies Certificate or Emphasis. Students majoring in Political Science may elect to pursue a Latin American Studies Certificate combining courses from the major with selected outside courses of wholly Latin American content. See "Latin American Studies," page 340, for more information.

MINOR IN POLITICAL SCIENCE

The minor in Political Science consists of 18 semester hours in political science courses, 12 hours of which must be upper-division courses. Students who minor in Political Science must have two courses from among the following:

POS 101 Political Ideologies *SB* 3
POS 110 Government and Politics *SB* 3
or POS 310 American National Government *SB* (3)
POS 150 Comparative Government *SB, G* 3
POS 160 Global Politics *SB, G* 3

Students who minor in Political Science must have a minimum GPA of 2.00 for all courses that count toward the minor. Upper-division courses that count toward the minor must have a grade of "C" (2.00) or higher; no more than one "D" (1.00) grade in a lower-division course may be counted toward the minor. No more than three hours of POS 484

Internship and three hours of POS 499 Individualized Instruction may be applied to the minor.

BIS CONCENTRATIONS

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

SECONDARY EDUCATION—BAE

This degree is offered through the Initial Teacher Certification (ITC) program in the College of Education. Students pursuing a major in Secondary Education with an academic specialization in political science have an advisor in the College of Education and an advisor within the Department of Political Science.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

Academic Specialization ITC Admission Requirements

At least four required courses in the academic specialization must be completed with a grade of "C" (2.00) or higher before applying to the ITC professional program.

Political Science. The major teaching field consists of 41–42 semester hours and six hours in teaching methods. A minimum grade of "C" (2.00) is required in all academic specialization courses. Required major courses are as follows:

POS	101	Political Ideologies *SB* 3
POS	110	Government and Politics *SB* 3
		or POS 310 American National Government *SB* (3)
POS	150	Comparative Government *SB, G* 3
		or POS 160 Global Politics *SB, G* (3)
POS	301	Empirical Political Inquiry *SB* 3
POS	311	Arizona Constitution and Government 2
		or POS 417 The Arizona Political System *SB* (3)
Electives[1]		 15
Related area[2]		 12
Total		 41–42

[1] Six hours must be in the upper division.

[2] Choose in consultation with a department advisor.

Students are required to complete two methods courses, one of which is SED 480 Methods of Teaching Social Studies. For the second methods course, students select from the following:

GCU	414	Teaching Geography Standards 3
GCU	494	ST: Geography in the K–12 Classroom 3
HST	480	Methods of Teaching History: Classroom Resources 3
HST	481	Methods of Teaching History: Community Resources 3

Courses may be substituted for POS 417 with departmental approval.

Social Studies. This degree is offered through the Initial Teacher Certification program in the College of Education. Students pursuing a major in Secondary Education have an advisor in the College of Education and an advisor within the department of their academic specialization area.

See "College of Education," page 192, for information on admission eligibility requirements, admission deadlines, field experiences, and student teaching. For more information, or to schedule an appointment with an advisor, call the Office of Student Services in the College of Education at 480/965-5555.

GRADUATE PROGRAMS

The faculty in the Department of Political Science offer programs leading to the MA and PhD degrees. See the *Graduate Catalog* for requirements.

POLITICAL SCIENCE (POS)

POS 101 Political Ideologies. (3)
fall and spring
Leading political ideas and belief systems, e.g., Marxism, liberalism, conservatism, theories of democracy, and alternative futures.
General Studies: SB

POS 110 Government and Politics. (3)
fall and spring
Major institutions of modern government and processes of individual and group political activity, with emphasis on the American experience. Meets the federal government requirement for teacher certification. Credit is allowed for only POS 110 or 310.
General Studies: SB

POS 150 Comparative Government. (3)
fall and spring
Political institutions and processes in selected foreign countries, including origins, strengths, and weaknesses of contemporary political systems and political development.
General Studies: SB, G

POS 160 Global Politics. (3)
fall and spring
Nature of contemporary world politics through the study of both general theoretical topics and specific geographical areas.
General Studies: SB, G

POS 220 Political Issues and Public Policy. (3)
once a year
Contemporary social problems and political issues, particularly development of public policy.
General Studies: SB

POS 230 Current Issues in National Politics. (3)
fall and spring
Major issues facing national governments in the domestic field. Prerequisite: ENG 101 or 105.
General Studies: L/SB

POS 240 Introduction to Southeast Asia. (3)
fall and spring
Interdisciplinary introduction to the cultures, religions, political systems, geography, and history of Southeast Asia. Cross-listed as ASB 240/GCU 240/HST 240/REL 240. Credit is allowed for only ASB 240 or GCU 240 or HST 240 or POS 240 or REL 240.
General Studies: HU/SB, G

POS 260 Current Issues in International Politics. (3)
fall and spring
Analyzes major current problems in world politics. Prerequisite: ENG 101 or 105.
General Studies: L/SB, G

POS 270 American Legal System. (3)
fall and spring
Concepts, institutions, classifications, and functions of law. Role of the courts and impact of judicial decision making on social change.
General Studies: SB

POS 300 Contemporary Controversies in Global Politics. (3)
fall and spring
Explores key controversies in global politics, including security, economic stability, poverty, gender, race, and the environment.
General Studies: SB, G

POS 301 Empirical Political Inquiry. (3)
fall and spring
Logic of political inquiry, including research problems, concepts, hypotheses, theories, measurement, data collection, and analysis.
General Studies: SB

POS 305 Politics and Film. (3)
once a year
Examines portrayal of political events, ethnic groups, and sociopolitical situations in film, a major medium addressing questions of human values. May be repeated for credit when topics vary. Lecture, film, discussion.
General Studies: SB

POS 310 American National Government. (3)
fall and spring
Powers, functions, and agents of American political institutions. Meets the federal government requirement for teacher certification. Credit is allowed for only POS 310 or 110.
General Studies: SB

POS 311 Arizona Constitution and Government. (2)
fall and spring
Constitution and government of the State of Arizona. Credit is allowed for only POS 311 or 316 or 417. Meets the Arizona constitution requirement for teacher certification. May not be counted for the major or a teaching major or minor in Political Science.

POS 313 The Congress. (3)
once a year
Lawmaking process in the U.S. Congress.
General Studies: SB

POS 314 The American Presidency. (3)
once a year
Office, role, and power of the American presidency in the American political system.
General Studies: SB

POS 315 The Supreme Court. (3)
once a year
Role of the Supreme Court in American society and politics; examines decision-making process and impact of decisions; restraint versus activism.
General Studies: SB

POS 316 State and Local Government. (3)
once a year
Survey of the operations, problems, and policies of state and local governments in the United States. Credit is allowed for only POS 316 or 311.
General Studies: SB

POS 320 Public Administration. (3)
once a year
Role of the administrator in the political process with an examination of the basic concepts of bureaucracy.
General Studies: SB

POS 325 Public Policy Development. (3)
once a year
Examines one or more aspects of public policy development, including agenda setting and policy formulation, implementation, and analysis.
General Studies: SB

POS 330 Contemporary Controversies in Domestic Politics. (3)
fall and spring
Explores key controversies in domestic politics, including the environment, the economy, poverty, gender, race, and security.
General Studies: SB

POS 331 Public Opinion. (3)
once a year
Formation, expression, and influence of individual and organized opinion on political institutions.
General Studies: SB

POS 332 American Political Parties. (3)
once a year
Development of the American party system. Party organization and functions.
General Studies: SB

POS 333 Interest Groups. (3)
once a year
Examines how minority, corporate, labor, farm, consumer, environmental, health, education and public interest groups, and single-issue movements influence government.
General Studies: SB

POS 336 Voters in America. (3)
once a year
Voting behavior and the attitudes, perceptions, and activities of the citizenry in the political process.
General Studies: SB

POS 340 History of Political Philosophy I. (3)
once a year
Western political philosophers and their theories to the 17th century.
General Studies: HU, H

POS 341 History of Political Philosophy II. (3)
once a year
Western political philosophers and their theories from the 17th to the 20th centuries.
General Studies: HU, H

POS 346 Problems of Democracy. (3)
once a year
Issues and problems in democratic theory, e.g., the nature of democracy, majority rule, representation, equality, and the value of political participation.
General Studies: HU

POS 350 Comparative Politics. (3)
once a year
Theoretical approaches and political institutions, such as parties, pressure groups, legislatures, and executives, from a cross-national perspective.
General Studies: SB, G

POS 351 Democratization. (3)
fall
Examines the consolidation of democracies in postauthoritarian and postcommunist settings (e.g., Latin America, Eastern Europe, Asia).
General Studies: SB, G

POS 355 Russia and Successor States. (3)
once a year
Description and analysis of political institutions and practices in Russia and successor states.
General Studies: SB, G

POS 356 European Union. (3)
once a year
History and workings of EU member states, including single market, Euro, legal system, ethnonationalism, immigration, expansion, trade wars, and defense.
General Studies: SB, G

POS 357 South Asia Politics. (3)
once a year
Political culture and systems of South Asia examined through study of political writings, novels, and poetry. Lecture, discussion.
General Studies: SB, G

POS 358 Southeast Asia. (3)
once a year
Political background, governmental institutions, political dynamics, and developmental problems of Southeast Asian nations.
General Studies: SB, G

POS 359 African Politics and Society. (3)
selected semesters
Comparative analysis of socioeconomic forces, political processes, government institutions, and political novels in Sub-Sahara Africa.
General Studies: SB, G

POS 360 World Politics. (3)
once a year
Theory and practice of statecraft as applied to selected issues, regions, or eras. May be repeated for credit when topics vary.
General Studies: SB, G

POS 361 American Foreign Policy. (3)
once a year
United States in world affairs; foreign policy since World War I. Techniques in formulating American foreign policies.
General Studies: SB, G

POS 364 National Security, Intelligence, and Terrorism. (3)
once a year
Theoretical and empirical assessment of U.S. national security policy in the post-cold war era.
General Studies: SB

POS 368 Ethics and Human Rights. (3)
spring
Explores issues of ethics, morality, and human rights in the global community. Lecture, discussion.

POS 369 War, Politics, and Society. (3)
fall in odd years
Relationships between techniques/technology of war and political/social structures in different time periods and locations. Who commands, dies, and pays?

POS 370 Law and Society. (3)
once a year
Analyzes debates among social scientists and legal theorists concerning the relationship between "law" and "society."
General Studies: SB

POS 401 Political Statistics. (3)
fall and spring
Basic concepts in statistics as they facilitate the description, explanation, and prediction of social and political phenomena. Prerequisite: POS 301 (or its equivalent) or instructor approval.
General Studies: CS

POS 410 Governing American Cities. (3)
once a year
Reviews modern urban problems, their sources, and potential solutions, including structural and policy alternatives.
General Studies: SB

POS 417 The Arizona Political System. (3)
selected semesters
Contemporary political problems within the context of Arizona's constitutional, political, and social frameworks. Meets the Arizona Constitution requirement for teacher certification. Credit is allowed for only POS 417 or 311.
General Studies: SB

POS 426 Elements of Public Policy. (3)
once a year
Each section may cover one of the following topics: consumer protection, natural resources, criminal justice, environmental protection, science and technology, or theories of public policy. May be repeated for credit when topics vary.
General Studies: SB

POS 431 Campaigns and Elections. (3)
once a year
Examines campaigns from a multitude of perspectives, including the politician, reporter, campaign strategist, and voter. Lecture, discussion.
General Studies: SB

POS 433 Money and Politics. (3)
once a year
Role of money and special interests in elections, campaign politics, and public policy-making in American politics. Lecture, discussion.
General Studies: SB

POS 434 Media and Politics. (3)
once a year
Studies mass media and politics in the United States, e.g., media and elections, media and government. Lecture, discussion.
General Studies: SB

POS 435 Women and Politics. (3)
selected semesters
Focuses on the uniqueness of women in modern political systems and political thought. Emphasis may vary with instructor.
General Studies: SB, C

POS 439 Minority Group Politics in America. (3)
selected semesters
Role of minority groups in American politics.
General Studies: SB, C

POS 442 American Political Thought. (3)
once a year
Political theories and movements from the colonial period to the present.
General Studies: HU

POS 443 Topics in Contemporary Political Theory. (3)
once a year
Major problems and theories in contemporary political thought.
General Studies: HU

POS 445 Asian Political Thought. (3)
once a year
Contemporary political ideas and theories in selected Asian countries, including the impact of Marxist and non-Marxist theories on revolutionary processes.
General Studies: SB, G

POS 451 China, Japan, and the Koreas. (3)
once a year
Comparative analysis of the political modernization experiences of China, Japan, and the two Koreas, focusing on their differing reactions to the West.
General Studies: SB, G

POS 452 China. (3)
once a year
Background of the Communist revolution, political processes, and developmental problems in China from a comparative perspective.
General Studies: SB, G

POS 453 South America. (3)
once a year
Political institutions, process, and developmental problems of South American states examined through comparative analysis, novels, and poetry.
General Studies: SB, G

POS 454 Mexico. (3)
once a year
Mexican federal, state, and local governmental institutions.
General Studies: SB, G

POS 455 Central America and the Caribbean. (3)
once a year
Governmental institutions, political processes, and developmental problems of the nation-states and dependent areas of Central America and the Caribbean.
General Studies: SB, G

POS 459 South and Southern Africa. (3)
once a year
Post-apartheid South African government and politics; South Africa and the southern African region; regional security and development.
General Studies: SB, G

POS 463 Inter-American Relations. (3)
once a year
Diplomatic relations among the Latin American states. Development of U.S. foreign policy toward Latin America.
General Studies: SB, G

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

POS 465 International Organization and Law. (3)
once a year
History, practical political significance, and future of international institutions, transnational regimes, and international law.
General Studies: SB, G

POS 467 International Security. (3)
once a year
Examines issues affecting the international security of states and peoples, e.g., military, economic, technological, environmental, and demographic.
General Studies: SB, G

POS 468 Comparative Asian Foreign Policies. (3)
once a year
Foreign policies of the Asian states, emphasizing their security relations and movements toward regionalism.
General Studies: SB, G

POS 471 Constitutional Law I. (3)
once a year
Development of the U.S. Constitution as reflected in decisions of the Supreme Court; jurisdiction and organization of the federal courts; judicial review; separation of powers; federalism; the commerce clause; national taxing and spending power; state police power.
General Studies: SB

POS 472 Constitutional Law II. (3)
once a year
Development of the U.S. Constitution as reflected in decisions of the Supreme Court; due process; equal protection of laws; individual rights; civil liberties.
General Studies: SB

POS 484 Internship. (1–12)
selected semesters

POS 485 Political Economy. (3)
once a year
Problems, policies, and possibilities of various political-economic systems and the interrelationship of capitalism, socialism, and democracy.
General Studies: SB

POS 486 International Political Economy. (3)
once a year
Contending approaches to historical and contemporary issues of international political economy, including global welfare, equality, ecology, and peace.
General Studies: SB, G

POS 498 Pro-Seminar. (3)
once a year
Small group study and research for advanced students within their major area. Prerequisite: major in the department or instructor approval.
General Studies: L

POS 499 Individualized Instruction. (3)
selected semesters

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

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

Department of Psychology

psych.la.asu.edu
480/965-3326
PSY 237

Keith A. Crnic, Chair

Regents' Professors: Cialdini, Eisenberg, Russo, Sandler

Professors: Aiken, Barrera, Braver, Castro, Chassin, Crnic, Gonzales, Homa, Karoly, Kenrick, Killeen, Knight, Lanyon, Linder, MacKinnon, Millsap, Neisewander, Neuberg, Okun, Parkinson, Presson, Reich, Sadalla, Somerville, Van Orden, West, Wolchik, Zautra

Associate Professors: Alexander, Castaneda, Conrad, Davis, Fabricius, Goldinger, Leshowitz, McBeath, Nagoshi, Nemeroff, Saenz, Stone

Assistant Professors: E. Amazeen, P. Amazeen, Lemery, Luecken

Senior Lecturers: Barton, Wosinski

Lecturer: Palmer

The Department of Psychology maintains an undergraduate advising office staffed by trained personnel. All psychology majors are encouraged to meet with an advisor once each semester to ask questions regarding choices of courses. Failure to do so may prevent graduation at the expected time. It is the responsibility of the student to consult with an undergraduate advisor.

PSYCHOLOGY—BA

The BA degree in Psychology consists of 37 semester hours in psychology, including at least 24 upper-division semester hours, and 12 semester hours of related course work. All courses must be passed with a minimum grade of "C" (2.00). The requirements are as follows:

I. Foundations of Psychology (10 semester hours)

PGS 101 Introduction to Psychology *SB* (3)
PSY 230 Introduction to Statistics *CS* (3)
PSY 290 Research Methods *L/SG* (4)

II. Breadth (12 semester hours)

One course from each of four of the following five clusters:

Biological: PSY 325
Personality/Mental Health: PGS 315, 466
Cognitive/Learning: PSY 320, 323, 324
Developmental: PGS 341
Social: PGS 306, 350, 351

III. Depth (six semester hours)

Two additional courses from one of the clusters used to meet the breadth requirements. At least one of the courses must be at the 400 level.

Biological: PSY 424, 425, 426, 470
Personality/Mental Health: PGS 315, 365, 443, 444, 462, 464, 465, 466, 468, 471, 472
Cognitive/Learning: PSY 320, 323, 324, 420, 434, 437
Developmental: PGS 344, 427, 441, 445, 446
Social: PGS 306, 350 or 351, 430, 451, 452, 458, 461

IV. Additional Psychology Courses (nine semester hours)

Three courses in psychology (two must be in the upper division) excluding PGS 270, 484 and PSY 484. Approved 200-level community college courses may be used in this category. These courses may not be used to also satisfy breadth or depth requirements. Students may count up to six semester hours in PGS or PSY 399 or 499 to satisfy this requirement. Honors students may count up to three semester hours of PSY 492 and three semester hours of PSY 493 (six semester hours total), in lieu of six semester hours of PGS or PSY 399 or 499, to satisfy this requirement.

V. Mathematics Foundation (three semester hours)

MAT 119, 251, or higher than 251.

VI. Foundations of Behavior (nine semester hours)

Any three courses from among the following prefixes: ASB, ASM, BIO, GCU, SOC, PHI, and HPS.

For more information, see "College Degree Requirements," page 330.

PSYCHOLOGY—BS

The BS degree in Psychology is focused on the science of psychology and is designed specifically for students planning to pursue an advanced degree in psychology or related disciplines. The requirements for the BS degree in Psychology are identical to the requirements for the BA degree with the following three exceptions:

1. PSY 330 must be completed as one of the options in the additional psychology course requirements.
2. At least three semester hours of PSY 390 or PGS or PSY 399 or 499 must be completed as one of the options in the additional psychology course requirements.
3. MAT 251 or higher must be completed for the mathematics foundation requirement.

MINOR IN PSYCHOLOGY

The minor in Psychology consists of completing the 22 semester hours of course work in the foundations of psychology and the breadth categories described above. Students with an appropriate equivalent course may exclude PSY 230 from the requirements but need an additional three hours in psychology to equal the 22 hours minimum. All courses must be passed with a minimum grade of "C" (2.00).

BIS CONCENTRATION

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

GRADUATE PROGRAMS

The faculty in the Department of Psychology offer a program leading to the PhD degree. See the *Graduate Catalog* for requirements.

PSYCHOLOGY (SOCIAL AND BEHAVIORAL) (PGS)

PGS 101 Introduction to Psychology. (3)
fall, spring, summer
Major areas of theory and research in psychology. Requires participation in department-sponsored research or an educationally equivalent alternative activity.
General Studies: SB

PGS 194 Special Topics. (1–4)
selected semesters

PGS 222 Human Sexual Behavior. (3)
fall and spring
Patterns of sexual behavior, including variations and deviations; theories of sexual attraction, sex differences, and sexual dysfunction and treatment. Prerequisite: PGS 101.
General Studies: SB

PGS 270 Psychology of Adjustment. (3)
fall, spring, summer
Principles of mental health, adjustment, conflict, stress, and coping processes derived from clinical and experimental research. Intended for nonmajors; cannot be used for major credit. Prerequisite: PGS 101.
General Studies: SB

PGS 304 Effective Thinking. (3)
once a year
Understanding and improving intellectual and behavioral skills; information analysis, inference, logic, problem solving, and decision making. Prerequisite: MAT 119 or PSY 230 (or its equivalent).
General Studies: L

PGS 306 Environmental Psychology. (3)
fall, spring, summer
Concepts and research strategies in the study of behavior in interaction with physical environment. Prerequisite: PGS 101.
General Studies: SB

PGS 315 Personality Theory and Research. (3)
fall, spring, summer
Definition and description of personality in terms of theoretical and methodological approaches. Prerequisites: PGS 101; PSY 290.
General Studies: SB

PGS 341 Developmental Psychology. (3)
fall and spring
Analyzes behavior development in terms of psychological principles. Current research in human development. Prerequisites: PGS 101; PSY 290.
General Studies: SB

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

PGS 344 Directed Child Study. (3–4)
fall, spring, summer
Theories and methods of intervention with preschool children and supervised practicum in the Child Study Laboratory. 1 hour lecture, 6–8 hours practicum. Prerequisites: CDE 232; ECD 314 (or PSY 290).

PGS 350 Social Psychology. (3)
fall, spring, summer
Human social behavior, including such concepts as aggression, attraction, attribution, conformity, groups, helping, person perception, and persuasion. Prerequisite: PGS 101.
General Studies: SB

PGS 351 Honors Social Psychology. (3)
selected semesters
Critical analysis of human social behavior for honors students; topics include stereotyping, social influence, attraction, aggression, helping, groups, and attitudes. Open only to students without previous credit for PGS 350. Lecture, discussion. Prerequisites: PGS 101; honors standing; instructor approval.
General Studies: L/SB

PGS 365 Community Psychology. (3)
fall and spring
Mental health and psychological well-being in the community, emphasizing current issues and related research. Prerequisite: PGS 315 or 350.
General Studies: SB

PGS 394 Special Topics. (1–4)
selected semesters

PGS 399 Supervised Research. (1–3)
fall, spring, summer
Experience within the context of current faculty research projects. Responsibility is assigned depending on qualifications. "Y" grade only. May be repeated for a total of 6 hours. Prerequisites: approval of faculty member before registration; 3.00 GPA in major. Pre- or corequisite: PSY 230 (or its equivalent).

PGS 414 History of Psychology. (3)
fall and spring
Historical development of psychology from its philosophical beginnings to the present. Prerequisites: PGS 101; PSY 230, 290.
General Studies: L/SB

PGS 427 Psychology of Aging. (3)
selected semesters
Analyzes loss, maintenance, and gain associated with cognitive and affective aging. Individual differences in coping with normative life transitions. Prerequisites: PGS 101, 341.
General Studies: L/SB

PGS 430 Industrial Psychology. (3)
fall, spring, summer
Organizations and management systems; motivation and work performance; human factors in systems design and evaluation; personnel selection and testing. Prerequisite: MGT 300 or PGS 101.

PGS 441 Cognitive Development. (3)
fall and spring
Experimental and theoretical literature in child development and behavior. Prerequisite: PGS 341 or instructor approval.
General Studies: L/SB

PGS 443 Abnormal Child Psychology. (3)
fall and spring
Covers major disorders of childhood and adolescence (e.g., autism, hyperactivity, phobias, and delinquency), including cause, diagnosis, treatment, and prevention. Prerequisites: PGS 315 (or 341 or 350); PSY 290.
General Studies: L/SB

PGS 444 Adolescent Psychology and Psychopathology. (3)
selected semesters
Advanced-level survey of normal adolescent psychological development and psychological disorders of this age period. Lecture, discussion. Prerequisites: PGS 101, 341; PSY 290.
General Studies: L

PGS 445 Child Language and Drawing. (3)
fall
Language acquisition and developmental changes in drawing, considered in the context of cognitive developmental stages. Children's representation and communication of knowledge through language and drawing. Prerequisite: PGS 341.
General Studies: SB

PGS 446 Social Development. (3)
selected semesters
Discusses theory, research, and issues regarding social development. Example topics: formation of attachments, prosocial development, and gender-role development. Lecture, seminar. Prerequisite: PGS 341.
General Studies: L

PGS 451 Stereotyping, Prejudice, and Discrimination. (3)
selected semesters
Critical investigation of the processes underlying, and the factors contributing to, stereotyping, prejudice, and discrimination. Lecture, discussion. Prerequisites: PGS 101, 350.
General Studies: L

PGS 452 Applied Social Psychology. (3)
fall
Studies applications of social psychological theory and concepts in natural settings; research design and data analysis. Lecture, lab-type activities. Prerequisites: PGS 101, 350; PSY 230.
General Studies: L

PGS 458 Group Dynamics. (3)
fall
Theories and methods of group leadership, group effectiveness, communication within groups, and relations between groups and individual members. Prerequisite: PGS 350.

PGS 461 Interpersonal Influence. (3)
selected semesters
Principles and procedures that affect the process of social influence; consideration of attitudinal, compliance-inducing, and perceptual influences. Prerequisite: PGS 350.
General Studies: SB

PGS 462 Health Psychology. (3)
fall and spring
Contributions of psychology to health promotion and illness prevention, adaptation to acute and chronic illness, and to the health care system. Prerequisites: PSY 230, 290.

PGS 464 Minority Issues in Psychology. (3)
spring
Psychological issues relating to the diversity of human cultural experiences among ethnic minorities in the U.S. Prerequisite: PSY 290.

PGS 465 Psychology of Stress and Coping. (3)
fall
Readings in theory and research in the area of stress and coping. Lecture, discussion, class presentations. Prerequisites: PGS 315 (or 350); PSY 290.
General Studies: L

PGS 466 Abnormal Psychology. (3)
fall, spring, summer
Historical and current definitions, theory, and research concerning abnormal behavior. Major categories of psychopathology, including related treatment approaches. Prerequisites: PGS 101; PSY 290.
General Studies: SB

PGS 467 Psychology of Magical Beliefs. (3)
selected semesters
Psychological nature and bases of magical beliefs and their impact on health behaviors, eating practices, and interpersonal relations. Lecture, seminar. Prerequisites: a combination of PGS 315 and 466 and PSY 434 or only instructor approval.
General Studies: L

PGS 468 Psychology and Law. (3)
fall and spring
Theories, research, and practice in psychology as related to law, including criminal, civil, domestic relations, and professional issues. Lecture, discussion. Prerequisite: PSY 290.

PGS 471 Psychological Testing. (3)
spring
Methods and theory of psychological testing; various types of psychological tests; consideration of ethical, social, and legal aspects of testing. Prerequisite: PSY 290.

PGS 472 Clinical Psychology. (3)
fall and spring
Clinical psychology as a science and profession. Historical development, methods of interviewing, assessment, and therapeutic intervention. Prerequisite: PGS 466.

PGS 484 Internship. (1–12)
selected semesters

PGS 494 Special Topics. (1–4)
selected semesters

PGS 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.

PSYCHOLOGY (SCIENCE AND MATHEMATICS) (PSY)

For more PSY courses, see "Course Prefix Index," or access www.asu.edu/aad/catalogs/courses. The campus designation—E (East), M (Tempe), or W (West)—may affect how courses may be used to fulfill requirements.

M PSY 230 Introduction to Statistics. (3)
fall, spring, summer
Basic concepts in descriptive and inferential statistics, emphasizing applications to psychology. Self-paced (PSI) and lecture sections. Prerequisites: MAT 117; PGS 101.
General Studies: CS

M PSY 290 Research Methods. (4)
fall and spring
Planning, execution, analysis, and reporting of experiments. Literature, procedures, and instruments in representative areas of psychological research. 3 hours lecture, 3 hours lab. Prerequisites: ENG 101 (or 105); PSY 230.
General Studies: L/SG

M PSY 320 Learning and Motivation. (3)
fall, spring, summer
Principles of conditioning and motivation; approaches to learning, including acquisition of verbal materials, concepts, and motor skills; memory and transfer. Prerequisite: PSY 290.

M PSY 323 Sensation and Perception. (3)
fall and spring
Underlying processes of vision, audition, and the other senses. Applies current research and theory in a laboratory environment. Prerequisite: PSY 290 or instructor approval.

M PSY 324 Memory and Cognition. (3)
fall, spring, summer
Processes underlying information storage and retrieval, including different kinds of memory, forgetting, depth of processing, and control processes. Prerequisite: PSY 290.

M PSY 325 Physiological Psychology. (3)
fall, spring, summer
Relationships of physiological processes to behavior. Emphasizes nervous system functioning. Prerequisites: PSY 290 (or 2 courses in biological science); instructor approval.

M PSY 330 Statistical Methods. (3)
spring
Advanced application of statistics to psychology. Highly recommended for students interested in attending graduate school. 3 hours lecture, 1 hour lab. Prerequisite: PSY 230.
General Studies: CS

M PSY 390 Experimental Psychology. (3)
spring
Continuation of concepts in PSY 290, with emphasis on multifactor designs and programmatic sequence of experiments. Lecture, lab. Prerequisite: PSY 290.
General Studies: L

M PSY 399 Supervised Research. (1–3)
fall, spring, summer

M PSY 420 Analysis of Behavior. (3)
selected semesters
Research, applications, and philosophy of the analysis and control of human behavior. Prerequisite: PSY 320.
General Studies: L

Tempe campus features more than 300 diverse species of trees and plants. Tim Trumble photo

M PSY 422 Motor Control in Special Populations. (3)
spring
Discusses principles of motor control theories and related practical applications for certain special developmental populations. Lecture, discussion. Cross-listed as KIN 422. Credit is allowed for only KIN 422 or PSY 422. Prerequisite: KIN 345.
General Studies: L

M PSY 424 Genetic Psychology. (3)
spring
Introduces the concepts, methodologies, and findings of behavioral genetics for Psychology majors. Prerequisites: PGS 101; PSY 230, 290.
General Studies: L

M PSY 425 Biological Bases of Behavior. (3)
selected semesters
Critical study of physiological psychology; brain mechanisms underlying motivation and learning. Prerequisite: PSY 325.
General Studies: L

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

M PSY 426 Neuroanatomy. (4)
selected semesters
Structure and function of mammalian brain, including sheep brain dissection. 3 hours lecture, 3 hours lab. Prerequisite: PSY 325 (or its equivalent).

M PSY 434 Cognitive Psychology. (3)
spring
Human organism as a processor of information, from perception to cognition. Abstract concepts, semantic memory, attention, and mental imagery. Prerequisite: PSY 323 or 324 or instructor approval.
General Studies: L

M PSY 437 Human Factors. (3)
fall
Emphasizes human factors in high-technology systems. Specific topics include systems development, systems analysis techniques, displays, and controls. Prerequisites: both PSY 290 and upper-division standing or only instructor approval.
General Studies: L

M PSY 470 Psychopharmacology. (3)
fall and spring
Basis of drug action at physiological and behavioral levels. Psychological and medical applications and limitations of drugs used in the treatment of mental illness. Prerequisites: PSY 325; 1 semester each of biology and chemistry.

M PSY 484 Internship. (1–12)
selected semesters

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

M PSY 493 Honors Thesis. (1–6)
selected semesters

M PSY 494 Special Topics. (1–4)
selected semesters

M PSY 497 Honors Colloquium. (1–6)
selected semesters

M PSY 498 Pro-Seminar. (1–7)
fall and spring
Topics may include the following:
- Behavioral Neuroscience Research. (3)
  General Studies: L

M PSY 499 Individualized Instruction. (1–3)
selected semesters

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

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

Department of Religious Studies

www.asu.edu/clas/religious_studies
480/965-7145
ECA 377

Joel D. Gereboff, Chair

Professors: Cady, Feldhaus, Foard, Morrison, Samuelson

Associate Professors: Clay, Fessenden, Gereboff, Moore, Schober, Swanson, Woodward

Assistant Professors: Aguilera, Benn, Damrel, Park, Umar, Wenger

Lecturer: Kefeli-Clay

RELIGIOUS STUDIES—BA

The BA degree in Religious Studies consists of 45 semester hours, 30 of which must be in religious studies (including 21 in upper-division courses) and 15 of which must be in related fields. In order for the student to become acquainted with the character and role of religions across a wide spectrum of social and historical contexts, the 30 semester hours in religious studies must include the following courses:

1. REL 305 Ritual, Symbol, and Myth;
2. at least one course from each of the following distribution areas: Religion in the Americas, Religion and Asian Cultures, and Religion and Western Cultures;
3. REL 400 Approaches to Religion; and
4. two research seminars, including REL 405 Problems in Religious Studies, which may be repeated for credit; or
5. in place of a second seminar, a student may take REL 499 to write an undergraduate thesis.

The Religious Studies major is an appropriate choice for students wishing to explore such areas as African or African American studies; Islamic studies; myth, ritual, and the arts; Native American studies; and religion and politics. All majors must plan their programs in consultation with a departmental advisor. A minimum GPA of 2.50 is required in the 30 semester hours of religious studies courses.

MINOR IN RELIGIOUS STUDIES

The minor in Religious Studies consists of 18 semester hours, at least 12 of which must be in the upper division. Both REL 305 and 405 are required. For minor verification, students must consult a department advisor.

BIS CONCENTRATION

A concentration in religious studies is available under the Bachelor of Interdisciplinary Studies (BIS) degree, a program intended for the student who has academic interests

that might not be satisfied with existing majors. Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

CERTIFICATES AND EMPHASES

The following are certificate programs or emphases offered in the Department of Religious Studies. For more information on each, see "Certificate Programs and Areas of Emphasis," page 336, or access the department Web site at www.asu.edu/clas/religious_studies.

Asian Studies Certificate. Students majoring in Religious Studies may elect to pursue an Asian Studies emphasis or East Asian Studies Certificate combining courses from the major with selected outside courses of wholly Asian content.

Islamic Studies Certificate. Students majoring in Religious Studies may elect to earn an Islamic Studies Certificate by successfully completing the requirements mentioned in "Islamic Studies Certificate," page 340.

Jewish Studies Certificate. Students majoring in Religious Studies may elect to pursue a Jewish Studies Certificate combining courses from the major with selected outside courses in the area of Jewish Studies.

Latin American Studies Certificate. Students majoring in Religious Studies may elect to pursue a Latin American Studies certificate combining courses from the major with selected outside courses of wholly Latin American content.

Russian and East European Studies. Students majoring in Religious Studies may elect to earn a Russian and East European Studies Certificate by successfully completing one of the options mentioned in "Russian and East European Studies," page 341.

Southeast Asian Studies Emphasis. Students majoring in Religious Studies may elect to earn a Southeast Asian Studies Certificate by successfully completing the requirements.

Women and Gender Studies. Students majoring in Religious Studies may elect to earn a Women and Gender Studies Certificate by successfully completing the requirements.

GRADUATE PROGRAM

The faculty in the Department of Religious Studies offer a graduate program leading to the MA degree for those who wish to enter a doctoral program in the study of religions, for those who wish to teach at the community college level, and for those in nonacademic careers who desire general competence in the academic study of religions. A doctoral program is offered. See the *Graduate Catalog* for requirements.

RELIGIOUS STUDIES (REL)

REL 100 Religions of the World. (3)
fall and spring
Introduces the history of religious traditions of the world, including Buddhism, Christianity, Hinduism, Islam, Judaism, and others. Credit is allowed for only REL 100 or 200.
General Studies: HU, G

REL 200 The Study of Religious Traditions. (3)
selected semesters
Writing-intensive course introducing analytical skills necessary for understanding religious traditions. Beliefs, practices, and communities of several religious traditions of the world. Credit is allowed for only REL 200 or 100. Prerequisite: ENG 101 or 105.
General Studies: L/HU, G

REL 201 Religion and the Modern World. (3)
once a year
Introduces the nature and role of religious beliefs and practices in shaping the lives of individuals and societies, with particular attention to the modern world. Prerequisite: ENG 101 or 105.
General Studies: L/HU

REL 202 Religion and Popular Culture. (3)
once a year
Explores various intersectors between religion and the popular media, including music, news, advertising, the visual arts, literature, performance, and film. Lecture, discussion.
General Studies: HU, C

REL 203 Saints and Sinners: Explorations in Sacred Biography. (3)
selected semesters
Comparison of the role of biography across religions to examine the process of categorizing people as saints or sinners. Lecture, discussion.
General Studies: HU, H

REL 210 Introduction to Judaism. (3)
once a year
Beliefs, ceremonies, festivals, and institutions of Judaism emphasizing the contemporary era. Assumes no previous knowledge about Judaism. Prerequisite: ENG 101 or 105.
General Studies: L/HU, H

REL 225 African American Religion. (3)
selected semesters
Introduces the history and development of the African American religious tradition. Lecture, discussion.
General Studies: HU, C

REL 240 Introduction to Southeast Asia. (3)
fall and spring
Interdisciplinary introduction to the cultures, religions, political systems, geography, and history of Southeast Asia. Cross-listed as ASB 240/GCU 240/HST 240/POS 240. Credit is allowed for only ASB 240 or GCU 240 or HST 240 or POS 240 or REL 240.
General Studies: HU/SB, G

REL 260 Introduction to Islam. (3)
spring
Examines Islamic beliefs, ceremonies, festivals, and institutions. Assumes no prior knowledge about Islam. Lecture, discussion.
General Studies: HU, G

REL 270 Introduction to Christianity. (3)
once a year
Beliefs, ceremonies, festivals, and institutions of Christianity, emphasizing the contemporary era. Assumes no previous knowledge about Christianity.
General Studies: HU

REL 301 Comparative Mysticism. (3)
once a year
Comparative examination of Eastern and Western mystical traditions from antiquity to the present. Lecture, discussion. Prerequisite: REL 100.
General Studies: HU

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

REL 305 Ritual, Symbol, and Myth. (3)
fall and spring
Ritual, symbol, and myth as types of religious expression, with examples selected from the nonliterate religions of the world.
General Studies: L/HU

REL 310 Western Religious Traditions. (3)
fall and spring
Religious traditions of Judaism, Christianity, and Islam, comparing their doctrinal, institutional, and ritual systems and social histories. Lecture, discussion.
General Studies: HU, H

REL 315 Hebrew Bible (Old Testament). (3)
once a year
Nature, content, background, historical situation, and message of the books of the Hebrew Bible in English translation.
General Studies: L/HU, H

REL 317 Introduction to Rabbinic Judaism. (3)
selected semesters
Historical analysis of the thought, literature, and institutions of rabbinic Judaism.
General Studies: HU, H

REL 318 Contemporary American Jewish Identities. (3)
spring
Analyzes the complexity and diversity of the contemporary American Jewish community in religious and secular affairs. Lecture, discussion. Cross-listed as SOC 375. Credit is allowed for only REL 318 or SOC 375.
General Studies: HU/SB, C

REL 320 American Religious Traditions. (3)
fall and spring
Examines the formation, development, and interaction of major American religious traditions (indigenous, African American, Asian American, and Euro-American).
General Studies: HU, C, H

REL 321 Religion in America. (3)
fall and spring
History of religion in America with attention to issues of historiography, pluralism, gender, race, ethnicity, politics, and social reform.
General Studies: HU, C, H

REL 322 Malcolm and Martin. (3)
selected semesters
Examines and contrasts the lives, ministries, contributions, and legacies of Malcolm X and Martin Luther King, Jr.
General Studies: HU, C

REL 323 Black Religion: A Biographical Approach. (3)
selected semesters
Examines the experiences, motivations, and contributions of a number of figures associated with African American religion.
General Studies: HU, C

REL 324 Spirituals and the Blues. (3)
spring
Multidisciplinary exploration of the African American religious and musical response to the North American diaspora experience. Lecture, discussion.

REL 326 U.S. Latino Religion and Culture. (3)
fall
Survey of the formative myths, rituals, and symbols of Mexican Americans, Puerto Ricans, and Cuban Americans. Lecture, discussion.
General Studies: HU, C

REL 330 Native American Religious Traditions. (3)
once a year
Presents world views and religious thought through the art, architecture, literature, music, mythology, ritual, and folklore of representative tribes in North America.
General Studies: HU, C

REL 331 History of Native American Religious Traditions. (3)
once a year
Role of religion in Native American history, including missionization; religious adaptation; and prophetic, messianic, and religious revitalization movements.
General Studies: L/HU, C, H

REL 332 South American Indian Religions. (3)
selected semesters
Introduces the sacred stories, ceremonies, and beliefs of Native South American peoples in their historical contexts.
General Studies: HU, G

REL 343 Taoism. (3)
fall
Introduces the history, doctrines, and practices of Taoism from the mid-second century CE up to the present. Lecture, discussion.
General Studies: L/HU, G, H

REL 344 Religion and Values in Japanese Life. (3)
once a year
Japanese values expressed in the life and annual cycles of the family, local and national identities, and popular culture. Lecture, discussion.
General Studies: HU, G

REL 345 Asian Religious Traditions. (3)
once a year
Introduces the major concepts of religious beliefs, rituals, and practices in Hinduism and Buddhism. Lecture, discussion.
General Studies: HU, G

REL 346 Chinese Religions. (3)
selected semesters
Examines the history and practices of Chinese religions with particular attention to culture, society, and history.

REL 350 Hinduism. (3)
once a year
Studies diverse forms of Hinduism through its institutions, literature, folklore, art, and architecture.
General Studies: L/HU, G

REL 351 Buddhism. (3)
once a year
Doctrines, practices, and institutions of the Buddhist religion, emphasizing its role in the history and culture of Asian societies.
General Studies: L/HU, G

REL 352 Modern Buddhism. (3)
fall
Examines diverse modernities with regard to Buddhist institutions, practices, colonialism and cultural transformations in Asia and the West. Lecture, discussion. Prerequisite: REL 100 or 345 or 351.

REL 355 Japanese Cities and Cultures to 1800. (3)
once a year
Relations among ideas and literary, visual, and performing arts of the ancient aristocracy, medieval samurai, and early modern townspeople. Cross-listed as HUM 310. Credit is allowed for only HUM 310 or REL 355.
General Studies: L/HU, H

REL 365 Islamic Civilization. (3)
fall
Global historical survey of Islamic cultures and societies up to the modern period. Lecture, discussion.
General Studies: HU, H

REL 366 Islam in the Modern World. (3)
spring
Examines the worldwide transformations of Islamic religion, cultures, and societies in the modern period. Lecture, discussion.
General Studies: HU, G, H

REL 369 Women in Islam. (3)
fall
Examines the roles women have played through Islamic history (Middle East) and the changing discourse on gender identity. Lecture, seminar.

REL 371 New Testament. (3)
once a year
Origins and literature of early Christian communities; historical investigations of the types of oral and written tradition in the New Testament.
General Studies: HU

REL 372 Formation of the Christian Tradition. (3)
once a year
Origins, development, and expansion of Christianity; major themes and tensions from the New Testament world to the beginning of the Middle Ages.
General Studies: HU, H

REL 373 Women in Judaism. (3)
spring
Studies the legal, social, and cultural status of Jewish women in various historical and contemporary societies. Cross-listed as WST 372. Credit is allowed for only REL 373 or WST 372.

REL 374 Witchcraft and Heresy in Europe. (3)
selected semesters
Background, origins, and development of the Inquisition; persecution of women and marginal groups. Cross-listed as HST 361. Credit is allowed for only HST 361 or REL 374. Prerequisite: upper-division standing or instructor approval.
General Studies: L/HU, H

REL 377 Religion in Russia. (3)
selected semesters
Examines the history of the various religious traditions of Russia and the former USSR from an interdisciplinary perspective.
General Studies: HU, H

REL 379 Religion, Nationalism, and Ethnic Conflict. (3)
selected semesters
Examines the role of religion in national and ethnic conflict in the contemporary world.
General Studies: HU, G

REL 381 Religion and Moral Issues. (3)
once a year
Manner in which human religiousness relates to social concerns, e.g., sexuality, the environment, bioethical issues, and violence.
General Studies: L/HU

REL 382 Religion, Magic, and Science. (3)
once a year
Relationship and conflict between religion, magic, and science in the West from antiquity to the present. Lecture, discussion.
General Studies: L/HU

REL 383 Origins, Evolution, and Creation. (3)
selected semesters
Examines scientific, mythic, and religious ideas relating to origins (particularly human). Place of antievolutionism and "scientific creationism" in American culture. Lecture, discussion. Cross-listed as BIO 344/HPS 311/HUM 371. Credit is allowed for only BIO 344 or HPS 311 or HUM 371 or REL 383.

REL 384 The Bible and Archaeological Discoveries. (3)
spring
Studies the Bible alongside the stories that architecture, pottery, metalwork, sculpture, tombs, and paintings of the ancient Near East have to tell. May be repeated for credit.

REL 385 Contemporary Western Religious Thought. (3)
selected semesters
Introduces contemporary Jewish and Christian thought. Topics include religion and politics, problem of evil, interpretations of God, and feminist theology.
General Studies: HU

REL 386 America and the Holocaust. (3)
fall
Analyzes the historical and sociopolitical factors that shaped U.S. policy decisions regarding Germany's assault on Europe's Jews.
General Studies: HU/SB

REL 390 Women and Religion. (3)
fall and spring
Role of women in several organized religions and/or religious sects, including a study of myth and symbols as they are used to establish, maintain, and enforce sex roles within specific religions.
General Studies: HU, G

REL 394 Special Topics. (1–4)
selected semesters

REL 400 Approaches to Religion. (3)
fall
Examines the intellectual history of academic study of religion through various theoretical approaches, major themes, and thinkers. Seminar. Prerequisite: REL 305.

REL 405 Problems in Religious Studies. (3)
fall and spring
Selected topics in religious studies; involves students in research interests of instructor. May be repeated for credit when topics vary. Seminar. Prerequisite: at least 9 semester hours of REL courses or instructor approval.

REL 410 Judaism in Modern Times. (3)
selected semesters
Variety of expressions of Judaism and Jewishness in the modern period. Topics may include American Judaism or religious responses to the Holocaust.
General Studies: HU, H

REL 420 Religion in American Life and Thought. (3)
selected semesters
Influence of religion on American society, culture, and ideas; the distinctive character of religion in America. Prerequisite: REL 320 or 321 (or its equivalent).
General Studies: HU

REL 427 American Religious Thought. (3)
selected semesters
Thought of representative American religious thinkers, e.g., Jonathon Edwards, William Ellery Channing, Horace Bushnell, and Reinhold Niebuhr. Prerequisite: REL 320 or 321 (or its equivalent).
General Studies: HU, H

REL 444 Religion in Japan. (3)
once a year
Religion in Japanese history, especially the development of Japanese Buddhism, and religion in the modern transformation of Japan. Prerequisite: instructor approval.
General Studies: HU, G, H

REL 460 Studies in Islamic Religion. (3)
selected semesters
Issues in the interpretation and understanding of Islamic texts, history, society, culture, and rituals. Prerequisites: both REL 365 and Religious Studies major or only instructor approval.
General Studies: HU, G

REL 470 Religion in the Middle Ages. (3)
selected semesters
Religious aspects of medieval life and thought; variety of forms of dissent, heresy, and reform movements from the 4th to 13th centuries.
General Studies: HU, H

REL 471 Reformation and Modern Christianity. (3)
selected semesters
Protestant Reformation to contemporary Christian movements; includes factors in the dissolution of the Medieval Christian synthesis, variety of reform movements and reformation patterns, Catholic counter-reform measures, formation of liberal theology, ecumenical movement, and the World Council of Churches.
General Studies: HU, H

REL 480 Religion and Global Politics. (3)
once a year
Explores the nature and role of religion in international politics in the modern period. Lecture, discussion.
General Studies: G

REL 483 Religion and Science. (3)
spring
Investigates the correlation between science and religion as an interdisciplinary study from a historical perspective. Readings, film, lecture, discussion. Prerequisite: junior standing or instructor approval.

REL 494 Special Topics in Religious Studies. (3)
fall and spring
Open to all students. Topics may be selected from various areas. Prerequisite for freshmen: instructor approval.

REL 498 Pro-Seminar in Religious Studies. (3)
selected semesters
For students with a major or minor emphasis in Religious Studies.

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

REL 499 Individualized Instruction. (1–3)
fall and spring

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

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 Sociology

www.asu.edu/clas/sociology
480/965-3546
COOR 5681

Jennie Jacobs Kronenfeld, Chair

Professors: Cobas, Hackett, Jacobson, Kronenfeld, Kulis, Thomas, Weitz

Associate Professors: Agadjanian, Benin, Harlan, Keith, Miller-Loessi, Sullivan

Assistant Professors: Glick, Padilla, Yabiku

Senior Lecturer: Fine

SOCIOLOGY—BA

The BA degree in Sociology requires a minimum of 30 semester hours of Sociology course work and 15 hours in closely related fields. Of the 30 required hours, a minimum of 18 hours must be upper-division with at least 12 of the 18 upper-division hours taken in residence at the Tempe campus. All upper-division courses in the major must be completed with a grade of "C" (2.00) or higher. The following courses are required:

SOC	101	Introductory Sociology *SB* ..... 3 or SOC 301 Principles of Sociology *SB* (3)
SOC	390	Social Statistics I *CS* 3
SOC	391	Sociological Research *SB* 3
SOC	483	History of Social Thought *SB* ..... 3 or SOC 486 Contemporary Theory *SB* (3)
Total		 12

Sociology majors may complete the remaining 18 required hours through selecting one of two options. For a general sociology degree, students must choose six courses that sample at least three of the following seven sociology content areas:

1. family;
2. intergroup relations and social psychology;
3. political/comparative-historical;
4. social problems and processes;
5. stratification/occupations/organization;
6. urban sociology/demography; or
7. race and ethnicity.

If majors desire a more focused preparation in a specialized area, they may complete the remaining 18 hours in one of five focus areas: family issues, urban issues, diversity issues, work/organizational issues, and health issues. Students choosing this option must complete one required focus area course. Other requirements include four courses from a list of optional courses within that focus area and one additional sociology course. Internships (SOC 484) are available within the focus area option for those who qualify.

Information concerning the two options for fulfilling major requirements is available in the Department of Sociology office in COOR 5681, and on the Internet at www.asu.edu/clas/sociology/undergraduate/undergraduate.html.

MINOR IN SOCIOLOGY

The minor in Sociology requires 18 hours, of which 12 hours must be upper-division courses, with at least six upper-division hours completed at the Tempe campus. The required courses are as follows:

SOC	101	Introductory Sociology *SB* ..... 3 or SOC 301 Principles of Sociology *SB* (3)
SOC	391	Sociological Research *SB* ..... 3 or SOC 483 History of Social Thought *SB* (3) or SOC 486 Contemporary Theory *SB* (3)
Total		 6

The remaining four courses consist of sociology electives.

BIS CONCENTRATION

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

GRADUATE PROGRAMS

The faculty in the Department of Sociology offer programs leading to the MA and PhD degrees. See the *Graduate Catalog* for requirements.

SOCIOLOGY (SOC)

SOC 101 Introductory Sociology. (3)
fall, spring, summer
Fundamentals of sociology, organization of human groups and society, processes of interaction, and social change. Credit is allowed for only SOC 101 or 301.
General Studies: SB

SOC 220 Sport and Society. (3)
fall and spring
Examines sports in American society as a source of socialization and an institution where gender, race/ethnicity, and class interact.
Prerequisite: SOC 101.
General Studies: SB

SOC 270 Racial and Ethnic Relations. (3)
fall, spring, summer
Problems of minorities in heterogeneous societies. Evaluates theories of prejudice and research dealing with discrimination, desegregation, and assimilation. Lecture, discussion. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB, C

SOC 301 Principles of Sociology. (3)
fall, spring, summer
Intensive and critical analysis of the concepts of sociology. Credit is allowed for only SOC 301 or 101.
General Studies: SB

SOC 312 Sociology of Adolescence. (3)
fall, spring, summer
Cultural values and the social processes that help explain the development of the phenomenon of modern adolescence, including investigation of adolescent subcultures and cross-cultural references. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB

SOC 315 Courtship and Marriage. (3)
fall, spring, summer
Overview of courtship, marriage, and related processes, focusing on problematic aspects of these institutions from the sociological perspective. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB

SOC 321 Sociology of Work. (3)
fall and spring
Social and cultural analysis of industry. Occupational roles, status, and social participation of workers. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB

SOC 331 Environmental Sociology. (3)
fall and spring
Analyzes human organizational responses to population growth, technological change, and environmental stressors on both a national and global scale. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB, G

SOC 332 Urban Sociology. (3)
selected semesters
Growth, characteristics, and problems of the modern city. Prerequisite: SOC 101 or 301.
General Studies: SB, G

SOC 333 Population. (3)
fall and spring
Global trends in population growth, composition, and distribution; theories, policies, and impact of population trends on environmental quality and development. Prerequisite: SOC 101 or 301.
General Studies: SB, G

SOC 334 Technology and Society. (3)
selected semesters
Development of technology in relation to society, work, science, the environment, public health, and cultural values related to social change. Lecture, discussion. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB

SOC 340 The Sociology of Deviance. (3)
fall, spring, summer
Sociological analysis of stigmatized behaviors and conditions, including the causes, effects, and management of stigma. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB

SOC 341 Modern Social Problems. (3)
fall, spring, summer
Selected issues such as education, poverty, race relations, crime, drugs, and international issues such as population, environment, global inequality, conflict. Prerequisite: SOC 101 or 301.
General Studies: SB

SOC 352 Social Change. (3)
selected semesters
Patterns of social change, resistance to change, and change-producing agencies and processes. Prerequisite: SOC 101 or 301.
General Studies: SB, G, H

SOC 360 Sociological Psychology. (3)
fall and spring
Interaction patterns between the sociocultural order and individuals; socialization process; norms, roles, and statuses; collective behavior. Prerequisite: SOC 101 or 301.
General Studies: SB

SOC 361 Variant Sexuality. (3)
selected semesters
Sociological research and theories dealing with homosexuality, transvestism, transsexualism, and other variations in sexual orientation and gender identity. Prerequisite: SOC 101 or 301.
General Studies: SB

SOC 363 Men and Masculinity. (3)
selected semesters
Sociological analysis of how masculine identity is defined, negotiated, and variously constructed depending upon class, ethnicity, age, and sexual orientation. Prerequisites: SOC 101 (or 301); WST 100 (or 300).
General Studies: SB

SOC 365 Sociology of Mass Communication. (3)
fall and spring
Sociological exploration of the major mass media as a communicative process in American society. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB

SOC 368 Sociology of Everyday Life. (3)
selected semesters
Examines routine everyday behavior as it relates to problems of social order, control, change, identity, and relationships. Prerequisite: SOC 101 or 301 or instructor approval.

SOC 375 Contemporary American Jewish Identities. (3)
spring
Analyzes the complexity and diversity of the contemporary American Jewish community in religious and secular affairs. Lecture, discussion. Cross-listed as REL 318. Credit is allowed for only REL 318 or SOC 375.
General Studies: HU/SB, C

SOC 390 Social Statistics I. (3)
fall, spring, summer
Descriptive and inferential statistical methods for analysis of social data. Computer applications. Prerequisites: SOC 101 (or 301); a General Studies MA course.
General Studies: CS

SOC 391 Sociological Research. (3)
fall, spring, summer
Methods of sociological research, including the fundamental assumptions underlying research and some practical experience in research design, data collection techniques, and data analysis. Prerequisites: both SOC 101 (or 301) and 390 or only instructor approval.
General Studies: SB

SOC 415 The Family. (3)
fall and spring
Family considered from the institutional viewpoint; its historical development and its adaptation to a changing culture; the family system in many cultures. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB

SOC 416 Marriage Problems in Contemporary Society. (3)
spring
Marital and family problems in today's society from the viewpoint of personal and cultural adjustment. Prerequisites: both SOC 101 (or 301) and an additional 3 hours in sociology or only instructor approval.
General Studies: L/SB

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

SOC 417 Family Violence. (3)
selected semesters
Current research and theories about domestic violence, including child maltreatment, spousal aggression, and courtship violence. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB

SOC 418 Aging and the Life Course. (3)
fall and spring
Social aspects of aging. Theoretical and methodological perspectives and problems of aging such as life satisfaction, retirement, and adjustment to role loss. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB

SOC 420 Sociology of Religion. (3)
selected semesters
Interrelationship of culture, society, and religion; religion and social stratification; religious, economic, and political institutions; social change and religion. Emphasizes American society and institutions. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: L/SB

SOC 421 Education and Society. (3)
fall
Uses contemporary sociological perspectives to examine effects of schools and schooling on individuals and society. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB

SOC 422 Sociology of Complex Organizations. (3)
selected semesters
Sociological studies of government agencies, industrial firms, labor unions, military establishments, and other large-scale organizations. Prerequisite: 6 hours in sociology (including SOC 101 or 301) or instructor approval.
General Studies: L/SB

SOC 423 Social Class and Stratification. (3)
spring
Classical and contemporary theories about who gets what and why. Examines social and economic inequalities by class, gender, and race/ethnicity. Lecture, discussion. Prerequisites: both SOC 101 (or 301) and an additional 3 hours in sociology or only instructor approval.
General Studies: L/SB

SOC 424 Women and Health. (3)
selected semesters
Women as health care workers and issues of health, illness, and health care for women. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: L/SB

SOC 427 Sociology of Health and Illness. (3)
fall and spring
Social aspects of illness and sociological analysis of the health care system and its practitioners. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: L/SB

SOC 429 Sociology of Law. (3)
selected semesters
Examines law as an institution; its origins, operations, and consequences. Emphasizes contemporary legal issues and problems. Prerequisite: SOC 101 or 301.
General Studies: SB

SOC 433 Applied Demography. (3)
spring
Science of population analysis. Covers techniques for measuring fertility, mortality, migration, and population composition. Lecture, projects. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB

SOC 446 Sociology of Crime. (3)
fall and spring
Process of criminalization, exploring the behavior of the definers of crime, and the behavior of those defined as criminals. Prerequisites: both SOC 101 (or 301) and 340 or only instructor approval.
General Studies: SB

SOC 448 Epidemics and Society. (3)
fall
How epidemics occur; how they are perceived in society; how epidemics affect society. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB, G

SOC 451 Comparative Sociology. (3)
selected semesters
Cross-cultural study of basic social institutions; the methodology of cross-cultural research. Prerequisite: ASB 102 or SOC 101 (or 301) or instructor approval.
General Studies: SB, G

SOC 456 Political Sociology. (3)
selected semesters
Social factors associated with voting; nature and structure of the electorate and political parties and the nature of national and international power structure. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB, G

SOC 464 Sociology of Women. (3)
spring
Sociological analysis of the development, nature, and consequences of women's position in contemporary society. Lecture, discussion. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: L/SB, C

SOC 474 African Americans in Modern Society. (3)
selected semesters
Social and cultural heritage of black Americans; achievements and current trends. Lecture, discussion. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB, C

SOC 483 History of Social Thought. (3)
fall, spring, summer
Social thought in human culture. Background of modern sociology. Prerequisite: SOC 101 or 301.
General Studies: SB

SOC 484 Internship. (1–12)
fall and spring
See Department of Sociology advisor. Topics may include the following:
- Service Learning
  Fee.

SOC 486 Contemporary Theory. (3)
selected semesters
Contemporary issues and crises in social theory with major focus on particular theorists. Ideological factors in theory, philosophical issues, the nature of theory and its relationship with methodology. Prerequisite: SOC 101 or 301 or instructor approval.
General Studies: SB

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

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

Department of Speech and Hearing Science

www.asu.edu/clas/shs
480/965-2374
COOR 2211

Sid P. Bacon, Chair

Professors: S. Bacon, Dorman, D. Ingram, Wilcox

Associate Professors: Azuma, Liss, Restrepo

Assistant Professors: Edgar, Gray, Pittman

Clinical Professors: Mathy, Wiley

Clinical Associate Professors: C. Bacon, Brown

Clinical Assistant Professors: K. Ingram, McBride, Wexler, Woods

Senior Lecturer: Forestal

Lecturers: Barto, Francini, Howard, O'Brien, Quinn

SPEECH AND HEARING SCIENCE—BS

The BS degree in Speech and Hearing Science consists of 40 semester hours of speech and hearing science courses emphasizing the developmental and scientific aspects of language, speech, and hearing. The following courses, or their approved equivalents, are required:

SHS 250 Introduction to Phonetics 3
SHS 310 Anatomical and Physiological Bases of Speech 3
SHS 311 Physical and Physiological Bases of Hearing 3
SHS 367 Language Science *SB* 3
SHS 375 Speech Science 3
SHS 376 Psychoacoustics 3
SHS 401 Introduction to Audiology 3
SHS 402 Modifying Communicative Behavior 3
Choose two from the courses below 6
  SHS 431 Developmental Speech Disorders (3)
  SHS 470 Developmental Language Disorders (3)
  SHS 485 Acquired Speech and Language Disorders (3)
SHS 450 Observation 1
SHS 465 Speech and Language Acquisition *SB* 3
SHS 496 Aural Rehabilitation 3
Total 37

The remaining speech and hearing science courses to complete the major are determined by the students in consultation with an advisor. A list of approved electives is available through the department. Supporting courses from related fields must include the following or their equivalents:

BIO 201 Human Anatomy and Physiology I *SG* 4
MAT 170 Precalculus *MA* 3
PGS 101 Introduction to Psychology *SB* 3
PHY 101 Introduction to Physics *SQ* 4
PSY 230 Introduction to Statistics *CS* 3

PSY 290 Research Methods is strongly recommended.

MINOR IN SPEECH AND HEARING SCIENCE

The minor in Speech and Hearing Science consists of 24 semester hours with the following classes required:

SHS 105 Introduction to Human Communication Disorders 3
SHS 250 Introduction to Phonetics 3
SHS 310 Anatomical and Physiological Bases of Speech 3
SHS 311 Physical and Physiological Bases of Hearing 3
Choose one from the courses below 3
  SHS 367 Language Science *SB* (3)
  SHS 375 Speech Science (3)
  SHS 376 Psychoacoustics (3)

The remainder of the 24 credits must come from the following courses:

SHS 320 Facilitating Speech and Language Development in Early Childhood 3
SHS 401 Introduction to Audiology 3
SHS 402 Modifying Communicative Behavior 3
SHS 431 Developmental Speech Disorders 3
SHS 465 Speech and Language Acquisition *SB* 3
SHS 470 Developmental Language Disorders 3
SHS 485 Acquired Speech and Language Disorders 3
SHS 496 Aural Rehabilitation 3

BIS CONCENTRATION

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

GRADUATE PROGRAMS

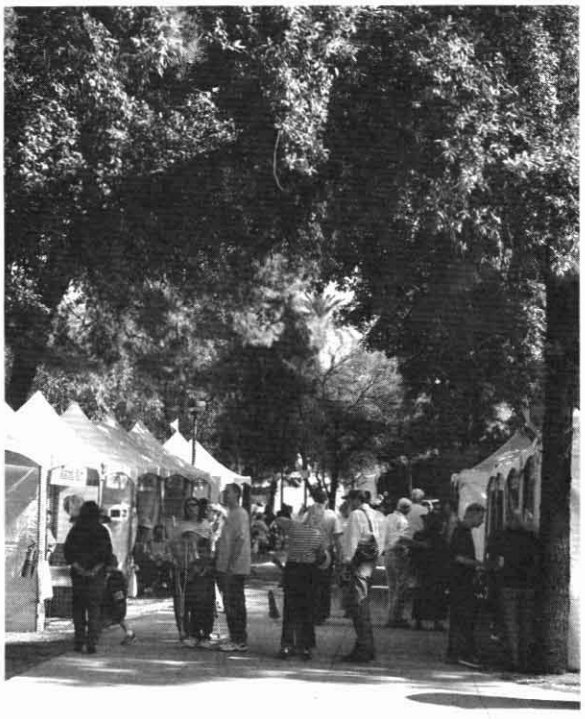
The faculty in the Department of Speech and Hearing Science offer programs leading to the MS degree in Communication Disorders, the AuD degree in Audiology, and the PhD degree in Speech and Hearing Science. See the *Graduate Catalog* for requirements.

SPEECH AND HEARING SCIENCE (SHS)

SHS 101 American Sign Language I. (4)
fall and spring
Basic receptive/expressive conversational skills; basic grammar and syntax rules. Orientation to deafness and deaf culture. Lecture, drill, practice, lab.

SHS 102 American Sign Language II. (4)
fall and spring
Further development of receptive/expressive conversation skills in ASL; finger spelling. Continued exploration of deaf culture. Lecture, drill, practice, lab. Prerequisite: SHS 101.

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



This year's Homecoming Block Party included the second annual art walk. Tim Trumble photo

SHS 105 Introduction to Human Communication Disorders. (3)
fall and spring
Introduces hearing, language, and speech problems in children and adults. Lecture, demonstration.

SHS 201 American Sign Language III. (4)
fall and spring
Continued development of fluency in ASL with emphasis on more abstract concepts and the ability to narrate events. Lecture, discussion, drill, lab. Prerequisite with a grade of "C" (2.00) or higher: SHS 102.

SHS 202 American Sign Language IV. (4)
fall and spring
Further development of fluency in ASL with emphasis on literature, folklore, and signing narratives with multiple characters. Lecture, discussion, drill, lab. Prerequisite with a grade of "C" (2.00) or higher: SHS 201.

SHS 250 Introduction to Phonetics. (3)
fall
Introduces English phonetics with emphasis on phonetic transcription, articulation, phonology, and disorders of speech.

SHS 310 Anatomical and Physiological Bases of Speech. (3)
fall
Noncadaveric study of anatomical systems that underlie human speech and language, including respiration, phonation, articulation, and related nervous system processes. Prerequisite: BIO 201.

SHS 311 Physical and Physiological Bases of Hearing. (3)
fall
Studies the physical characteristics of sound and of the structure and function of the human auditory system. Prerequisites: BIO 201; PHY 101.

SHS 320 Facilitating Speech and Language Development in Early Childhood. (3)
fall and spring
Speech and language development and strategies for facilitating communication skills in early childhood educational settings.

SHS 350 Brain Memory and Language. (3)
fall
Covers memory and language and their associated brain areas, and the resulting behavioral consequences of injury and disease. Lecture, discussion, case studies, demonstrations. Prerequisite: PGS 101 or SHS 105.

SHS 367 Language Science. (3)
fall
Normative aspects and integration of language structure, comprehension, and production in children and adults.
General Studies: SB

SHS 375 Speech Science. (3)
spring
Normative aspects of speech, hearing, and language. Prerequisites: SHS 310, 311.

SHS 376 Psychoacoustics. (3)
spring
Introduces acoustics, cochlear anatomy and physiology, and the perception of sound. Prerequisite: SHS 311 or instructor approval.

SHS 394 Special Topics. (1–4)
selected semesters

SHS 401 Introduction to Audiology. (3)
fall
Introduces hearing disorders and the purposes and procedures for basic clinical tests of auditory function. Credit is allowed for only SHS 401 or 501. Prerequisites: both SHS 311 and 376 or only instructor approval.

SHS 402 Modifying Communicative Behavior. (3)
fall
Principles and techniques of modifying speech and language behavior. Prerequisite: SHS 250 (or its equivalent).

SHS 431 Developmental Speech Disorders. (3)
fall
Introduces the nature of articulation, fluency, resonance, and voice disorders in childhood. Prerequisites: SHS 250 and 310 (or their equivalents).

SHS 450 Observation. (1)
fall and spring
Opportunity to obtain observation experience at the ASU Speech and Hearing Center or at external sites. Prerequisite: instructor approval.

SHS 465 Speech and Language Acquisition. (3)
spring
Speech and language development in the normal child. Prerequisite: SHS 367 (or its equivalent).
General Studies: SB

SHS 470 Developmental Language Disorders. (3)
fall
Introduces the nature and treatment of language disorders in children. Prerequisite: SHS 465 or instructor approval.

SHS 485 Acquired Speech and Language Disorders. (3)
spring
Introduces acquired speech and language disorders across the lifespan. Prerequisites: SHS 250, 310.

SHS 494 Special Topics. (1–4)
fall and spring
May be repeated for credit. Topics may include the following:
- Hearing Disorders. (3)
- Research. (3)
- Speech and Language Disorders. (3)

Prerequisite: instructor approval.

SHS 496 Aural Rehabilitation. (3)
spring
Approaches to aural rehabilitation of children and adults. Introduces educational audiology and assistive listening devices. Prerequisites: SHS 375 and 376 and 401 (or their equivalents).

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.

Women and Gender Studies Program

www.asu.edu/clas/womens_studies
480/965-2358
ECA 209

Mary Margaret Fonow, Director

CORE FACULTY

Professors: Fonow, Koblitz, Rothschild, Weitz
Associate Professor: Scheiner
Assistant Professors: Anderson, Katsulis, Leong
Lecturer: McGibbney Vlahoulis

AFFILIATED FACULTY

African and African American Studies
Professor: Reyes

Anthropology
Professor: Brandt

Architecture and Landscape Architecture
Associate Professor: Fish Ewan

Art
Professors: Codell, Fahlman, Magenta
Associate Professors: Schleif, Wolfthal

Asian Pacific American Studies
Assistant Professor: de Jesús

Community Resources and Development
Professor: Allison

Curriculum and Instruction
Professors: Edelsky, Guzzetti

Educational Leadership and Policy Studies
Professor: Turner

English
Professors: Adams, Crowley, Gutierrez, Hogue, Horan, Nilsen, Rhodes
Associate Professors: DeLamotte, Pritchard, Tohe
Assistant Professors: Fox, Parchesky
Senior Lecturers: Heenan, Norton

Exercise and Wellness (East campus)
Associate Professor: Swan

Family and Human Development
Professor: Martin

History
Professors: Fuchs, Green, Lavrin, Warnicke
Associate Professors: Gray, Gullett, Stoner

Human Communication
Professors: Carlson, Nakayama
Associate Professors: Davis, Martinez
Assistant Professor: Park-Fuller

Interdisciplinary Studies
Senior Lecturer: Nelson
Lecturer: Lattouf

Justice and Social Inquiry
Professors: Jurik, Romero, Zatz
Associate Professors: Adelman, Menjivar

Kinesiology
Professor Emerita: Wells

Languages and Literatures
Regents' Professor: Foster
Professors: Losse, Williams
Associate Professors: Choi, Orlich, Tompkins
Assistant Professors: Duncan, George, Gruzinska

Music
Professor: Williamson
Assistant Professor: Sullivan

Philosophy
Associate Professor: McGregor

Psychology
Regents' Professors: Eisenberg, Russo
Professor: Chassin
Associate Professor: Saenz

Psychology in Education
Professors: Arredondo, Bernstein, Hackett, Kerr, Moore

Religious Studies
Professor: Feldhaus
Associate Professor: Fessenden

Social Work
Professor: Segal
Associate Professors: Brzuzy, Gerdes, Stromwall
Assistant Professor: Larson

Sociology
Professors: Kronenfeld, Kulis, Weitz
Associate Professors: Agadjanian, Benin, Miller-Loessi, Sullivan

Theatre
Professors: Honegger, Knapp
Assistant Professor: Woodson

Women's Studies (West campus)
Professor: Stage

The Women and Gender Studies Program is an interdisciplinary university program housed in the College of Liberal Arts and Sciences. Information on faculty affiliation is provided for reference.

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

WOMEN AND GENDER STUDIES—BA

Women and Gender Studies provides our students with an intensive interdisciplinary liberal arts education that enables them to write well, think critically, and analyze problems effectively. Our students take a variety of courses, including a capstone seminar requiring original research and writing, and an internship that helps them prepare for life after college. Original undergraduate research is encouraged, and some courses involve students in studying community problems and formulating policy solutions.

The BA degree in Women and Gender Studies consists of 45 semester hours (with a grade of "C" [2.00] or higher), of which 30 must be taken from WST or WSH prefixes or from other prefixes designated as part of the major. The other 15 must be in closely related fields chosen in consultation with an academic advisor. At least 36 of the 45 semester hours required for the major must be completed in upper-division courses.

All Women and Gender Studies majors are encouraged to compile a portfolio to leave on file in the Women and Gender Studies Program office upon graduation.

Required Courses. Students must complete these courses:

WST 100	Women and Society *SB, C*	3
	or WST 300 Women in Contemporary Society *SB, C* (3)	
WST 377	History of American Feminist Thought *L, C*	3
WST 378	Contemporary Feminist Theory *L, C*	3
WST 380	Gender, Race, and Class *L/SB, C*	3
WST 484	Internship	3
WST 498	PS: Theoretical Issues in Women's Studies	3
Total		18

Electives. Students majoring in Women and Gender Studies must complete four courses (12 semester hours) chosen from the WST or WSH course list.

Related Fields. Students majoring in Women and Gender Studies must complete five courses (15 semester hours) in closely related fields from the WST or WSH course list, cross-listed or interdisciplinary courses, or other courses selected in consultation with a Women and Gender Studies academic advisor.

Students must complete one course chosen from the electives or related fields on nonwestern women. A second course chosen from these same areas must also be completed on either nonwestern, racial or sexual minority women in the United States. For more information, see an academic advisor.

MINOR IN WOMEN AND GENDER STUDIES

The Women and Gender Studies minor consists of 18 semester hours, 12 of which must be in the upper division. The following courses are required:

WST 100	Women and Society *SB, C*	3
	or WST 300 Women in Contemporary Society *SB, C* (3)	
WST 377	History of American Feminist Thought *L, C*	3
	or WST 378 Contemporary Feminist Theory *L, C* (3)	
Total		6

Twelve additional hours of approved women and gender studies courses must be taken after consultation with the women and gender studies advisor.

Students pursuing a minor must register at least one semester before graduation and are encouraged to meet with the Women and Gender Studies academic advisor early in their course of studies.

CERTIFICATE PROGRAM IN WOMEN AND GENDER STUDIES

The certificate program is equivalent to an interdisciplinary minor, consisting of 18 semester hours, and is open to graduate as well as undergraduate students. Students pursuing a certificate must consult with the Women and Gender Studies advisor. See "Women and Gender Studies," page 342, for a description of the certificate program.

BIS CONCENTRATION

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

GRADUATE STUDIES

The Women and Gender Studies Program plans to offer a graduate degree program within the next two years. In the interim, it is possible to pursue a graduate degree in some existing programs with a thesis or dissertation topic related to women's studies. For more information, contact a Women and Gender Studies academic advisor.

WOMEN'S STUDIES HUMANITIES (WSH)

WSH 413 Lesbian, Gay, and Gender Studies. (3)
spring
Explores lesbian, gay, bisexual, transgender, and queer experiences in the U.S. and globally, from sociological, psychological, historical, and literary perspectives. Lecture, discussion. Prerequisite: WST 100 or 300 or instructor approval.
General Studies: HU, C

WSH 464 Voices and Visions. (3)
fall and spring
Explores the contributions of visionary women in the humanities; topics vary from semester to semester. May be repeated for credit when topics vary. Lecture, discussion. Prerequisite: WST 100 or 300 or instructor approval.
General Studies: HU, C

WSH 470 Women and Popular Culture. (3)
spring
Interdisciplinary examination of how gender is constructed in popular cultural forms. Lecture, discussion. Prerequisite: WST 100 or 300 or instructor approval.
General Studies: HU, C

WSH 494 Special Topics. (1–4)
fall and spring
Topics include a wide variety of interdisciplinary courses.þ Check department for current semester offerings.

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

WOMEN'S STUDIES (WST)

WST 100 Women and Society. (3)
fall, spring, summer
Interdisciplinary introduction examining critical issues in women's studies. Credit is allowed for only WST 100 or 300.
General Studies: SB, C

WST 191 First-Year Seminar. (1–3)
selected semesters
Restricted to freshmen. Pass/fail. Topics may include the following:
- All About Feminism. (1)

WST 294 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Women and Social Action
  Fee.

WST 300 Women in Contemporary Society. (3)
fall, spring, summer
Intensive interdisciplinary examination of such topics as gender roles, work, education, sexuality, politics, health, and law. Credit is allowed for only WST 300 or 100.
General Studies: SB, C

WST 313 Women and Sexuality. (3)
fall and spring
Explores feminist theories about women's sexuality and the relationship of these theories and related research to women's experience. Lecture, discussion. Prerequisite: WST 100 or 300 or instructor approval.
General Studies: SB

WST 360 Women as Healers. (3)
spring
Examines the role of women as caregivers, healers, physicians, midwives, and nurses in different cultures and historical periods. Lecture, discussion.
General Studies: SB, G

WST 372 Women in Judaism. (3)
spring
Studies the legal, social, and cultural status of Jewish women in various historical and contemporary societies. Cross-listed as REL 373. Credit is allowed only for REL 373 or WST 372.

WST 373 Latina/Chicana Issues. (3)
selected semesters
Examines the roles Mexican American, Chicana, and/or Latina immigrant women play historically, socially, and politically in the United States. Prerequisite: WST 100 or 300 or instructor approval.
General Studies: SB, C

WST 375 Women and Social Change. (3)
spring
Combines research and theory on a contemporary social problem with a community action experience focusing on women's social change initiatives. Lecture, field placement. Prerequisite: WST 100 or 300 or instructor approval.
General Studies: SB, C

WST 377 History of American Feminist Thought. (3)
fall
Explores the development of American feminist theory from its roots to 1975. Lecture, discussion. Prerequisite: WST 100 or 300 or instructor approval.
General Studies: L, C

WST 378 Contemporary Feminist Theory. (3)
spring
Contemporary feminist theories and exploration of the intersection of gender, race, ethnicity, and class through critical analysis. Prerequisite: WST 100 or 300 or instructor approval.
General Studies: L, C

WST 380 Gender, Race, and Class. (3)
fall and spring
Explores cultural diversity, class, and gender issues in American social life. Lecture, seminar, analysis papers, and writing. Prerequisite: WST 100 or 300 or instructor approval.
General Studies: L/SB, C

WST 394 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Feminist Voices of Color
- Gender and Performance
- Girlhood and Adolescence
- Women and Religion
- Women Warriors

WST 457 Gender, Culture, and Development. (3)
fall or spring
Economic, cultural, and sociopolitical contexts for understanding women's roles related to health, family, work, education, and politics in developing countries. Prerequisite: 6 hours in social science or instructor approval.
General Studies: L/SB, G

WST 460 Women and the Body. (3)
fall or spring
Interdisciplinary look at how representations of woman as body permeate culture and affect a woman's sense of self. Lecture, discussion. Prerequisite: WST 100 or 300 or instructor approval.
General Studies: SB, C

WST 477 Women and Violence. (3)
fall or spring
Global examination of forms of violence against women at the individual, institutional, and cultural levels, and efforts to control it. Lecture, discussion. Prerequisite: WST 100 or 300 or instructor approval.
General Studies: SB, C

WST 484 Internship. (1–3)
fall and spring
Practical experience to enhance the academic perspectives that emerge from women's studies instruction. Prerequisite: internship coordinator approval.

WST 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Women, Science, and Technology

WST 498 Pro-Seminar. (1–7)
fall and spring
Topics may include the following:
- Theoretical Issues in Women's Studies. (3)
  Reading and research on important theoretical issues in women's studies. Prerequisite: WST 100 or 300 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.

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

College of Nursing

nursing.asu.edu **Bernadette M. Melnyk, PhD, Dean**

PURPOSE

The faculty in the College of Nursing acknowledge their responsibility to health care consumers for the preparation through teaching, research, practice, and service of individuals who can provide professional quality nursing care. The purpose of the College of Nursing is to provide educational programs that prepare professional nurses to meet the health care needs of individuals, groups, and communities. To achieve this purpose, the college offers undergraduate, graduate, post-master's, and continuing and extended education programs. Within the context of a liberal education, the degree programs prepare professional nurses who

1. provide the highest-quality health care to individuals, groups, and communities and who critically examine and effectively respond to the changing health care needs of society;
2. conduct research and creative activities that strengthen the knowledge base of the discipline, improve evidence-based nursing practice, and benefit the health of individuals, groups, and communities; and
3. provide service to the community through a range of nursing activities with diverse populations in a variety of settings.

The continuing and extended education program facilitates lifelong learning by providing opportunities for registered nurses (RNs) to enhance and expand their nursing practice to meet the health care needs of various populations and to further their own professional development.

ORGANIZATION

The College of Nursing is organized around two major clinical divisions: adult health/parent-child nursing and community public health/psycho-mental health nursing systems.

The college offers an undergraduate program leading to a Bachelor of Science in Nursing (BSN) degree, a Master of Science (MS) degree in Nursing with preparation for advanced practice in nursing, a Doctor of Nursing Science (DNS) degree, and continuing and extended education opportunities for RNs, which include RN-BSN and RN-BSN-MS program tracks. A Post-Master's Nurse Practitioner program is also available.

ADMISSION

Preprofessional Admission. Students are admitted into the College of Nursing as "premajor Nursing" students. Admission to Arizona State University as a premajor Nursing student does not guarantee admission into the professional program. Admission to the professional program requires a separate application to the College of Nursing and is competitive, with the greatest emphasis placed on grade point average based on selected prerequisite courses.

In addition to meeting the university requirements for admission, it is recommended that students complete one year each of high school chemistry and biology.

Premajor Nursing students are required to seek academic advising each semester through the College of Nursing Student Services Office. This advising includes course planning and information about application materials and deadlines.

Transfer Credits. While ASU accepts transfer credit from other accredited institutions, all transfer credit may not apply toward a BSN degree. Students completing course work at a community college or university other than ASU should consult a College of Nursing academic advisor to plan an appropriate sequence of prerequisite courses and to apply to the professional program. The college has a transfer partnership agreement with the Maricopa Community College District. See a College of Nursing academic advisor for details. The college may not accept transfer credit (especially science) completed more than seven years before the date of application to the professional program.

Professional Program Admission. Individuals interested in applying to the professional program must receive advising from a College of Nursing academic advisor and are required to attend an application workshop. Contact the Student Services Office in the College of Nursing at 480/965-2987 for details. Students are eligible for consideration for admission to the professional program if they meet the following criteria:

1. regular admission to the College of Nursing at Tempe campus as a premajor Nursing student;
2. academic good standing at ASU and in the College of Nursing;
3. minimum prerequisite GPA of 2.75;

4. completion of designated prerequisite courses with an earned grade of "C" (2.00) or higher in each course;
5. completion of all application materials;
6. submission of all required health and immunization requirements;
7. a Test of English as a Foreign Language (TOEFL) score of 550 or higher for international students (see "TOEFL," page 71);
8. receipt of entrance examination scores; and
9. submission of other required materials.

Admission is selective and based on available resources. Meeting the minimum prerequisite GPA does not ensure admission. All qualified applicants may not be admitted. Students admitted to the professional program are required to meet the following additional criteria:

1. proof of CPR certification (Level C American Heart Association Health Care Provider);
2. proof of negative drug screen;
3. completion of all required health and immunization information;
4. eligible for fingerprint clearance card;
5. removal of all ASU admission deficiencies; and
6. other required materials.

Professional program courses are offered at the Tempe campus, the East campus, and the West campus. Students are asked to specify location preference as part of the application process. Students are expected to complete the professional program on the campus assigned upon admission.

Opportunities for individual, direct, and group patient care are available in a variety of settings: community clinics; health fairs; hospice; geriatric facilities; schools; industries; hospitals; home health; and rehabilitation agencies.

Professional Program Transfer. Students requesting to transfer into the professional program with advanced standing may be required to submit letters of recommendation. Any student enrolled in good standing at any accredited/approved baccalaureate school of nursing within the past two years may apply for admission into the professional program. To be considered for admission to the professional program, transfer students must first be admitted to ASU as premajor Nursing students (see "Undergraduate Admission," page 66) and must also meet all professional program admission requirements. To be considered for advanced standing in the professional program courses, petitions for each course must be completed by the student accompanied by course descriptions and syllabus materials and be approved by the College Standards Committee.

Admission of Registered Nurses (RNs). All RN students are admitted into the College of Nursing as premajor Nursing students. Each RN must show evidence of a current unencumbered Arizona RN license. RN students are responsible for adhering to Arizona State Board of Nursing Rules and Regulations.

Alternatives are available to RNs to facilitate their progress in the program, including credit by examination, substitution of previously completed nursing courses for specified ASU nursing courses, and transfer of general education course work completed at other accredited colleges and universities. All RN students must consult with an academic advisor in planning their program of study. See "Professional Program Admission," page 474, for admission criteria into the BSN professional program. Registered nurses are admitted into the RN-BSN *only* program track twice a year, in January and in August.

Additional admission criteria required for application to the RN-BSN-MS program track include submission of

1. GRE scores;
2. current résumé;
3. statement of career goals;
4. three references (forms provided);
5. interview;
6. minimum prerequisite GPA of 3.0; and
7. other required materials.

RNs are accepted into the RN-BSN-MS program track once a year (in January).

Readmission to the Professional Program. Students who have not been in continuous enrollment must file a petition requesting readmission to the professional program and must provide the following documents:

1. proof of current enrollment or readmission to ASU and the College of Nursing in good standing;
2. transcripts from all colleges attended; and
3. all other admission requirements as outlined under "Admission," page 474.

Arizona State Board of Nursing Requirement. To be eligible to write the National Council Licensure Examination for Registered Nurses (NCLEX-RN), a student must have a high school diploma or GED certificate as well as proof of graduation from an approved nursing program. Arizona State law prohibits an individual convicted of a felony from applying for nursing licensure or certification until five years after the date of absolute discharge of the sentence. Application for, and passage of, the NCLEX-RN is the sole responsibility of the student.

College Health Requirements. Students admitted/enrolled in the professional program are responsible for fulfilling the requirements of the health policies of the College of Nursing. The student is responsible for providing proof to the College of Nursing Student Services Office of having met these requirements before enrollment in the professional program courses. These health policies include the following requirements:

1. proof of measles (rubeola), mumps, and rubella immunization (two MMRs or appropriate titers);
2. proof of annual tuberculosis screening;
3. completed series of hepatitis B vaccine;
4. proof of hepatitis B titer

5. current American Heart Association Level C CPR Certification;
6. proof of tetanus, diphtheria immunization (TD);
7. proof of varicella (chicken pox) immunization; and
8. proof of negative drug screen.

A student may not participate in any clinical experience without meeting these requirements.

An annual flu vaccine is also recommended; other health information may be required. While the Hepatitis A vaccination is not required for admission, information on who might benefit from the vaccination is available from the College of Nursing Student Services Office.

Fingerprint Clearance. All College of Nursing students admitted to the professional program must submit a photocopy of their fingerprint clearance card to the Student Services Office by the first day of class.

Essential Functions. Students admitted to the professional program are expected to meet the Essential Functional Abilities of the Undergraduate Nursing Student. Essential functions for this program include gathering data through the senses (hearing, seeing, etc.), synthesizing information from a variety of sources, making decisions regarding patient care, and performing necessary physical and mental activities to ensure safe care. For complete details, contact an advisor in the Student Services Office at NUR 108, or call 480/965-2987.

ASU Health Requirements. See "Undergraduate Admission," page 66, and "Immunization Requirements," page 72.

Professional Liability Insurance. It is highly recommended that students carry their own professional liability insurance when enrolled in clinical nursing courses.

Health and Accident Insurance. It is strongly recommended that all students carry their own health and accident insurance. Some clinical agencies require students to have current health insurance. See the *Undergraduate Student Handbook.* Each student is personally responsible for costs related to any accident or illness during or outside of school activities.

Automobile Insurance. Students are required by state law to carry automobile insurance. Students are responsible for transportation to and from clinical sites. Extensive travel may be required for selected clinical experiences.

ACADEMIC ADVISING

Academic advising, provided by the College of Nursing through the Student Services Office, is an essential aspect of the education experience; see "Academic Advising," page 77.

While the College of Nursing provides academic advising, *it is ultimately the responsibility of each student to fulfill academic and program requirements.* Advisors are available by appointment in the College of Nursing Student Services Office. Visit NUR 108, or call 480/965-2987 (see "Student Services," page 480). Advisors assist students with program planning, registration, preparation of needed petitions, verification of graduation requirements, referrals to university and community resources, and career planning.

Student responsibilities include following university guidelines regarding submission of transcripts from all colleges other than ASU, obtaining the necessary signatures or computer verifications required by the university, and following university procedures for matriculation.

Mandatory Advising. All premajor Nursing students are required to meet with an academic advisor before registering for each semester of classes. All students on probation are required to meet with an advisor to plan strategies for improving their academic standing.

Declaration of Graduation. Students following the curriculum requirements of the 1996–1998 or later catalog editions must file a Declaration of Graduation form using the Degree Audit Reporting System during enrollment in the first semester of the professional program.

Student Employment. Each of the four semesters in the prelicensured professional program is composed of 16 semester hours. Seven to eight of these semester hours reflect three days in clinical laboratory practicum experience. The remaining eight to nine semester hours reflect classroom hours with preparation and study requiring additional time and effort. It is suggested that any other extracurricular activities or employment be kept at a minimum.

DEGREES

Nursing—BSN

The completion of the curriculum leads to a Bachelor of Science in Nursing (BSN) degree. The purpose of the program is to prepare beginning professional nurses, who possess the theoretical foundation and the clinical competence, to function in various health care settings. The graduate is prepared to deliver nursing care services to individuals, families, specific population groups, and communities. The undergraduate program provides students with a foundation for graduate studies in nursing at the master's level.

Professional program courses are offered at four locations: the Tempe campus, the East campus, the West campus, and Mayo Clinic. To be eligible to enroll in the professional courses at any location, students must be admitted to the College of Nursing at the Tempe campus, submit all required material for admission to the professional program, and be admitted to the college's undergraduate professional program.

Program objectives for the undergraduate curriculum are directed toward preparation of graduates with generalist abilities. Based on theoretical and empirical knowledge from nursing, the humanities, and physical, biological, and behavioral sciences, graduates are prepared to

1. combine theoretical knowledge from the sciences, humanities, and nursing as a base for critical thinking in professional nursing practice and develop understanding of client, health, environment, and nursing;
2. design comprehensive therapeutic nursing care in partnership with individuals, families, groups, populations, and communities, including those who are

culturally diverse and/or vulnerable and at risk for health disparities;

3. provide safe, competent, and effective nursing care using principle-based communication, technical/psychomotor, teaching, management, and therapeutic skills;
4. generate own professional practice that focuses on health promotion, risk reduction, disease prevention and illness and disease management from a holistic perspective;
5. analyze and apply research findings to promote evidence-based nursing practice;
6. display values and behaviors consistent with the culture of professional nursing;
7. display personal and leadership characteristics appropriate for providers, designers, managers, and coordinators of care;
8. display responsibility and accountability for providers, designers, managers, and coordinators of care;
9. collaborate with nurses, other health care providers, and clients in the delivery of holistic care that is responsive to changing needs, sociopolitical, and global environmental factors; and
10. analyze current nursing and health care services and trends, and identify future health care needs.

Nursing—RN Program Tracks

Courses have been designed to expand the knowledge base of the RN. Practice experiences in home health, community health, and leadership prepare RNs for roles in the expanding health care arena. Programs of study are developed and implemented that reflect individual capabilities, prior educational learning experiences, and career goals of RNs. Faculty and academic advisors work with RN students to maximize learning experiences and plan a program that meets their unique needs and interests.

Two program tracks are available for RNs. The RN-BSN *only* and the RN-BSN-MS program tracks are structured to provide an accessible, accelerated, and predictable pathway through the program.

RN-BSN Only. The RN-BSN *only* program track offers RNs the opportunity to complete upper-division professional nursing courses in one calendar year in a program featuring reasonable costs, predictable year-round course scheduling, reduced in-class time, and a variety of instructional delivery methods, including Web-enhanced and Web-based courses. Completion of upper-division general education requirements may require additional time beyond the one year of professional nursing courses. Satisfactory completion of all general education and nursing prerequisite courses with a grade of "C" (2.00) or higher and an earned minimum prerequisite GPA of 2.75 is required. RNs are accepted into the RN-BSN *only* program track twice a year (January and August). See "Admission of Registered Nurses (RNs)," page 475.

RN-BSN-MS. The RN-BSN-MS program track, designed for highly motivated and experienced RNs, reflects an expansion of the RN-BSN *only* option. It provides for more rapid progression to graduate education that builds on the existing undergraduate curriculum and enables RN students to take selected graduate courses (earning a grade of "B" [3.00] or higher) that apply toward their baccalaureate degree. Satisfactory completion of all general education and nursing prerequisite undergraduate courses with a grade of "C" (2.00) or higher and an earned minimum prerequisite GPA of "B" (3.00) is required. See "Admission of Registered Nurses (RNs)," page 475.

The RN to master's degree program requires students to complete a minimum of 30 semester hours with a grade of "B" (3.00) or higher in all courses in the master's program of study.

Nursing—MS

The faculty in the College of Nursing offer a program leading to an MS degree in Nursing with concentrations in

1. adult health nursing with tracks in the primary care of chronically ill adults or the care of the acutely ill;
2. community health nursing;
3. psychiatric/mental health nursing;
4. family health nursing;
5. women's health; and
6. parent-child nursing with the tracks in primary or acute care nursing of children, and neonatal program.

The program requires a minimum of 40 semester hours with an earned grade of "B" (3.00) or higher in all courses in the program of study. Students in the nurse practitioner options are required to complete additional semester hours. Requirements for this program are described in the *Graduate Catalog*. Persons interested in applying for admission to the program should write to the Division of Graduate Studies for a *Graduate Catalog* and application form (see "Admission to the Division of Graduate Studies," page 501) and contact the College of Nursing Student Services Office.

Nursing—DNS

Our innovative DNS program prepares students to pursue a career as a leader in health policy, healthcare delivery, nursing education, and/or research. Emphasis is on application of research and theory in nursing practice. For more information, access nursing.asu.edu.

COLLEGE OF EXTENDED EDUCATION

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

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

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

UNIVERSITY GRADUATION REQUIREMENTS

In addition to fulfilling college and major requirements, students must meet all university graduation requirements. For more information, see "University Graduation Requirements," page 88.

First-Year Composition Requirement

Completion of both ENG 101 and 102 or ENG 105 or equivalent with a grade of "C" (2.00) or higher is required for graduation from ASU in any baccalaureate degree program.

General Studies Requirement

All students enrolled in a baccalaureate degree program must satisfy a university requirement of a minimum of 35 semester hours of approved course work in General Studies, as described in "General Studies," page 92. Note that all three General Studies awareness areas are required. Consult an advisor for an approved list of courses. Many of the university General Studies requirements may be met through completion of College of Nursing course requirements. See an academic advisor for details. General Studies courses are listed in the "General Studies" table, page 94, in the *Schedule of Classes,* and in the *Summer Sessions Bulletin.*

COLLEGE DEGREE REQUIREMENTS

The BSN degree requires 120 semester hours. Any request for a course substitution or waiver, or modification in degree requirements and/or professional program admission requirements may be requested through a petition to the College of Nursing Standards Committee. For details, see an academic advisor.

Prerequisite Course Requirements

The following courses must be completed before enrolling in the professional program. Completion of these courses does not ensure admission to the professional program. RN students should refer to "RN-BSN Degree Requirements," on this page.

BIO	201	Human Anatomy and Physiology I *SG*	4
BIO	202	Human Anatomy and Physiology II	4
CDE	232	Human Development *SB*	3
CHM	101	Introductory Chemistry *SQ*	4
ENG	101	First-Year Composition	3
ENG	102	First-Year Composition	3
HCR	210	Clinical Health Care Ethics *HU*	3
HCR	220	Health Care Organizations *H*	3
HCR	230	Culture and Health *C, G*	3
HCR	240	Human Pathophysiology	4
MIC	205	Microbiology *SG**	3
MIC	206	Microbiology Laboratory *SG**	1
NTR	241	Human Nutrition	3
PGS	101	Introduction to Psychology *SB*	3
PHI	103	Principles of Sound Reasoning *L/HU*	3
CS statistics elective			3
HU/SB elective			3
MA course			3
Total prerequisites			56

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

MAJOR REQUIREMENTS

The Nursing major requirements are completed after admission to the professional program. All practice courses are graded satisfactory/fail. RN students should refer to "RN-BSN Degree Requirements," on this page.

Nursing Core Courses

Junior Year

First Semester

NUR	341	Theory I: Health Integrity	4
NUR	351	Pharmacology in Nursing	3
NUR	361	Professional Development	2
NUR	381	Nursing Practice I	7
Total			16

Second Semester

NUR	342	Theory II: Health Integrity and Alterations	5
NUR	362	Professional Development II: Nursing Research *L*	3
NUR	382	Nursing Practice II	8
Total			16

Senior Year

First Semester

NUR	441	Theory III: Health Integrity and Alterations	6
NUR	461	Professional Development III: The Art of Nursing *HU*	3
NUR	481	Nursing Practice III	7
Total			16

Second Semester

NUR	442	Theory IV: Health Integrity and Alterations	3
NUR	443	Theory V: Leadership and Management	3
NUR	462	Professional Development IV	2
NUR	482	Nursing Practice IV	8
Total			16
Nursing core total			64

Each semester of courses is prerequisite to subsequent semesters. See an advisor for current program information.

RN-BSN DEGREE REQUIREMENTS

Prerequisite Course Requirements

BIO	201	Human Anatomy and Physiology I *SG*	4
BIO	202	Human Anatomy and Physiology II	4
CDE	232	Human Development *SB**	3
CHM	101	Introductory Chemistry *SQ*	4
ENG	101	First-Year Composition	3
ENG	102	First-Year Composition	3
HCR	240	Human Pathophysiology*	4
MIC	205	Microbiology	3
NTR	241	Human Nutrition	3
NUR	341	Theory I: Health Integrity*	4
NUR	342	Theory II: Health Integrity and Alterations*	5
NUR	351	Pharmacology in Nursing*	3
NUR	361	Professional Development*	2
NUR	381	Nursing Practice I*	7
NUR	382	Nursing Practice II*	8
PGS	101	Introduction to Psychology *SB*	3
C, H elective			3
CS statistics elective			3
HU elective			3

MA course 3
Total prerequisites 75

* For alternatives, see an advisor.

General Education Courses
Electives (upper division) 7
G course (upper division) 3
Total 10

Professional Nursing Courses for RNs. The following nursing courses are taught over a period of 12 months. Theory classes are held one day a week for six months. Practice and theory courses require a commitment of three days a week over the remaining six months.

NUR 364 Professional Development: Nursing Research for RNs *L* 3
NUR 391 Registered Nurse Mobility I: Professional Development *L* 3
NUR 392 Registered Nurse Mobility II: Health and Wellness 3
NUR 440 Theory III: Health Integrity and Alterations for RNs 6
NUR 445 Theory V: Leadership and Management for RNs 3
NUR 444 Theory IV: Health Integrity and Alterations for RNs 3
NUR 460 Professional Development: The Art of Nursing for RNs *HU* 3
NUR 464 Professional Development for RNs 2
NUR 495 Community Health/Home Health Practice for RNs 4
NUR 496 Leadership and Management Practice for RNs 5
Total 35
General elective total 10
Nursing core (RN) total 45

The sequential progression of courses for the RN-BSN is as follows:

1. NUR 391
2. NUR 392
3. NUR 460
4. NUR 364
5. NUR 440
6. NUR 495
7. NUR 444
8. NUR 445
9. NUR 496
10. NUR 464

RNs interested in pursuing the RN-BSN-MS track should contact an advisor in the College of Nursing Student Services Office.

ACADEMIC STANDARDS

Students are admitted into the College of Nursing as premajor Nursing students and are subject to the general standards of academic good standing at the university. However, students who maintain standards of academic good standing do not necessarily qualify for admission into the professional program.

Consideration for admission into the professional program is contingent on achieving at least a "C" (2.00) in all prerequisite courses and earning a minimum GPA of 2.75 in prerequisite courses. In addition, a grade of "C" (2.00) or higher is required in all course work for the degree except in nursing practice courses where a designation of a "Y" (satisfactory) grade is required.

Once admitted into the professional program, students are allowed only one nursing course failure within the program. The second failure in a nursing course leads to an automatic disqualification from the College of Nursing.

Probation and/or disqualification is in accordance with university policies. Academic dishonesty is not tolerated in any course and is subject to specific College of Nursing policies and procedures.

GRADING POLICY FOR NURSING COURSES

Within the undergraduate program, grades are assigned to reflect levels of achievement in relation to course objectives. Students who do not complete a required nursing course satisfactorily, receiving a grade of "D" (1.00) or "E" (0.00) (failing) or a mark of "W" (withdrawal), are not eligible to progress in the professional program. A student who withdraws from a course with a failing grade reported as an "E3," "E4," or "E9" is considered to have failed the course.

Any petition for curriculum adjustment, course substitution, overload, readmission to a nursing course, or readmission to the professional program must be approved by the College Standards Committee.

Withdrawal is in accordance with ASU withdrawal policy. Students are responsible for completing the university withdrawal procedure. To be considered for reenrollment in a professional program course, a completed petition must be submitted and approved by the College Standards Committee. See an academic advisor for assistance.

An incomplete in a required nursing course must be satisfactorily removed before progression in the professional program is permitted. A grade of "I" is not allowed in clinical courses. See "Grading System," page 81, for university policy.

Audited courses are not accepted as course credit in the minimum 120-semester-hour requirement for graduation.

STUDENT RESPONSIBILITIES

Health. Students in the College of Nursing who exhibit or demonstrate a lack of physical and/or mental health necessary to function effectively as a professional nurse may be required to complete a health examination and have the results made available to the College Standards Committee. Students whose health, behavior, and/or performance have been questioned are reviewed for continuation in nursing courses by the College Standards Committee. The student may appear in person before the committee and personally present information relevant to the committee's review.

Information may also be presented in writing without making a personal appearance.

Professional Standards. Students are held to the professional standards reflected in the American Nurses'

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

Association Code of Ethics for Nurses. Professional behavior and appearance are required during all nursing course activities.

Student Transportation. Students are responsible for their own transportation to and from health agencies and other selected experience settings, such as home visits to clients. Extensive travel may be required for selected clinical experiences.

Laboratory Fees. In several nursing laboratory and clinical practice courses, students are provided an opportunity to practice and perfect nursing skills before contact with clients. These courses require an extensive use of equipment and supplies from the Nursing Learning Resource Center. Accordingly, students are assessed a fee for the following courses: NUR 341, 342, 381, 382, 441, 442, 481, and 482. Consult with an advisor for information on laboratory fees for Nursing courses. Fees may be assessed on other courses. See the current *Schedule of Classes.*

SPECIAL PROGRAMS

Honors Program. The Nursing Honors Program provides opportunities for academically talented nursing students to engage in educational enrichment opportunities. The program focuses on students in the professional program; however, opportunities are available in lower-division courses. For students pursuing upper-division honors work, this enriched learning experience begins in the junior year. Honors course work, consisting of at least 18 hours of upper-division honors credit, offers a challenging curriculum. Honors students are guided to complete honors credit in courses that complement their academic and career goals. Students interested in pursuing the Nursing Honors Program are encouraged to seek advising in the College of Nursing Student Services Office. Once admitted to the professional program, students receive advising from the honors coordinator.

For more information, call 480/965-2987 or stop by the Student Services Office at NUR 108. Interested students should also call the Barrett Honors College at 480/965-2359.

Continuing and Extended Education Program. The Continuing and Extended Education Program presents a variety of credit and noncredit offerings at ASU campuses, employer work sites, or electronically. These offerings are designed to assist practicing registered nurses in maintaining and enriching their competencies, broadening their scientific knowledge base, and enhancing their skills in adapting to the changing health care environment. Programs are organized in response to both the health care needs of populations and the learning needs of nurses engaged in a variety of professional roles and clinical specialties. Some offerings are multidisciplinary and are open to non-RNs. For descriptions of continuing and extended education offerings, call the Continuing and Extended Education Program, College of Nursing, at 480/965-7431, send e-mail to conceep@asu.edu, or access the program's Web site at nursing.asu.edu/ce.

Academic Nursing Centers. The College of Nursing administers four Academic Nursing Centers: Community Service Health Clinic in Scottsdale; Breaking the Cycle Community Healthcare in Phoenix; and Escalante Health Clinic and Westside Community Health Center in Tempe. Nurse practitioners provide primary care with an emphasis on promotion of wellness to families and individuals of all ages. The centers also serve as learning sites for both master's and baccalaureate nursing students.

American Indian Students United for Nursing (ASUN). The ASUN project was established in the fall of 1990 through a grant from the Indian Health Service. The purpose of ASUN is to increase the number of Native Americans studying nursing at ASU and the number of nurses providing care to Native American communities. This is being accomplished through special recruitments and providing programs to help the students successfully complete their studies in nursing. ASUN services include academic advising, tutoring, and computer access. General information is provided regarding American Indian student resources, periodic Pow Wows, Blessings, luncheons, and similar activities. For more information, call the ASUN office at 480/965-0123.

GENERAL INFORMATION

Student Services. The Student Services Office in the College of Nursing provides academic advising, general advising, and referral to university resources. The staff of the Student Services Office is available to help students with a variety of concerns related to academic or personal issues. Advising appointments are available at four locations: the East campus, the West campus, Community Services Building, and NUR 108. Prospective students wanting more information on College of Nursing programs or wanting to schedule an advising appointment should contact the College of Nursing Student Services Office at 480/965-2987.

Scholarship and Financial Aid. For information on scholarships and loans, see "Financial Aid," page 59. Information about scholarship and loans for nursing students may be obtained from the Student Financial Assistance Office or the College of Nursing Student Services Office.

Learning Resources. The Learning Resource Center (LRC) contains a clinical simulation laboratory with a full range of simulated medical equipment and manikins, a complex care unit, and a health assessment lab at the East, Tempe, and West campuses, and the Community Services Building. The LRC materials include nursing course reference materials, selected nursing textbooks, nursing theses and applied projects, audiovisual equipment, videos, models, and other visual aides. In the computer lab, computers with Microsoft Office Suite are available for nursing students, as well as a variety of computer software related to nursing and health care. Selected resources are available for checkout. The LRC is staffed to assist students during regular semester schedules. For more information, see the *Undergraduate Student Handbook*, available on the College of Nursing Web site at nursing.asu.edu/studentservices/handbook.htm.

Clinical Facilities. Learning experiences with patients/clients and families are provided under the supervision of qualified faculty in cooperation with a variety of federal, state, county, private, and other agencies. The College of Nursing has contracts with more than 350 agencies to provide clinical and practice experience for students, operates its own nurse-managed academic nursing centers in community settings, and offers experiences in a variety of other nurse-managed health services facilities. Various clinical laboratory facilities are available to students in this essential component of the program.

Student Activities. All ASU students are members of the Associated Students of ASU (ASASU) and participate in campus activities of interest to them. The student government of the university, ASASU, has a strong presence and offers a variety of services and activities. It is the official representative of the student body in matters of governance and budgeting.

College Council of Nursing Students. The College Council of Nursing Students (CCNS) is a member of ASASU and serves as the governing body of all student activities in the college. The council acts as a liaison between the Graduate Nurse Organization (GNO), the Student Nurses' Association (SNA), and the Nursing Students for Ethnic and Cultural Diversity. The CCNS provides for communication, cooperation, and understanding among undergraduate students, graduate students, and faculty and represents the college in university and nonuniversity affairs.

Graduate Nurse Organization. GNO is the coordinating body for nursing students in the graduate program. GNO provides programs, information, and orientation services.

Student Nurses' Association. SNA is a professional nursing organization. By being a member of SNA, the student belongs to the National Student Nurses' Association (NSNA), which is the student counterpart of the American Nurses Association for RNs. NSNA provides means for financial assistance, career planning, a voice in Washington, an opportunity for involvement, and low-cost comprehensive malpractice insurance.

Nursing Students for Ethnic and Cultural Diversity. This organization was formed in 1989 to provide a network of information and support for students interested in issues of cultural awareness and diversity.

Sigma Theta Tau International. The Beta Upsilon chapter of Sigma Theta Tau International (STTI) was chartered at the College of Nursing in 1976. Membership in STTI is an honor conferred on undergraduate and graduate students who have demonstrated outstanding academic and professional achievement.

ROTC Program. Students pursuing a commission through the Air Force or Army ROTC programs must take from 12 to 20 hours in the Department of Military Science. To preclude excessive course overloads, these students should plan on an additional one to two semesters and/or summer school to complete all degree requirements of the college.

American Museum of Nursing. The American Museum of Nursing is located in the Community Services Building. Exhibits include surgical suites, apothecary dating from 1700, nurse uniforms, and patient care equipment from the 1800s to the present day. A library/archives houses nursing texts, journals, and books related to nursing.

College of Nursing

nursing.asu.edu
480/965-3244
NUR 344

Professors: Fleury, Komnenich, Mattson, Melnyk

Associate Professors: Alpers, Baldwin, Brillhart, Cesarotti, Dirksen, Evans, Ismeurt, Killeen, McCarthy, Ruiz, Sousa

Assistant Professors: Chen, Cook, Cooke, Hrabe, McGrath, Pickens, Rosdahl, Shearer, Small, Tann

Clinical Professor: Bell

Clinical Associate Professors: Adams, Armbruster, Fargotstein, Hagler, Jasper, Johnson, Kastenbaum, Link, Morris, Nuñez, Stillwell, White

Clinical Assistant Professors: Benesh, Jarrell, Lersch, Maxwell, Sayles, Wotring

COMMUNITY HEALTH PRACTICE (CHP)

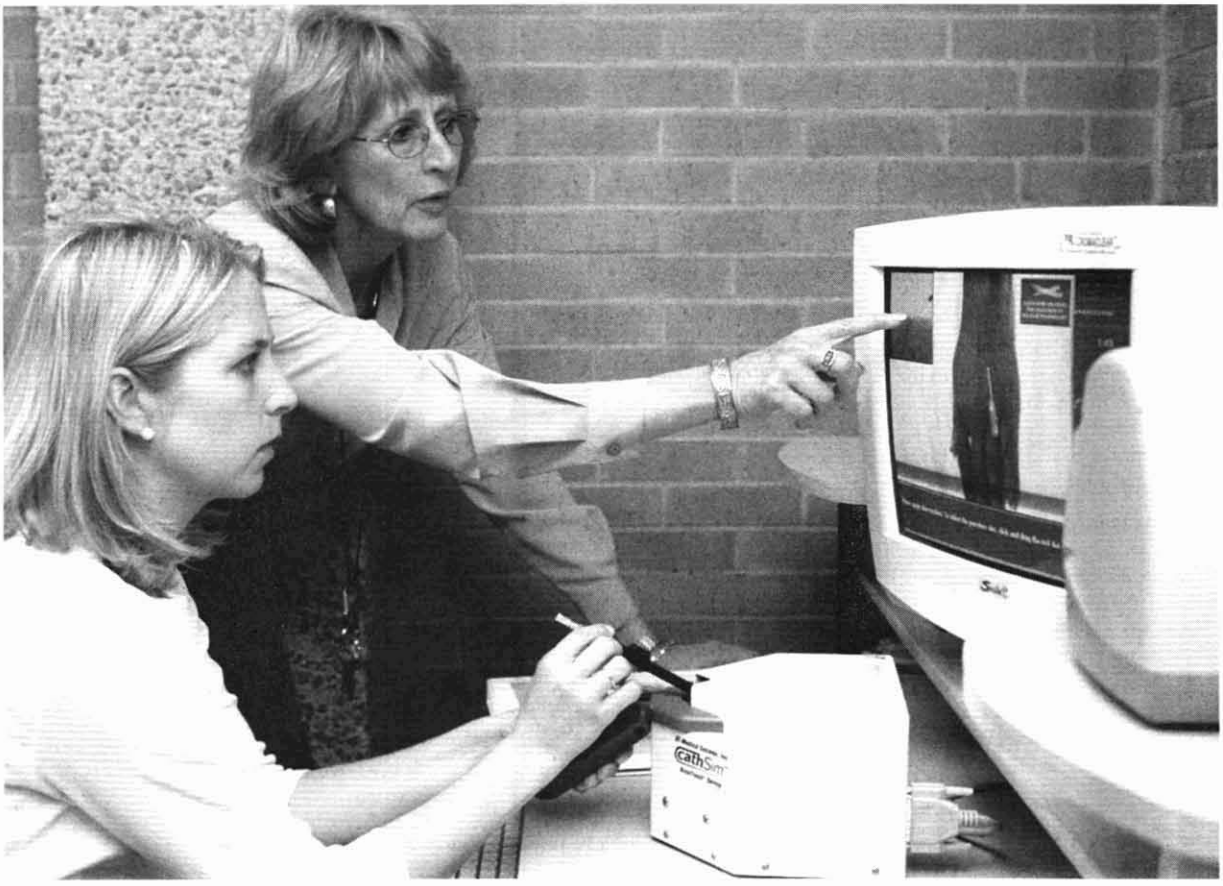
Graduate-Level Courses. For information about courses numbered from 500 to 799, see the *Graduate Catalog*, or access www.asu.edu/aad/catalogs on the Web. In some situations, undergraduate students may be eligible to take these courses; for more information, see "Graduate-Level Courses," page 62.

HEALTH CARE RELATED (HCR)

HCR 210 Clinical Health Care Ethics. (3)
fall, spring, summer
Health care ethics emphasizing analysis and ethical decision making at clinical and health policy levels for health care professionals.
General Studies: HU

HCR 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 HSM 220. Credit is allowed for only HCR 220 or HSM 220.
General Studies: H

HCR 230 Culture and Health. (3)
fall, spring, summer
Cultures of diverse groups and health/illness. Cross-cultural communication, awareness of own cultural influences, indigenous and alternative healing practices.
General Studies: C, G



A student is learning a computer-simulated method of locating and inserting IV needles. Feedback from the machine allows students to learn without discomfort to human subjects.

Tim Trumble photo

HCR 240 Human Pathophysiology. (4)
fall, spring, summer
Chemical, biologic, biochemical, and psychological processes used in study of structural and functional alterations in health with selected therapeutics. Prerequisites: BIO 201 and 202 and MIC 205 and 206 (or their equivalents).

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

NURSING (NUR)

NUR 314 Health Assessment for Registered Nurses. (3)
spring
Introductory knowledge and skills for systematic physical, psychosocial, and developmental nursing assessment over the life span. 2 hours lecture, 3 hours lab. Prerequisite: admission to graduate Nursing program.

NUR 341 Theory I: Health Integrity. (4)
fall and spring
Concepts related to health integrity with focus on individual clients. Fee. Prerequisite: admission to professional Nursing program. Corequisite: NUR 381. Pre- or corequisites: NUR 351, 361.

NUR 342 Theory II: Health Integrity and Alterations. (5)
fall, spring, summer
Concepts related to selected alterations in health integrity with focus on individuals, families, and groups. Fee. Prerequisite: Junior I courses. Corequisite: NUR 382. Pre- or corequisite: NUR 362.

NUR 351 Pharmacology in Nursing. (3)
fall and spring
Foundations of pharmacological interventions. Prerequisite: admission to professional Nursing program.

NUR 361 Professional Development. (2)
fall and spring
Introduces professional nursing roles and responsibilities. Prerequisite: admission to professional Nursing program.

NUR 362 Professional Development II: Nursing Research. (3)
fall, spring, summer
Introduces concepts and issues in nursing research. Emphasizes quantitative and qualitative research processes, examination of nursing research literature. Prerequisite: Junior I or admission to RN-BSN program.
General Studies: L

NUR 364 Professional Development II: Nursing Research for RNs. (3)
fall and spring
Introduces concepts and issues in nursing research. Emphasizes qualitative and quantitative research processes, examination of nursing research literature. Seminar, Internet hybrid. Prerequisites: NUR 391; licensed RN.

NUR 381 Nursing Practice I. (7)
fall and spring
Applies health assessment, nursing process, and basic skills to promote and maintain health integrity of individual clients. Lab, clinical experience. Fee. Prerequisite: admission to professional Nursing program. Corequisite: NUR 341. Pre- or corequisites: NUR 351, 361.

NUR 382 Nursing Practice II. (8)
fall, spring, summer
Applies nursing process with selected individuals, families, and groups experiencing alterations in health integrity. Lab, clinical experience. Fee. Prerequisite: Junior I. Corequisite: NUR 342. Pre- or corequisite: NUR 362.

NUR 391 Registered Nurse Mobility I: Professional Development. (3)
fall and spring
Historical, philosophical, and theoretical bases for professional nursing practice. Enhancement of critical inquiry skills through exploration of selected issues. Prerequisite: admission to RN-BSN program.
General Studies: L

NUR 392 Registered Nurse Mobility II: Health and Wellness. (3)
fall and spring
Concepts of health integrity and community-based practice and professional nursing roles.

NUR 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- International Community/Public Health Nursing. (3–4)
  summer
  Theoretical and clinical application of community assessment, intervention, health education program planning, and culturally competent nursing care. Lecture, discussion, clinical, seminar. Credit is allowed for only NUR 394 or 598 International Community/ Public Health Nursing. Prerequisites: both graduate student in an approved nursing graduate program and RN licensure (US) or only RN licensure (US); 2 completed clinical semesters of Nursing major in an approved BSN or ADN program.

NUR 440 Theory III: Health Integrity and Alterations for RNs. (6)
spring and summer
Concepts related to health integrity and alterations with focus on individuals, families, groups, aggregates, and communities. Prerequisite for RNs: NUR 392.

NUR 441 Theory III: Health Integrity and Alterations. (6)
fall, spring, summer
Concepts related to health integrity and alterations with focus on individuals, families, groups, aggregates, and communities. Fee. Prerequisite: Junior II. Corequisite: NUR 481. Pre- or corequisite: NUR 461.

NUR 442 Theory IV: Health Integrity and Alterations. (3)
fall, spring, summer
Advanced concepts related to health integrity and alterations in that integrity, with focus on selected client populations. Fee. Prerequisite: Senior I. Corequisites: NUR 443, 482. Pre- or corequisite: NUR 462.

NUR 443 Theory V: Leadership and Management. (3)
fall, spring, summer
Selected theories and concepts of organizations, management, leadership with focus on nursing management and leadership in health care organizations. Prerequisite: Senior I. Corequisites: NUR 442, 482. Pre- or corequisite: NUR 462.

NUR 444 Theory IV: Health Integrity and Alterations for RNs. (3)
fall, spring, summer
Advanced concepts related to health integrity and alterations in that integrity, with focus on selected client populations. Prerequisite: NUR 364.

NUR 445 Theory V: Leadership and Management for RNs. (3)
fall and summer
Selected theories and concepts of organizations, management, leadership with focus on selected client populations for experienced RNs. Prerequisite: NUR 364.

NUR 450 School Nursing Practice. (3)
summer
Role of the professional nurse in planning, implementation, and evaluation of the school health program. Prerequisite: RN license.

NUR 451 Health Assessment of the Child. (3)
summer
Maintenance of good health in the school-aged child using health assessment and promotion techniques. Lecture, discussion, self study, demonstration. Prerequisite: RN license.

NUR 452 Nursing of Children with Developmental Disabilities. (3)
summer
Congenital and acquired physical and mental developmental disorders, including the evaluation of child and family and community resources. Prerequisite: RN license.

NUR 460 Professional Development III: The Art of Nursing for RNs. (3)
fall and spring
Explores the aesthetic, ethical, and personal patterns of knowing in nursing for the practicing RN. Pre- or corequisite: NUR 391.

NUR 461 Professional Development III: The Art of Nursing. (3)
fall, spring, summer
Explores the aesthetic, ethical, and personal patterns of knowing in nursing. Prerequisite: Junior II or admission to RN-BSN program.
General Studies: HU

NUR 462 Professional Development IV. (2)
fall, spring, summer
Focuses on role transition to professional nursing. Prerequisite: Senior I.

NUR 464 Professional Development IV for RNs. (3)
fall and summer
Capstone professional development course for the RN student. Prerequisite: NUR 460.

NUR 481 Nursing Practice III. (7)
fall, spring, summer
Applies concepts and clinical practice related to health integrity and alterations with focus on individuals, families, groups, aggregates, and communities. Lab, clinical experiences. Fee. Prerequisite: Junior II. Corequisite: NUR 441. Pre- or corequisite: NUR 461.

NUR 482 Nursing Practice IV. (8)
fall and spring
Capstone course with focus on synthesis and application of patterns of knowing and leadership, management concepts in collaborative nursing practice. Lab, clinical experiences. Fee. Prerequisite: Senior I. Corequisites: NUR 442, 443. Pre- or corequisite: NUR 462.

NUR 494 Special Topics. (1–4)
fall, spring, summer
Advanced study and/or supervised practice in an area of nursing. Lecture and lab to be arranged. Prerequisite: 12 hours in Nursing major or instructor approval.

NUR 495 Community Health/Home Health Practice for RNs. (4)
spring and summer
Theoretical content related to community and home health care. Clinical practice with individual, family aggregates. 1 hour lecture, 3 hours lab. Fee. Pre- or corequisite: NUR 440.

NUR 496 Leadership and Management Practice for RNs. (5)
fall and summer
Capstone leadership and management experience for the RN student that utilizes patterns of knowing in nursing practice. Clinical lab. Fee. Pre- or corequisite: NUR 443.

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

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

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

College of Public Programs

www.asu.edu/copp **Jeffrey Chapman, PhD, Interim Dean**

PURPOSE

The College of Public Programs offers students rare opportunities to study and advance social work, public administration, nonprofit leadership and management, community resources for recreation planning, and tourism policy and planning. The college prepares students for rewarding careers in government, nonprofit agencies, politics, social services, public administration and public management, education, business and industry, and international service.

Established in 1979, the college is the home of the School of Community Resources and Development, School of Public Affairs, and School of Social Work. The college was established to bring together academic disciplines that have a focus on community and a concern for relevance in education and scholarly potential. Professional degree and certificate programs incorporate the spirit of leadership, scholarship, and professionalism.

Students in the college are able to leverage the location of the university to address urban issues, cultural diversity, globalization, and shifting demographics. Academic programs integrate professional training, social science research, community engagement, and the latest social theories. Highly qualified faculty are committed to improving institutions' and individuals' capacities to address critical public issues of an urbanized, advanced, and diverse society emphasizing local, national, and global concerns. Academic and student support staff are responsive to student needs and are committed to providing comprehensive student support services to ensure student success.

The College of Public Programs is committed to excellence in instruction, innovative research, and public service and provides transdisciplinary academic degrees and certificates that recognize civic responsibility, leadership, diversity, and human potential.

ORGANIZATION

The college is composed of three academic units, each administered by a director:

School of Community Resources and Development
School of Public Affairs
School of Social Work

The college administers these centers and institutes:

Advanced Public Executive Program
Center for Nonprofit Leadership and Management
Center for Urban Inquiry
Morrison Institute for Public Policy
Southwest Interdisciplinary Research Consortium

The general administration of the college is the responsibility of the dean, who is responsible to the executive vice president and provost. For more information, access the college's Web site at www.asu.edu/copp.

ADMISSION

Freshmen and Transfers. Individuals interested in admission to an undergraduate program in the College of Public Programs should refer to "Undergraduate Admission," page 66. Those who meet the minimum university admission requirements will be admitted to the undergraduate academic unit of the college as a preprofessional in that respective academic unit.

Professional Status Admission Requirements. Entry to any undergraduate academic unit of the college with professional status requires

1. the completion of at least 56 semester hours with a minimum cumulative GPA of 2.50;
2. the university First-Year Composition requirement and the university mathematical studies requirement (see "University Graduation Requirements," page 88); and
3. the College of Public Programs writing competence, communication, and computer requirements (see "College Degree Requirements," page 486).

The academic units may also have additional requirements.

Most upper-division courses in the college are not open to preprofessional students. Preprofessionals should check the catalog information in their major fields to determine any course enrollment restrictions.

Students should refer to the section of the catalog and advising documents with reference to their preferred areas of study for specialized departmental retention requirements and/or continued enrollment in their major courses.

Transfer Credit. In most cases, course work successfully completed at a regionally accredited four-year institution of higher education is accepted into the respective academic unit.

Transferable course work successfully completed at an accredited two-year institution of higher education

College of Public Programs Baccalaureate Degrees and Majors

Major	Degree	Concentration*	Administered By
Recreation	BS	Recreation management or tourism management	School of Community Resources and Development
Social Work	BSW	—	School of Social Work

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

(community or junior college) transfers as lower-division credit up to a maximum of 64 semester hours.

Successful completion is defined for purpose of transfer as having received a grade comparable to an "A" (4.00), "B" (3.00), or "C" (2.00) at ASU. The acceptance of credits is determined by the director of Undergraduate Admissions, and the utilization of credits toward degree requirements is at the discretion of the academic unit and the college.

ADVISING

The advising mission for the College of Public Programs professional academic advising staff is to assist students in developing meaningful educational plans to meet their academic, career, and personal goals in an ongoing process of evaluation and clarification.

The advisors strive to perform their duties in a professional, ethical, confidential, accurate, and supportive manner, respecting student diversity and needs, and always holding the individual in highest regard. The student and advisor should accomplish this process in a spirit of shared responsibility to develop academic excellence, strong decision-making skills, and self-reliance.

A student who has been admitted to the College of Public Programs is assigned an academic advisor from the academic unit of the student's major area of study. Questions about advising should be directed to the student's academic advisor or to the College of Public Programs Student Services Office, WILSN 203.

Mandatory Advising. The following categories of students are required to receive advising and to be cleared on the Mandatory Advising Computer System before they may register for classes:

1. students with admissions competency deficiencies;
2. all freshmen;
3. transfer students in their first semester at ASU;
4. readmitted students;
5. students on probation;
6. students who have been disqualified;
7. students with special admissions status; and
8. all Social Work undergraduate majors.

Course Load. A normal course load per semester is 15 to 16 semester hours. The maximum number of hours for which a student can register is 18 semester hours unless an overload petition has been filed and approved by the Department/School Standards Committee and the Academic and Student Affairs Committee of the college. Semester course loads may be further limited for students in mandatory advising.

Petitions for overload are not ordinarily approved for students who have a cumulative GPA less than 3.00 and who do not state valid reasons for the need to register for the credits. Students who register for semester hours in excess of 18 and do not have an approved overload petition on file may have courses randomly removed through an "administrative drop" action.

Specific degree requirements are explained in detail under the respective college, school, and department sections.

DEGREES

Successful completion of a four-year program of 120 semester hours is specified by the respective academic unit within the College of Public Programs. See "College of Public Programs Baccalaureate Degrees and Majors" table, on this page.

GRADUATE PROGRAMS

Master's degree programs are offered by the three academic units of the College of Public Programs, and two of the units offer doctoral degrees. See the "College of Public Programs Graduate Degrees and Majors" table, page 486.

For more information on courses, faculty, and programs, see the *Graduate Catalog*.

COLLEGE OF EXTENDED EDUCATION

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

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

UNIVERSITY GRADUATION REQUIREMENTS

In addition to fulfilling college and major requirements, students must meet all university graduation requirements.

First-Year Composition Requirement

Students must demonstrate reasonable proficiency in written English by achieving a grade of "C" (2.00) or higher in both ENG 101 and 102 (or ENG 107 and 108 for international students), or in ENG 105 or its equivalent. Should a student receive a grade lower than "C" (2.00) in any of the courses, it must be repeated until the specified proficiency is

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

College of Public Programs Graduate Degrees and Majors

Major	Degree	Concentration*	Administered By
Public Administration	MPA	Optional: nonprofit administration*	School of Public Affairs
	PhD	—	School of Public Affairs
Recreation	MS	—	School of Community Resources and Development
Social Work	MSW	Advanced direct practice or planning, administration, and community practice	School of Social Work
	PhD	—	School of Social Work

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

demonstrated. Composition courses transferred from out-of-state institutions must be evaluated and approved by the Writing Programs Office.

General Studies Requirement

All undergraduate students in the College of Public Programs are required to complete the university General Studies requirement to be eligible for graduation in any of the undergraduate curricula offered by the college.

General Studies courses are regularly reviewed. To determine whether a course meets one or more parts of the General Studies requirement, see "General Studies," page 92, and the current *Schedule of Classes.*

General Studies courses are also identified following course descriptions according to the "Key to General Studies Credit Abbreviations," page 94.

COLLEGE DEGREE REQUIREMENTS

In addition to the university General Studies requirement, the College of Public Programs has requirements in communication, computer science, and writing competence.

Communication Requirement

Undergraduate students in the College of Public Programs are required to take a course in communication. The course provides an overview of human communication in public and/or cultural contexts and helps students develop oral presentation skills and competence. Students majoring in Social Work choose from the following courses:

COM 100 Introduction to Human Communication *SB*.....3
COM 225 Public Speaking *L*.....3
COM 230 Small Group Communication *SB*.....3
COM 241 Introduction to Oral Interpretation *L/HU*.....3
COM 259 Communication in Business and the Professions 3

Majors in the School of Community Resources and Development choose from COM 225, 241, or 259.

Computer Requirement

A computer course is required for all undergraduate majors. Any computer (CS) course from the university General Studies list is acceptable. It may be included within the numeracy requirement or department or school degree program, where appropriate.

Non-English Language Requirement

The School of Social Work requires proficiency in a language other than English.

Writing Competence Requirement

In addition to ENG 101 and 102 First-Year Composition or their equivalent, one of the following courses in advanced written expository composition is required of all undergraduate majors:

BUS 301 Fundamentals of Management Communication *L*.....3
ENG 215 Strategies of Academic Writing *L* 3
ENG 216 Persuasive Writing on Public Issues *L*.....3
ENG 217 Writing Reflective Essays *L*.....3
ENG 218 Writing About Literature *L/HU* 3
ENG 301 Writing for the Professions *L*.....3
JMC 201 Journalism Newswriting *L* 3
JMC 202 Radio-Television Writing *L* 3

The writing competence course may be counted as fulfilling the university General Studies literacy and critical inquiry (L) requirement if it is on the university-approved list.

Pass/Fail Option

The College of Public Programs does not offer any courses for pass/fail credit. Courses completed for pass/fail credit outside the College of Public Programs may count only as elective credit in meeting degree requirements.

Limit on Physical Education Activity Hours

No more than eight hours of physical education activity courses may be counted within the minimum 120 hours required for graduation.

PREPROFESSIONAL REQUIREMENTS

Students should refer to the respective department or school section of the catalog and to department or school advising documents for more information on requirements.

Undergraduate Credit for Graduate Courses

To enable undergraduate students to enrich their academic development, the Division of Graduate Studies and the individual academic units of the College of Public Programs allow qualified students to take graduate-level courses for undergraduate credit. To qualify for admission to a graduate-level course, the student must have senior standing (87 or more semester hours successfully completed) and a cumulative GPA of 3.00 or higher. In addition, permission to enroll must be given before registration and must be approved by the instructor of the course, the student's advisor, the department chair or school director, and the dean of the college in which the course is offered.

ACADEMIC STANDARDS AND RETENTION

Good Standing. Students in the College of Public Programs are considered in good standing for the purpose of retention if they maintain a cumulative GPA of 2.00 or higher in all courses taken at ASU. However, to achieve professional status in the undergraduate degree programs in the college, students must have a cumulative GPA of 2.50 or higher at ASU.

Probation. Any student who does not maintain good standing is placed on academic probation. A student on academic probation is required to observe any limitations or rules the college may impose as a condition for retention.

Disqualification. A student who is on probation becomes disqualified if (1) the student has not returned to good standing or (2) the student has not met the required semester GPA.

Disqualification is exercised at the discretion of the college and becomes effective on the first day of the fall or spring semester following college action. A disqualified student is notified by the Office of the Registrar and/or the dean of the college and is not allowed to register for a fall or spring semester at the university until reinstated. A student who is disqualified may not attend as a nondegree student.

Reinstatement. Students seeking reinstatement after disqualification should contact the College of Public Programs Student Services Office regarding procedures and guidance for returning to good standing. When reinstatement includes readmission, application must be made to the Readmissions Section of the Office of the Registrar.

All academic disciplinary action is the function of the College of Public Programs Student Services Office, WILSN 203, under the direction of the dean of the college. Students having academic problems should call this office for advising at 480/965-1034.

SPECIAL PROGRAMS

Barrett Honors College

The College of Public Programs cooperates with the Barrett Honors College, which affords superior undergraduates opportunities for special classes taught by selected faculty. Honors students receive special advising and priority preregistration and complete a senior honors thesis. Participating students can major in any academic program. A full description of the requirements and the opportunities offered by the Barrett Honors College can be found in "The Barrett Honors College," page 129.

For more information, visit the College of Public Programs Student Services Office at WILSN 203, or call 480/965-1034. For more information about the Barrett Honors College, call 480/965-2359.

Certificate in Lesbian, Gay, Bisexual, and Transgender Studies

The undergraduate certificate in Lesbian, Gay, Bisexual, and Transgender Studies is offered by the Committee on Lesbian, Gay, Bisexual, and Transgender Studies, administered through the College of Public Programs.

Lesbians, gay men, bisexuals, and transgendered (LGBT) people play important roles as colleagues, clients, parents, children, siblings, neighbors, employees and employers, religious leaders, and friends. Given the increasing visibility and changing political climate for LGBT people in the United States, all students—not only those who identify themselves as gay, lesbian, bisexual, or transgender–are served well by learning about the histories, communities, and contemporary social issues regarding people from LGBT backgrounds. The educational experience is enhanced when students are introduced to complex intersections between and among sexual, racial, ethnic, religious, geographic, and national identities. The philosophy of this certificate program is to promote intellectual and pedagogical diversity as one of the university's greatest assets, in part by instilling in students sensitivity to cultures different from their own, but also through careful analysis of the self in historical, artistic, and sociocultural contexts.

The specific goals of the certificate program are to give students knowledge about specific lesbian, gay, bisexual, and transgendered communities; knowledge about the history and maintenance of the category, "lesbians and gay men"; theoretical perspectives on "heterosexuality" as a presumptive sexual identity; an understanding of Lesbian, Gay, Bisexual, and Transgender Studies as an academic area of inquiry; an understanding of community politics, dynamics, and conflicts; use-inspired education that culminates in a public presentation; and practical experience in utilizing course work knowledge in the community through an internship or community service project.

For information on the faculty and certificate requirements, access the Web site at www.asu.edu/copp.

College of Public Programs Council

The College of Public Programs Council is a unit of Associated Students of Arizona State University and serves as the coordinating body of student activities in the college. The council fosters communication, cooperation, and understanding among undergraduate students, graduate students, faculty, and staff. As the official representative student organization to the dean and college administration, the council appoints student members to faculty committees, cosponsors events with the college alumni association, and represents students at college and university functions.

Center for Nonprofit Leadership and Management

The mission of the Center for Nonprofit Leadership and Management is "to improve the quality of life in communities by enhancing the performance of nonprofit organizations." Varied strategies accomplish this mission and include coordination of educational offerings, selected technical assistance to nonprofits, support for research projects for faculty and students, and the convening of nonprofit leaders and managers through a variety of training opportunities. The center supports the activities of two complementary nonprofit management education programs— the Nonprofit Youth and Human Service Leadership and Management:

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

American Humanics Certificate (undergraduate) and the Nonprofit Leadership and Management Certificate (graduate). For more information, call 480/965-0607, or access the Web site at www.asu.edu/copp/nonprofit.

NONPROFIT LEADERSHIP AND MANAGEMENT (NLM)

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.

Center for Urban Inquiry. *The mission of the Center for* Urban Inquiry (CUI) is threefold: critical social science research, community engagement, and innovative education. The research agenda prioritizes the scrutiny of economic and social privilege and disadvantage. Specific research requests from policymakers, nonprofit and government agencies, and citizen groups are also considered. This includes a rapid response community research initiative established to provide intensive feedback to community research requests that must be completed within a limited time frame, as well as long-term process and outcome evaluations of programs and policies in the private and public sectors. CUI also facilitates collaborative research efforts among faculty, research professionals, and students. Such research includes an examination of the individual and collective costs of poverty in the Southwest and the design of comprehensive research to explore the extent and nature of racial profiling among agents of social control.

CUI's direct community involvement ranges from the local to the global. This includes support of neighborhood groups advocating for homeowners and renters within the context of urban development and displacement, the creation of a hospital-based community partnership to combat youth violence, and participation in United Nations summits on sustainable development and indigenous peoples' rights. The center serves the university and community through innovative educational endeavors, including a distance-learning college program for incarcerated women, in-depth research training for graduate and undergraduate students, and courses in service learning, community action research, and international urban issues. CUI also serves as the administrative and programmatic home for the needs-based Nina Mason Pulliam Legacy Scholars Program for nontraditional students.

For more information, call 480/965-9216, access the center's Web site at www.asu.edu/copp/urban, or write

CENTER FOR URBAN INQUIRY
ARIZONA STATE UNIVERSITY
PO BOX 874603
TEMPE AZ 85287-4603

College of Public Programs

The academic units within the College of Public Programs may use the CPP prefix for course offerings that cross disciplinary boundaries.

COLLEGE OF PUBLIC PROGRAMS (CPP)

CPP 194 Special Topics. (1–4)
selected semesters

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

CPP 394 Special Topics. (1–4)
selected semesters

CPP 484 Internship. (1–12)
selected semesters

CPP 494 Special Topics. (1–4)
selected semesters

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

CPP 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.

School of Community Resources and Development

scrd.asu.edu
480/965-7291
AG 281

Randy J. Virden, Director

Professors: Allison, Yoshioka

Associate Professors: Ashcraft, Teye, Timothy, Virden

Assistant Professors: Barry, Brown, Budruk, Guo, Pritchard, White

RECREATION—BS

The School of Community Resources and Development is dedicated to improving the economic, and environmental, social, and cultural well-being of communities (local, regional, and global) through research, discovery, instruction, and professional service.

The BS degree program in the School of Community Resources and Development is focused on three general areas of study: parks and recreation resources; tourism development and management; and nonprofit leadership and management. It is a professional program that exposes students fully to community resource-related issues, including amenity service delivery, philanthropy, natural and cultural resources, human behavior and development, development issues (social, economic, and environmental), and public policy.

This interdisciplinary program is designed to provide the student with competencies necessary for employment in management and program delivery positions in diverse public, nonprofit, and private organizations such as community service departments, municipal and county park and recreation departments, state and national natural resource agencies, YMCAs, Boys and Girls Clubs of America, the United Way and other nonprofit agencies, clinical rehabilitation centers, hospitals, visitor and convention bureaus, senior centers, resorts, destination management companies, and

other components of the tourism/commercial recreation industry.

Concentrations

Students may select from two concentrations: (1) recreation management and (2) tourism management.

Recreation Management. Students pursuing the recreation management concentration can further specialize in therapeutic recreation, community and urban recreation, natural resource recreation, or nonprofit youth and human service leadership and management (American Humanics). In addition to the 34 semester hours of major core classes, these areas of study consist of from 15 to 18 semester hours of recreation-related courses and from 12 to 19 semester hours of related-areas courses.

Therapeutic Recreation. Within the recreation management concentration, students may specialize in therapeutic recreation and in doing so, may qualify to sit for the National Council for Therapeutic Recreation Certification exam. This professional development prepares students for careers in clinical and community settings, working with disabled individuals in their pursuit of quality leisure experiences. This program is the only one of its kind in a growing field in Arizona.

Tourism Management. The tourism management concentration consists of 34 semester hours of major core courses, 12 semester hours of tourism-related requirements, nine semester hours of tourism options, and nine semester hours of nonmajor related course work.

SCHOOL MAJOR REQUIREMENTS

Students may declare Recreation as their major but cannot register for upper-division core classes without *professional status.* To be officially admitted with professional status to the BS degree program in Recreation, students must

1. meet the College of Public Programs preprofessional status admission requirements (see "Admission," page 484);
2. complete REC 120 and 210 with a grade of "C" (2.00) or higher; and
3. complete either COM 225, 241, or 259.

Transfer students who have completed 56 semester hours or more at another institution must remove any of the above course or scholastic deficiencies before being admitted *with professional status* to the BS degree in Recreation.

To graduate, students must complete the university General Studies requirement and the College of Public Programs course requirements in addition to major requirements.

PROGRAM REQUIREMENTS

The 64- to 68-semester-hour BS degree in Recreation includes 34 semester hours of major core courses.

Recreation Major Core Courses

REC	120	Leisure and the Quality of Life *SB* 3
REC	210	Leisure Delivery Systems 3
REC	330	Programming of Recreation Services *L* 3
REC	364	Foundations of Therapeutic Recreation 3
REC	440	Recreation Planning and Facility Development 3
REC	462	Management of Recreation and Tourism Services 3
REC	463	Senior Internship 12
REC	482	Assessment and Evaluation of Recreation Services 3
REC	494	ST: Preinternship Workshop 1
Total		34

REC 330, 440, 462, and 482 require *professional status* and must be taken in the proper sequence. REC 463 is the final capstone course taken in the department.

Two hundred hours of recreation leadership experience are required before enrollment in REC 463 Senior Internship. Students are not permitted to take additional course work during their senior internship placement period. Approval of internships for Tempe campus students must be received from the School of Community Resources and Development office.

A student must attain a grade of "C" (2.00) or higher in all courses within the major, including the related area. Specific courses that may be used to fulfill the related requirements, the related areas, and the directed elective course work are listed on check sheets available in the department office and on the Web at scrd.asu.edu.

MINORS

The school offers two minors: (1) Recreation Management and (2) Tourism. The minor in Recreation Management consists of REC 120 Leisure and the Quality of Life, REC 160 Leisure and Society, and 12 additional semester hours of approved course work, including 12 semester hours at the upper-division level, from Tempe campus. The Tourism minor consists of REC 120 Leisure and the Quality of Life, REC 305 Introduction to Travel and Tourism, and nine additional semester hours of upper-division approved courses from Tempe campus.

BIS CONCENTRATIONS

Concentrations in recreation management and tourism 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. Students in the BIS degree program cannot choose recreation management and tourism management as the two concentrations.

A concentration in nonprofit/youth agency administration is available under the Bachelor of Interdisciplinary Studies (BIS) degree.

Building on two academic concentrations (or one double concentration) and an interdisciplinary core, students in the BIS program take active roles in creating their educational plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

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

CERTIFICATE PROGRAM

Nonprofit Youth and Human Service Leadership and Management: American Humanics Certificate Program. The certificate program in American Humanics is education and preparation for leadership and management positions in nonprofit youth and human service organizations. The program features professional affiliation with and certification by American Humanics, Inc., the nation's leader in education for nonprofit careers. American Humanics collaborates with several nonprofit organizations, including American Red Cross, Big Brothers/Big Sisters, Boys and Girls Clubs, Boy Scouts, Camp Fire Boys and Girls, Girl Scouts, Habitat for Humanity, Junior Achievement, the United Way, and YMCA.

This program features an academic and experiential approach that highlights the unique issues of nonprofit organization management, with a particular emphasis in youth development agencies. The program includes active participation by nonprofit professionals who offer workshops, seminars, mentoring, and field trips. American Humanics national certification can be earned in conjunction with any baccalaureate degree.

REC	220	Introduction to Nonprofit Youth and Human Service Organizations 3
REC	300	Fund Raising 3
REC	310	Volunteerism 3
REC	320	Youth and Human Service Workshop* 4
REC	420	American Humanics Institute 2
REC	430	Managing Nonprofit Organizations 3
REC	463	Senior Internship 12
Minimum total 30		

* REC 320 is taken four semesters, for one semester hour each term.

GRADUATE PROGRAM

MS Degree in Recreation. The curriculum for the MS degree in Recreation is designed to help students achieve both academic and professional goals. Areas of study include natural resource recreation, recreation administration, social/psychological aspects of leisure, and tourism and commercial recreation. Each student may complete a thesis or professional option. Information on the MS degree in Recreation is detailed in the *Graduate Catalog.*

RECREATION MANAGEMENT AND TOURISM (REC)

REC 120 Leisure and the Quality of Life. (3)
fall, spring, summer
Conceptual foundations for understanding the role of leisure in the quality of life. Social, historical, psychological, cultural, economic, and political foundations of play, recreation, and leisure.
General Studies: SB

REC 150 Outdoor Pursuits. (3)
summer
Theories and practical applications related to outdoor recreation pursuits. Interdisciplinary approach to wilderness issues and philosophies, culminating in an outdoor experience. Field trips.

REC 160 Leisure and Society. (3)
once a year
Analyzes the human relationship to leisure. Historical survey of philosophical, psychological, and socioeconomic bases for development of systems that provide leisure programs. Non-Recreation majors only.
General Studies: SB

REC 210 Leisure Delivery Systems. (3)
fall and spring
Introduces development, management, and organization of the public, not-for-profit, and private sectors of the leisure services profession. Organized into five modular units that study the delivery of services in the recreation and tourism professions. Lecture, team taught. Prerequisite: Recreation major. Pre- or corequisite: REC 120.

REC 220 Introduction to Nonprofit Youth and Human Service Organizations. (3)
fall and spring
Introduces the nonprofit youth and human service sector and its role in United States society, the economy, and service delivery systems.

REC 235 Service Learning for Youth Development. (3)
fall and spring
Applies youth development theories and approaches through a community service immersion in collaboration with one or more nonprofit partners. Case studies, small group discussion. Prerequisite: instructor approval.

REC 300 Fund Raising. (3)
fall
Methods, techniques, and directed experience in fund raising for voluntary youth and human services agencies. Budget control and accountability.

REC 305 Introduction to Travel and Tourism. (3)
fall and spring
Examines the components of the travel and tourism industry at the state, national, and global levels.
General Studies: G

REC 310 Volunteerism. (3)
spring
Administration of volunteer service programs. Studies and analyzes the volunteer personnel process.

REC 315 Community Recreation Systems. (3)
fall
Explores and assesses community recreation delivery systems in the United States. Prerequisite: REC 210.

REC 320 Youth and Human Service Workshop. (1)
fall and spring
Professional seminar featuring nonprofit executives; variable topics on nonprofit and youth leadership. Forum for exchange between students and professionals. May be repeated for credit. Prerequisite: instructor approval.

REC 325 Tourism Accommodations. (3)
fall
Local, national, and international overview of the lodging and food service industries. Prerequisite: REC 305.

REC 330 Programming of Recreation Services. (3)
fall and spring
Foundations for effective program planning in varied leisure delivery systems. Prerequisite: Recreation professional status.
General Studies: L

REC 340 Outdoor Survival. (3)
fall
Interdisciplinary approach to outdoor survival, including attitudes, psychological stress, physiological stress, preparation, hypothermia, navigation, flora, and wildlife. Field trips.

REC 345 Meeting and Convention Planning. (3)
fall
Basic aspects and skills in planning meetings and conventions. Industry and market overview of certified meeting planners. Prerequisite: REC 305.

REC 350 Tourism Marketing. (3)
fall and spring
Critical examination of marketing principles; applications to travel, tourism, and related industries in diverse settings, including local, national, and international. Corequisite: REC 305.

REC 364 Foundations of Therapeutic Recreation. (3)
fall and spring
Introduces special recreation and therapeutic recreation services for persons with disabilities. Offers both a community and clinical

perspective on specialized services. Prerequisite: Recreation major or minor.

REC 370 Natural Resource Recreation Planning and Management. (3)
fall
Comprehensive introduction into theory, processes, and techniques for managing natural resource recreation with an emphasis on the public sector.

REC 372 Tourism Planning. (3)
fall and spring
Applies economic and regional development concepts and theories to destination product development. Prerequisite: REC 305.

REC 380 Wilderness and Parks in America. (3)
fall and spring
Examines the American Conservation Movement and the relationships between the environment and recreation behavior.
General Studies: SB, H

REC 400 Processes and Techniques in Therapeutic Recreation. (3)
fall
In-depth analysis of theoretical and philosophical approaches to therapeutic recreation practice with emphasis on various facilitation techniques used in therapy. Prerequisite: REC 364 or instructor approval.

REC 401 Program Design and Evaluation in Therapeutic Recreation. (3)
spring
In-depth analysis of assessment, treatment planning, program implementation, documentation, and evaluation strategies employed in therapeutic recreation practice. Prerequisites: both REC 364 and 400 or only instructor approval.

REC 415 Tourism Transportation Systems. (3)
spring
Examines the role of various modes of transportation in domestic and international tourism development. Prerequisite: REC 305.

REC 420 American Humanics Institute. (1–2)
fall
National Management Institute for preparation of youth development and nonprofit professionals. Out-of-state conference includes seminars and case studies. May be repeated for credit. Prerequisite: instructor approval.

REC 430 Managing Nonprofit Organizations. (3)
spring
Analyzes administrative structures, decision making, and program delivery within nonprofit youth and human service organizations. Prerequisites: REC 220; senior standing.

REC 440 Recreation Planning and Facility Development. (3)
fall and spring
Provides an understanding of the major principles and procedures associated with the planning and development of park, recreation, sport, and tourism areas and facilities. Prerequisite: Recreation professional status.

REC 458 International Tourism. (3)
fall and spring
Global examination of international tourism and its significance as a vehicle for social and economic development.
General Studies: G

REC 460 Clinical Issues in Therapeutic Recreation. (3)
spring
Explores contemporary problems/issues confronting the therapeutic recreation field; includes philosophical, historical, practice, management, research, and educational issues. Lecture, off-campus lab. Prerequisites: both REC 364 and 400 or only instructor approval.

REC 462 Management of Recreation and Tourism Services. (3)
fall and spring
Basic principles of administration and their application in successful administrative situations. Analyzes administrative function, structure, and policies. Prerequisites: REC 330; Recreation professional status.

REC 463 Senior Internship. (6 or 12)
fall, spring, summer
Supervised guided experience in selected agencies. May be repeated for credit. Fee. Prerequisites: REC 440, 462, 482; Recreation major; senior standing.

REC 470 Environmental Interpretation and Education. (3)
spring
Introduces park interpretation and environmental education that includes theories, principles, and techniques. Prerequisite: REC 370.

REC 480 Natural Resource Tourism. (3)
spring
Examines the interaction of tourism with culture, natural environment, as well as the impacts of tourism on the environment.

REC 482 Assessment and Evaluation of Recreation Services. (3)
fall and spring
Introduces applied leisure research with emphasis on program evaluation, research design, data collection techniques, and data analysis. Prerequisites: REC 330; Recreation professional status.

REC 494 Special Topics. (1–3)
fall and spring
Special topics selected by department faculty. Topics may include the following:
- Preinternship Workshop. (1)

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

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

School of Public Affairs

spa.asu.edu
480/965-3926
WILSN 208

Robert Denhardt, Director

Professors: Alozie, Cayer, Chapman, Coor, Crow, J. Denhardt, R. Denhardt, Hall, Lan, Perry

Associate Professors: Campbell, McCabe

Assistant Professors: Catlaw, Corley, Peck, Voorhees

Professor of Practice: Blessing

Certificate

The School of Public Affairs offers a 15-semester-hour Public Administration and Public Management Certificate program. The certificate prepares students for citizenship, leadership, and careers in governmental agencies and nonprofit associations. To meet certificate requirements, students take four core courses and one elective course. The list of approved electives may be obtained by visiting the School of Public Affairs Student Services Office in WILSN 211, or by calling 480/965-1037.

PAF	300	Public Management and Administration 3
PAF	340	Public Management and Policy 3
PAF	420	Public Leadership 3

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

PAF 460 Public Service Ethics	3
Elective	3
Total	15

BIS Concentration

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

Graduate Degrees

The school also offers a 42-semester-hour professional Master of Public Administration degree and the Doctor of Philosophy degree. The MPA degree is accredited by the National Association of Schools of Public Affairs and Administration. Consult the *Graduate Catalog* for information about the programs.

PUBLIC AFFAIRS (PAF)

PAF 300 Public Management and Administration. (3)
fall and spring
Examines the context and role of the public manager and the development of the field of public administration.

PAF 340 Public Management and Policy. (3)
fall and spring
Develops conceptual, critical, and practical understanding of policy, the policy process, and policy analysis.

PAF 401 Statistics. (3)
fall and spring
Surveys statistical concepts and techniques with application to public administration. Does not count toward program of study. Satisfies statistics prerequisite requirement for PAF 501 and 502.

PAF 420 Public Leadership. (3)
fall and spring
Examines key concepts, models, and strategies for leading public and nonprofit organizations, emphasizing self-knowledge, skills, and abilities for effective leadership.

PAF 460 Public Service Ethics. (3)
fall and spring
Role, values, and issues of public management in democratic governance, citizen participation, power structures, and professional codes of conduct.

PAF 498 Pro-Seminar. (3)
selected semesters
Small group and study for advanced students in the field of public administration. May be repeated for credit for a total of 6 hours. Prerequisites: minimum 2.00 GPA; school approval.

PAF 499 Individualized Instruction. (1–3)
fall, spring, summer
Original study or investigation in public administration and public management under the supervision of a faculty member. May be repeated for credit for a total of 6 hours. Prerequisites: minimum 3.00 GPA; school approval.

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

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

School of Social Work

ssw.asu.edu
480/965-3304
WHALL 135

Leslie Leighninger, Director

Professors: Ashford, LeCroy, Leighninger, MacEachron, Marsiglia, Martinez-Brawley, Moroney, Segal

Associate Professors: Brzuzy, Gerdes, Gustavsson, Montero, Napoli, Nichols, Paz, Risley-Curtiss, Steiner, Stromwall, Waller

Assistant Professors: Bacchus, Holley, Kang, Larson, Niles, Okamoto

Senior Instructional Professional: Gonzalez-Santin

Assistant Administrative Professionals: Knutson-Woods, Rountree

PURPOSE

The purpose of the School of Social Work is to prepare professional social work practitioners who are committed to the enhancement of individual, family, and group problem-solving capacities and the creation of a more nurturing, just, and humane social environment.

The mission of the School of Social Work is the training of professional social workers for beginning-level generalist practice (BSW) and for advanced direct practice and planning, administrative, and community practice (MSW). The focus is on populations of the Southwest and those who are most oppressed and most in need of social services.

The school is committed to the university's mission to be competitive with the best public research universities in the country. Faculty members have active research agendas under way that venture into a wide variety of topics, including work with children, issues of specific importance to Latino and indigenous peoples, poverty, human services planning, and many other areas of interest.

ORGANIZATION

The School of Social Work is organized around three program areas:

1. Bachelor of Social Work (BSW);
2. Master of Social Work (MSW); and
3. Doctor of Philosophy (PhD with a major in Social Work).

The MSW program has two areas of concentration: (1) advanced direct practice (ADP) and (2) planning, administration, and community practice (PAC). In considering the PAC area of emphasis, students need to be aware that, because of space availability, preference is given to individuals with significant previous experience.

The BSW and MSW degrees are offered at Tempe campus and the Tucson component; the PhD degree is offered at Tempe campus.

For more information regarding the master's and PhD programs, see the *Graduate Catalog*.

ADMISSION

Bachelor of Social Work

Preprofessional Status. Students who have declared Social Work as their major or have transferred from other universities or community colleges are admitted to ASU and the School of Social Work with preprofessional status. Transfer students should follow the procedure outlined under "Undergraduate Admission Standards," page 67.

Applying for Professional Program Status. Students who have completed 56 semester hours or more and have taken SWU 171 Introduction to Social Work, SWU 291 Social Service Delivery Systems, SWU 295 Foundations of Social Work Practice, SWU 301 Human Behavior in the Social Environment I, and SWU 310 Social Work Practice I are eligible to apply for professional program status.

Students may obtain an application packet at the School of Social Work, Academic Services, WHALL 135, or request that one be mailed to their home address by calling 480/965-6081.

Applications are reviewed for admission for the fall and spring semesters. Students applying must have a Certificate of Admission to the university in their files by November 1 for spring admission and March 1 for fall admission. All other application materials (i.e., application form, additional statement, and two letters of reference) must be returned to

SCHOOL OF SOCIAL WORK
ACADEMIC SERVICES
ARIZONA STATE UNIVERSITY
PO BOX 871802
TEMPE AZ 85287-1802

Materials must be received by November 1 for spring admission or March 1 for fall admission. Failure to meet these deadlines may result in the applicant having to wait for the next admissions period. Applicants are notified by mail of the committee's decision. Those applicants who have been denied admission may request a conference with the BSW program coordinator to discuss the decision and to obtain guidance in the development of future plans.

Criteria for Professional Program Status. Admission to professional program status is based on the following criteria:

1. A minimum of 56 semester hours with a cumulative GPA of at least 2.50 at ASU is required.
2. A minimum cumulative GPA of 2.75 in core social work courses (SWU 171, 291, 295, 301, and 310) and a grade of "C" (2.00) or higher in all social work courses are required.
3. The applicant's educational and career goals must be compatible with the educational objectives of the school.
4. Before admission to preprofessional status, it is required that students have had human service experience for a minimum of 240 hours in social work-related settings. Personal life experience may be substituted.
5. References are required for each applicant. One reference should be from a person who knows the applicant in a professional capacity and one from a person who knows the applicant in an academic capacity. Additionally, a third reference is later requested by the school from the applicant's SWU 310 instructor. This reference is used in the field placement process.
6. Fulfilling the College of Public Programs professional program status admissions requirements outlined under "Professional Status Admission Requirements," page 484.

Leave of Absence. Occasionally, for health or personal reasons, Social Work students who have achieved professional program status find it necessary to interrupt their studies. Students considering such requests meet with an academic advisor to look at alternatives and then submit a written request to the BSW program coordinator. A student may request a leave of absence from the Social Work program for a period of one year. Failure to request a leave of absence results in removal from the professional program. (This leave applies only to the Social Work program and not to the university. No leave of absence is granted from the university.) Except when recommended by the Committee on Academic and Professional Standards, the student must be in good standing in the program at the time the request is made. Students should be aware that nonattendance at the university for one or more semesters requires reapplication to the university. Failure to request a leave of absence by Social Work majors results in removal from the program.

Readmission. Undergraduate students who have previously attended ASU but have not been enrolled at this institution for one or more semesters are required to apply for readmission following university procedures as outlined under "Readmission to the University," page 78. Students who were previously admitted to the professional program may, in addition, be required to reapply for professional status.

Transfer Students. The university standards for evaluation of transfer credit are listed under "Transfer Credit," page 69. Community college students planning to transfer at the end of their first or second year should plan their community college courses to meet the requirements of the ASU curriculum selected. Students attending Arizona community colleges are permitted to follow the degree requirements specified in the ASU catalog in effect at the time they begin their community college work, providing their college attendance is continuous. See "Guidelines for Determination of Catalog Year," page 88.

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

Arizona students are urged to refer to the Course Applicability System for the transferability of specific courses from Arizona community colleges. Students may also access the guide through the Academic Transfer Articulation Office's Web site at www.asu.edu/provost/articulation.

Courses transferred from community colleges are accepted as lower-division credit only. Students are urged to choose their community college courses carefully, in view of the fact that there is a minimum number of hours of work taken at the university that must be upper-division credit (see "Credit Requirements," page 88).

Direct transfer of courses from other accredited institutions to the School of Social Work is subject to the existence of parallel and equal courses in the school's curriculum. Transfer credit is not given for courses in which the student has earned a grade below "C" (2.00).

Credit for "life experience" is not given in lieu of course requirements. A minimum of 30 semester hours earned in resident credit courses at ASU is required for graduation.

ADVISING

Students are responsible for meeting the degree requirements and seeking advising regarding their program status and progress. Upon admission to the Social Work major, each student is assigned a faculty advisor who assists with career planning. The academic advisor assists students with program planning, registration, preparation of needed petitions, verification of graduation requirements, and referrals to university and/or community resources. Students must meet with an academic advisor before any registration transaction.

Degrees

SOCIAL WORK—BSW

The school's undergraduate curriculum leads to a Bachelor of Social Work (BSW) degree. The BSW degree program is accredited by the Council of Social Work Education (CSWE). The principal objective of the undergraduate curriculum is to prepare students for beginning-level generalist practice in social work. The program is also designed to prepare students for culturally sensitive practice and to provide preparation for graduate training in social work. During the freshman and sophomore years, students concentrate on obtaining a strong background in liberal arts and sciences and are classified as preprofessional until they are officially admitted to the professional program. Entrance into the Social Work professional program is not automatic (see "Applying for Professional Program Status," page 493).

Junior and senior Social Work majors focus on social work courses in research, social policy and services, social work practice, human behavior in the social environment, and field instruction in community agencies. In addition, majors take elective courses in related areas.

The BSW-level practitioner is seen as a generalist. The curriculum focuses on such roles as advocacy, case management, problem-solving, and referral functions with individuals, groups, families, organizations, and the community.

Tucson Component. The Tucson Component serves students living and working in southern Arizona pursuing the BSW degree. The Tucson Component—established in 1995 as a partnership between the Arizona Department of Economic Security, the ASU School of Social Work, and the College of Extended Education—became permanent in 1999. Full- and part-time students can complete all required upper-division social work courses and electives at a centrally located site near downtown Tucson, while completing general studies and other degree requirements through area community colleges, the University of Arizona, and Northern Arizona University. For more information, call the Tucson Component at 520/884-5507, extension 10.

MINOR

Contact the school for information on the minor in Social Work.

EARLY INTERVENTION CERTIFICATE PROGRAM

The Early Intervention Certificate is cross-disciplinary and is certified by the Arizona Early Intervention Program in the Arizona State Department of Economic Security. Students majoring in Social Work or Family and Human Development who wish to learn more about infants and toddlers at risk for developmental delay because of a known disability or because of exposure to environmental risk factors, and students who wish to work with infants and toddlers and their families in a variety of settings would benefit from this training.

Students interested in earning a certificate in Early Intervention must make a formal application to the Early Intervention Training Program. Students must have completed 56 semester hours and have a cumulative GPA of at least 2.50.

The certificate requires 17 semester hours of course work:

Choose between the course combinations below.....8
- CDE 338 Child Development Practicum (3)
- FAS 484 Internship (5)

— *or* —

- SWU 412 Field Instruction I (5)
- SWU 414 Field Instruction II (3)

SWU 437 Infant-Family Assessment and Observation *L/SB* 3
or CDE 437 Infant-Family Assessment and Observation *L/SB* (3)

SWU 446 Risk and Variation in Child Development 3
or CDE 444 Risk and Variation in Child Development (3)

SWU 498 Pro Seminar.....3
or CDE 337 Early Childhood Intervention (3)

BIS CONCENTRATION

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

GRADUATE PROGRAMS

The faculty in the School of Social Work offer a Master of Social Work (MSW) degree and a PhD degree in Social Work. For more information, see the *Graduate Catalog.*

UNIVERSITY GRADUATION REQUIREMENTS

In addition to fulfilling college and major requirements, students must meet all university graduation requirements. For more information, see "University Graduation Requirements," page 88.

General Studies Requirement

All students enrolled in a baccalaureate degree program must satisfy a university requirement for a minimum of 35 semester hours of approved course work in General Studies. See"General Studies," page 92.

Note that all three General Studies awareness areas are required, consult an academic advisor for approved courses.

SCHOOL OF SOCIAL WORK DEGREE REQUIREMENTS

All students enrolled in a baccalaureate degree program must satisfy School of Social Work degree requirements with additional course work chosen from among those courses that satisfy the General Studies requirement. General Studies courses are listed in the "General Studies Courses" table, page 94, in the course descriptions, in the *Schedule of Classes,* and in the *Summer Sessions Bulletin.*

A well-planned program of study may enable students to complete many General Studies and School of Social Work 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. All students are required to demonstrate proficiency in a language other than English (a spoken language or American Sign Language). Proficiency is defined as completing the second semester, intermediate level or higher, of a language other than English. The School of Social Work faculty strongly encourages students to consider Spanish or a tribal language.

Specific courses from the following areas must be taken to fulfill the college degree requirements.

Numeracy. School of Social Work students must complete a statistical analysis course (CS).

Humanities and Fine Arts. School of Social Work students must complete PHI 101 Introduction to Philosophy, PHI 105 Introduction to Ethics, or PHI 306 Applied Ethics.

Social and Behavioral Sciences. The following courses are required:

ECN	111	Macroeconomic Principles *SB* 3
PGS	101	Introduction to Psychology *SB* 3
		or SOC 101 Introductory Sociology *SB* (3)
		or SOC 301 Principles of Sociology *SB* (3)
Total		 6

Natural Sciences. School of Social Work students must complete a course in either human biology or anatomy and physiology.

MAJOR REQUIREMENTS

The School of Social Work awards a Bachelor of Social Work degree upon the successful completion of a curriculum consisting of a minimum of 120 semester hours. This curriculum includes all university requirements (see "University Graduation Requirements," page 88), the College of Public Programs requirements, including the General Studies requirements (see "General Studies," page 92), as well as the School of Social Work degree requirements.

Course Load. A normal course load per semester is 15 to 16 semester hours. The maximum number of hours for which a student can register is 18 semester hours, unless an overload petition has been filed with and approved by the BSW program coordinator and the College of Public Programs dean's office.

Overload petitions are not ordinarily granted to students who have a cumulative GPA of less than 3.00 and who do not state valid reasons for the need to register for the credits. Students who register for semester hours in excess of 18 and do not have an approved overload petition on file may have courses randomly removed through an "administrative drop" action.

Social Work Core Requirement

SWU	171	Introduction to Social Work *SB, H* 3
SWU	291	Social Service Delivery Systems 3
SWU	295	Foundations of Social Work Practice *SB/C* 3
SWU	301	Human Behavior in the Social Environment I *L/SB* 3
SWU	310	Social Work Practice I 3
SWU	320	Research Methods in Social Work 3
SWU	332	Social Policy and Services 3
SWU	340	Human Behavior in the Social Environment II *SB* 3
SWU	374	Diversity and Oppression in a Social Work Context *C* 3
SWU	410	Social Work Practice II 3
SWU	411	Social Work Practice III 3
SWU	412	Field Instruction I 5
SWU	413	Field Instruction Seminar 1
SWU	414	Field Instruction II 3
SWU	415	Integrative Field Seminar 3
SWU	442	Introduction to Practice with Children and Families in Child Welfare 3
		or SWU 444 Issues in School Social Work (3)
Total		 48

SWU 412 and 414 each require 16 hours weekly per semester in the field. Students must file an application for field work before registering for the courses. Students must have senior standing to participate in the field.

No credit is granted toward fulfilling major core requirements in any course in the student's major unless the grade in that course is at least a "C" (2.00). If a grade of "D" (1.00) or "E" (0.00) is earned in a major core course, the student must see the faculty advisor to discuss continuance in the major. Most courses in the program are sequential; successful completion of each course in the sequence is required to enroll in the following course.

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

Field Instruction. Field instruction for the BSW program is offered concurrently with classroom study. Students are assigned to a social service agency and work under the supervision of a School of Social Work-approved social work professional. Field instruction permits testing theory in practice and provides a base of experience for class discussions. Qualified agencies in several Arizona communities are utilized for field instruction.

BSW students work in one placement for 16 hours a week, for a total of 480 hours over two semesters. In assigning the placement, the school takes into account the student's educational needs and career goals. Generalist social workers need to be familiar with the methods of working with individuals, families, and groups, as well as in organizations and communities and with all ages and ethnic groups. Faculty are committed to establish the capabilities necessary for high-quality, social work generalist practice.

BSW field instruction agencies are located primarily in the Phoenix metropolitan area for Tempe students and throughout southern Arizona for Tucson students. Specially arranged, more distant placements may require up to a two-hour drive. Although car pools are possible, personal transportation is strongly recommended while attending school.

ELECTIVES

Each student is encouraged to consult with an academic advisor in selecting electives. Economics, education, psychology, and sociology are only a few of the academic units offering knowledge of value to the professional social work practitioner.

Undergraduate Student Enrollment in Graduate Classes. Seniors within 12 semester hours of graduation may enroll in a maximum of nine graduate semester hours in the School of Social Work, providing they have an overall GPA of 3.00 or higher at the time of enrollment and have secured the required signatures for approval. Courses may be eligible for use in a future graduate program on the same basis as work taken by a nondegree graduate student (see the *Graduate Catalog*).

ACADEMIC STANDARDS

Good Standing. To remain in good academic standing, a student must maintain a minimum overall GPA of 2.00 or higher at the end of each semester in all courses taken at ASU.

Probationary Status. Any student who does not maintain good standing status is placed on probation. Students are placed on probation automatically when the GPA is less than the minimum 2.00 at the end of any semester.

Disqualification. Any student who is on probation becomes disqualified if (1) the student has not returned to good standing or (2) the student has not met the required semester GPA. See "Academic Standards and Retention," page 487, for more details on academic standards.

Academic Dishonesty. The faculty of the School of Social Work follow the guidelines as specified in the University Student Academic Integrity Policy. A copy of the policy may be obtained from the School of Social Work Office of Academic Services.

Termination from the Social Work Professional Program. A student is terminated from the professional program under any one of the following circumstances:

1. A BSW student receives an "E" (0.00) grade (failure) in field practicum.
2. A BSW student does not accept or is not accepted by three or more field agencies if, in the judgment of faculty and field staff, the placements can provide appropriate field experiences without undue inconvenience to the student.
3. The student does not adhere to professional expectations and standards (see the ASU Student Code of Conduct, National Association of Social Workers Code of Ethics, and CSWE Curriculum Policy Statement).
4. At any time field instructors, faculty, or the faculty advisor identify problems that indicate that a student cannot perform the required functions of a social worker.

Continuous Evaluation. While students are subject to the university's general retention policy, they are evaluated in the school on broader criteria than mere GPA. Students are reviewed for evidence of competency in social work and are continuously evaluated as they progress in the program. Prospective Social Work candidates who do not meet the established criteria are guided toward a program that is compatible with their interests and abilities.

Reinstatement. A disqualified student who desires to be reinstated may submit an application for reinstatement. A disqualified student normally is not reinstated until at least one semester has elapsed from the date of disqualification. The burden of establishing fitness is on the disqualified student, who may be required to take aptitude tests and submit to other examinations before being readmitted.

APPEAL PROCEDURES

Appeals involving the professional standards of the discipline are decided by the School of Social Work Committee on Academic and Professional Standards only after discussing the matter with the instructor of the course, the faculty advisor, and the program coordinator.

STUDENT RESPONSIBILITIES

Students are expected to support and maintain the highest professional standards as spelled out in the *ASU Student Code of Conduct* and the *National Association of Social Workers Code of Ethics.*

Regular attendance is expected in all classes and in field education and is a critical factor in evaluation of performance.

Students' rights are protected through appeal to the Committee on Academic and Professional Standards or through consultation with the school's ombudsperson.

SOCIAL WORK (GRADUATE PROGRAM) (SWG)

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

SOCIAL WORK (UNDERGRADUATE PROGRAM) (SWU)

SWU 171 Introduction to Social Work. (3)
fall and spring
Descriptive and analytical historical perspective of the profession of social work, social problems, and the social welfare system. Designed for freshmen and sophomores considering this major.
General Studies: SB, H

SWU 250 Stress Management Tools. (3)
spring
Helps students develop an understanding and behaviors to create a healthy balance in their lives by studying the bio/psycho/social aspects of wellness. Lecture, cooperative learning, small group activity.

SWU 291 Social Service Delivery Systems. (3)
fall and spring
Knowledge and skills necessary to utilize community resources to be a competent case manager. Includes 40 hours of observational experience in local agencies. Pre- or corequisite: SWU 171.

SWU 295 Foundations of Social Work Practice. (3)
fall and spring
Provides theoretical foundation and skill base necessary for social work interventions with individuals, small groups, and larger systems. Pre- or corequisites: SWU 171, 291.
General Studies: SB, C

SWU 301 Human Behavior in the Social Environment I. (3)
fall and spring
Analyzes theories of personality and life span development from methodological, ecological, and systems perspectives up to adolescence. Prerequisite: PGS 101 or SOC 101. Pre- or corequisites: SWU 171, 291, 295.
General Studies: L/SB

SWU 302 Human Biology for Social Workers. (3)
fall and spring
Overview of human anatomy and physiology, and the reciprocal relationship between physical and social environments. Lecture, discussion. Pre- or corequisites: SWU 171, 291.

SWU 310 Social Work Practice I. (3)
fall and spring
Introduces social work methods, emphasizing the following skills: cross-cultural interviewing, assessment, referrals, and process and psychological recording. Prerequisite: SWU 295. Pre- or corequisite: SWU 301.

SWU 320 Research Methods in Social Work. (3)
fall and spring
Applies scientific principles to field practice, impact assessment, intervention procedures, and problem formulation in social work. Lecture, cooperative learning. Pre- or corequisite: SWU 310.

SWU 321 Statistics for Social Workers. (3)
fall and spring
Teaches social work students how to use and interpret descriptive and inferential statistics in social work practice. Lecture, small group work. Prerequisites: MAT 117, 142. Pre- or corequisite: SWU 320.
General Studies: CS

SWU 332 Social Policy and Services. (3)
fall and spring
Contemporary social, political, and economic issues. Special emphasis on poverty and inequality in the Southwest. Analysis and development of social welfare policies and programs. Lecture, cooperative learning, small group activity. Prerequisite: ECN 111. Pre- or corequisite: SWU 310.

SWU 340 Human Behavior in the Social Environment II. (3)
fall and spring
Life span development from middle childhood to maturity. Lecture, discussion. Prerequisite: SWU 301. Pre- or corequisites: SWU 302, 310.
General Studies: SB

SWU 374 Diversity and Oppression in a Social Work Context. (3)
fall and spring
Issues of social inequality related to race, ethnicity, gender, sexual orientation, and disability. Emphasizes populations of the Southwest. Prerequisite: SWU 310.
General Studies: C

SWU 410 Social Work Practice II. (3)
fall and spring
Knowledge and skills in social work practice with individuals and families. Prerequisites: PHI 101 (or 105 or 306); SWU 310; Social Work major. Corequisites: SWU 412, 413.

SWU 411 Social Work Practice III. (3)
fall and spring
Knowledge and skills in social work practice with groups, communities, and organizations. Prerequisites: SWU 410, 412, 413; Social Work major. Corequisites: SWU 414, 415.

SWU 412 Field Instruction I. (5)
fall and spring
16 hours a week of supervised practice in an approved placement. Fee. Prerequisite: Social Work major. Corequisites: SWU 410, 413.

SWU 413 Field Instruction Seminar. (1)
fall and spring
Field-focused seminar, including practice evaluation. 1.5 hours per week. Prerequisite: Social Work major. Corequisites: SWU 410, 412.

SWU 414 Field Instruction II. (3)
fall and spring
16 hours a week of supervised practice in an approved placement. Fee. Prerequisites: SWU 413; Social Work major. Corequisites: SWU 411, 415.

SWU 415 Integrative Field Seminar. (3)
fall and spring
Field-focused seminar to help integrate practice and theory. Prerequisite: Social Work major. Corequisites: SWU 411, 414.

SWU 437 Infant Family Assessment and Observation. (3)
fall
Examines strategies for implementing developmental assessments and observations of young children and their families. Cross-listed as CDE 437. Credit is allowed for only CDE 437 or SWU 437. Prerequisite: CDE 232 or SWU 301 (or their equivalents).
General Studies: L/SB

SWU 442 Introduction to Practice with Children and Families in Child Welfare. (3)
fall and spring
Focuses on the characteristics, strengths, and service needs of families and children in the Child Welfare System. Lecture, cooperative learning. Prerequisites: SWU 410, 412, 413; Social Work major.

SWU 444 Issues in School Social Work. (3)
fall and spring
Demonstrates how community, family, and school are interdependent using an ecological metaphor, and introduces school social work. Lecture, cooperative learning. Prerequisites: SWU 410, 412, 413; Social Work major.

SWU 446 Risk and Variation in Child Development. (3)
fall and spring
Impact that constitutional and environmental risk factors have on young children and their families. Cross-listed as CDE 444. Credit is allowed for only CDE 444 or SWU 446. Prerequisite: CDE 232 or SWU 301 (or their equivalents).

SWU 493 Honors Thesis. (1–6)
selected semesters
General Studies: L

SWU 498 Pro-Seminar. (1–7)
selected semesters
Topics may include the following:
- Developing Grants and Fund Raising. (3)
- Early Childhood Intervention. (3)
- Social Work and the Law. (3)
- Social Work with American Indians. (3)
- Substance Abuse. (3)

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 / **SQ** natural science—general core courses / **SQ** natural science—quantitative / **C** cultural diversity in the United States / **G** global / **H** historical / See "General Studies," page 92.

Division of Graduate Studies

www.asu.edu/graduate **Maria T. Allison, PhD, Vice Provost and Dean of Graduate Studies**

PURPOSE

The ASU Division of Graduate Studies offers programs to meet the educational needs of those who already hold baccalaureate and master's degrees. While many students prepare for careers in research, the professions, and the arts, others study for personal enrichment. Both part-time and full-time students are enrolled in a wide range of master's and doctoral degree programs encompassing hundreds of concentrations and specialties. Other students explore new areas of interest or prepare for career advancements apart from formal degree programs.

The size, strength, and diversity of the graduate community reflect the university's commitment to high-quality education. As a major center for graduate education, ASU supports cultural and intellectual activity as well as research in a broad range of arts, sciences, and professional disciplines; in addition, the university conducts research addressing the social, cultural, and economic growth and development of Arizona and the Southwest.

One distinctive project that magnifies the Division of Graduate Studies' dedication to graduate students is the Preparing Future Faculty program, which is designed to educate students about faculty roles and prepare doctoral students specifically for faculty positions in colleges and universities across the nation.

This past year, a large number of ASU graduate students were awarded prestigious fellowships and scholarships funded by the National Science Foundation, NASA, the Ford Foundation, Fulbright, and other public agencies and private foundations.

Funded programs, together with more than 30 research centers and institutes, provide assistantships and training for many graduate students; further, the centers coordinate conferences, colloquia, and special seminars to heighten the learning experience. The Office of the Vice President for Research and Economic Affairs provides seed money to enable ASU faculty and students to work at the frontiers of knowledge. Such activities continually encourage the creative embrace of change and experimentation.

ASU provides numerous choices in student life, for personal enrichment as well as cultural interaction. Many internationally known speakers present lectures here, bringing together faculty, graduate students, and the community to engage in stimulating dialogue.

Intellectual Environment. More than 11,000 students from all 50 states and more than 100 nations are enrolled in graduate study at the university. Such size and diversity contribute to a cosmopolitan setting that is ideal for intellectual discourse and stimulation. As a balance to this large grouping of students, individual graduate programs conduct small colloquia and seminars where students and faculty discuss their work in an intimate, intellectual environment supportive of student development. The result is a spirited, lively atmosphere in which students and faculty members get to know each other through collaborative research and intellectual exchange.

GRADUATE PROGRAMS

Degree Programs

Although graduate degree programs differ in many ways, they all share two important characteristics. First, in comparison to baccalaureate programs, they demand a deeper and broader understanding of a body of knowledge in a recognized discipline or profession. Second, especially in doctoral programs, graduate students prepare to make original contributions to their fields through research and other creative activities of a high order. ASU offers several types and levels of postbaccalaureate degrees. For admission information and procedures, access the Web site at www.asu.edu/graduate/admissions.

Master's and Doctoral Work. Many students pursue a master's degree to satisfy their own quest for learning. In some disciplines, such as dance or architecture, the master's degree is frequently the terminal or final degree. In other fields, students enter master's programs as a step toward more advanced work, such as doctoral studies, that prepares students for a lifetime of intellectual inquiry and creativity or for the application of knowledge to professional practice.

Research Degrees. Students at ASU may pursue research-oriented or practice-oriented degrees. Research-oriented degree programs—including the Master of Arts (MA), Master of Science (MS), and Doctor of Philosophy (PhD)—prepare students for careers in research and scholarship in governmental, business, and industrial organizations or in university or college teaching. Students in these programs

develop the ability to evaluate existing knowledge critically and to extend it into fresh areas of inquiry and scholarship.

Professional Degrees. The professional or practice-oriented degree programs have slightly different names and distinct academic missions. The names of the degrees are commonly tied to the academic unit offering the program, for example, Master of Business Administration (MBA), Master of Music (MM), Master of Social Work (MSW), and Doctor of Education (EdD). With the objective of preparing students for professional practice, such programs require rigorous preparation in the fundamental literature and scholarship of the field. Some degrees require demonstrated expertise through an internship, an exhibition (art), a performance, or a recital (music). Examples of ASU fields in which academic units offer professional programs include architecture and design, business, education, engineering, health services administration, law, nursing, public administration, and social work.

Nondegree Graduate Study

Many students enter graduate studies without intending to obtain a new degree but rather to enhance personal or professional knowledge. These students may want to advance in their present career, acquire the background to make a career change, or make up academic deficiencies before entering a degree program. All graduate students, degree or nondegree, enjoy the benefits of cultural and intellectual activities at the university, such as colloquia, seminars, and conferences focusing on the latest scholarship in the field. By consulting with appropriate academic units, students can learn which courses are suitable to their needs.

Note: A maximum of nine semester hours taken at ASU as a nondegree graduate student may be applied, at the academic unit's discretion, toward a future ASU master's degree.

For admission information and procedures, access the Web site at www.asu.edu/graduate/admissions.

Clinics on Preparing for Graduate School

Assistance is offered to prospective graduate students through workshops. Topics include the admissions process, program selection, and financial support. For more information, call the Division of Graduate Studies at 480/965-3521, or access the Web site at www.asu.edu/graduate.

Graduate Studies and the University Environment

The Division of Graduate Studies spans the university in supervising graduate studies. Since more than 1,600 ASU faculty members teach graduate students in more than 100 instructional units, the Division of Graduate Studies works closely with the university's colleges and academic units. In most cases, graduate instruction is offered by units that also provide related undergraduate programs.

Interdisciplinary Study

For more information, see "Graduate Interdisciplinary Programs," page 509.

RESEARCH

ASU continues to advance as a major research institution. The Office of the Vice President for Research and Economic Affairs provides leadership in obtaining external funding and in coordinating and administering sponsored projects. Many graduate students receive financial support and gain first-hand experience as they participate with faculty members in carrying out these research projects.

Much of this work is associated with campus research centers that help to develop proposals, coordinate activities, and bring together in colloquia and conferences students and faculty with common intellectual interests. Such centers include the Center for Solid State Science, the Institute for Manufacturing Enterprise Systems, the Institute of Human Origins, the Hispanic Research Center, the Joan and David Lincoln Center for Applied Ethics, and the Prevention Intervention Research Center. For more information, see "Research Centers," page 33.

Research Facilities

ASU lends support to research in diverse ways, including providing extensive facilities for research and instructional programs. State-of-the-art facilities include an architecture building, a fine arts complex, the Goldwater Center for Science and Engineering, an addition to the Life Sciences Center, and the Computing Commons. The Engineering Research Center, built as part of the Engineering Excellence Program, houses advanced facilities such as the Molecular Beam Epitaxy laboratory and a clean room for microelectronic device fabrication. Among other facilities supporting research on campus are the Institute for Studies in the Arts, in the Katherine K. Herberger College of Fine Arts; the Facility for High Resolution Electron Microscopy, in the College of Liberal Arts and Sciences; and the Southwest Archaeological Collection, in the Department of Anthropology.

Library System. The ASU library system is a major research facility (see "University Libraries and Collections," page 28). It contains more than 3 million volumes of books and approximately 6.6 million pieces of microforms and subscribes to more than 36,000 serials. Among the nation's research libraries, it is in the top quarter in annual volume acquisition. It is especially strong in amassing current monographs and serials to support graduate programs. Some of the most important research collections include manuscripts and rare photographs on Arizona and Southwest topics and an excellent collection of social science materials on Southwestern and border studies topics, including materials on northwestern Mexico. In the humanities, the Hayden Library has an outstanding collection of literary works and literary criticism from small and major presses in American and English literature. The Child Drama Collection is also outstanding. A growing rare book and manuscript collection supports the research interests of academic units. The Arthur Young Tax Library emphasizes accounting and law. The Noble Science and Engineering Library is a designated U.S. Patent Depository and, as such, is one of fewer than 30 U.S. academic libraries to receive copies of all new patents. The entire collection of U.S. patents in microfilm is housed in the Noble Library.

The libraries contain extensive U.S. and Arizona government documents and selected international documents.

The Music Library contains scores and sound recordings.

The Architecture and Environmental Design Library houses a nationally recognized set of materials on solar

energy and research collections on the work of Frank Lloyd Wright and Paolo Soleri as well as other Arizona architects.

The libraries offer excellent support to researchers interested in electronic information sources. The online library system incorporates the usual catalog to ASU library holdings as well as several other important electronic reference databases and gateways. Bibliographic information on the library holdings can be accessed from any location in the world via a modem-equipped microcomputer.

The library system belongs to the Center for Research Libraries, permitting access to the center's vast collections of materials for extended loan periods.

Graduate Student Support Services. Providing academic and professional development support to graduate students is an important part of the Division of Graduate Studies mission. Services include referral, individual mentoring for disadvantaged students, financial assistance, orientation sessions, workshops, career seminars, and research conferences. Division of Graduate Studies Student Programs/Services maintains a variety of programs specifically for graduate students (degree and nondegree). For more information, access the Division of Graduate Studies Web site at www.asu.edu/graduate.

Division of Graduate Studies Financial Support Office. The Division of Graduate Studies Financial Support Office assists graduate students applying for external fellowships. The office processes tuition waivers/remission and health insurance benefits for research and teaching assistants, tuition fellowships for students who are not research or teaching assistants, travel grants, and other financial support in partnership with academic units.

For assistance with loans, access the Web site at www.asu.edu/fa, or visit Student Financial Assistance in SSV 216A.

Advising and Career/Professional Development. Many graduate students have questions and concerns about which degree to pursue; how to combine their student roles with parenting, partnering, and worker roles; and what to do with their degrees upon graduation. The Division of Graduate Studies provides the following resources.

Preparing Future Faculty. Preparing Future Faculty (PFF) is a program coordinated by the Division of Graduate Studies for doctoral students who are seeking careers in the professorate. Originally a national initiative under the Council of Graduate Schools and the Association of American Colleges and Universities, PFF encourages fresh thinking and planning in faculty preparation, identifies strategies to improve the quality of teaching and learning, and orients doctoral students to different types of higher education institutions.

Preparing Future Professionals. The Preparing Future Professionals (PFP) program, administered by the Division of Graduate Studies, assists doctoral students interested in pursuing nonacademic professions. PFP parallels the well-established and successful PFF program. Through a series of activities, PFP familiarizes doctoral students with various nonacademic career tracks to develop skills to successfully pursue a wide range of career opportunities.

Strategies for Success. The Strategies for Success series of professional development workshops is broken into three categories: teaching and instruction, career development, and enriching the graduate experience. These workshops are open to all registered graduate students.

Diversity Programs. Diversity Programs are designed to increase the number of graduate students from groups underrepresented in certain professions and fields of study.

Step-Up. The Division of Graduate Studies STEP-UP (Seeking Talent, Expanding Participation, Unleashing Potential) program is designed to assist academic units in the recruitment and retention of excellent first-year graduate students from underrepresented groups. STEP-UP provides academic and financial support through assistantships. For more information, contact specific academic units.

The Social and Academic Mentor (SAM) Program. The SAM program is designed to recruit top graduate students from domestic, international, and underrepresented populations. Academic units submit nominations to the Division of Graduate Studies for a first-year student (mentee) and peer mentor match. The mentor, two or more years advanced in the program, promotes the mentee's social and academic integration into graduate school by using a structured approach. The mentor receives an hourly compensation.

Orientations. Before each fall semester, the Division of Graduate Studies hosts an orientation/reception for new graduate students. An online orientation is available on the Division of Graduate Studies' Web site at www.asu.edu/graduate.

All new teaching assistants (TAs) are required by the university and the Arizona Board of Regents to attend the TA Orientation conducted by the Division of Graduate Studies. Additional professional development forums are held during the academic year and TAs are encouraged to participate.

Workshops for Undergraduate Students Considering Graduate Education. The Division of Graduate Studies holds workshops to address issues that students contemplating graduate study should consider. The purpose of graduate study, the choices among research and professional degrees, the selection of schools to apply to, and the types and sources of financial support are among the topics discussed.

Student Organizations. The Graduate and Professional Student Association (GPSA) is part of the Associated Students of Arizona State University (ASASU), the student government for the university. The GPSA represents graduate student interests within ASASU and the Office of Student Life. It assists the Division of Graduate Studies in planning orientations, the Graduate and Professional Student Appreciation Week, and other student-related activities. This office, with the Division of Graduate Studies, also funds small research grants to support graduate students' thesis and dissertation projects. In addition to the GPSA, many other special interest organizations are available for graduate students, such as the Latino(a) Graduate Student Association, American Indian Graduate Student Association, Black Graduate Student Association, and Graduate Women's Association.

Format Advising. The thesis, dissertation, or equivalent is the culmination of an important stage of graduate studies. By researching and writing this final work, graduate students are able to demonstrate acquired skills essential to a discipline. The Division of Graduate Studies publishes a *Format Manual* as a guide in preparing the master's or doctoral document. The *Format Manual* and forms pertaining to procedures for completing all graduation requirements are available in the Division of Graduate Studies lobby in Wilson Hall or on the Web at www.asu.edu/graduate/format.

Publications Program. The Division of Graduate Studies publishes a number of brochures, fliers, and other items pertaining to academic program offerings, procedures, student financial assistance, and related topics and events in graduate education. For more information, call 480/965-3521.

ASU Graduate Councils

The mission of the Division of Graduate Studies is to promote and support—in partnership with schools, departments, colleges, and campuses—the integrity, quality, and vitality of ASU graduate programs, including master's degrees professional degrees, and doctoral degrees. The Graduate Councils (East, Tempe, and West Campus councils) consist of faculty from each campus who review and make recommendations regarding the quality and nature of programs, policies, and standards related to graduate education. The councils serve in an advisory capacity to the vice provost and dean of Graduate Studies. In addition to the faculty leadership of each campus, the dean and associate deans of the Division of Graduate Studies serve in ex-officio capacities to enhance and foster cross-campus collaboration and communication. For more information, access the Web site at www.asu.edu/graduate/gradcouncil.

Offices of the Division of Graduate Studies

The general offices of the division, including those of the dean, admissions, advising, financial assistance, and graduate academic services and programs, are located on the first floor of Wilson Hall. Division offices are open Monday through Friday, from 8 A.M. to 5 P.M. The Division of Graduate Studies may be called at 480/965-3521. The Web address is www.asu.edu/graduate.

ADMISSION TO THE DIVISION OF GRADUATE STUDIES

Eligibility

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

Division of Graduate Studies Requirements

Generally, an applicant must have a GPA of 3.00 (scale is 4.00 = A), or the equivalent, in the last two years of work leading to the bachelor's degree. A student who enters a graduate degree program is expected to have undergraduate educational experiences, including general education studies, that are similar to those required for the baccalaureate degree at ASU.

Requirements of the Academic Unit

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

Submission of an Application

For admission information and procedures, access the Web site at www.asu.edu/graduate/admissions. Students are encouraged to apply via the Web. If students cannot access the Internet, they may call the Division of Graduate Studies at 480/965-6113 or send e-mail to grad-q@asu.edu.

Application Fee

Each application for entry to ASU graduate programs must be accompanied by a nonrefundable application fee. The fee is $50 to apply for admission to a degree program and $50 to apply for nondegree studies. For admission information and procedures, access the Web site at www.asu.edu/graduate/admissions.

International Applicants

Applicants who will attend the university while holding F-1 or J-1 visas must meet the requirements of U.S. immigration regulations in addition to the requirements of the Division of Graduate Studies and the academic units to which they apply.

Applicants from outside the United States are also required to submit additional materials and should follow the procedures described in the *Application for Graduate Admission* booklet or on the Web at www.asu.edu/graduate/admissions. International applicants should read this information carefully to become familiar with all the requirements, consulting it often for instructions to follow regarding the submission of materials. The *Graduate Catalog* provides essential information about ASU and its graduate programs.

As required by the U.S. government, international applicants must also verify that they have the financial resources to cover their expenses during graduate study at ASU. The Financial Guarantee form is available through the Division of Graduate Studies Web site at www.asu.edu/graduate/admissions. The I-20 or the IAP66 (documents needed to obtain a student visa) are issued only after the completed, properly verified Financial Guarantee form and support documents have arrived. International students may enroll at ASU only if they have been admitted to a degree program, a certificate program, or the postbaccalaureate teacher education program. They must meet all appropriate immigration standards and requirements.

Applications are processed when they are received. However, international applicants should submit all materials in December or January in order to begin study the following fall semester and in August or September in order to begin

study the following spring semester. An application fee of $50 (in U.S. funds) must accompany each application.

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

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

English Language Requirement. Applicants who are from a country whose native language is not English must provide evidence of English proficiency as indicated by acceptable scores on the Test of English as a Foreign Language (TOEFL) as follows:

1. The minimum TOEFL requirement for entry into any graduate program is 550 (paper-based) or 213 (computer-based).
2. Individual academic units may have higher TOEFL requirements for their various programs. Consult the department Web sites and this catalog for more information.

The following exceptions apply to the TOEFL requirement:

1. Applicants who have earned a bachelor's degree or higher from a university in the United States are exempt from the TOEFL requirement. This study must have been done within the United States.
2. Applicants who have completed a minimum of 12 semester hours of graduate level study at a regionally accredited college or university in the United States with a GPA of 3.00 or higher are exempt from the TOEFL requirement.
3. Applicants who have completed the American English and Culture Program Advanced 2 Level are exempt from the TOEFL requirement.

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

Additional Information

The Division of Graduate Studies does not have deadlines. Applications are processed as they are received. However, many academic units have specific and early deadlines; many units review applications only once a year, usually in January or February for fall admission. Applicants are urged to contact the academic units regarding deadlines.

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

Notice of Admission Decisions

Only the dean of graduate studies can make formal offers of admission. The Division of Graduate Studies notifies all applicants in writing of the admission decision.

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

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

Admission Classifications

Regular Admission. Applicants who fulfill all requirements for admission and are academically acceptable to both the academic unit and the Division of Graduate Studies are granted regular admission.

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

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

Nondegree Admission. A student not immediately intending to earn a degree may enroll as a nondegree student. The application process is streamlined and does not require submission of transcripts or test scores. For nondegree admission information and procedures, access the Web site at www.asu.edu/graduate/admissions. A maximum of nine hours taken at ASU while in this category may be applied toward a master's degree if appropriate for the student's program of study.

The six-year maximum time limit applies to nondegree semester hours appearing on a master's program of study. Also, because of limited class size and resources, certain

academic units may limit the enrollment of nondegree students.

Recognition of a Degree

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

Definition of a Unit of Credit

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

DIVISION OF GRADUATE STUDIES PROCEDURES

Change in Graduate Degree Program

A change from one graduate degree program to another requires a new application to the Division of Graduate Studies. The usual admission procedures are followed. For details on matters relating to the application fee, see "Application Fee," page 501.

Readmission to the Division of Graduate Studies

Any graduate student who has not been in attendance at the university for one semester must submit an application for readmission to the Division of Graduate Studies. The application should be submitted at least one month before the beginning of the semester in which the student plans to reenter. For details on readmission and other matters relating to the application fee, access the Web site at www.asu.edu/graduate/admissions.

Determination of Catalog Requirements

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

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

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

Registration

Graduate students, like all university students, register during the intervals indicated in the *Schedule of Classes* issued by the University Registrar's Office. Details regarding registration and course drop-add procedures are also provided in the *Schedule of Classes*. Day and evening graduate classes, offered on or off campus during the two regular semesters and the summer sessions, are considered part of the regular program. SunDial, the ASU touch-tone telephone system for registration and fee payment, and the online registration system, accessed at any registrar site, ease the enrollment process.

Audit Enrollment

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

Withdrawal Policies and Procedures

Withdrawal from the University. To withdraw from *all* classes after having paid registration fees, a student must submit a request to withdraw using ASU Interactive, SunDial, or submit a signed request to any registrar location. The ASU Interactive and SunDial complete withdrawal option is available through the semester transaction deadline. A student may withdraw from all courses with marks of "W" through the semester transaction deadline. See the *Schedule of Classes* or the *Summer Sessions Bulletin* for dates of the complete withdrawal periods.

Instructor-Initiated Drop. An instructor may drop a student for nonattendance during the second week of classes in fall or spring semesters or the first four days of each summer session. Instructor-initiated drops for nonattendance are signed by the dean or dean's designee. The college notifies students by mail. The student must contact the instructor before the end of the first week of classes if absences during that period cannot be avoided.

Instructor-Initiated Withdrawal. An instructor may withdraw a student from a course with a mark of "W" or a grade of "E" (0.00) only if the student's continued presence in the course is disruptive to the instructor's ability to conduct the course. A student may appeal an instructor-initiated withdrawal within 10 days of being withdrawn to the standards committee of the college in which the course is offered. The decision of the committee is final.

Course Withdrawal. During the second week through the 10th week of a semester or the third day through the third week of a summer session or at the midpoint of the term for winter and flexibly scheduled sessions, a student may

Enrollment Verification Guidelines for Graduate Students

	Full Time	Half Time	Less Than Half Time
Regular semester			
Graduate	9 or more hours	5–8 hours	4 or fewer hours
Graduate assistant*	6 or more hours	—	—
Five-week summer session			
Graduate	3 or more hours	2 hours	1 hour
Graduate assistant*	2 or more hours	1 hour	—
Eight-week summer session			
Graduate	5 or more hours	3–4 hours	2 or fewer hours

* For enrollment verification purposes, "graduate assistant" is a generic term that includes teaching assistants, research assistants, teaching associates, and research associates.

withdraw from any course with a mark of "W." See the *Schedule of Classes* or the *Summer Sessions Bulletin* for dates of the withdrawal period.

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

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

Course Load

The course load is determined by the supervisory committee but is not to exceed 15 semester hours of credit during each of the two semesters. Refer to the latest *Summer Sessions Bulletin* for course load limits for five-week and eight-week sessions. An audited course is counted in the student's maximum load.

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

All graduate students doing research, working on theses or dissertations, taking comprehensive or final examinations, or using university facilities or faculty time must be registered for a minimum of one semester hour of credit (not audit) that appears on the program of study or is an appropriate graduate-level course, such as 595, 695, or 795 Continuing Registration.

All doctoral students are expected to fulfill academic residence requirements. Contact the offices of individual degree programs for information on specific residency requirements.

Enrollment Verification Guidelines. The registrar is responsible for verifying enrollment according to the general guidelines. See the "Enrollment Verification Guidelines for Graduate Students" table, on this page.

DIVISION OF GRADUATE STUDIES DEGREE REQUIREMENTS

Graduate Advising

The Division of Graduate Studies' Referral Office offers general information about policies, procedures, requirements, and support services. Students with regular admission status should contact their academic unit for degree program advising and program of study planning.

Grading

The "Grades" table, page 505 defines grades and gives their values.

Ordinarily the instructor of a course has full discretion in selecting which grades to use and report from the available grading options.

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

Grades of "D" (1.00) and "E" (0.00) cannot be used to meet the requirements for a graduate degree, although they are used to compute GPAs. A student receiving a grade of "D" (1.00) or "E" (0.00) must repeat the course in a regularly scheduled (not an independent study) class if it is to be included in the program of study. However, both the "D" (1.00) or "E" (0.00) and the new grade are used to compute GPAs.

Graduate course work (500-, 600-, and 700-level courses) reported as an "I" (incomplete) must be completed within one calendar year. At the time the "I" grade is given, the

Grades

Grade	Definition	Value
A+	—	4.33[1]
A	Excellent	4.00
A-	—	3.67
B+	—	3.33
B	Good	3.00
B-	—	2.67
C+	—	2.33
C	Passing	2.00
D	No graduate credit	1.00
E	Failure	0.00
I	Incomplete	—
NR	No report	—
W	Withdrawal	—
X	Audit	—
Y	Satisfactory	—
Z	Course in progress[2]	—

[1] Although the scale includes a grade of A+ with a value of 4.33, the cumulative GPA is capped at 4.00.

[2] This grade is usually given pending completion of courses.

student must complete a "Request for Grade of Incomplete" form. The form first serves as a record of the "I" grade and the work required to complete it. When the student has completed the work, the form then serves as a change-of-grade authorization.

If the work specified on the form is not completed within one calendar year, the "I" grade (500-, 600-, and 700-level courses) becomes part of the student's permanent transcript, and the student is not allowed to complete the course work as specified on the "Incomplete" form. The student may, however, repeat the course after the "I" has become permanent, by reregistering, paying fees, and fulfilling all course requirements. The grade for the repeated course appears on the transcript but does not replace the permanent "I."

A grade of "W" is given whenever a student officially withdraws.

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

University Policy for Student Appeal Procedures on Grades

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

A. The aggrieved student must first follow the informal procedure of conferring with the instructor, stating the evidence (if any) and reasons for questioning that the grade received was not given in good faith. The instructor is obliged to review the matter, explain the grading procedure utilized, and show how the grade in question was determined. If the instructor is a graduate assistant and this interview does not resolve the difficulty, the student may then go to the faculty member in charge of the course (regular faculty member or director of the course sequence) with the problem.

B. If the grading dispute is not resolved in step A, the student may appeal to the department chair or other appropriate chair of the area within the department (if any). The department chair may confer with the instructor to handle the problem. Step B applies only in departmentalized colleges.

C. If these discussions are not adequate to settle the matter to the complainant's satisfaction, the student may then confer with the dean of the college concerned (or the dean-designate), who will review the case. If unresolved, the dean or designate may refer the case to the college academic grievance hearing committee to review the case formally. In most instances, however, the grievance procedure does not go beyond this level.

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

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

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

Scholarship

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

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

Academic excellence is expected of students doing graduate work. Upon recommendation from the head of the

academic unit, the dean of graduate studies can withdraw a student who is not progressing satisfactorily.

The designation of honors (such as *cum laude*) is reserved for undergraduates. The Division of Graduate Studies does not use these academic distinctions.

Graduate Credit Courses

Courses at the 500, 600, and 700 levels are graduate credit courses. Courses at the 400 level apply to graduate degree requirements when appearing on an approved program of study. However, 400-level courses are not graduate courses by definition and cannot be certified as such for purposes of employment or transferring to other institutions.

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

Permission to reserve a course does not guarantee that the student is admitted to a graduate degree program or that the course may be used toward graduate degree requirements. A maximum of nine hours of credit may be reserved, and only courses with a grade of "B" (3.00) or higher are applicable. Reserved credit earned before admission to a graduate degree program is classified as nondegree credit. The maximum course load for a student enrolled in a reserved course is 15 semester hours during a regular semester and six hours during a summer session.

Transfer Credit. Transfer of credit is the acceptance of credit from another institution for inclusion in a program of study leading to a degree awarded by ASU.

Under most circumstances, transfer credit may not be applied toward the minimum degree requirements for an ASU degree if they have been counted toward the minimum requirements for a previously-awarded degree.

At the individual academic unit's discretion, the number of hours transferred from other institutions may not exceed 20 percent of the total minimum semester hours required for a master's degree unless stated otherwise for a specific degree program. At the academic unit's discretion, up to 12 hours of credit taken at another institution and not counted toward a previous degree may be counted toward the minimum semester hours required for a specific ASU doctoral degree program.

Transfer credit taken before admission to a graduate degree program at ASU is nondegree credit. Nondegree credit taken at ASU combined with nondegree credit taken at another institution may not exceed nine semester hours on the master's program of study. The nine-hour limit does not apply to doctoral programs.

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

Certain types of graduate credits cannot be transferred to ASU, including the following:

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

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

Transfer credits must be acceptable toward graduate degrees at the institution where the courses were completed. Only resident graduate courses (at the institution where the courses were completed) with an "A" (4.00) or "B" (3.00) grade may be transferred. A course with the grade of pass, credit, or satisfactory may not be transferred.

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

Graduate Supervisory Committees

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

Academic professionals (e.g., research scientists, research engineers), nontenure-track faculty (e.g., adjunct professors, research professors), and individuals granted affiliated faculty status through established university procedures may serve as cochairs, members, or extra members of thesis and dissertation committees upon approval by the Division of Graduate Studies. Individuals who are recommended by an academic unit as eligible to serve as a cochair must meet the criteria established by the academic unit and be approved by the Division of Graduate Studies.

Qualified individuals outside the university, upon the recommendation of the head of the academic unit and approval of the Division of Graduate Studies, may serve as members of thesis and dissertation committees; however, such individuals may not serve as chairs or cochairs (unless they have affiliated faculty status). With the approval of the academic unit and the dean of graduate studies, former ASU faculty with students completing their degrees may continue to serve as cochairs. At least half of the committee must be faculty from ASU.

Foreign Language Requirements

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

Students who are required to demonstrate proficiency in a foreign language must pass a foreign language examination specific to their particular graduate program. The examinations are administered three times each year by the Department of Languages and Literatures, which certifies language competency. The chair of the student's supervisory committee is responsible for providing the Department of Languages and Literatures with materials from which the examination is then prepared. The chair should submit or recommend relevant books or journals of approximately 200 pages in length in the desired foreign language.

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

Theses and Dissertations

The master's thesis or equivalent is an introduction to research writing. All doctoral degree candidates must submit a dissertation, with the exception of the Doctor of Musical Arts degree in Music (with a concentration in conducting or performance), which requires three recitals and a research paper. The Ph.D. dissertation should be a valuable educational experience that demonstrates the candidate's mastery of research methods, theory, and tools of the discipline. It should demonstrate the candidate's ability to address a major intellectual problem and to propose

The atrium area in the new Biodesign Institute Building fosters the open exchange of ideas among researchers working on collaborative projects.

Barb Backes photo

meaningful questions and hypotheses. The dissertation should be a contribution to knowledge that is worthy of publication by an established press as a book or monograph or as one or more articles in a reputable journal.

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

Graduate students and their supervisory committee chairs jointly select a style guide or journal format representative of the field of study. The Division of Graduate Studies allows certain flexibility in the format of the manuscript, but Division of Graduate Studies and library guidelines must be followed.

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

Application for Graduation

Students should apply for graduation with the Graduation section of the University Registrar's Office no later than the date specified in the "Division of Graduate Studies Calendar," found in the *Graduate Catalog.* All fees are payable at that time. Students applying for graduation after the deadline listed in the calendar are required to pay a late fee. At the end of the semester in which a student applies for graduation, the student is officially notified of any requirements the student has not yet completed.

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

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

Summer Sessions

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

Dates and Deadlines

The "Division of Graduate Studies Calendar," in the *Graduate Catalog,* lists deadlines for the submission of theses and dissertations to the Division of Graduate Studies, the last day to apply for graduation, the last day to hold an oral defense of a thesis or dissertation, and the last day to submit theses and dissertations to the Tempe campus Bookstore for binding. This information is also available on the Web at www.asu.edu/graduate/generalinfo/GradDdlns. Published dates are subject to change.

Student Responsibility

Graduate students are responsible for knowing and observing all procedures and requirements of the Division of Graduate Studies as defined in the *Graduate Catalog,* the *Schedule of Classes,* and the *Format Manual.* Each student should also be informed about the requirements of his or her degree program and any special requirements within the academic unit.

ACADEMIC INTEGRITY

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

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

The university academic integrity policy is available at the Office of the Executive Vice President and Provost of the University, or as part of the *Student Affairs Policies and Procedures Manual*— STA 104-01, at www.asu.edu/aad/manuals/sta/sta104-01.html on the Web.

MISCONDUCT IN SCHOLARLY RESEARCH AND CREATIVE ACTIVITIES

Students are expected to maintain the highest standards of integrity and truthfulness in scholarly research and creative activities. Misconduct in scholarly research and creative activities includes, but is not limited to, fabrication, falsification or misrepresentation of data, and plagiarism. Misconduct by any student may result in suspension or expulsion from the university and other sanctions as specified by the individual colleges. Policies on misconduct are available in the Office of the Vice President for Research and Economic Affairs and on the Web at www.asu.edu/aad/manuals/rsp/rsp105.html.

Graduate Interdisciplinary Programs

Although most graduate programs are offered by academic units, diverse interdisciplinary programs cross academic disciplines. Many majors are in fields that are still emerging as recognized academic disciplines and, therefore, do not customarily form the academic basis for departments. Other fields of study are inherently interdisciplinary and do not fit well with conventional disciplines around which departments are formed. Curricula reflect intrinsically broad disciplinary affinities, and faculty are drawn from more than one academic unit.

Examples of interdisciplinary programs include

1. Atmospheric Science (certificate);
2. Creative Writing (MFA);
3. Exercise Science (PhD);
4. Geographic Information Science (certificate);
5. Gerontology (certificate);
6. Materials Science (MS);
7. Science and Engineering of Materials (PhD);
8. Statistics (MS and certificate); and
9. Transportation Systems (certificate).

Each of these programs uses resources and faculty from several disciplines. The programs promote cooperative research and instruction among faculty who share common interests but are housed in different academic units and allow students to pursue degrees that are intellectually coherent but bring together diverse strengths of ASU.

Creative Writing—MFA

The interdisciplinary M.F.A. degree in Creative Writing (with options in fiction, nonfiction, playwriting, poetry, and screenwriting) is administered by the Creative Writing Committee. This studio/academic program involves the research, creative activity, and teaching interests of faculty within the Departments of English and Theatre. This program provides students with the opportunity to tailor a course of study to fit individual needs, talents, and goals. Students work under the direction of faculty who are practicing, published writers. For more information, see the *Graduate Catalog.*

Exercise Science—PhD

The interdisciplinary Ph.D. degree in Exercise Science is administered by the Committee on Exercise Science. This individualized interdisciplinary degree integrates graduate courses from a variety of academic units to provide a sound foundation for research leading to a dissertation with concentrations in biomechanics, motor behavior/sport psychology, or physiology of exercise. For more information, see the *Graduate Catalog.*

Science and Engineering of Materials—PhD

The interdisciplinary Ph.D. degree in Science and Engineering of Materials is administered by the Committee on the Science and Engineering of Materials. Areas of concentration are available in high-resolution nanostructure analysis and solid-state device materials design. Emphasis is placed on the applications of chemical thermodynamics, the mechanics of solids, quantum mechanics and transport theory for investigation of the relationships between the microstructure and properties of solids, and the dependence of microstructures on processing. For more information, see the *Graduate Catalog.*

SCIENCE AND ENGINEERING OF MATERIALS (SEM)

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.

Statistics—MS

The interdisciplinary M.S. degree in Statistics is administered by the Committee on Statistics. The program involves faculty and resources from the School of Accountancy and Information Management and the Department of Mathematics and Statistics. Areas of emphasis include applied statistics, mathematical statistics, statistical computing, statistical modeling, and statistical sampling and survey research. For more information, see the *Graduate Catalog.*

CERTIFICATE PROGRAMS

A number of certificate programs are offered by various academic units or programs on campus (see the "ASU Graduate Certificates" table, page 122).

Geographic Information Science

The interdisciplinary certificate program in Geographic Information Science (GIS) is administered by an executive committee. The objective of this program is to enable existing ASU graduate students and GIS professionals with advanced degrees to learn how to apply GIS concepts and technology for the purposes of spatial analysis. For more information, see the *Graduate Catalog.*

Transportation Systems

The interdisciplinary Certificate in Transportation Systems program is administered by the Committee on Transportation Systems. The objective of this program is to enable existing ASU graduate students and transportation professionals with advanced degrees to examine transportation-related issues from a variety of perspectives and in the context of different travel modes. For more information, see the *Graduate Catalog.*

TRANSPORTATION SYSTEMS CERTIFICATE (TRC)

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.

ASU Graduate Degrees

Graduate degrees, majors, and concentrations offered by the Tempe campus, East campus, and West campus and through College of Extended Education are shown in the "ASU Graduate Degrees" table below, organized by the name of the major. The table includes only officially approved concentrations; other informal areas of study may be available. See also the "Concurrent and Dual Degrees" table, page 515.

ASU offers these graduate degrees, abbreviated in the table below and elsewhere in the catalog:

Master of Accountancy and Information Systems (MAIS)
Master of Advanced Study (MAS)
Master of Architecture (MArch)
Master of Arts (MA)
Master of Business Administration (MBA)
Master of Computer Science (MCS)
Master of Computing Studies (MCST)
Master of Counseling (MC)
Master of Education (MEd)
Master of Engineering (MEng)
Master of Laws (LLM)
Master of Legal Studies (MLS)
Master of Urban and Environmental Planning (MUEP)
Master of Fine Arts (MFA)
Master of Health Sector Management (MHSM)
Master of Mass Communication (MMC)
Master of Music (MM)
Master of Natural Science (MNS)
Master of Physical Education (MPE)
Master of Public Administration (MPA)
Master of Public Health (MPH)
Master of Science (MS)
Master of Science in Design (MSD)
Master of Science in Engineering (MSE)
Master of Science in Technology (MSTech)
Master of Social Work (MSW)
Master of Taxation (MTax)
Master of Teaching English as a Second Language (MTESL)
Professional Science Master's (PSM)
Doctor of Audiology (AuD)
Doctor of Education (EdD)
Doctor of Musical Arts (DMA)
Doctor of Nursing Science (DNS)
Doctor of Philosophy (PhD)
Juris Doctor (JD)

ASU Graduate Degrees

Major	Degree	Concentration[1]	Campus
Accountancy and Information Systems	MAIS	—	Tempe
Aerospace Engineering	MS, MSE, PhD	—	Tempe
Agribusiness	MS	Optional: agribusiness management and marketing or food quality assurance[1]	East
Anthropology	MA	Archaeology, bioarchaeology, linguistics, museum studies, physical anthropology, or social-cultural anthropology	Tempe
	PhD	Archaeology, physical anthropology, or social-cultural anthropology	Tempe
Applied Biological Sciences	MS	GIS/remote sensing, natural resource management, or range ecology	East
Applied Psychology	MS	—	East
Architecture	MArch	—	Tempe
Art	MA	Art education or art history	Tempe
	MFA	Ceramics, digital technology, drawing, fibers, intermedia, metals, painting, photography, printmaking, sculpture, or wood	Tempe

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

[2] This program is also offered through the College of Extended Education.

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

[4] This major is jointly offered with the University of Arizona.

[5] Students apply to this degree program through the College of Law, not the Division of Graduate Studies.

ASU Graduate Degrees (continued)

Major	Degree	Concentration[1]	Campus
Asian Languages and Civilizations—Chinese/ Japanese	MA	—	Tempe
Audiology	AuD	—	Tempe
Bioengineering	MS, PhD	—	Tempe
Biology	MS, PhD	Optional: ecology[1]	Tempe
Biotechnology and Genomics	LLM	—	Tempe
Building Design	MS	Design knowledge and computing, energy performance and climate-responsive architecture, or facilities development and management	Tempe
Business Administration	MBA	—	Tempe[2] West
	PhD	Accountancy, computer information systems, finance, health services research,[3] management, marketing, or supply chain management	Tempe
Chemical Engineering	MS, MSE, PhD	—	Tempe
Chemistry	MS, PhD	Analytical chemistry, biochemistry, geochemistry, inorganic chemistry, organic chemistry, physical chemistry, or solid-state chemistry	Tempe
Civil and Environmental Engineering	MS, MSE, PhD	—	Tempe
Communication	MA	—	Tempe
	PhD	Communicative development, intercultural communication, or organizational communication	Tempe
Communication Disorders	MS	—	Tempe
Communication Studies	MA	—	West
Composition	MM	Optional: interdisciplinary digital media and performance[1]	Tempe
Computational Biosciences	PSM	—	Tempe
Computer Science	MCS	—	Tempe
	MS, PhD	Optional: arts, media, and engineering[1]	Tempe
Computing Studies	MCST	—	East
Construction	MS	Optional: construction science, facilities, or management[1]	Tempe
Counseling	MC	—	Tempe
Counseling Psychology	PhD	—	Tempe
Counselor Education	MEd	—	Tempe
Creative Writing	MFA	—	Tempe
Criminal Justice	MA	—	West
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	Tempe

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

[2] This program is also offered through the College of Extended Education.

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

[4] This major is jointly offered with the University of Arizona.

[5] Students apply to this degree program through the College of Law, not the Division of Graduate Studies.

ASU Graduate Degrees (continued)

Major	Degree	Concentration[1]	Campus
Curriculum and Instruction (continued)	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	Tempe[2]
		English as a second language, instructional media in K-12 schools, or professional studies	East
	EdD	Bilingual education, curriculum studies, early childhood education, elementary education, English as a second language, Indian education, language and literacy, mathematics education, science education, secondary education, or social studies education	Tempe
	PhD	Art education, curriculum studies, early childhood education, elementary education, English education, exercise and wellness education, language and literacy, mathematics education, physical education, science education, or special education	Tempe
		Exercise and wellness education	East
Dance	MFA	Optional: interdisciplinary digital media and performance[1]	Tempe
Design	MSD	Graphic design, industrial design, or interior design	Tempe
Economics	MS, PhD	—	Tempe
Educational Administration and Supervision	MEd	—	Tempe[2] West
	EdD[3]	—	Tempe
Educational Leadership and Policy Studies	PhD	—	Tempe
Educational Psychology	MA, MEd	—	Tempe
	PhD	Learning; lifespan developmental psychology; measurement, statistics, and methodological studies; or school psychology	Tempe
Educational Technology	MEd, PhD	—	Tempe
Electrical Engineering	MS, PhD	Optional: arts, media, and engineering[1]	Tempe
	MSE	—	Tempe[2]
Elementary Education	MEd	Optional: bilingual education, educational technology, ESL education, or reading[1]	West
Engineering	MEng	—	Tempe[2]
Engineering Science	MS	—	Tempe
	MSE	Optional: executive embedded systems[1]	Tempe[2]
	PhD	Optional: materials science and engineering[1]	Tempe
English	MA	Comparative literature, English linguistics, literature and language, or rhetoric and composition	Tempe
	PhD	Literature or rhetoric/composition and linguistics	Tempe
Environmental Design and Planning	PhD	Design; history, theory, and criticism; or planning	East Tempe
Exercise and Wellness	MS	—	East
Exercise Science	PhD	Biomechanics, motor behavior/sport psychology, or physiology of exercise	Tempe
Family and Human Development	MS	Optional: family studies[1]	Tempe
Family Science	PhD	Optional: marriage and family therapy[1]	Tempe

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

[2] This program is also offered through the College of Extended Education.

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

[4] This major is jointly offered with the University of Arizona.

[5] Students apply to this degree program through the College of Law, not the Division of Graduate Studies.

ASU Graduate Degrees (continued)

Major	Degree	Concentration[1]	Campus
French	MA	Comparative literature, linguistics, or literature	Tempe
Geographic Information Systems	MAS	—	Tempe
Geography	MA, PhD	—	Tempe
Geological Sciences	MS, PhD	—	Tempe
German	MA	Comparative literature, language and culture, or literature	Tempe
Health Sector Management	MHSM	—	Tempe[2]
Higher and Postsecondary Education	MEd, EdD	Optional: higher education[1]	Tempe
History	MA	Asian history, British history, European history, Latin American history, public history, U.S. history, or U.S. Western history	Tempe
	PhD	Asian history, British history, European history, Latin American history, or U.S. history	Tempe
History and Theory of Art[4]	PhD	—	Tempe
Industrial Engineering	MS, MSE, PhD	—	Tempe
Information Management	MS	—	Tempe
Interdisciplinary Studies	MA	Optional: gerontology[1]	West
Justice Studies	MS	—	Tempe
	PhD	Optional: criminal and juvenile justice; dispute resolution; law, justice, and minority populations; law, policy, and evaluation; or women, law, and justice[1]	Tempe
Kinesiology	MS	—	Tempe
Law[5]	JD	—	Tempe
Legal Studies	MLS	—	Tempe
Mass Communication	MMC	—	Tempe
Materials Engineering	MS, MSE	—	Tempe
Materials Science	MS	—	Tempe
Mathematics	MA, PhD	—	Tempe
Mechanical Engineering	MS, MSE, PhD	—	Tempe
Microbiology	MS, PhD	—	Tempe
Molecular and Cellular Biology	MS, PhD	—	Tempe
Music	MA	Ethnomusicology, music history and literature, or music theory	Tempe
	DMA	Conducting, interdisciplinary digital media and performance, music composition, music education, or performance	Tempe
Music Education	MM	Choral music, general music, instrumental music, or jazz studies	Tempe
Natural Science	MNS	Biology, chemistry, geological sciences, mathematics, microbiology, physics, and/or plant biology	Tempe
Nursing	MS	Adult health nursing, community health nursing, family health nursing, nursing administration,[3] parent-child nursing, psychiatric/mental health nursing, or women's health	Tempe[2]
	DNS	—	Tempe

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

[2] This program is also offered through the College of Extended Education.

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

[4] This major is jointly offered with the University of Arizona.

[5] Students apply to this degree program through the College of Law, not the Division of Graduate Studies.

ASU Graduate Degrees (continued)

Major	Degree	Concentration[1]	Campus
Nutrition	MS	—	East
Performance	MM	Music theatre/opera musical direction, music theatre/opera performance, performance, performance pedagogy, or piano accompanying	Tempe
Philosophy	MA, PhD	—	Tempe
Physical Education	MPE	—	East
Physics	MS, PhD	—	Tempe
Plant Biology	MS, PhD	Optional: ecology or photosynthesis[1]	Tempe
	PhD	—	East
Political Science	MA, PhD	American politics, comparative politics, international relations, or political theory	Tempe
Psychology	PhD	Behavioral neuroscience, clinical psychology, cognitive/behavioral systems, developmental psychology, quantitative research methods, or social psychology	Tempe
Public Administration	MPA	Optional: nonprofit administration[1]	Tempe[2]
	PhD	—	Tempe
Public Health[3]	MPH	Community health practice or health administration and policy	Tempe
Recreation	MS	—	Tempe
Religious Studies	MA, PhD	—	Tempe
Science and Engineering of Materials	PhD	High-resolution nanostructure analysis or solid-state device materials design	Tempe
Secondary Education	MEd	Optional: educational technology[1]	West
Social and Philosophical Foundations of Education	MA	—	Tempe
Social Work	MSW	Advanced direct practice or planning, administration, and community practice	Tempe[2]
		Advanced generalist practice	West
	PhD	—	Tempe
Sociology	MA, PhD	—	Tempe
Spanish	MA	Comparative literature, language and culture, linguistics, or literature	Tempe
	PhD	Cultural studies or literature	Tempe
Special Education	MA	—	Tempe
	MEd	Gifted, mildly disabled, multicultural exceptional, or severely/multiply disabled	Tempe
		Infants and young children	West
Speech and Hearing Science	PhD	Developmental neurolinguistic disorders, neuroauditory processes, or neurogerontologic communication disorders	Tempe
Statistics	MS	—	Tempe
Taxation	MTax	—	Tempe
Teaching English as a Second Language	MTESL	—	Tempe

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

[2] This program is also offered through the College of Extended Education.

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

[4] This major is jointly offered with the University of Arizona.

[5] Students apply to this degree program through the College of Law, not the Division of Graduate Studies.

ASU Graduate Degrees (continued)

Major	Degree	Concentration[1]	Campus
Technology	MSTech	Aeronautical engineering technology, aviation management and human factors, computer systems, electronic systems engineering technology, environmental technology management, fire service administration, global technology and development, information technology, instrumentation and measurement technology, management of technology, manufacturing engineering technology, mechanical engineering technology, microelectronics engineering technology, or security engineering technology	East[2]
Theatre	MA	—	Tempe
	MFA	Directing, interdisciplinary digital media, performance design, or theatre for youth	Tempe
	PhD	Optional: theatre and performance of the Americas or theatre for youth[1]	Tempe
Tribal Policy, Law, and Government	LLM	—	Tempe
Urban and Environmental Planning	MUEP	—	Tempe

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

[2] This program is also offered through the College of Extended Education.

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

[4] This major is jointly offered with the University of Arizona.

[5] Students apply to this degree program through the College of Law, not the Division of Graduate Studies.

Concurrent and Dual Degrees

Degrees	Administered By
JD/MBA	College of Law/W. P. Carey School of Business
JD/MHSM	College of Law/School of Health Management and Policy
JD/MS in Economics*	College of Law/Department of Economics
JD/PhD in Justice Studies	College of Law/School of Justice and Social Inquiry
MA in Anthropology/MS in Justice Studies	Department of Anthropology/School of Justice and Social Inquiry
MAIS/MBA	W. P. Carey School of Business
MArch/MBA	School of Architecture and Landscape Architecture/W. P. Carey School of Business
MBA/MHSM	W. P. Carey School of Business
MBA/MS in Economics*	W. P. Carey School of Business
MBA/MS in Information Management	W. P. Carey School of Business
MBA/MTax	W. P. Carey School of Business
MBA/Master of International Management	W. P. Carey School of Business/Carlos III University of Madrid (Spain); Graduate School of Business Administration (Peru); Graduate School of Commerce (France); Monterrey Institute for Technical and Superior Studies, Mexico State Campus (Mexico); and Thunderbird, the Garvin School of International Management

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

International Programs

ipo.asu.edu **William G. Davey, Ph.D., Director**

PURPOSE

Arizona State University is an internationally recognized research and doctoral granting institution. The International Programs Office (IPO) is responsible for developing and implementing a wide variety of international policies and activities. As part of the Office of the Executive Vice President and Provost, IPO administers university study programs abroad, visiting scholar programs at ASU, and protocol for international visitors. In cooperation with academic and administrative units, IPO develops the international policies for ASU, represents the international interests of the university to the community at large, administers scholarships for studying abroad, supports faculty exchanges, and facilitates joint international research and training projects. IPO also represents the university's international interests to professional organizations and government agencies. The Office of Immigration Programs for International Faculty and Scholars within IPO assumes responsibility for international visitors who come to work, study, or conduct research on the ASU campuses, and also operates one of the nation's first U.S. Passport Offices located at a state university.

ACADEMIC PROGRAMS

The Department of State-sponsored IIE Open Doors report ranks ASU as one of the nation's top twenty institutions in terms of student international mobility. In increasing numbers, students have chosen ASU because of its excellence in undergraduate programs and extensive international study opportunities.

Two types of programs—study abroad and student exchange—are designed to enhance the academic development, professional preparation, and international perspective of students.

IPO offers more than 200 fall and spring semester and year-long international programs for ASU resident credit. Students on an official study abroad or exchange program retain full-time student status and the catalog status they held at the time of their departure. Study Abroad and Exchange Programs are available in: Albania, Argentina, Armenia, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Costa Rica, Czech Republic, Denmark, Dominican Republic, Ecuador, Egypt, England, France, Germany, Ghana, Greece, Hungary, India, Ireland, Israel, Italy, Japan, Jordan, Macedonia, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Russia, Scotland, Senegal, Serbia, Singapore, South Africa, South Korea, Spain, Sweden, Taiwan, Thailand, Turkey, and Vietnam.

For a current list of host universities (in the countries listed in the previous paragraph) and the programs they offer, see the promotional flier available on the IPO Web site at ipo.asu.edu/asu/program.

Exchange Programs. Exchange programs are those in which ASU students may study at a foreign institution, in return for which students from that institution have a reciprocal opportunity to study at ASU. ASU students simply pay their normal registration fees and tuition at ASU. For exchange programs, ASU registration fees and tuition may be paid by scholarships or waivers. Financial aid may, in most cases, be applied to the costs of exchange programs. Exchange programs offer students the chance to enter mainstream university life in the country of their choice. Normally, participation in an exchange program is dependent on prior attainment of an adequate level of language competence to be able to function in classes in the host country.

In several instances, students may have the opportunity to obtain advanced-level intensive language instruction for approximately one month in the host country before the start of the academic term.

Palacio Nacional, Mexico City Julie Williams photo

Diverse program locations for students proficient in the host language include Chile, Ecuador, France, Germany, Italy, Mexico and more. Students desiring exchange programs with English as the language of instruction may consider programs in not only Australia, England, New Zealand, and Scotland, but also Austria, Netherlands, Scandinavia, Singapore, and Thailand. IPO also offers special exchanges in Japan, Italy, and Mexico where both English and the host language may be used.

Study Abroad Programs. IPO offers a world of study abroad programs, which are distinct from exchange programs in two ways: (1) rather than pay one's ASU tuition for the terms abroad as exchange programs require, participants simply pay a program fee to IPO that covers costs associated with that particular program, and financial aid may be applied to the program fee; (2) there is no reciprocal exchange of students (no foreign students come to ASU for the participants IPO sends abroad).

IPO Exchange and study abroad programs are administered in three ways:

1. direct programs,
2. partnership programs, and
3. specialty programs.

Direct Programs. ASU offers numerous study abroad and exchange program destinations through direct affiliation with overseas schools and universities. IPO direct programs can accommodate students from nearly every ASU major and suit a variety of personal preferences.

Partnership Programs. IPO works in conjunction with select major national program providers, such as the *American Institute for Foreign Study* (AIFS), *International Studies Abroad* (ISA), the *Institute for Study Abroad, Butler University* (IFSA, Butler), and the *Council for International Education Exchange* (CIEE), to expand the number of quality program choices available to ASU students. Partnership programs offer opportunities for ASU students to study abroad through IPO on programs offered by these reputable partners while still maintaining enrollment at ASU, allowing access to ASU financial aid and resulting in ASU resident credit.

Specialty Programs. Specialty programs are specifically designed by one academic unit (ASU school, college, or department), are partly administered by that unit in cooperation with IPO, and are available to only students from that academic area. Specialty programs are offered by the West campus College of Human Services (for social work), the College of Education (for student teaching), the College of Law, the Department of Kinesiology, the Morrison School of Agribusiness and Resource Management, the School of Architecture, and the W. P. Carey School of Business.

International Programs maintains close ties with ASU's area studies programs, including the Center for Asian Studies, the programs in Korean Studies and Southeast Asian Studies, the Latin American Studies Center, the Russian and East European Studies Consortium, and Scandinavian Studies. Many IPO programs are specifically designed for students in these areas.

Close relationships are maintained with a number of campus partners. IPO cooperates with the Office of Pan-American Initiatives in the development of international relationships with international exchange and research opportunities throughout the Americas. The Barrett Honors College cooperates in the creation of special programs for the benefit of its students. The Department of Languages and Literatures assists in the staffing and management of a number of study abroad programs, especially those related to language acquisition. The W. P. Carey School of Business and College of Liberal Arts and Sciences maintain advising services and offer scholarships for their students intending to study abroad. The Ira A. Fulton School of Engineering and the Corporate Leaders Program also actively place students in study programs and internships around the world.

Procedures. Students interested in participating in such programs should contact the International Programs Office in TMPCT 198.

IPO assists students through every stage of planning, preparation, participation, and return from exciting international educational experiences. International Program coordinators are available to assist students in choosing a program that meets one's academic, personal, and professional goals.

Information on programs can be obtained from the International Programs Office in TMPCT 198, from the IPO Web page at ipo.asu.edu, or by phone at 480/965-5965.

How to Apply. Before participating in a study abroad or an exchange program, students must register and select a program choice. A list of choices is available on the Web at ipo.asu.edu. Eligible students then obtain the program specific application packet at IPO. Completed application packets are due to IPO by October 1, for spring programs, and by March 1, for most fall and academic year programs. After the application process is completed, students attend predeparture orientations conducted by IPO. These presentations are designed to prepare participants for a comfortable and rewarding international experience.

Immigration Programs for International Faculty and Scholars. The International Faculty and Scholars Office (Immigration/Employment Visa Services) of the IPO is responsible for administration of the university's Exchange Visitor Program and Employment-Based Visa Programs. The responsibilities of this office also include providing information, guidance, and advice to the various departments, programs, and colleges of the Tempe Campus, East campus, and West campus, as well as to the university's faculty, staff, students, and guests on questions and issues related to the university's J-1 Exchange Visitor and Employment-Based Visa programs and other immigration-related issues.

Summer Sessions

www.asu.edu/summer **Carol Switzer, MS, Director**

PURPOSE

Summer Sessions offers more than 4,000 fully accredited courses and provides an opportunity for students to begin or continue academic work on a year-round basis. Summer courses are equivalent to fall and spring courses in terms of content, credit awarded, and the standards expected of students regarding academic performance.

The program offers two five-week sessions and one eight-week session. See "University Calendar," page 17, for specific dates.

All Tempe campus courses (except some KIN courses) are held in air-conditioned classrooms or laboratories. A number of courses are offered at off-campus locations.

Through various summer study programs, ASU also offers students the opportunity to earn credit while studying in foreign countries. These programs are directed by ASU faculty and have been approved by the appropriate academic unit.

For more information, access the Summer Sessions Web site at www.asu.edu/summer.

Admission and Registration. The admission and registration process for summer sessions begins when the *Summer Sessions Bulletin* is distributed in early March.

Admission. All students must be admitted to ASU for the summer as nondegree students before enrolling, except continuing students who attend during the previous spring semester. New students admitted for the fall semester following the current summer must process the summer nondegree admission form before enrolling. The submission of transcripts or test scores is not required to attain this status.

Readmission. ASU students not enrolled during the spring semester preceding the current summer must be readmitted. See "Readmission to the University," page 78.

Conditional admission before graduation from high school may be granted. See "Admission Before Receipt of Final Transcript," page 67.

Advising. All students are strongly encouraged to seek academic advising before enrolling in summer courses. See "Academic Advising," page 77.

Bulletin. The *Summer Sessions Bulletin,* which contains the class schedule and the registration procedure, is available in early March at the Office of Summer Sessions, RITT B160, and at all registrar locations. The *Summer Sessions Bulletin* is also available on the Web at www.asu.edu/summer.

To request the *Summer Sessions Bulletin*, summer study abroad brochures, or other summer information, call 480/965-6611, or write

SUMMER SESSIONS
ARIZONA STATE UNIVERSITY
PO BOX 870601
TEMPE AZ 85287-0601

Food Services. Meal plans are available. For more information, call 480/965-3464, or write

SODEXHO SERVICES
ARIZONA STATE UNIVERSITY
PO BOX 870901
TEMPE AZ 85287-0901

Housing. Air-conditioned residence halls are available for Tempe campus students. For more information, call 480/965-3515, or write

RESIDENTIAL LIFE
ARIZONA STATE UNIVERSITY
PO BOX 870801
TEMPE AZ 85287-0801

Immunization. Students born after December 31, 1956, are not permitted to register without proof of measles (rubeola) immunity or immunization given after January 1, 1980. See "Immunization Requirements," page 72.

Parking. A decal is required to park at ASU. For more information, call 480/965-6124, or write

PARKING SERVICES
ARIZONA STATE UNIVERSITY
PO BOX 870704
TEMPE AZ 85287-0704

Registration. Registration may be completed online, by using SunDial, or in person. For more information, see the *Summer Sessions Bulletin.*

A maximum of seven semester hours in each five-week session or nine semester hours in the eight-week session may be taken. Hours of enrollment in any other institution or independent learning course are included in the maximum allowable course load during any given session.

Tuition and Fees. Summer sessions students pay for the actual number of semester hours enrolled, plus the Associated Students' Association fee, the Financial Aid Trust Fee, and the Student Recreation Complex fee. Students are also required to pay any special fees attached to specific classes. For more information, see the *Summer Sessions Bulletin.*

Regents' Professors

The title "regents' professor" is conferred on selected members of the ASU tenured faculty who have achieved and are sustaining the highest level of distinction by their exceptional contributions to the mission of the university in research or other creative activity and in teaching or professional service.

JOHN ALCOCK
Life Sciences

DAVID L. ALTHEIDE
Justice and Social Inquiry

C. AUSTEN ANGELL
Chemistry and Biochemistry

CHARLES J. ARNTZEN
Life Sciences

CONSTANTINE A. BALANIS
Electrical Engineering

DAVID C. BERLINER
Educational Leadership and Policy Studies and Psychology in Education

PETER R. BUSECK
Chemistry and Biochemistry and Geological Sciences

RON CARLSON
English

PHILLIP R. CHRISTENSEN
Geological Sciences

ROBERT B. CIALDINI
Psychology

GEOFFREY A. CLARK
Anthropology

JOHN M. COWLEY
Physics and Astronomy, Emeritus

NORMAN DUBIE
English

NANCY H. EISENBERG
Psychology

LEROY EYRING
Chemistry and Biochemistry, Emeritus

DAVID K. FERRY
Electrical Engineering

DAVID WILLIAM FOSTER
Languages and Literatures

GENE V GLASS
Educational Leadership and Policy Studies and Psychology in Education

LUIS R. GOMEZ-MEJIA
Management

WILLIAM L. GRAF
Geography, Emeritus

RONALD GREELEY
Geological Sciences

GERALD THOMAS HEYDT
Electrical Engineering

DAVID R. HICKMAN
Music

PETER IVERSON
History

DAVID H. KAYE
Law

GARY D. KELLER
Languages and Literatures

MARK C. KLETT
Art

RAYMOND W. KULHAVY
Psychology in Education, Emeritus

DANIEL M. LANDERS
Kinesiology

SHENG H. LIN
Chemistry and Biochemistry, Emeritus

JANE MAIENSCHEIN
Biology and Society

JAMES W. MAYER
Chemical and Materials Engineering and Solid State Science

CARLETON B. MOORE
Chemistry and Biochemistry and Geological Sciences, Emeritus

JEFFRIE G. MURPHY
Law and Philosophy

MICHAEL O'KEEFFE
Chemistry and Biochemistry, Emeritus

CAIO PAGANO
Music

DENNIS J. PALUMBO
Justice and Social Inquiry, Emeritus

G. ROBERT PETTIT
Chemistry and Biochemistry

STEPHEN J. PYNE
Life Sciences

ALBERTO ALVARO RÍOS
English

NANCY FELIPE RUSSO
Psychology

IRWIN N. SANDLER
Psychology

DAVID J. SMITH
Physics and Astronomy and Solid State Science

MARY LEE SMITH
Educational Leadership and Policy Studies and Psychology in Education

JOHN C.H. SPENCE
Physics and Astronomy

SUMNER G. STARRFIELD
Physics and Astronomy

MARY BETH STEARNS
Physics and Astronomy, Emerita

CHRISTY G. TURNER II
Anthropology, Emeritus

J. BRUCE WAGNER JR.
Chemistry and Biochemistry and Solid State Science, Emeritus

KURT WEISER
Art

Administrative Personnel

Arizona Board of Regents

Governor of Arizona ..... Janet Napolitano
Superintendent of Public Instruction ..... Tom Horne
Student Regent (voting), appointed to June 2005 ..... Wesley McCalley
Student Regent (nonvoting), appointed to June 2006 ..... Benjamin Graff
Regent, appointed to January 2006 ..... Chris Herstam
Regent, appointed to January 2006 ..... Jack Jewett
Regent, appointed to January 2008 ..... Christina Palacios
Regent, appointed to January 2008 ..... Gary L. Stuart
Regent, appointed to January 2010 ..... Fred T. Boice
Regent, appointed to January 2010 ..... Robert B. Bulla
Regent, appointed to January 2012 ..... Ernest Calderón
Regent, appointed to January 2012 ..... Lorraine Frank
Executive Director ..... Joel Sideman
Counsel to the Board ..... Paulina Vazquez-Morris

Executive Officers

President ..... Michael M. Crow
Senior Advisor to the President ..... James O'Brien
Executive Vice President and Provost of the University ..... Milton D. Glick
Senior Vice President and Secretary of the University ..... Christine K. Wilkinson
Senior Vice President and University Planner ..... Richard Stanley
Chief Financial Officer ..... *To Be Appointed*
Vice President for Public Affairs ..... Virgil Renzulli
Vice President for Research and Economic Affairs ..... Jonathan Fink
Vice President for Student Affairs ..... Juan C. Gonzalez
Vice President for University Administration and General Counsel ..... Paul J. Ward
Vice President for University Undergraduate Initiatives ..... James A. Rund
Vice President and Provost, ASU at the Downtown Phoenix Campus ..... Mernoy E. Harrison
Vice President and Provost, ASU at the East Campus ..... Jerry Jakubowski
Vice President and Provost, ASU at the West Campus ..... Mark Searle
Executive Director for Athletics ..... Eugene Smith
President, ASU Foundation ..... Ira Jackson

President's Office

President ..... Michael M. Crow
Senior Vice President and Secretary of the University ..... Christine K. Wilkinson
Senior Vice President and University Planner ..... Richard Stanley
  Executive Director, Institutional Analysis/Data Administration/Strategic Planning ..... *To Be Appointed*
  Director, Budget Planning and Management ..... James Sliwicki
Senior Advisor to the President ..... James O'Brien
Director, Office of the President and Special Assistant to the President ..... Joyce Smitheran
Executive Director, Office of Sustainability and Special Advisor to the President ..... James Buizer
Executive Director, Office of University Initiatives and Special Advisor to the President ..... Kimberly Loui
Director, Office of Pan-American Initiatives and Special Advisor to the President ..... Jorge De Los Santos
Director, Strategic Projects and Special Assistant to the President ..... Mariko Silver
Advisor to the President on American Indian Affairs ..... Peterson Zah
Executive Director of Athletics ..... Gene Smith
Director, Equal Opportunity/Affirmative Action ..... Barbara A. Mawhiney
ICA Faculty Athletic Representative ..... Myles Lynk

Deans

Dean, the Barrett Honors College ..... Mark Jacobs
Dean, College of Architecture and Environmental Design ..... Wellington Reiter
Dean, College of Education ..... Eugene E. Garcia

Interim Dean, College of Extended Education ..... William A. Verdini
Interim Dean, College of Human Services ..... Lesley Di Mare
Dean, College of Law ..... Patricia D. White
Dean, College of Liberal Arts and Sciences ..... David A. Young
Dean, College of Nursing ..... Bernadette Melnyk
Interim Dean, College of Public Programs ..... Jeffrey Chapman
Dean, College of Teacher Education and Leadership ..... Joseph Ryan
Dean, College of Technology and Applied Sciences ..... Albert L. McHenry
Dean, Division of Graduate Studies ..... Maria T. Allison
Dean, East College ..... Glenn W. Irvin
Dean, Ira A. Fulton School of Engineering ..... Peter E. Crouch
Dean, The Katherine K. Herberger College of Fine Arts ..... J. Robert Wills
Dean, Morrison School of Agribusiness and Resource Management ..... Raymond A. Marquardt
Dean, New College of Interdisciplinary Arts and Sciences ..... Emily F. Cutrer
Interim Dean, School of Global Management and Leadership ..... Leanne Atwater
Dean, University College ..... Gail Hackett
Dean, University Libraries ..... Sherrie Schmidt
Dean, W. P. Carey School of Business ..... Robert E. Mittelstaedt Jr.
Interim Dean, Walter Cronkite School of Journalism and Mass Communication ..... Stephen K. Doig

Chief Financial Officer

Interim Chief Financial Officer ..... Mernoy E. Harrison
Interim Senior Executive Assistant to the Chief Financial Officer ..... Sheila Stokes
Associate Vice President, Financial Services, and Treasurer ..... Gerald E. Snyder
- Director, Student Business Services ..... Joanne Wamsley
- Director, Financial Services ..... Marilyn Mulhollan
- Associate Director, Financial Services ..... Terri Deasey
- Assistant Director, Financial Services ..... Laura James
- Assistant Director, Financial Services ..... Edalia Kousari
- Assistant Director, Financial Services ..... Kathleen Rogers

Deputy Executive Vice President, University Services ..... Scott Cole
- Director, Campus Physical Planning ..... Steve Nielsen
- Director, Capital Programs Management Group ..... Ted Cary
- Director, Facilities Planning and Space Management ..... David Techau
- Director, Facilities Management ..... Dave Brixen
- Director, Environmental Health and Safety ..... Leon Igras
- University Architect ..... Ron McCoy

Associate Vice President, Administration and Business Services ..... Ray Jensen
- Director, Purchasing and Business Services ..... John Riley
- Director, ASU Bookstore ..... Val Ross
- Associate Director, Real Estate ..... Karen Honeycutt
- Associate Director, Document Production Services ..... Robert Lane
- Associate Director, Purchasing and Business Services ..... Gina Webber
- Associate Director of Parking and Transit ..... Linda Riegel

College of Extended Education

See "College of Extended Education Administrative Personnel," page 711.

Downtown Phoenix Campus

See "Downtown Phoenix Campus Administrative Personnel," page 525.

East Campus

See "East Campus Administrative Personnel," page 604.

Intercollegiate Athletics

Executive Director, Athletics ..... Gene Smith

ASU Head Coaches

Baseball—Men ..... Pat Murphy
Basketball—Men ..... Rob Evans
Basketball—Women ..... Charli Turner Thorne
Cross Country—Men and Women ..... Walt Drenth
Diving—Men and Women ..... Mark Bradshaw
Football—Men ..... Dirk Koetter

Golf—Men ..... Randy Lein
Golf—Women ..... Melissa Luellen
Gymnastics—Women ..... John Spini
Soccer—Women ..... Ray Leone
Softball—Women ..... Linda Wells
Swimming—Men and Women ..... Michael Chasson
Tennis—Men ..... Lou Belken
Tennis—Women ..... Sheila McInerney
Track and Field—Men and Women ..... Greg Kraft
Volleyball—Women ..... Brad Saindon
Water Polo—Women ..... Vicki Gorman
Wrestling—Men ..... Thom Ortiz

Public Affairs

Vice President for Public Affairs ..... Virgil Renzulli
Deputy Vice President for Public Affairs ..... Charles S. Miller
Associate Vice President for Community Development ..... Nancy Jordan
Assistant Vice President for Strategic Communication ..... *To Be Appointed*
Assistant Vice President for Policy Affairs and Executive Director, Federal Relations ..... Stuart Hadley
Assistant Vice President for Cultural Affairs and Executive Director, Public Events ..... Colleen Jennings-Roggensack
Director, Community Relations ..... *To Be Appointed*
Director, Public Relations ..... Wilma Mathews
Director, State Relations ..... Scott A. Smith
Director, Special Events ..... Tye Thede
Executive Director, Community Development ..... Sandra Ferniza
General Manager, Television Station KAET ..... Greg Giczi

Research and Economic Affairs

Vice President for Research and Economic Affairs ..... Jonathan Fink
Associate Vice President for Research ..... Paul C. Johnson
Associate Vice President, Economic Affairs ..... Rob Melnick
Program Manager, Office of the Vice President for Research and Economic Affairs ..... Anna-Rosa Lampis
Assistant to the Vice President ..... Cynthia Ryan
Director, Fiscal and Business Services ..... *To Be Appointed*
Executive Director, Financial Services ..... Jay Murphy
Director, Biodesign Institute at ASU ..... George H. Poste
Acting Director, Office of Research and Sponsored Projects Administration ..... Cheryl Conover
Director, Clinical Partnerships ..... Kathleen Matt
Executive Director, Materials Research ..... Tom Picraux
Director, Center for the Study of Religion and Conflict ..... Linell Cady
Director, Flexible Display Center ..... Greg Raupp
Director, Office of Research Publications ..... Conrad Storad
Director, International Institute for Sustainability ..... Charles L. Redman
Director, Partnership for Research in Spatial Modeling Program (PRISM) ..... Anshuman Razdan
Director, Animal Care and Technology ..... Michael McGarry
Director, Southwest Center for Environmental Research and Policy ..... Joseph Zehnder
Director, Radiation Safety Office ..... Kenneth L. Mossman

Student Affairs

Vice President for Student Affairs ..... Juan C. Gonzalez
Associate Vice President and Dean of Students ..... Bob Soza
Associate Vice President for Facility Development and Residential Life ..... Kevin Cook
Associate Vice President for Fiscal and Program Development ..... Sally Ramage
Director, Arizona Prevention Resource Center ..... Gail Chadwick
Director, Career Services ..... Raymond I. Castillo
Director, Counseling and Consultation ..... Martha Dennis Christiansen
Director, Recreational Sports ..... *To Be Appointed*
Director, Student Health and Wellness Center ..... *To Be Appointed*
Director, Student Media ..... Kristin Gilger

Tempe Campus

See "Tempe Campus Administrative Personnel," page 680.

University Administration and General Counsel

Vice President for University Administration and General Counsel . . . . . Paul J. Ward
Director, Equal Opportunity/Affirmative Action . . . . . Barbara Mawhiney
Associate Vice President, Human Resources . . . . . David Butler
Director, Consulting Services . . . . . *To Be Appointed*
Director, Employee Assistance Office/Wellness/Worklife Balance Programs . . . . . Phillip Potter
Senior Director, Human Resources . . . . . Christine Cervantes
Associate Vice President, University Administration . . . . . LeEtta Overmyer
Director, Internal Audit and Management Services . . . . . *To Be Appointed*
Director, Administration and Finance Information Technology . . . . . *To Be Appointed*
Associate Vice President for Legal Affairs . . . . . Nancy Tribbensee
Director/Chief of Police, Department of Public Safety . . . . . John Pickens

University Undergraduate Initiatives

Vice President for University Undergraduate Initiatives . . . . . James A. Rund
Director, Undergraduate Initiatives Technology Services . . . . . Mike Schaefer
Director, Student Financial Assistance . . . . . Craig Fennell
Dean, Undergraduate Admissions . . . . . Tim Desch
University Registrar . . . . . Lou Ann Denny

West Campus

See "West Campus Administrative Personnel," page 702.

Downtown Phoenix Campus

www.asu.edu/downtownphoenix

Mernoy E. Harrison Jr., PhD,
Vice President, ASU; Provost, Downtown Phoenix Campus

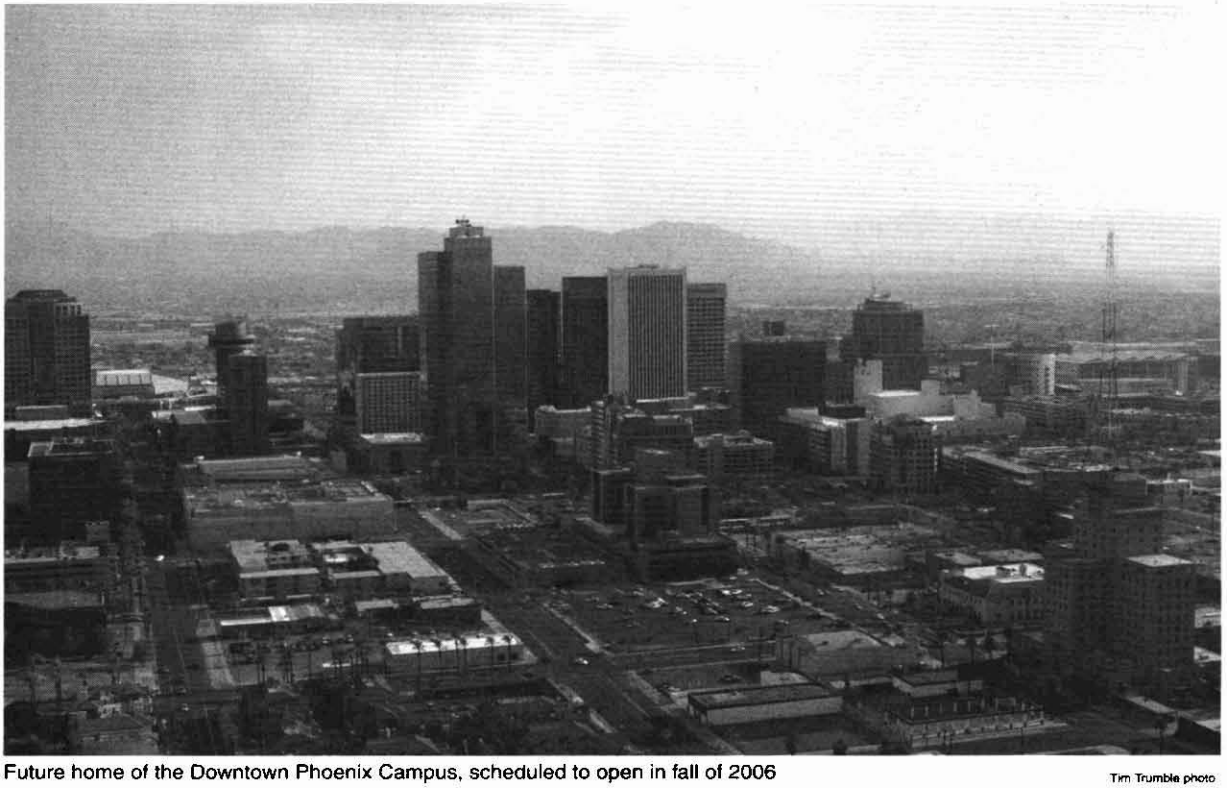
Arizona State University is partnering with the City of Phoenix to build a modern, vibrant university campus in downtown Phoenix as part of a larger plan to revitalize and redevelop the city's urban core. ASU envisions a campus embedded within the city, embracing the cultural, socio-economic, and physical setting of urban downtown Phoenix in the 21st century. The first phase of the campus will open in the fall semester of 2006. The full manifestation of ASU in downtown Phoenix is likely to take more than 10 years to achieve. When fully developed, the new full-service downtown Phoenix campus will serve 15,000 students, with academic buildings, student and nonstudent housing, compatible retail development, and cultural programs that create an active 24/7 environment. Current plans call for the College of Nursing, the Walter Cronkite School of Journalism, the College of Public Programs (which includes the School of Community Resources and Development, the School of Social Work, and the School of Public Affairs) the School of Health Management and Policy, KAET (Channel 8), and the Morrison Institute for Public Policy to relocate from the Tempe campus to downtown Phoenix. In addition, University College has been created to provide undergraduate students with an alternative to the existing majors. Construction of the campus is being designed around the planned light rail system, which will provide a 20-minute commute between the downtown Phoenix and Tempe campuses.

Downtown Phoenix Campus Administrative Personnel

Vice President, ASU; Provost, Downtown Phoenix Campus ..... Mernoy E. Harrison Jr.
Vice Provost for Administrative Services ..... Sheila W. Stokes

ASU Administrative Personnel

See "Administrative Personnel," page 521.



Future home of the Downtown Phoenix Campus, scheduled to open in fall of 2006

Tim Trumble photo

East Campus

www.east.asu.edu **Gerald S. Jakubowski, PhD, Provost, East campus; Vice President, ASU**

The East campus of Arizona State University is distinguished by the academic programs it offers and by its residential setting. As the university's polytechnic campus, it offers a variety of professionally oriented undergraduate and graduate programs that are applicable to the real world and require high levels of technological literacy and skill.

The Morrison School of Agribusiness and Resource Management offers bachelor's and master's degrees in Agribusiness that prepare students for careers in sectors of global business that are in high demand. The College of Technology and Applied Sciences offers bachelor's programs and a master's degree in several specialized areas of technology. East College offers a broad range of undergraduate and graduate degrees that teach students how to apply professional and liberal arts studies to real life. The college also provides the general education courses for all the East campus degree programs.

All three academic units at the East campus offer the Bachelor of Applied Science (BAS) degree, a program designed specifically as a career progression degree for students holding the Associate of Applied Science (AAS) degree. The BAS emphasizes management, leadership, and communication skills along with additional technical course work.

Twenty baccalaureate degree programs, nine master's degree programs, and four certificate programs are currently offered at the East campus. Through partnerships with programs at the Tempe campus, select doctoral programs are also offered. (See the "Morrison School of Agribusiness and Resource Management Baccalaureate Degrees and Majors" table, page 532; the "East College Baccalaureate Degrees and Majors" table, page 540; and the "College of Technology and Applied Sciences Baccalaureate Degrees and Majors" table, page 568).

Located 23 miles southeast of the Tempe campus and with a student population of fewer than 5,000, the 600-acre campus offers a small residential college environment. East campus students learn in high-tech, mediated classrooms and practice in fully equipped laboratories. They enjoy small classes, friendly and accessible faculty, opportunities for student leadership, and academic support services dedicated to helping them grow, learn, and graduate. East campus graduates move into the world of work with knowledge and skills that help them succeed in their careers and in their personal and civic lives.

The campus is easily accessible via major interstate routes. See the "East Campus Map," page 597. For information, call 480/727-EAST (3278) or access the Web site at www.east.asu.edu.

ACADEMIC ORGANIZATION

The chief academic officer of the East campus is the provost. There are two colleges and one school at the East campus administered by deans. These academic units develop and implement the teaching, research, and service programs of the institution. Additional support for the academic mission of the campus is provided by Library Services and Information Technology, each administered by a director. See "East Campus Faculty and Academic Professionals," page 599, and "Academic Organization," page 10.

ACCREDITATION

The North Central Association of Colleges and Schools accreditation of ASU includes the East campus. In addition, programs in Electronics Engineering Technology, Manufacturing, and Mechanical Engineering Technology are accredited by the Technology Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc. (TAC of ABET). For more 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, e-mail caa@auburn.edu, or write

COUNCIL ON AVIATION ACCREDITATION
3410 SKYWAY DRIVE
AUBURN AL 36830

The Bachelor of Science in Industrial Technology degree (including the environmental technology management, graphic information technology, and industrial technology management concentrations) is 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 East 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 East campus. To be admitted to an East campus degree program, the student must meet undergraduate admissions requirements and the specific admission requirements of the East campus program. A student who is admitted to an East campus degree program is defined as an East campus student.

For more admissions information and applications to the East campus degree programs, call 480/727-EAST (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 an East campus degree program should contact Student Services at the East 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 East campus. Students should consult with their East 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 East 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 formed an innovative academic partnership that combines the strengths of the two institutions. ASU students receive instruction from both institutions. Chandler-Gilbert faculty teach freshman and sophomore General Studies, general interest courses, and

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

Academic Advising at the East Campus

Unit	Location	Telephone	Days	Hours[1]
Agribusiness and Resource Management, Morrison School of	WANNER	480/727-1585	Mon.–Fri.	8 A.M.–5 P.M.
Barrett Honors College[2]	IRISH A121	480/965-2359	Mon.–Fri.	8 A.M.–5 P.M.
East College	SUTTON	480/727-1333	Mon.–Fri.	8 A.M.–5 P.M.
Applied Biological Sciences, Department of	WANNER	480/727-1444	Mon.–Fri.	8 A.M.–5 P.M.
Applied Psychology, Faculty of	SUTTON	480/727-1333	Mon.–Fri.	8 A.M.–5 P.M.
Business Administration, Faculty of	SUTTON	480/727-1333	Mon.–Fri.	8 A.M.–5 P.M.
Education, Faculty of	SUTTON	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	SUTTON	480/727-1333	Mon.–Fri.	8 A.M.–5 P.M.
Multimedia Writing and Technical Communication, Faculty of	SUTTON	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.

[1] Walk-ins are welcome; appointments are recommended.

[2] The Barrett Honors College is located at the Tempe campus.

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 upper-division general education and general interest courses. ASU students are enrolled concurrently in both institutions. All transactions are handled through ASU. Students pay combined tuition or ASU tuition, whichever is less. Through the partnership with CGCC, ASU students can take all the courses needed to graduate with an ASU baccalaureate degree on the Williams Campus.

ADVISING

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

For more information or to schedule an advising session, contact an academic advisor (see the "Academic Advising at the East Campus" table, on this page).

COLLEGE OF EXTENDED EDUCATION

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

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

CAMPUS AND STUDENT SERVICES

The East 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 a learning center, child care services, student union, bookstore, and copy center. A shuttle service provides transportation between the East 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 residing in QUADs one, two, and four, 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.

Learning Center

In the Learning Center, undergraduate and graduate students can study, utilize computers for research and writing, and access tutoring services. Qualified undergraduate and graduate students provide tutoring to individual students or study groups by appointment or on a drop-in basis. Writing assistance is offered both face-to-face and online through the Learning Center Web site to students seeking help with any written assignment. Other services include workshops on writing, presentation and study skills, and computer-assisted instruction. Learning Center tutors also staff the Freshman Year Experience Hall study room during weekday and evening hours.

The Learning Center is located in the Academic Center Building. For more information or to schedule a tutoring appointment, call 480/727-1452, or visit the Web site at www.east.asu.edu/learningcenter.

Library Services

Strong resources and personal service define the East Campus Library. 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 East 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.east.asu.edu.

Computing Services

Information Technology (IT) at East campus provides computing services to support academic programs. The IT East department provides specialized software and systems to meet the particular needs of the East campus programs in support of e-learning initiatives. All classrooms at East 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 East maintains computing sites around campus, including the Computing Commons in the Academic Center, offering students computing and printing facilities. IT East has a staff of support personnel to aid the campus community's diverse computing needs, including Web development, academic computing, and administrative computing.

Food Services

The East 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 at the East campus, call 480/727-1443.

Student Health Center

The East campus Student Health Center provides confidential, primary health care services for all full- and part-time East campus students at a nominal fee. The clinic offers primary assessment and limited treatment of health problems and minor injuries. The center is staffed by a full-time nurse practitioner and a part-time doctor. Services include physical examinations and immunizations; 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 East campus.

For more information, call 480/727-1041, or access the Web site at www.east.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. Appointments may also be made in person at Student Counseling Services in the Student Affairs Complex, Building 370.

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. For more information, call 480/727-1041, or access the Web site at www.east.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 meeting space, study rooms, a computer lab, a TV lounge, dining facilities, a game room, a bookstore, and a ballroom. Programs and services that complement the academic experience and enhance campus life include a film series, dances, live performances, resources for student organizations, 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.

Recreational Facilities and Services

ASU and Chandler-Gilbert Community College 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 and the Chandler-Gilbert Physical Education 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 to September) with lights.

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

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In addition to the facilities, the PAC 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 cultural dance classes. A full schedule of intramural programs and special events are also offered at the PAC. Times for open recreation are scheduled at the PAC and the Chandler-Gilbert Physical Education 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.

For more information, access the PAC Web site at www.east.asu.edu/pac, 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 East campus provides students with the best 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.

The East campus's unique residential environment offers housing options for Williams Campus students throughout their undergraduate and graduate education. This includes 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.east.asu.edu/sta/u-life/housing, or send e-mail to easthousing@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, send e-mail to easthousing@asu.edu.

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.east.asu.edu/sta/u-life/housing, or send e-mail to easthousing@asu.edu.

Residents can select a meal plan from several options offered by Campus Dining Services. For more information, access the Web site at www.east.asu.edu/students/dining.

Faculty Fellows. The Faculty Fellows program provides opportunities for faculty to interact with students outside of the classroom and to build academic community on campus. Fellows join students for meals in the dining hall, participate in special events, such as the Leadership Conference, and help plan a variety of activities, including field trips, the Faculty Film Series, and community service projects. Through these informal meetings faculty enhance students' opportunities for learning outside of the classroom and develop mentoring relationships, which help students make the most of their college experience. For more information about this program, call 480/727-1452.

Morrison School of Agribusiness and Resource Management

www.east.asu.edu/msabr **Raymond A. Marquardt, PhD, Dean**

PURPOSE

Located at the East campus, 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 532.

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.

ADMISSION

The Morrison School admits students to the BS degree programs who meet the undergraduate admission

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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*.

requirements of Arizona State University; see "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 92), and the school and concentration requirements—leads to the BS degree. Note that all three General Studies awareness areas are required. An 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 534.

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 111 Macroeconomic Principles *SB*[3] 3
ECN 112 Microeconomic Principles *SB* 3
ENG 301 Writing for the Professions *L* 3
MAT 210 Brief Calculus *MA*[2] 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, golf and facilities management, or resource 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.

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.

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 other 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.

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

Special class fees are in place to cover the cost of PGA books, seminars, and testing. The PGM program fee ensures all students will 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 *SQ*	4
CHM 115 General Chemistry with Qualitative Analysis *SQ*	5
or CHM 116 General Chemistry *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 331 General Organic Chemistry (3)	
CHM 332 General Organic Chemistry (3)	
CHM 335 General Organic Chemistry Laboratory (1)	
CHM 336 General Organic Chemistry Laboratory (1)	
ECN 111 Macroeconomic Principles *SB*	3
or ECN 112 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	6
Total	54–58

[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	21
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	54–58
Total	75–79

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.

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.east.asu.edu/msabr
480/727-1585
WANNER, First Floor

Raymond A. Marquardt, Dean

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

Associate Professors: Patterson, Raccach, Richards, Schmitz

Assistant Professors: Eaves, Hughner, Manfredo

Senior Lecturer: Lindley

AGRIBUSINESS (AGB)

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

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

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

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

AGB 194 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 92.

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

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

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

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

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

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 112.

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 112.

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 111 and 112 (or their equivalents); introductory accounting.

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 111 and 112 (or their equivalents); introductory accounting.

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

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

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

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

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.

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

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

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.

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

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

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

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

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

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).

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

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

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).

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.

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).

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).

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.

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.

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

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

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.

AGB 443 Food and Industrial Fermentations. (3)
spring
Management, manipulation, and metabolic activities of industrial microbial cultures and their processes. Prerequisite: AGB 442 or instructor approval.

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.

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

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 112; MAT 117.
General Studies: CS

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 112.

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

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 112.
General Studies: SB

AGB 457 Resource Policy and Sustainability. (3)
fall
Considers the evolution of policy design, focusing on how resource and environmental concerns have affected agricultural development and trade policies. Prerequisite: ECN 112.

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

AGB 463 Electronic Commerce Applications. (3)
fall
Overview of electronic commerce technology with introduction to basics of design, control, operation, organization, and emerging issues. Pre- or corequisite: AGB 460 (or its equivalent).

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.

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

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.

AGB 473 Animal Physiology I. (3)
selected semesters
Control and function of the nervous, muscular, cardiovascular, respiratory, and renal systems of domestic animals. Prerequisites: BIO 188; CHM 113.

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.

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.

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

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

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

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

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

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

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/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.

PROFESSIONAL GOLF MANAGEMENT (PGM)

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.

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.

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

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.

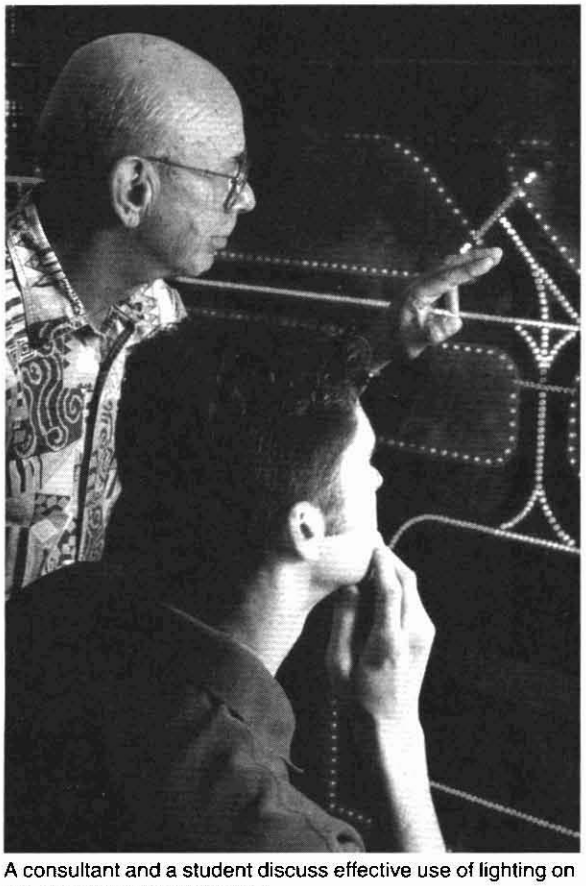
PGM 112 Player Development III. (1)
fall and spring
Emphasizes classroom and "hands-on" applications of full swing analysis and short game strategies. Special focus on golf course management. Evaluation. Fee. Prerequisite: admission to PGM program.

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.

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.

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

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.



A consultant and a student discuss effective use of lighting on the airport lighting simulator. Dave Tevis photo

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.

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

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

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.

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.

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.

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.

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.

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).

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.

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

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.

PGM 484 Internship. (1–12)
selected semesters

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.

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.

East College

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

PURPOSE

East College offers a variety of liberal 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.

Each semester, East College offers a selection of popular upper-division ASU General Studies and general interest courses. While designed primarily to support East campus students, these courses are open to all ASU students who might find the times and location convenient. East College typically offers courses in anthropology, art, communication, economics, English, history, mathematics, music, philosophy, political science, psychology, religious studies, sociology, and women's studies. Students should refer to the current *Schedule of Classes* for specific courses offered at East campus each semester. All credit earned at East campus automatically transfers to Tempe campus or West campus.

Students who begin their college careers at East campus benefit from the small, residential campus environment. If they are uncertain about a major they can declare exploratory/undeclared status. Students are able to complete General Studies requirements and search for an ASU major that serves their personal and career objectives while enrolled as exploratory/undeclared majors. East College provides advising to exploratory/undeclared majors.

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.

APPLIED MATHEMATICS (APM)

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

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.

APPLIED SCIENCE CORE (ASC)

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.

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.

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.

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

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.

Partnership in Baccalaureate Education. The Partnership in Baccalaureate Education, an agreement between Chandler-Gilbert Community College and East campus, is coordinated through East College. Through this partnership, East campus students take first-year composition courses and courses that meet lower-division ASU General Studies requirements. They are listed in "General Studies," page 92. 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 540. For graduate degrees, see the "East College Graduate Degrees and Majors" table, page 541.

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.

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

East College Baccalaureate Degrees and Majors

Major	Degree	Concentration*	Administered By
Applied Biological Sciences	BS	Applied biological sciences, applied biological sciences/secondary education, ecological restoration, urban horticulture, or wildlife habitat management	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 126.	Bachelor of Interdisciplinary Studies Advisory Committee
Multimedia Writing and Technical Communication	BS	—	East College
Nursing	BSN	—	College of Nursing (Tempe 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*.

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 East campus take their core courses and at least one concentration through East campus. The second concentration may be taken at the Tempe campus or East campus. The BIS core courses are offered by East College. Concentrations at East 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 with an East College advisor at 480/727-1333 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 "Bachelor of Interdisciplinary Studies," page 125.

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.

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	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 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 East campus.

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 G.P.A. 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 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.east.asu.edu/ecollege or contact an East College advisor at 480/727-1333.

Department of Applied Biological Sciences

www.east.asu.edu/ecollege/appliedbiologicalsciences

480/727-1444

WANNER, Third Floor

Ward W. Brady, Chair

Professors: Brady, Brock, Mushkatel, Ohmart, Sommerfeld, Stutz

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

Assistant Professors: Hu, Marcum

Lecturer: Huffman

APPLIED BIOLOGICAL SCIENCES—BS

Programs offered by the Department of Applied Biological Sciences integrate applied research in the biological sciences with education and service to the community. Faculty strive to be at the forefront of their chosen academic disciplines; they combine classroom teaching, student advising, research, and practical problem solving. The aim is to provide the best possible education to the next generation of biological practitioners and scientists through mentors who

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

themselves understand the science, the means by which it advances, and the manner in which it can be brought to bear on practical problems. The educational goal is to offer students rigorous and practical programs in applications of the biological sciences that feature current technologies as well as an understanding of the policy context in which biologists work. Consistent with a polytechnic vision, programs involve extensive student interaction with the faculty through experience based learning activities such as laboratories, field trips, internships, and faculty guided research and service learning projects. Faculty are committed to the advancement of knowledge in their chosen fields of study and work closely with graduate students in the Master of Science degree program. Graduate students gain practical experience in the practice of research leading to a solid foundation for scholarly research. The Department of Applied Biological Sciences is also committed to providing service to the community outside the university. Because of the variety of career options available in this field, one general and four focused concentrations are offered:

1. applied biological sciences;
2. applied biological sciences/secondary education;
3. ecological restoration;
4. urban horticulture; and
5. wildlife habitat management.

Applied Biological Sciences graduates can pursue entry-level careers in biological research, education, and applied sciences such as ecological restoration, urban horticulture, and wildlife biology. The Applied Biological Sciences major also prepares students for graduate school and professional schools in disciplines such as medicine, dentistry, physical therapy, ecology, horticulture, and wildlife biology. For the latest information about program requirements and courses, access the Web site at www.east.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 92. 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	301	Technology and Biology 2
ABS	302	Policy and Biology 2
ABS	311	Applied Cellular Biology 3
		or ABS 312 Structure and Function (4)
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
BIO	360	Animal Physiology 3
		or PLB 308 Plant Physiology (4)
MAT	210	Brief Calculus *MA* 3
Total		 31–33

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

Applied Biological Sciences Concentration

This concentration provides maximum flexibility for students seeking careers in the biological sciences. The Applied Biological Sciences core provides a foundation in the biological sciences; required courses in chemistry and physics complete the general science requirements. Students intending to pursue research careers in biology and postgraduate studies may find this concentration appropriate. In addition, the concentration is designed for students planning to enter professional programs in the health care professions such as medicine, medical technology, epidemiology, dentistry, optometry, pharmacy, physical therapy, podiatry, 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	113	General Chemistry *SQ* 4
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 Laboratory *SQ*[1] (1)
		— *or* —
	CHM 331	General Organic Chemistry (3)
	CHM 332	General Organic Chemistry (3)
	CHM 335	General Organic Chemistry Laboratory (1)
	CHM 336	General Organic Chemistry Laboratory (1)
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 biology and science 12		
Total		 36–44

[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 552, 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	113	General Chemistry *SQ* 4
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 2		
Total 25–26		

* 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* 3
EDP	310	Educational Psychology for Non-Teachers *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

Ecological Restoration Concentration

The discipline of ecological restoration provides a scientific basis for the reconstruction of damaged and degraded ecosystems. It focuses on management practices designed to improve the ecological structure and function of these ecosystems. These practices may involve all ecosystem components, including soils, water, vegetation, and wildlife. The actual restoration process includes identifying the causes of degradation, devising goals and methods for the restoration effort, developing management strategies for the restored sites, and monitoring and assessing restoration success. Restoration activities may include reintroducing plants or animals, removal of invasive species, rebuilding soils, and returning natural processes such as fire and flooding to ecosystems that historically experienced these disturbance regimes. The goals of restoration are to restore ecological integrity and to meet societal needs for sustainable and functional ecosystems. Successful restoration projects require stakeholder involvement and demand consideration of the economic and social context in which restoration is carried out. The policies guiding such processes are also taken into account.

For students choosing the Ecological Restoration Concentration, the following courses each 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

Ecological Restoration Concentration

ABS	207	Applied Plant Taxonomy 3
ABS	225	Soils *SQ*[1] 3
ABS	226	Soils Laboratory *SQ*[1] 1
ABS	370	Ecology 3
ABS	380	Restoration and Wildlife Plants 3
ABS	381	Natural Resources Policy 3
ABS	402	Vegetation and Wildlife Measurement 3
ABS	440	Ecological Restoration Techniques 3
ABS	441	Ecological Restoration Practicum 1
ABS	480	Ecosystem Management and Planning *L* 3
ABS	482	Ecology and Planning for Restoration 3
ABS	483	Restoration Planning Practicum 2
ABS	485	GIS in Natural Resources 3
ABS	490	Applied Biological Sciences Seminar 1
CHM	101	Introductory Chemistry *SQ* 4
CHM	231	Elementary Organic Chemistry *SQ*[2] 3
Total 42		

[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.

Ecological Restoration Supporting Courses

Select 12 semester hours from the following list, or courses approved by advisor:

ABS 368 Plant Propagation (3)
ABS 374 Introduction to Wildlife Management (3)
ABS 376 Wildlife Ecology (3)
ABS 425 Soil Classification and Management (3)
ABS 430 Watershed Management (3)
ABS 433 Riparian and Wetland Ecology (3)
ABS 434 Soil Ecology (3)
ABS 475 Habitat Management for Small Wildlife (4)
ABS 476 Big Game Habitat Management (3)
ABS 481 Riparian and Wetland Restoration (3)
ABS 486 Introduction to Remote Sensing (4)

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

Urban Horticulture Concentration

Urban horticulture emphasizes the relationship of plants and people in city environments. Set in a unique southwestern desert location, East 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	101 Introductory Chemistry *SQ*	4
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		41–43

[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 Habitat Management Concentration

The wildlife habitat management concentration focuses on the ecological relationship between wildlife and its habitats. The goal of wildlife habitat management is to create conditions that ensure sustainable wildlife populations. Achieving this goal requires expertise in both wildlife biology and habitat management. The wildlife habitat management concentration is distinguished by its strong emphasis on habitat management. While students are expected to master the material found in traditional wildlife biology curricula, they are also expected to develop 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, and a comprehensive understanding of the economic and policy contexts in which wildlife habitat management occurs.

Wildlife Habitat Concentration General Studies Requirements. For students choosing the wildlife habitat 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 Habitat Management Concentration

ABS	207 Applied Plant Taxonomy	3
ABS	355 Vertebrate Zoology	4
ABS	370 Ecology	3
ABS	374 Introduction to Wildlife Management	4
ABS	376 Wildlife Ecology	3
ABS	402 Vegetation and Wildlife Measurement	3
ABS	440 Ecological Restoration Techniques	3
ABS	480 Ecosystem Management and Planning *L*	3
ABS	485 GIS in Natural Resources	3
ABS	490 Applied Biological Sciences Seminar	1
CHM	101 Introductory Chemistry *SQ*	4
CHM	231 Elementary Organic Chemistry *SQ**	3
Total		37

* Both CHM 231 and 235 must be taken to secure SQ credit.

Wildlife Supporting Courses

Select nine semester hours from the following list, or courses approved by advisor:

ABS	375 Conservation Biology	3
ABS	378 Wildlife Nutrition	3
ABS	470 Mammalogy	3
ABS	471 Ornithology	3
ABS	475 Habitat Management for Small Wildlife	4
ABS	476 Big Game Habitat Management	3
BIO	331 Animal Behavior	3
BIO	385 Comparative Invertebrate Zoology	4
BIO	410 Techniques in Wildlife Conservation Biology *L*	3
BIO	426 Limnology *L*	4
BIO	473 Ichthyology	3
BIO	474 Herpetology	3

Habitat Supporting Courses

Select nine semester hours from the following list, or courses approved by advisor:

ABS	225 Soils *SQ**	3
ABS	226 Soils Laboratory *SQ**	1
ABS	368 Plant Propagation	3
ABS	380 Restoration and Wildlife Plants	3
ABS	381 Natural Resource Policy	3
ABS	430 Watershed Management	3
ABS	433 Riparian and Wetland Ecology	3
ABS	435 Ecological Modeling	3
ABS	481 Riparian and Wetland Restoration	3
ABS	486 Introduction to Remote Sensing	4
PLB	308 Plant Physiology	4

* Both ABS 225 and 226 must be taken to secure SQ credit.

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 plans and defining their career goals. For more information, see "School of Interdisciplinary Studies," page 124.

MINOR

The Applied Biological Sciences minor consists of 24 semester hours, including BIO 187 General Biology I, BIO 188 General Biology II, ABS 312 Structure and Function, and at least 12 hours selected with the approval of an advisor; at least nine hours must be in the upper division. This minor is not available to students majoring in life 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.

Biology and plant biology courses regularly offered on East campus include BIO 340, BIO 360, PLB 308, and PLB 414. For courses, see "School of Life Sciences," page 422.

APPLIED BIOLOGICAL SCIENCES (ABS)

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

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

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.

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)

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)

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

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

ABS 300 Environmental Biology. (3)
spring
Applies biological sciences to environmental issues. Includes ecological, historical, and global perspectives on environmental conservation.

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.

ABS 302 Policy and Biology. (2)
fall
Policy environment for the practice of biology. Covers policy formulation, regulatory agencies, and policies in biotechnology, agriculture, and environment.

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 182; CHM 231 (or their equivalents).

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.

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

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

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.

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).

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.

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).

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.

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.

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

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.

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.

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.

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.

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.

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.

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.

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.

ABS 381 Natural Resources Policy. (3)
fall
Policies and regulations affecting management of natural resources, with emphases on wildlife and ecological restoration.

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.

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).

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.

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.

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.

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.

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

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.

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.

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.

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

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.

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

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

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.

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.

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. Prerequisite: senior standing or instructor approval.
General Studies: L

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.

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.

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.

ABS 484 Internship. (1–12)
selected semesters

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

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.

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.

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.

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

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

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

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

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/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 Applied Psychology

www.east.asu.edu/ecollege/appliedpsych
480/727-1515
SUTTON, Third Floor

Roger W. Schvaneveldt, Faculty Head

Professors: Cooke, Schvaneveldt

Assistant Professor: 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 East 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 92), 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* or HON 493 Honors Thesis *L* (3)	3
Total			28

* This PSY course is offered only by East campus. All other PSY courses listed above are offered by East 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

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

PSY 494 Special Topics 1–4

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

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 East campus. All other PSY courses listed above are offered by East campus and Tempe campus.

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 480/727-1515, or access the Web site at www.east.asu.edu/ecollege/appliedpsych.

For PGS courses and additional PSY courses, see "Department of Psychology," page 458.

PSYCHOLOGY (SCIENCE AND MATHEMATICS) (PSY)

For more PSY courses, see "Course Prefix Index," or access www.asu.edu/aad/catalogs/courses. The campus designation—E (East), 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.east.asu.edu/ecollege/businessadmin
480/727-1515
SUTTON, Third Floor

Roger W. Hutt, Faculty Head

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

Associate Professors: Butler, Hutt, Patterson, Richards

Assistant Professors: Manfredo, 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 92).

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, 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 East campus.

Business Administration Core

BUA	394	ST: Professional Development	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 MGT 494 ST: 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 East campus industry-specific business programs (Aeronautical Management Technology, Agribusiness, and Information and Management Technology).

For the latest information about application, admissions, program requirements, and courses, call East College at 480/727-1515, or access the Web site at www.east.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

In addition to the courses listed for the major, students in the program also satisfy the requirement for BUS 301 Fundamentals of Management Communication (listed in the business core) and BUS 451 Business Research Methods (listed as a major support course). These courses are integrated into the major, not taken separately. Because of the emphasis on teamwork, interaction with business professionals, and completion of all requirements within a year, students may enter the program in only the fall semester. Classes meet from 9 to 11:45 A.M. Monday through Thursday in a classroom assigned to the Real Estate program. For more information, call 480/727-1055.

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 (BIS Majors Only)

The requirements for the small business concentration are identical to those for the minor in Small Business listed above. For BIS degree requirements, see "School of Interdisciplinary Studies," page 124.

BUSINESS ADMINISTRATION (BUA)

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.

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.

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

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.

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.

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.

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.

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.

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

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.

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)

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.

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.

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.

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. See REA Note 1. Prerequisites: 2.00 ASU GPA; junior standing.

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.

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.

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.east.asu.edu/ecollege/education
480/727-1103
SUTTON 240E

Bette S. Bergeron, Faculty Head

Professors: Bergeron, Darst

Assistant Professors: Kulinna, Mahoney, Marble, White-Taylor

Clinical Assistant Professors: Molina-Walters, Smith

Senior Lecturers: Stever, Wenhart

Lecturers: Foley, Gomez, Hopper, Orlowicz, Prest

ELEMENTARY EDUCATION—BAE

Program Overview

The Elementary Education program at East 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 East campus or participate in 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 92) 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 East Elementary Education program before enrolling in the Professional Preparation Program courses (Blocks I–IV).

Foundations (15 semester hours)*

ECD 314 The Developing Child 3
EDP 310 Educational Psychology *SB* 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 192.

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 340 Writing and the Professional Educator *L* 3
EDC 354 Educational Media in the Classroom 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 355 Accommodating Instruction for Diverse Learners 3
EDC 474 Field Experience 0–1

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. For more information, call 480/727-1103.

Application. Applications for the East 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 East 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 include two letters of recommendation and a résumé outlining work with school-age children and/or their families. Students should call the East 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 East 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

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 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 92). 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 full-time

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

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. A 2.50 GPA within the area of concentration;
3. Proficiency in written English, met in one of the following ways: (*a*) GPA of 3.0 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 East 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. Specific program requirements are under revision; students interested in the program should contact the East Education Office at East campus 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.east.asu.edu/ecollege/elementaryed, or call the East 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 the following courses in physical education in addition to the required KIN core courses:

KIN 361 Physical Education in the Secondary School	3
KIN 376 Physical Education for the Elementary School	3
KIN 382 Adaptive and Inclusive Physical Education	3
KIN 480 Methods of Teaching Physical Education	3
KIN elective*	3
Total	15

* See an advisor for approved electives.

Academic Specialization Admission Requirements. The following courses must be completed with a "C" (2.00) or higher *before* applying to the ITC program:

At least three KIN core courses	9
At least four semester hours of KIN 110	4
MAT 117 College Algebra	3

The following courses must be completed or in progress when applying to the ITC program:

BIO 201 Human Anatomy and Physiology I *SG*	4
BIO 202 Human Anatomy and Physiology II	4
CHM 101 Introductory Chemistry *SQ*	4
PGS 101 Introduction to Psychology *SB*	3
PHY 111 General Physics *SQ**	3

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

Students must also complete a three-semester Physical Education Teacher Certification Program professional sequence in the College of Education (23 semester hours).

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 542. 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 92). 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 Policy and 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* —	
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 *SQ*	4
CHM	116	General Chemistry *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	303	Human Development *L*	3
EDP	310	Educational Psychology for Non-Teachers *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
Concentration total			61–64

[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

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 East 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 East 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—both in applied biological sciences and 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 East campus Education Office, SUTTON, call 480/727-1103, or access the Web site at www.east.asu.edu/ecollege/education.

EARLY CHILDHOOD EDUCATION (EAC)

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.

ELEMENTARY EDUCATION (EDC)

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.

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.

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.

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.

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

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.

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

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

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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.

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

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.

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)

ELL 484 Internship. (1–12)
selected semesters

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)

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 (PPE)

PPE 484 Internship. (1–12)
selected semesters

PPE 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.

SECONDARY EDUCATION EAST (SDE)

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

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

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

SDE 484 Internship. (1–12)
selected semesters

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.

SPECIAL EDUCATION (SPC)

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

SPC 484 Internship. (1–12)
selected semesters

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/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 Exercise and Wellness

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

William J. Stone, Chair

Professors: Burkett, Stone

Associate Professors: Phillips, Swan

Assistant Professors: Adams, Tudor-Locke

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 other 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 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 92.

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	342	Health Behavior Change 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		21

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

BIO	201	Human Anatomy and Physiology I *SG* 4
BIO	202	Human Anatomy and Physiology II 4

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

CHM 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 2
EXW 315 Physiological Foundations of Movement 3
EXW 320 Program Development and Leadership 3
EXW 330 Kinesiological Foundations of Movement 3
EXW 400 Stress Management for Wellness 3
EXW 420 Exercise Testing 3
EXW 425 Exercise Prescription 3
Elective* 3
Total 23

* 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 320 Program Development and Leadership 3
EXW 325 Fitness for Life 3
EXW 346 Program Evaluation in Health Promotion 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
Elective* 6
Total 27

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

Teacher Preparation. This concentration is designed for the student interested in a physical education teaching career at the elementary or secondary school level; the concentration is also appropriate for students interested in coaching, youth sports, and recreation.

Required Courses
KIN 361 Physical Education in the Secondary School 3
KIN 376 Physical Education for the Elementary School 3
KIN 382 Adaptive and Inclusive Physical Education 3
Choose from among the courses below 12
- KIN 100 Introduction to Health and Wellness *SB* (3)
- KIN 283 Prevention and Care of Athletic Injuries (3)
- KIN 290 Sports Officiating (3)
- KIN 292 Sports Officiating (3)
- KIN 334 Functional Anatomy and Kinesiology (3)
- KIN 348 Psychological Skills for Optimal Performance *SB* (3)
- KIN 370 Advanced First Aid (3)
- KIN 400 Teaching Physical Activity Concepts *L* (3)
- KIN 413 Qualitative Analysis in Sport Biomechanics (3)
- KIN 441 Physiology of Women in Sport *L* (3)
- KIN 445 Exercise Physiology for Children and Adolescents (3)
- KIN 448 Applied Sport Psychology *L* (3)
- KIN 460 Theory of Strength Training *L* (3)
- KIN 484 Internship (6)
- KIN 494 ST: Administration of Athletics (3)
- KIN 494 ST: Research and Teaching in Physical Education (3)
- KIN 494 ST: Sport and Social Issues (3)

The minor is not open to Kinesiology majors or Secondary Education majors in the College of Education pursuing an academic specialization in physical education.

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 124.

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 *LSB*	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 Program Evaluation in Health Promotion	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 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
MGT 394 Special Topics	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.þ 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.þ See the *Graduate Catalog* for requirements.

EXERCISE AND WELLNESS (EXW)

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.

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.

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

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. 3 hours per week. Activity. Fee. See EXW Notes 1, 2.

EXW 205 Physical Activity Instruction: Intermediate. (1)
fall and spring
Intermediate-level instruction in a variety of physical activities. Continuation of EXW 105. "Y" grade only. May be repeated for credit. 3 hours per week. Activity. Fee. See EXW Notes 1, 2.

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.

EXW 215 Physical Activity and Healthy Lifestyles. (1)
fall and spring
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 students with credit for EXW 325.

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

EXW 280 Global Issues in Exercise and Wellness. (3)
spring
Historical overview of health promotion and wellness models as they relate to minority, gender, social, cultural, economic, international, and environmental issues.
General Studies: G

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

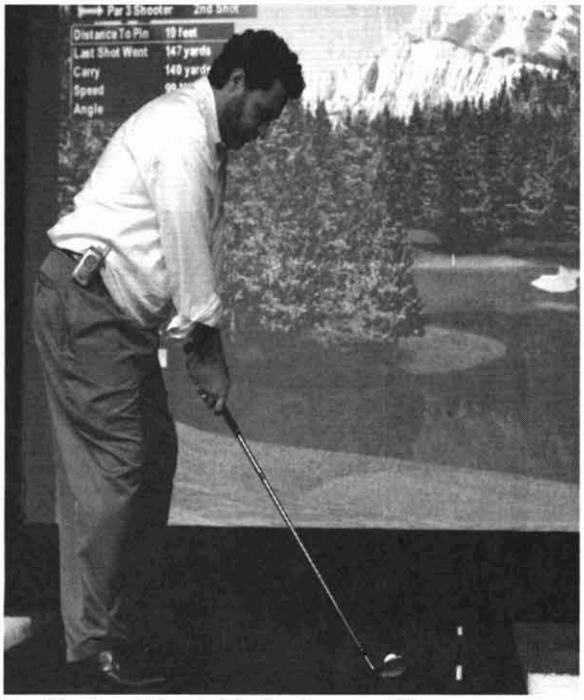
EXW 301 Concepts of Fitness and Wellness. (1)
fall and spring
Guidelines for achieving health benefits of physical activity and other healthy lifestyles. Telecampus course. Not open to Exercise and Wellness majors or to students who have credit for EXW 325.

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. 3 hours per week. Activity. Fee. See EXW Notes 1, 2.

EXW 310 Computer Skills and Technology for Exercise and Wellness. (3)
spring
Use of computers to statistically analyze data and design presentations of findings. Design of health promotion educational applications and presentations. Integrated lecture/lab. Prerequisite: MAT 117.
General Studies: CS

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

EXW 315 Physiological Foundations of Movement. (3)
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.



The Morrison School of Agribusiness and Resource Management offers a BS degree in Agribusiness with a concentration in professional golf management. Tim Trumble photo

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

EXW 325 Fitness for Life. (3)
fall and spring
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.

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

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

EXW 346 Program Evaluation in Health Promotion. (3)
spring
Introduces and applies theory-based concepts and methods of program evaluation in health promotion. Prerequisite: EXW 320. Pre- or corequisites: EXW 300, 310.

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.

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

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

EXW 420 Exercise Testing. (3)
fall
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.

EXW 425 Exercise Prescription. (3)
fall
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.

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

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.

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

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

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.

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/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 Human Health Studies

www.east.asu.edu/ecollege/humanhealth
480/727-1333
WANNER 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 *SQ* 4
CHM	116	General Chemistry *SQ* 4
CHM	331	General Organic Chemistry 3
CHM	332	General Organic Chemistry 3
CHM	335	General Organic Chemistry Laboratory 1
CHM	336	General Organic Chemistry Laboratory 1
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)

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

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

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

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.

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.

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

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.

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.

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.

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.

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.

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

Faculty of Multimedia Writing and Technical Communication

www.east.asu.edu/ecollege/multimedia
480/727-1515
SUTTON, 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, to design, and to manage information using both traditional and leading edge technologies. Students

1. learn to communicate, both 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—both 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.east.asu.edu/ecollege, or call an East College advisor at 480/727-1515.

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 480/727-1515, or access the Web site at www.east.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 124.

MULTIMEDIA WRITING AND TECHNICAL COMMUNICATION (TWC)

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

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

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

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.

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

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

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.

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

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

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

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

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.

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

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

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 92.

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.

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. Credit is allowed for only TWC 452 or 552.

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

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.

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

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.

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.

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.

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.

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.

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

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.

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

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.

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.

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.

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.

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

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.

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 Nutrition

www.east.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 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 *SQ* 4
CHM	116	General Chemistry *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; BUS 301; COB 380; MGT 300, 380, or 394) 3	
Marketing (AGB 320; COB 382; MKT 300 or 394) 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, COB, CSE, ECN, FIN, HSA, IBS, MGT, MKT, QBA, SCM, and TWC. Students select these courses in consultation with the Nutrition academic advisor.

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

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

An 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 *SQ* 4
CHM 116 General Chemistry *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
Total 19

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 124.

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)

NTR 100 Introductory Nutrition. (3)
fall, spring, summer
Basic concepts of human nutrition. Recent controversies in nutrition and how food choices affect personal health.

NTR 142 Applied Food Principles. (3)
fall and spring
Applied scientific principles of food preparation and production. 2 hours lecture, 3 hours lab. Fee.

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.

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).

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

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.

NTR 341 Introduction to Planning Therapeutic Diets. (3)
fall and summer
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).

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.

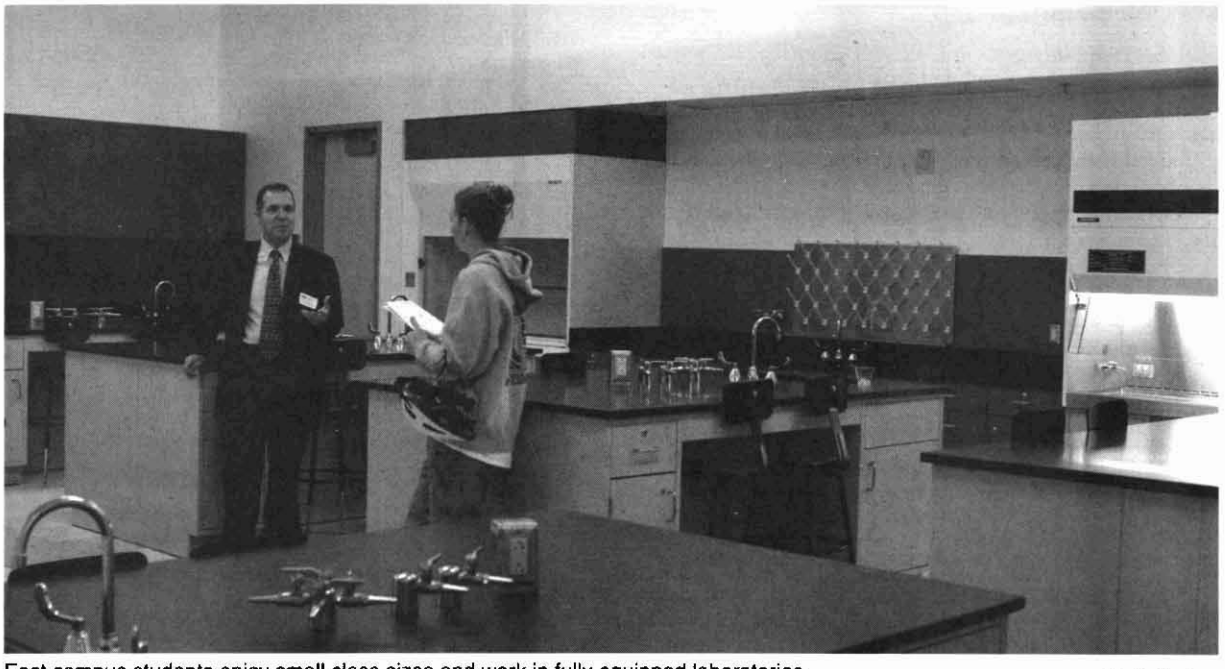
NTR 344 Nutrition Services Management. (3)
fall and spring
Organization, administration, and management of food and nutrition services in hospitals and other institutions. Possible field trips. Prerequisite: NTR 100 or 241 (or its equivalent).
General Studies: L

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.

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.

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

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



East campus students enjoy small class sizes and work in fully equipped laboratories. Tim Trumble photo

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

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.

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.

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.

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.

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).

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.

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.

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).

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).

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

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

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/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 Technology and Applied Sciences

www.east.asu.edu/ctas **Albert L. McHenry, PhD, Dean**

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 Information and Management Technology
Department of Mechanical and Manufacturing Engineering Technology
Division of Computing Studies

DEGREE PROGRAMS

See the "College of Technology and Applied Sciences Baccalaureate Degrees and Majors" table, page 568. For graduate degrees, see the "College of Technology and Applied Sciences Graduate Degrees and Majors" table, page 569.

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 on courses, faculty, and programs in the MST degree, 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

COUNCIL ON AVIATION ACCREDITATION
3410 SKYWAY DRIVE
AUBURN AL 36830

The Bachelor of Science degree in Industrial Technology, including the environmental technology management, graphic information technology, and industrial technology management concentrations is fully accredited by the National Association of Industrial Technology (NAIT). For more information, call 734/677-0720, 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 92.

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, 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, embedded systems technology, or software 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
Industrial Technology	BS	Environmental technology management, graphic information technology, or industrial technology management	Department of Information and Management Technology
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

[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.

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 69, with the exception that Arizona resident transfer students must have a 2.25 GPA.

Students admitted to a BS degree program in CTAS begin study under one of two student classifications, professional or preprofessional.

Professional Status

First-year students (new freshmen) may be admitted to CTAS with professional status if they meet the general aptitude criteria for admission and have no deficiencies in the basic competency requirements for admission. First-year students admitted upon completion of the GED may be admitted with professional status if they have also achieved the minimum ACT or SAT scores required for undergraduate admission to the university.

Students transferring from other ASU colleges may be admitted to CTAS with professional status if they have no remaining admissions deficiencies and 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 69. The CTAS also requires resident transfer students to have a cumulative GPA of 2.25.

All international students must have a minimum 500 TOEFL score to be admitted with professional status.

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, information technology, or management of technology	Department of Information and Management Technology
		Security engineering technology	College of Technology and Applied Sciences

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

Preprofessional Status

All other students are admitted with preprofessional status and may apply for professional status after they have removed the deficiency that disallows awarding professional status. All students are admitted to the professional flight concentration, in the Department of Aeronautical Management Technology, with preprofessional status. A secondary application process is required to attain professional status. Students with preprofessional status may not register for 300- and 400-level courses in the college until they have been awarded professional status. See an advisor for details.

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 69. 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 East 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 88, 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 92.

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 GPAs 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 92.

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)

ETC 100 Languages of Technology. (4)
fall and spring
Introduces computer-aided design, programming, modeling, and technical documentation. Lecture, lab.
General Studies: CS

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

ETC 194 Special Topics. (1–4)
selected semesters

ETC 211 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 260; PHY 111, 113.

ETC 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. Prerequisites: MAT 261; PHY 112, 114.

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

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.east.asu.edu
480/727-1381
SIM 205

William K. McCurry, Chair

Professors: Gesell, McCurry

Associate Professor: Karp

Associate Clinical Professor: Pearson

Assistant Professor: Niemczyk

Lecturers: O'Brien, Tripp

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.east.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.east.asu.edu. Requirements include First-Year Composition, university General Studies (see "General Studies," page 92), and the Aeronautical Management Technology Core. Note that all three General Studies awareness areas

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

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
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
ETC	100	Languages of Technology *CS* 4
Total		35

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 are typically nine months before the beginning of the appropriate semester.

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.east.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.east.asu.edu.

Flight instruction costs are not included in university tuition and fees. The estimated cost of flight training is $45,000 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 92), and the Aeronautical Management Technology core, the following additional courses are required for the professional flight management concentration:

AMT	100	Flight Safety I 1
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 3
Technical electives or internship		16
Total		51

Suggested Course Pattern for Freshmen

First Semester

AMT	100	Flight Safety I 1
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	15

Second Semester

AMT 214 Commercial/Instrument Ground School I	3
ENG 102 First-Year Composition	3
ETC 100 Languages of Technology *CS*	4
PHY 111 General Physics *SQ**	3
PHY 113 General Physics Laboratory *SQ**	1
Total	14

* 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 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 92), 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
IMC 346 Management Dynamics	3
ITM 343 Occupational Safety and Ergonomics	3
ITM 430 Ethical Issues in Technology	3
ITM 452 Industrial Human Resource Management	3
ITM 456 Introduction to Organized Labor	3
ITM 480 Organizational Effectiveness	3
Technical electives or internship	18
Total	51

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
ETC 100 Languages of Technology *CS*	4
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	17

* 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.

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

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
IMC	346	Management Dynamics 3
		or ITM 344 Industrial Organization (3)
		or ITM 452 Industrial Human Resource Management (3)
IMC	470	Project Management 3
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)

AMT Note 1. Flight instruction costs are not included in university tuition and fees.

AMT 100 Flight Safety I. (1)
fall, spring, summer
Supervised private pilot flight training and flight safety briefings. Requires continuous enrollment until completion of the FAA Private Pilot Certificate. Integrated lecture/lab. Fee. See AMT Note 1. Pre- or corequisites: both AMT 182 and 220 (or their equivalents).

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 East campus facilities.

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.

AMT 194 Special Topics. (1–4)
selected semesters

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.

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.

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.

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.

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.

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.

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.

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

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.

AMT 350 þAircraft 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.

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.

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.

AMT 382 Air Navigation. (3)
spring
Theory and application of modern advanced navigation and flight instrument systems. Introduces crew resource management in multiplace cockpits. Lecture, lab. Prerequisite: AMT 322. Pre- or corequisite: AMT 200 or instructor approval.

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.

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.

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.

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.

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.

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.

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.

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.

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.

AMT 412 Air Transportation Research. (1)
fall
Surveys practical research methodology in use in the air transportation industry. Topics include planning and design considerations.

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.

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.

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.

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.

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.

AMT 489 Airline Administration. (3)
spring
Administrative organizations, economics of airline administration, operational structure, and relationship with federal government agencies. Prerequisite: junior standing.

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.

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.

AMT 494 Special Topics. (1–4)
selected semesters

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.

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

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

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

Department of Electronics and Computer Engineering Technology

www.east.asu.edu/ctas/ecet
480/727-1976
TECH 101

Lakshmi V. Munukutla, Chair

Professors: McHenry, Munukutla, Robertson

Associate Professors: Darveaux, Macia, 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 92) as well as the math/science requirement of TAC of 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 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 Technology Accreditation Commission of the Accreditation Board for Engineering and Technology, 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:

ETC	100	Languages of Technology *CS*	4
ETC	211	Applied Engineering Mechanics: Statics	3
ETC	340	Applied Thermodynamics and Heat Transfer	3
Total			10

Electronics Engineering Technology Core and Major Requirements

CET	100	Object-Oriented Software Development I	3
CET	150	Digital Systems I *CS*	4

CET	350	Digital Systems II 4
CET	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

CET	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 *SQ* 4
UET	416	Dopant Control Technology 3
UET	417	Semiconductor Technology Practice 3
UET	418	Systems on Silicon 4
UET	421	IC Device Characterization 3
UET	432	Semiconductor Packaging and Heat Transfer 3
Approved technical elective 2		
Total 22		

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

CET	100	Object-Oriented Software Development I 3
CET	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

CET	350	Digital Systems II 4
ECN	111	Macroeconomic Principles *SB* 3
EET	208	Electric Circuit Analysis I 4
ETC	211	Applied Engineering Mechanics: Statics 3
MAT	261	Technical Calculus II *MA* 3
Total		 17

Second Semester

CHM	113	General Chemistry *SQ* 4
EET	301	Electric Circuit Analysis II 4
ETC	340	Applied Thermodynamics and Heat Transfer 3
MAT	262	Technical Calculus III *MA* 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 92.

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

CET	354	Microcomputer Architecture and Programming	4
CST	386	Operating Systems Principles	3
EET	494	ST: Data Analysis	3
IMC	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 primed 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)

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

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.

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

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.

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.

EET 310 Electronic Circuits I. (4)
fall and spring
Multistage amplifier, analysis, and design using models and computer simulation. Lecture, lab. Prerequisite: EET 208.

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.

EET 394 Special Topics. (1–4)
selected semesters

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.

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.

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).

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.

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.

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.

EET 422 Electronic Switching Circuits. (4)
once a year
Analysis and design of electronic circuits operating in a switching mode. Waveshaping, timing, and logic. Computer simulation. Lecture, lab. Prerequisites: CET 350; EET 301, 310.

EET 430 Instrumentation Systems. (4)
fall
Measurement principles and instrumentation, techniques. Signal and error analysis. Lecture, lab. Prerequisites: EET 301, 310.

EET 460 Power Electronics. (4)
spring
Analyzes circuits for control and conversion of electrical power and energy. Lecture, lab. Prerequisites: EET 301, 310, 407.

EET 470 Communication Circuits. (4)
spring
Analysis and design of passive and active communication circuits. Coupling networks, filters, and impedance matching. Modulation and demodulation techniques. Computer solutions. Lecture, lab. Prerequisites: EET 372; MAT 262.

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.

EET 484 Internship. (1–3)
selected semesters

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.

EET 492 Honors Directed Study. (1–3)
selected semesters

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

EET 494 Special Topics. (1–4)
fall and spring
Topics may include the following:
- Data Analysis. (3)
- Digital Filter Hardware Design. (3)

EET 498 Pro-Seminar. (1–3)
selected semesters

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/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.

MICROELECTRONICS ENGINEERING TECHNOLOGY (UET)

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

UET 194 Special Topics. (1–4)
selected semesters

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

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.

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.

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.

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.

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.

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).

UET 418 Systems on Silicon. (4)
spring
Factors that drive integration on silicon, including logic, memory, and interfaces. Economics of system-level solutions. Lecture with Web support, lab, practical project. Credit is allowed for only UET 418 or 518. Prerequisite: UET 331.

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.

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.

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.

UET 432 Semiconductor Packaging and Heat Transfer. (3)
spring
Packaging theory and techniques; hermetic and plastic assembly; thermal management; electrical characteristics and reliability. Prerequisites: ETC 340 and UET 331 (or their equivalents).

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.

UET 484 Internship. (1–3)
selected semesters

UET 485 Digital Testing Techniques. (3)
once a year
Hardware/software aspects of digital testing technology; systems, board, and logic testing and equipment. Lecture, lab. Prerequisites: CET 350; EET 310.

UET 492 Honors Directed Study. (1–3)
selected semesters

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

UET 494 Special Topics. (1–4)
selected semesters

UET 498 Pro-Seminar. (1–3)
selected semesters

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.

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

Department of Engineering

www.east.asu.edu/ctas/engineering
480/727-2727
CNTR 110

Chell Roberts, Chair

Professor: Jakubowski

Associate Professors: Grondin, Hinks, Kuo, Morrel, Roberts

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, 401/347-7700) 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 proceeding 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 graduate is prepared for positions of responsibility in a wide area of industrial and governmental settings that center on applied engineering science and technology. The student has a broad, interdisciplinary background in calculus-based, engineering science; skill in synthesizing and communicating information; engineering design; an ability to work in multidisciplinary teams; a knowledge of various cultures, the knowledge of law and economics needed to maneuver in a global workplace; and an understanding of how engineers make informed choices constrained by technological feasibility, economics, public health and safety, environmental concerns, legal and ethical concerns, manufacturability, sustainability and quality.

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, MAT 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 to ECE 100, ECE 201, ECE 210, ECE 212 (or ECE 214), and ECE 380 will be accepted as credit toward this degree.

Upper division courses will not be offered until the fall of 2006.

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.east.asu.edu/ctas/engineering.

Department of Information and Management Technology

www.east.asu.edu/ctas/imt
480/727-1781
TECH 102

Thomas E. Schildgen, Chair

Professors: Duff, Hild, Schildgen

Associate Professors: Grossman, Hirata, Humble, Matson, Olson

Assistant Professor: Harris

Assistant Clinical Professor: Nelson

Professors of Practice: Kime, Peterson

Senior Lecturer: Wilson

Lecturers: Dolin, Lestar, Parmentier

PURPOSE

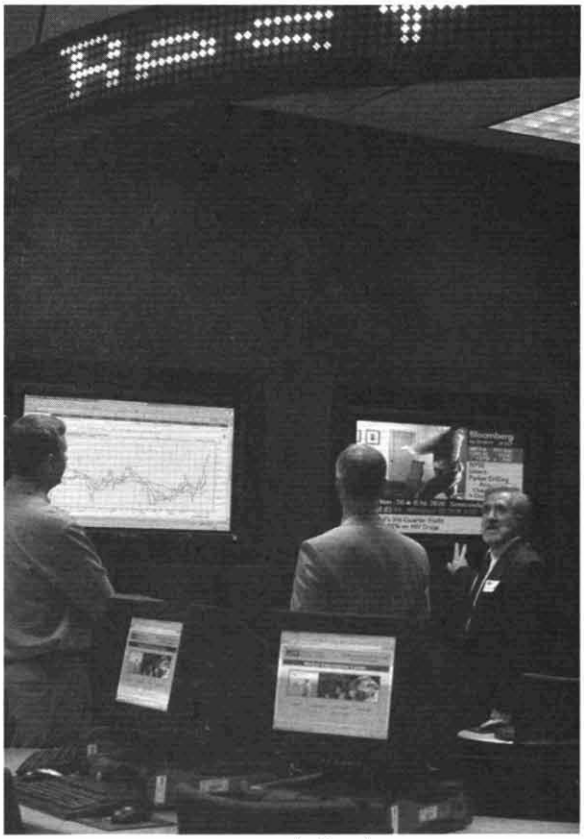
The mission of the department is to prepare graduates who are able to develop and communicate technological solutions to industrial problems, to manage systems operations, to improve and evaluate products, to provide customer support, and to facilitate technology transfer in industry and government. 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 Information and Management Technology offer the BS degree in Industrial Technology, with concentrations in the following areas: environmental technology management, industrial technology management, and graphic information technology.

The Bachelor of Science degree in Industrial Technology—including the environmental technology management, graphic information technology, and industrial technology management concentrations—is 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



As the polytechnic focal point of ASU, East campus maintains facilities at the leading edge of technology. Tim Trumble photo

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 development, graphic information technology, and management of technology. For more information about the graduate program, see the *Graduate Catalog*.

INDUSTRIAL TECHNOLOGY—BS

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 Information and Management core, program concentration course work, and technical electives selected with approval of an 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 92.

Information and Management Technology students are required to complete a minimum of 120 semester hours with a 2.00 cumulative GPA, including a minimum of 50 semester hours of upper-division courses to graduate.

Information and Management Core*

ETC	100	Languages of Technology *CS*	4
GIT	303	Digital Publishing	3
IMC	331	Quality Assurance	3
IMC	346	Management Dynamics	3
IMC	396	Professional Orientation	1
IMC	470	Project Management	3
IMC	494	ST: Senior Project	3
Total			20

* These courses are for the industrial technology management and graphic information technology concentrations.

Environmental Technology Management Concentration. The environmental technology management concentration 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.

Industrial Technology Management Concentration. The industrial technology management concentration prepares students for supervisory and administrative positions in industry, manufacturing, and public service organizations. Course work includes accounting, data analysis, economics, effective decision making, finance, international business, legal and ethical studies, marketing, operations management, and safety. Emphasis is placed on health and safety within the workplace.

The industrial technology management 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 the industrial technology management option. Consultation with an advisor is required to coordinate the course selection for transfer to this option.

Graphic Information Technology Concentration. The graphic information technology concentration 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 graphic technology program of study emphasizing theory and hands-on laboratory practice. Students develop skills to plan and execute graphic solutions using visualization and sketching, engineering graphic standards, technical document design, higher-level graphic programming languages, computer drawing and illustration, multimedia and three-dimensional modeling, project management, quality assurance, and e-commerce practices.

The Graphic Information Technology Facility (GITF), 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.

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 certificate program for nondegree students, a BS degree in Industrial Technology 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 124.

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
IMC	346	Management Dynamics	3
ITM	452	Industrial Human Resource Management or IMC 470 Project Management (3)	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.

Senior Project Requirement

All baccalaureate degree students (BS and BAS) in the Department of Information and Management Technology are required to complete a senior project for the requirements of graduation. The 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

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

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)

ETM 294 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Introduction to Organic Chemistry. (3)

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.

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.

ETM 303 Environmental Regulations. (3)
selected semesters
Explores environmental laws, regulations, and directives. Addresses air, land, and water. Lecture, full or partial Internet.

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.

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.

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.

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.

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.

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 contamination, and concentration. Lecture, full or partial Internet. Prerequisite: ETM 302. Pre- or corequisites: CHM 101; MAT 170.

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.

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.

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.

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.

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

ETM 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. Cross-listed as FSM 460. Credit is allowed for only ETM 460 or FSM 460.

ETM 461 Contingency Planning. (3)
selected semesters
Provides understanding of techniques for in-house or on-site planning as well as community planning.

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.

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.

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)

FSM 304 Fire Personnel Management. (3)
fall
Promotion, personnel development, career and incentive systems, validation of physical requirements, managerial and supervisory procedures.

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.

FSM 306 Fire Prevention Organization and Management. (3)
selected semesters
Examines and evaluates the techniques, procedures, programs, and agencies involved in preventing fires.

FSM 307 Fire Department Safety Organization and Management. (2)
summer
Focuses on the management of fire department safety programs.

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.

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.

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.

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.

FSM 401 Labor Relations in the Fire Service. (3)
fall
Examines the relationships between management and unions using the Relations by Objectives model.

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.

FSM 405 Fire Service Leadership. (3)
summer
Focuses on developing personal and organizational leadership qualities required to be successful in the fire service.

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.

FSM 425 Fire Service Administration. (3)
fall
Presents modern management and planning techniques that apply to organizing a fire department.

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. Cross-listed as ETM 460. Credit is allowed for only ETM 460 or FSM 460.

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.

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)

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.

GIT 194 Special Topics. (1–4)
selected semesters

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.

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

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).

GIT 230 Digital Illustration in Publishing. (3)
fall and spring
Raster and vector illustration in publishing. Integrated lecture/lab. Pre- or corequisite: GIT 135.

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.

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.

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

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.

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.

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.

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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.

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.

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.

GIT 352 Technical Presentations. (3)
spring
Technologies for planning, creating, and delivering individual and group presentations. Prerequisites: ENG 102; GIT 303.

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.

GIT 394 Special Topics. (1–4)
selected semesters

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.

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.

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.

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.

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).

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.

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 414.

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.

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.

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.

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).

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.

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.

INFORMATION AND MANAGEMENT CORE (IMC)

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

IMC 331 Quality Assurance. (3)
spring
Instrumentation and methodologies for materials testing and quality control in various manufacturing processes. Lecture, field trips.

IMC 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.

IMC 396 Professional Orientation. (1)
fall and spring
Senior advisement, industry presentations, and career counseling.

IMC 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 111; IMC 346; ITM 344.

IMC 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Senior Project. (3)

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

IMC 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.

INDUSTRIAL TECHNOLOGY MANAGEMENT (ITM)

ITM 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.

ITM 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: IMC 346.

ITM 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.

ITM 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.

ITM 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: IMC 346 (or its equivalent).

ITM 430 Ethical Issues in Technology. (3)
spring
Topics in social responsibility for industrial technology and engineering. Prerequisite: IMC 346.

ITM 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: IMC 346.
General Studies: G

ITM 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.

ITM 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: IMC 346 or ITM 343.

ITM 452 Industrial Human Resource Management. (3)
fall
Concepts and practices of human resource management in a global industrial environment. Prerequisite: IMC 346.

ITM 453 Safety Management. (3)
selected semesters
Development and management of safety programs, education and training, and relationships within an organization. Prerequisite: ITM 343 or instructor approval.

ITM 455 Industrial Marketing Concepts. (3)
selected semesters
Customer and sales strategies for industrial organizations, including current practice and future planning. Prerequisites: ECN 111; IMC 346; junior standing.

ITM 456 Introduction to Organized Labor. (3)
spring
Introduces labor relations, unions, federations, collective bargaining, grievances, and labor legislation. Prerequisites: IMC 346; ITM 344.

ITM 461 Operations Management. (3)
fall
Introduces supervisory principles as applied to production of goods and services. Prerequisites: IMC 346; ITM 344.

ITM 480 Organizational Effectiveness. (3)
spring
Human aspects of supervisory behavior in the industrial setting and how they influence efficiency, morale, and organizational practices. Prerequisite: IMC 346.

ITM 494 Special Topics. (1–4)
selected semesters

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

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

Department of Mechanical and Manufacturing Engineering Technology

www.east.asu.edu/ctas/mmet
480/727-1189
SIM 295

Scott G. Danielson, Chair

Associate Professors: Biekert, Danielson, Nam, Palmgren, Rajadas, Rogers

Assistant Professor: Post

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:

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

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 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.

For more information about both programs, access the Web site at www.east.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 567, 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 92), 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	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	451	Introduction to Automation 3
MET	460	Manufacturing Capstone Project I 3
MET	461	Manufacturing 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 442 Specialized Production Processes	3
Technical elective	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 434 Applied Fluid Mechanics	3
MET 438 Machine Design II	3
Approved technical elective	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 Manufacturing Capstone Project I	3
MET 461 Manufacturing 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

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

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.

IMC 470 Project Management	3
ITM 344 Industrial Organization	3
MET 401 Quality Assurance	3
MET 416 Applied Computer-Integrated Manufacturing *CS*	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. The 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 396 Manufacturing Professional Orientation	1
MET 400 Materials and Joining Processes	3
MET 402 Advanced Material Joining	3
MET 409 Applied Engineering Economics	3
MET 437 Design for Materials Joining	3
MET 451 Introduction to Automation	3
Total	20

AERONAUTICAL ENGINEERING TECHNOLOGY (AET)

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

AET 194 Special Topics. (1–4)
selected semesters

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.

AET 215 Mechanics of Aerospace Systems. (3)
spring
Basic physics of flight. Principles and design of aircraft systems and powerplants.

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

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.

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.

AET 312 Applied Engineering Mechanics: Dynamics. (3)
fall
Masses; motion kinematics; dynamics of machinery. Prerequisites: ETC 211; MAT 261.

AET 394 Special Topics. (1–4)
selected semesters

AET 396 Aerospace Professional Orientation. (1)
fall
Career focus for Aeronautical Engineering Technology students. Familiarization with the aerospace industry. Prerequisite: junior standing.

AET 415 Gas Dynamics and Propulsion. (3)
spring
Introduces compressible flow, internal and external flow, and aerothermodynamic analysis of propulsion systems. Prerequisite: MET 434.

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.

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.

AET 432 Applied Heat Transfer. (3)
fall
Heat transfer by conduction, convection, and radiation. Applies heat transfer to engineering design problems. Prerequisite: ETC 340. Pre- or corequisite: MET 434 or instructor approval.

AET 484 Internship. (1–12)
selected semesters

AET 487 Aircraft Design II. (3)
spring
Basic aerodynamics and airplane performance analysis methods applied to practical design project. Prerequisite: AET 300.

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

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

AET 494 Special Topics. (1–4)
selected semesters

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

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)

MET 150 Introduction to Engineering Technology. (1)
fall
Introduces mechanical, manufacturing, and aeronautical engineering technology. Covers aspects of the industries utilizing these majors.

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.

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

MET 194 Special Topics. (1–4)
selected semesters

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.

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.

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

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.

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.

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.

MET 313 Applied Mechanics of Materials. (3)
spring
Stress, strain, stress-strain relations. Axial, shear, bending, torsional and combined loads and deflections. Prerequisite: ETC 211.

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.

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.

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.

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.

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.

MET 394 Special Topics. (1–4)
selected semesters

MET 396 Manufacturing Professional Orientation. (1)
fall
Career focus for Manufacturing Engineering Technology students. Familiarization with the manufacturing industry. Prerequisite: junior standing.

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.

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. Lecture, lab. Prerequisite: junior standing.

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).

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.

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.

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.

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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

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. Lecture, lab. Credit is allowed for only MET 418 or 518. Prerequisite: MET 300 or instructor approval.

MET 432 Thermodynamics. (3)
spring
Thermodynamics of mixtures. Combustion process. Applies thermodynamics to power and refrigeration cycles. Prerequisite: ETC 340.

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.

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. Prerequisite: ETC 340.

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.

MET 436 Turbomachinery Design. (3)
selected semesters
Applies thermodynamics and fluid mechanics to the analysis of machinery design and power cycle performance predictions. Prerequisites: ETC 340; MET 434.

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.

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.

MET 442 Specialized Production Processes. (3)
fall
Nontraditional manufacturing processes, emphasizing EDM, ECM, ECG, CM, PM, HERF, EBW, and LBW. Prerequisite: MET 231.

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.

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.

MET 451 Introduction to Automation. (3)
spring
Introduces automation. Topics include assembly techniques, fixed and flexible automation systems, robots, material-handling systems, sensors, and controls. Lecture, lab. Prerequisite: MET 345.

MET 452 Implementation of Robots in Manufacturing. (3)
selected semesters
Robotic workcell design, including end effectors, parts presenters, and optimum material flow. Prerequisite: MET 451 or instructor approval.

MET 455 Automation Systems Integration. (3)
fall
Applies sensors and devices and their integration with PLCs and computers into automated devices and systems. Lecture, lab. Prerequisites: EET 403; MET 451.

MET 460 Manufacturing 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. Lecture, lab. Prerequisites: MET 331, 341; senior standing.

MET 461 Manufacturing Capstone Project II. (3)
spring
Small-group projects applying manufacturing techniques, with emphasis on demonstrating state-of-the-art technology. Lecture, lab. Prerequisite: MET 460 or instructor approval.

MET 484 Internship. (1–12)
selected semesters

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

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

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)

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

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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Division of Computing Studies

www.east.asu.edu/ctas/dcst
480/727-1257
SUTTON 140

Timothy E. Lindquist, Associate Dean and Director

Professor: Lindquist

Associate Professors: Koehnemann, Millard, 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, 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 degree program that is available for qualified BS graduates. For more information, see the *Graduate Catalog* or access the division Web site at www.east.asu.edu/ctas/dcst.

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 111 Macroeconomic Principles *SB* 3

Literacy
TWC 400 Technical Communications *L* 3

Natural Sciences
CHM 115 General Chemistry with Qualitative Analysis *SQ* 5
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
or CHM 113 General Chemistry *SQ* (4)
Natural Science Laboratory elective 4
Total 17

[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.

Mathematics
MAT 243 Discrete Mathematical Structures 3
MAT 270 Calculus with Analytical Geometry I *MA* 4
MAT 271 Calculus with Analytical Geometry II *MA* 4
STP 420 Introductory Applied Statistics *CS* 3
Numeracy elective 4
Total 18

Lower-Division Core
CET 100 Object-Oriented Software Development I 3
CET 150 Digital Systems I *CS* 4
CET 200 Object-Oriented Software Development II 3
CET 230 Applied Data Structures 3
ETC 100 Languages of Technology *CS* 4
Total 17

Upper-Division Core
CET 326 Programming Languages for Technology with C/C++ and Visual Basic 4
CET 354 Microcomputer Architecture and Programming 4
CET 364 Computer Architecture 3
CET 383 Shell and Script Programming with UNIX 3
CET 400 Software Engineering Technology 3
CST 386 Operating Systems Principles 3
CST 394 ST: Applications of Computing Theory 3
CST 415 Applied Software Process 3
or UET 415 Electronic Manufacturing Engineering Principles (3)
CST 494 ST: Professional Orientation 1
Total 27

Major Electives
Choose 21 semester hours from the following:
CET 420 Foundations of Distributed and Web-Based Applications in Java 3
CET 425 Server Software Programming 3
CET 427 Distributed Object Systems 3
CET 428 Web-Client User Interface Programming 3
CET 433 Database Technology 3
CET 441 Software for Personal Digital Assistants 3
CET 452 Digital Logic Applications 4
CET 458 Digital Computer Networks 3
CET 459 Internet Networking Protocols 3
CET 473 Digital/Data Communications 4
CET 488 Systems Administration of UNIX 3
CET 489 Network Administration with TCP/IP 3
CST 456 Microcomputer Systems Interfacing 4
CST 457 Advanced Assembly Language Applications 3
CST 494 ST: Embedded C 3
Technical electives 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 92.

Applied Computer Science
Program of Study
Typical First- and Second-Year Sequence

First Year

First Semester

CHM	113	General Chemistry *SQ*	4
ENG	101	First-Year Composition	3
ETC	100	Languages of Technology *CS*	4
MAT	270	Calculus with Analytic Geometry I *MA*	4
Total			15

Second Semester

CET	100	Object-Oriented Software Development I	3
CET	150	Digital Systems I *CS*	4
ENG	102	First-Year Composition	3
MAT	271	Calculus with Analytic Geometry II *MA*	4
HU or SB elective			3
Total			17

Second Year

First Semester

CET	200	Object-Oriented Software Development II	3
CET	354	Microcomputer Architecture and Programming	4
CET	383	Shell and Script Programming with UNIX	3
ECN	111	Macroeconomic Principles *SB*	3
MAT	243	Discrete Mathematical Structures	3
Total			16

Second Semester

CET	230	Applied Data Structures	3
CET	364	Computer Architecture	3
CHM	115	General Chemistry with Qualitative Analysis *SQ*	5
HU or SB elective			3
Mathematics elective			4
Total			18

COMPUTER SYSTEMS—BS

Students interested in the BS degree in Computer Systems may choose to specialize in one of the following three concentrations: computer hardware technology, embedded systems technology, and software 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.

The software technology concentration 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	111	Macreconomic Principles *SB*	3

Literacy

TWC	400	Technical Communications *L*	3

Natural Sciences

PHY	121	University Physics I: Mechanics *SQ*[1]	3
PHY	122	University Physics Laboratory I *SQ*[1]	1
PHY	131	University Physics II: Electricity and Magnetism *SQ*[2]	3
PHY	132	University Physics Laboratory II *SQ*[2]	1
Natural Science Laboratory elective			4
Total			12

[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.

Mathematics

MAT	243	Discrete Mathematical Structures	3
MAT	270	Calculus with Analytical Geometry I *MA*	4
MAT	271	Calculus with Analytical Geometry II *MA*	4
MAT	272	Calculus with Analytical Geometry III *MA*	4
STP	420	Introductory Applied Statistics *CS*	3
Total			18

Lower-Division Core

CET	100	Object-Oriented Software Development I	3
CET	150	Digital Systems I *CS*	4
CET	200	Object-Oriented Software Development II	3
CET	230	Applied Data Structures	3
ETC	100	Languages of Technology *CS*	4
Total			17

Major

CET	326	Programming Languages for Technology with C/C++ and Visual Basic	4
CET	354	Microcomputer Architecture and Programming	4
CET	364	Computer Architecture	3
CET	383	Shell and Script Programming with UNIX	3
CET	400	Software Engineering Technology	3
CST	386	Operating Systems Principles	3
CST	415	Applied Software Process	3
		or UET 415 Electronic Manufacturing Engineering Principles (3)	
CST	494	ST: Professional Orientation	1
Total			24

Computer Hardware Technology Concentration

CET	350	Digital Systems II	4
CET	401	Digital Signal Processing for Multimedia	3
CET	452	Digital Logic Applications	4
CET	458	Digital Computer Networks	3
		or CET 473 Digital/Data Communications (4)	
CST	456	Assembly Language Applications	4
EET	208	Electrical Circuit Analysis I	4
EET	301	Electric Circuit II	4
Technical electives			3-4
Minimum total			29–30

Embedded Systems Technology Concentration

CET	350	Digital Systems II	4
CET	420	Foundations of Distributed and Web-Based Applications in Java	3
CET	441	Software for Personal Digital Assistants	3
CET	458	Digital Computer Networks	3
		or CET 459 Internet Networking Protocols (3)	

CST 456 Assembly Language Applications 4
CST 494 ST: Embedded C 3
EET 208 Electric Circuit Analysis I 4
Technical electives 6
Total 30

Software Technology Concentration
CET 420 Foundations of Distributed and Web-Based Applications in Java 3
CET 427 Distributed Object Systems 3
CST 433 Database Technology 3
Choose two of the following courses 6
CET 425 Server Software Programming (3)
— or —
CET 428 Web-Client User Interface Programming (3)
— or —
CET 441 Software for Personal Digital Assistants (3)
CET 459 Internet Networking Protocols 3
CET 488 Systems Administration of UNIX 3
or CET 489 Network Administration with TCP/IP (3)
Technical electives 9
Total 30

Computer Systems Program of Study
Embedded Systems Concentration
Typical First- and Second-Year Sequences

First Year

First Semester
ENG 101 First-Year Composition 3
ETC 100 Languages of Technology *CS* 4
MAT 270 Calculus with Analytic Geometry I *MA* 4
PHY 121 University Physics I: Mechanics *SQ** 3
PHY 122 University Physics Laboratory I *SQ** 1
Total 15

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

Second Semester
CET 100 Object-Oriented Software Development I 3
CET 150 Digital Systems I *CS* 4
ENG 102 First-Year Composition 3
MAT 271 Calculus with Analytic Geometry II *MA* 4
HU/SB elective 3
Total 17

Second Year

First Semester
CET 200 Object-Oriented Software Development II 3
CET 350 Digital Systems II 4
CET 354 Microcomputer Architecture and Programming 4
ECN 111 Macroeconomic Principles *SB* 3
MAT 243 Discrete Mathematical Structures 3
Total 17

Second Semester
CET 230 Applied Data Structures 3
EET 208 Electric Circuit Analysis I 4
MAT 272 Calculus with Analytic Geometry III *MA* 4
PHY 131 University Physics II: Electricity and Magnetism *SQ** .3
PHY 132 University Physics Laboratory II *SQ** 1
Total 15

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

COMPUTER ENGINEERING TECHNOLOGY (CET)

CET 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. Prerequisite: ETC 100.

CET 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.
General Studies: CS

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

CET 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: CET 100.

CET 230 Applied Data Structures. (3)
fall
Introduces data structures: strings, stacks, queues, binary trees, recursion, searching, and sorting. Prerequisite: CET 200.

CET 256 C Programming for Engineering Technology. (3)
fall, spring, summer
Applied and practical problem solving using the C programming language. Prerequisite: ETC 100.

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

CET 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: CET 150, 200.

CET 350 Digital Systems II. (4)
fall
Analysis and design of synchronous and asynchronous state machines. Introduces VHDL. Lecture, lab. Prerequisite: CET 150.

CET 354 Microcomputer Architecture and Programming. (4)
fall and spring
Microcomputer architecture, assembly language programming, I/O considerations, exception and interrupt handling. Introduces interfacing. Prerequisite: CET 150.

CET 364 Computer Architecture. (3)
fall
Processor performance, RISC/CISC, processor design and implementation, basic pipelining, memory hierarchy, I/O. Prerequisite: CET 200, 354.

CET 383 Shell and Script Programming with UNIX. (3)
fall and spring
UNIX operating system programming of shells, environment and 4th-generation languages and tools, such as sed, awk, perl, grep, make. Prerequisite: CET 100 or 256.

CET 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: CET 326.

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.

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

CET 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: CET 230; CST 386.

CET 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: CET 420 or instructor approval.

CET 427 Distributed Object Systems. (3)
spring
Distributed applications with Web services, RMI, and CORBA; concepts and frameworks for managing registering, locating, and securing distributed object applications. Prerequisite: CET 420 or instructor approval.

CET 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: CET 420 or instructor approval.

CET 433 Database Technology. (3)
fall
Introduces database technologies and DBMS, data models, and languages. Prerequisites: CET 230, 326.

CET 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: CET 420.

CET 452 Digital Logic Applications. (4)
spring
Design of sequential machines using system design techniques and complex MSI/LSI devices with lab. Prerequisite: CET 350.

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. Prerequisites: CET 354; EET 372.

CET 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: CET 200 (or 256), 354.

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: CET 354; EET 372.

CET 484 Internship. (1–3)
selected semesters

CET 486 Hardware Description Languages: VHDL. (3)
spring
Introduces hardware description languages using VHDL. Techniques for modeling and simulating small digital systems using a VHDL simulator. Prerequisites: CET 350, 383.

CET 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: CET 383; CST 386.

CET 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: CET 383, 459.

CET 490 Reading and Conference. (1–12)
selected semesters

CET 492 Honors Directed Study. (1–3)
selected semesters

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

CET 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Applied Software Process. (3)
- Computer Project

CET 498 Pro-Seminar. (1–3)
selected semesters

CET 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.

COMPUTING STUDIES (CST)

CST 386 Operating Systems Principles. (3)
spring
Fundamentals of operating systems, process management, scheduling and synchronization techniques, memory and file management, protection and security issues. Prerequisites: CET 256 (or 100), 354.

CST 394 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Applications of Computing Theory (3)

CST 415 Applied Software Process. (3)
fall and spring
Applies software processes using Rational's Unified Process (RUP) and eXtreme Programming (XP), iterative and architecture-centric development. Prerequisite: CET 400.

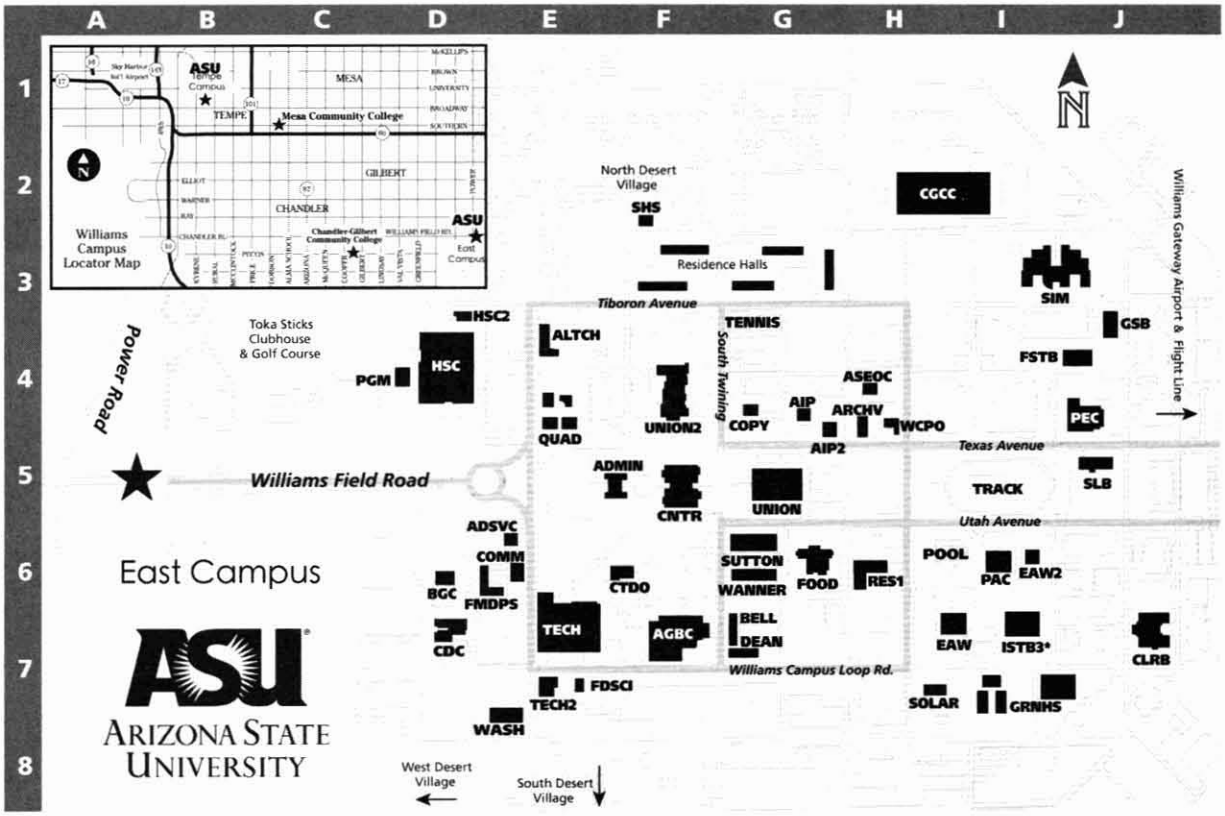
CST 456 Microcomputer Systems Interfacing. (4)
fall
Programming using BIOS and DOS routines. Disk operations, TSR routines, and device drivers. Lecture, lab. Prerequisite: CET 354.

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: CET 354.

CST 494 Special Topics. (1–4)
selected semesters
Topics may include the following:
- Professional Orientation (1)
- Embedded C (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.



ADMIN Administration Building (F5)
ADSVC Administrative Services (E5)
AGBC Agribusiness Center (F7)
AIP American Indian Programs (G4)
AIP2 American Indian Programs Annex (IG4)
ALTCH Altitude Chamber Building (E3)
ARCHV Library Archives (H4)
ASEOC Alternate State Emergency Operations Center (H4)
BELL Bell Hall (F7)
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 Telecommunications (D6)
COPY Williams Express Copy Services (G4)
CTDO College of Technology Dean's Office (E6)
DEAN Dean Hall (F7)
EAW Exercise and Wellness Center (I7)
EAW2 Exercise Instructional Lab Building (I6)
FDSCI Agribusiness Food Science Lab (E7)
FMDPS Facilities Management/DPS (D6)
FOOD Williams Campus Dining Hall (G6)
FSTB Fire Science Technology Building (I4)
GRNHS Greenhouses (I7)
GSB General Studies Building (J4)
HSC Health Sciences Center (D4)
HSC2 Health Sciences Center Research (D4)
ISTB3 Interdisciplinary Science and Technology Building 3 (I7)*
PAC Physical Activity Center (I6)
PEC Physical Education Center (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 Science Lab Building (J5)
SOLAR Photovoltaic Testing Laboratory (H7)
SUTTON 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)
WANNER Wanner Hall (G6)
WASH Launderette (D7)
WCPO Williams Campus Post Office (H4)

**To Be Completed 2006*

East Campus Directory

For the "Tempe Campus Directory," see page 606. For the "West Campus Directory," see page 693. For the "College of Extended Education Directory," see page 711.

Organization	Location	Telephone	Web Address
Agribusiness and Resource Management, Morrison School of	WANNER	480/727-1585	www.east.asu.edu/msabr
Professional Golf Management	PGM	480/727-1912	www.east.asu.edu/msabr/pgm
American Indian Programs	AIP	480/727-1075	www.east.asu.edu/aip
		480/727-1161	—
Bookstore	UNION	480/727-1168	www.east.asu.edu/admin/index_bookstore.html
Campus Copy Center, Williams	COPY	480/727-1600	east.asu.edu/admin/index_williamsexpress.html
Cashiering Services	QUAD 2	480/727-1081	www.east.asu.edu/admin/index_cashiering.html
Computing Commons, East campus	CNTR 150	480/727-1118	www.east.asu.edu/infotech/labs
East College	SUTTON	480/727-1333	www.east.asu.edu/ecollege
Advising		480/727-1333	—
Applied Biological Sciences, Department of	WANNER	480/727-1444	www.east.asu.edu/ecollege/appliedbiologicalsciences
Applied Psychology, Faculty of	SUTTON	480/727-1333	www.east.asu.edu/ecollege/appliedpsych
Business Administration, Faculty of	SUTTON	480/727-1333	www.east.asu.edu/ecollege/businessadmin
Education, Faculty of	SUTTON	480/727-1103	www.east.asu.edu/ecollege/education
Exercise and Wellness, Department of	EAW 109	480/727-1945	www.east.asu.edu/ecollege/wellness
Human Health Studies, Faculty of	WANNER	480/727-1333	www.east.asu.edu/ecollege/humanhealth
Multimedia Writing and Technical Communication, Faculty of	SUTTON	480/727-1333	www.east.asu.edu/ecollege/multimedia
Nutrition, Department of	HSC 1386	480/727-1728	www.east.asu.edu/ecollege/nutrition
Fitness Center, Williams Campus	WCFC Bldg.	480/988-8400	www.east.asu.edu/sta/u-life/recreation.htm
General information	QUAD 2	480/727-3278	www.east.asu.edu
Housing, Williams Campus	BELL	480/727-1700	www.east.asu.edu/housing
Learning Center	CNTR 160	480/727-1452	www.east.asu.edu/learningcenter
Library Services	CNTR 30	480/727-1037	eastlib.east.asu.edu
Parking	FMDPS 109	480/727-2775	www.east.asu.edu/admin/pts
Provost, Office of the	ADMIN	480/727-1028	—
Student Health Center	SHC	480/727-1041	www.east.asu.edu/students/health.html
Student Union	UNION	480/727-1098	www.asu.edu/sta/u-life/union.htm
Student Services*	QUAD 2	480/727-3278	www.east.asu.edu/students
Technology and Applied Sciences, College of	CTDO	480/727-1874	technology.east.asu.edu/
Aeronautical Management Technology, Department of	SIM 201	480/727-1775	eastair.east.asu.edu
Computing Studies, Division of	SUTTON 140	480/727-1257	www.east.asu.edu/ctas/dcst
Electronics and Computer Engineering Technology, Department of	TECH 101	480/727-1976	www.east.asu.edu/ctas/ecet
Engineering, Department of	CNTR 110	480/727-2727	www.east.asu.edu/ctas/engineering
Information and Management Technology, Department of	TECH 102	480/727-1781	www.east.asu.edu/ctas/imt
Mechanical and Manufacturing Engineering Technology, Department of	SIM 295	480/727-1584	www.east.asu.edu/ctas/mmet

* Student Services includes ASU Sun Cards, Office of the Registrar, Student Business Services, Student Financial Assistance, and Undergraduate Admissions.

East Campus Faculty and Academic Professionals

A

Adams, Troy B. (2002), Assistant Professor of Exercise and Wellness; BS, MS, Brigham Young University; PhD, University of Texas, Austin

Autore, Donald D. (1959), Professor Emeritus of Technology; BSE, University of Michigan; MSE, Arizona State University

B

Backus, Charles E. (1968), Professor Emeritus of Electrical Engineering; BSME, Ohio University; MS, PhD, University of Arizona

Barrett, Thomas W. (1950), Professor Emeritus of Agribusiness and Resource Management; BS, Brigham Young University; MS, PhD, Cornell University

Baxter, Harry R. (1982), Professor Emeritus of Electronics Engineering Technology; BA, New York University; MBA, Fairleigh Dickinson University; MTech, Arizona State University

Bergeron, Bette S. (2000), Professor of Education; Head, Faculty of Education; BSEd, University of Maine, Orono; MSEd, PhD, Purdue University

Biekert, Russell G. (2001), Associate Professor of Mechanical and Manufacturing Engineering Technology; BS, MS, Southern Illinois University; EdD, Arizona State University

Brady, Ward W. (1973), Professor of Applied Biological Sciences; Chair, Department of Applied Biological Sciences; BS, MS, PhD, Colorado State University

Brock, John H. (1977), Professor of Applied Biological Sciences; Coordinator, Sustainable Technologies, Agribusiness, and Resources Center; BS, MS, Fort Hayes State University; PhD, Texas A&M University

Brown, Walter C. (1966), Professor Emeritus of Technology; BS, Northwest Missouri State University; MEd, EdD, University of Missouri, Columbia

Brownson, Charles W. (1980), Librarian, East Campus Library Services; Director, East Campus Library Services; BA, South Dakota State University; MFA, University of Oregon; MLS, University of California, Berkeley

Burdette, Walter E. (1956), Professor Emeritus of Technology; BS, MS, Kansas State College of Pittsburg; EdD, University of Missouri, Columbia

Burk, Karl W. (1949), Professor Emeritus of Technology; BA, MA, Arizona State University; EdD, Bradley University

Burkett, Lee N. (1974), Professor of Exercise and Wellness; BA, MA, San Diego State University; PhD, Washington State University

Busch, Jay S. (2001), Lecturer of General Studies; BA, Michigan State University; MA, Arizona State University

Butler, Jay Q. (1972), Associate Professor of Real Estate; Director, Arizona Real Estate Center; BBA, MBA, University of New Mexico; PhD, University of Washington

C

Carlsen, Paul A. (1978), Professor Emeritus of Technology; BAE, MNS, EdD, Arizona State University

Cavalliere, William A. (1946), Professor Emeritus of Technology; BA, MA, Arizona State University

Chalquest, Richard R. (1971), Professor Emeritus of Agribusiness and Resource Management; BS, DVM, Washington State University; MS, PhD, Cornell University

Collins, Donald W. (1989), Professor Emeritus of Mechanical and Manufacturing Engineering Technology; BArch, Virginia Polytechnic Institute and State University; MS, PhD, University of Illinois, Chicago

Cooke, Nancy J. (2003), Professor of Applied Psychology; BA, George Mason University; MA, PhD, New Mexico State University

Corbin, Charles B. (1982), Professor Emeritus of Exercise and Wellness; BS, University of New Mexico; MS, University of Illinois; PhD, University of New Mexico

Cox, Frank E. (1972), Professor Emeritus of Technology; BSME, Purdue University; MSE, Arizona State University

D

D'Angelo, Barbara J. (2001), Lecturer of Multimedia Writing and Technical Communication; BA, Emmanuel College; MS, University of Illinois, Urbana-Champaign

Daneke, Gregory A. (1982), Professor of Agribusiness and Resource Management; BA, MA, Brigham Young University; PhD, University of California, Santa Barbara

Danielson, Scott G. (1999), Associate Professor of Mechanical and Manufacturing Engineering Technology; Chair, Department of Mechanical and Manufacturing Engineering Technology; BS, MS, University of Wyoming; PhD, North Dakota State University

Darst, Paul W. (1976), Professor of Physical Education; BS, MS, University of Akron; PhD, Ohio State University

Darveaux, Robert (2004), Associate Professor of Electronics and Computer Engineering Technology; PhD, North Carolina State University

Dixon, Kathleen S. (2000), Lecturer of Nutrition; BS, University of Arizona; MEd, Northern Arizona University

Dolin, Penny Ann (1998), Lecturer of Information and Management Technology; BA, Bard College; MS, Arizona State University

Duff, Jon M. (1997), Professor of Information and Management Technology; BS, MS, Purdue University; PhD, Ohio State University

E

Eaves, James E. (2003), Assistant Professor of Agribusiness and Resource Management; BA, University of Connecticut, Storrs; PhD, University of California, Davis

Edwards, Mark R. (1978), Professor of Agribusiness and Resource Management; BSME, United States Naval Academy; MBA, DBA, Arizona State University

Edwards, Marvin J. (1959), Professor Emeritus of Technology; BS, MA, Arizona State University

F

Foley, Dawn (2003), Lecturer of Education; BA, MA, Arizona State University

Fordemwalt, James N. (1987), Professor Emeritus of Electronics and Computer Engineering Technology; BS, MS, University of Arizona; PhD, Iowa State University of Science and Technology

G

Gannod, Barbara D. (1998), Assistant Professor of Computing Studies; BSc, Calvin College; MSc, PhD, Michigan State University

Gannod, Gerald (1998), Assistant Professor of Computer Studies; BS, MS, PhD, Michigan State University

Gary, Kevin (2004), Assistant Professor of Computing Studies; MS, PhD, Arizona State University

Gesell, Laurence E. (1984), Professor of Aeronautical Management Technology; BA, Upper Iowa University; MPA, University of San Francisco; PhD, Arizona State University

Gomez, Conrado L. (2003), Lecturer of Education; BA, MEd, University of Arizona; EdD, Northern Arizona University

Gordon, Richard S. (1980), Professor Emeritus of Agribusiness and Resource Management; BA, University of Rochester; MA, Harvard University; PhD, Massachusetts Institute of Technology

Gray, Robert D. (2001), Assistant Professor of Applied Psychology; BA, Queen's University (Canada); MA, PhD, York University (Canada)

Green, Douglas M. (1990), Associate Professor of Applied Biological Sciences; BS, Humbolt State University; MS, North Dakota State University; PhD, Oregon State University

Grondin, Robert O. (1983), Associate Professor of Electrical Engineering; Director, Student Academic Services, Ira A. Fulton School of Engineering; BS, MS, PhD, University of Michigan

Grossman, Gary M. (1994), Associate Professor of Information and Management Technology; Project Director, International Projects Unit; BA, University of the Pacific; MS, PhD, Purdue University

H

Hall, Richard E. II (2002), Lecturer of Nutrition; BS, Northern Arizona University; MS, Arizona State University

Hampl, Jeffrey (1998), Associate Professor of Nutrition; BS, Liberty University; MS, University of Massachusetts, Lowell; PhD, University of Nebraska

Harris, La Verne Abe (1999), Assistant Professor of Information and Management Technology; BA, MTech, Arizona State University; PhD, University of Arizona

Hefner, Stephen P. (1973), Instructional Professional of Agribusiness and Resource Management; BS, Illinois State University; MS, Arizona State University

Hild, Nicholas R. (1983), Professor of Information and Management Technology; BSME, MSEnve, University of Iowa; PhD, Union Graduate School

Hinks, Robert W. (1981), Associate Professor of Engineering; BSc, University of Wales (United Kingdom); MA, MSE, PhD, Princeton University

Hirata, Ernest T. (1974), Associate Professor of Information and Management Technology; BA, San Diego State College; EdD, Arizona State University

Hopper, Lee Ann (2001), Lecturer of Education; BS, Texas Tech University; MA, Arizona State University

Horowitz, Renee B. (1986), Professor Emerita of Information and Management Technology; BA, Brooklyn College; MA, PhD, University of Colorado

Hu, Quaing (1998), Assistant Professor of Applied Biological Sciences; BS, Hubei University (China); MS, Institute of Hydrobiology, Chinese Academy of Sciences (China); PhD, Ben-Gurion University of the Negev (Israel)

Huffman, Holly Ann (2004), Lecturer of Applied Biological Sciences; BS, National University; MS, California State Polytechnic University, Pomona; PhD, University of California, Riverside

Hughner, Renee D. (2002), Assistant Professor of Agribusiness and Resource Management; BS, MBA, University of Massachusetts, Amherst; PhD, Arizona State University

Humble, Jane E. (1989), Associate Professor of Information and Management Technology; BSE, MSE, PhD, Arizona State University

Hutchins, Andrea M. (2001), Assistant Professor of Nutrition; BS, Kansas State University; MS, PhD, University of Minnesota

Hutt, Roger W. (1975), Associate Professor of Business Administration; Head, Faculty of Business Administration; BS, MBA, Ohio State University; PhD, Michigan State University

I

Irvin, Glenn W. (1997), Professor of English; Dean, East College; BA, MA, PhD, Arizona State University

J

Jakubowski, Gerald S. (2004), Professor of Engineering; Provost, East campus; Vice President, ASU; BA, MA, PhD, University of Toledo

Johnston, Carol S. (1986), Professor of Nutrition; BS, University of Michigan; MA, PhD, University of Texas, Austin

K

Kagan, Albert (1992), Professor of Agribusiness and Resource Management; BS, MS, PhD, Iowa State University of Science and Technology

Karp, Merrill R. (1994), Associate Professor of Aeronautical Management Technology; BS, Arizona State University; MA, Central Michigan University; PhD, Walden University

Keith, Marlow F. (1946), Professor Emeritus of Technology; BA, MA, Arizona State University

Kelley, Donald G. (1980), Professor Emeritus of Manufacturing and Aeronautical Engineering Technology; BS, MS, Arizona State University

Kigin, Denis J. (1958–65; 1967), Professor Emeritus of Technology; Dean Emeritus, Continuing Education and Summer Sessions; BS, Mankato State University; MS, University of Wisconsin, Stout; EdD, University of Missouri