
College of Liberal Arts and Sciences

clas.asu.edu

David A. Young, PhD, Dean

PURPOSE

The graduate programs in the College of Liberal Arts and Sciences are characterized by both a diversity of disciplines and a commonality of purpose. The disciplinary diversity of the college is broad by intent, embracing those branches of learning most central to the foundations of society in the humanities and the sciences. Unity of purpose is achieved through a common commitment to intellectual integrity, to research, and to the preservation of freedom of academic inquiry, as well as through informal exchanges and cross-disciplinary centers.

The college has active research programs in all units offering advanced degrees. In recent years, the rapid addition of excellent faculty has enhanced the cadre of senior scholars and scientists with whom graduate students work.

ORGANIZATION

The college—which offers graduate study in the humanities, the mathematical and the natural sciences, and the social sciences—brings together highly qualified faculty and advanced students to share learning and discovery in 20 academic units and in a number of interdisciplinary centers. In lectures and seminars, in laboratories and libraries, in creative endeavors, field experiences, and research projects, faculty and students cooperate in preserving, evaluating, and expanding knowledge.

GRADUATE PROGRAMS

In cooperation with the Division of Graduate Studies, faculty affiliated with various departments and units within the College of Liberal Arts and Sciences offer three research-oriented degrees: the MA, the MS, and the PhD. In addition, six professional degrees are offered: the Master of Advanced Study in Geographic Information Systems, the Master of Natural Science, the Master of Teaching English as a Second Language, the Master of Physical Education, the Master of Fine Arts, and the Professional Science Master's degree in Computational Biosciences. An interdisciplinary creative writing program is also offered in cooperation with the Katherine K. Herberger College of Fine Arts.

Interdisciplinary programs leading to the PhD degree are offered in Exercise Science, Molecular and Cellular Biology, Science and Engineering of Materials, and Speech and Hearing Science. Many departments participate in the Master of Education, Doctor of Education, and Doctor of Philosophy degrees offered and administered through the College of Education. Members of the Department of Mathematics and Statistics faculty participate in the interdisciplinary MS degree in Statistics (with W. P. Carey School of Business faculty); members of the faculty in the Department of Chemistry and Biochemistry and the School of Life Sci-

ences participate in the interdisciplinary MS and PhD in Molecular and Cellular Biology; members of the faculty in the Departments of Anthropology, History, Languages and Literatures, Philosophy, Political Science, Psychology, Religious Studies, and Sociology participate in the interdisciplinary PhD in Justice Studies program; members of the Departments of Geography, Political Science, and Sociology faculty contribute to the interdisciplinary Doctor of Public Administration program; and members of the Departments of English, Family and Human Development, Sociology, and Speech and Hearing Science faculty participate in the interdisciplinary PhD degree in Communication.

One of the features of an interdisciplinary program is that it draws upon faculty research and teaching interests from a number of academic units; thus, a student may tailor a course of study to fit individual needs and goals.

See the “College of Liberal Arts and Sciences Graduate Degrees and Majors” table, page 242.

ADMISSION REQUIREMENTS

Applicants to graduate programs within the College of Liberal Arts and Sciences must meet general requirements for admission established by the Division of Graduate Studies (see “Admission to the Division of Graduate Studies,” page 58). In addition, academic units usually require test scores from the Graduate Record Examination and Miller Analogies Test, letters of recommendation, and a statement of purpose. Consult the individual degree programs for particular requirements. International applicants must also submit Test of English as a Foreign Language (TOEFL) scores and are advised to submit application materials well in advance of deadlines.

SPECIAL PROGRAMS

The college continually strives to provide students with new program areas, many of which are interdisciplinary in content. There are special strengths, for example, in planetary geology, as well as in more traditional geological sub-disciplines; in geochemistry, as well as in biochemistry and solid-state and materials science; and in magnetic properties of materials, as well as nuclear physics and surface physics. In psychology, traditional social, developmental and clinical research is augmented by a new interest in preventive mental health. Flexibility and forward-looking program development pervade all college programs. The interdisciplinary degree in Exercise Science is internationally recognized. The graduate Creative Writing program brings distinguished poets, playwrights, and novelists to ASU. The Teaching English as a Second Language program attracts students from all over the world. The Southwest environment has favorably affected program development in several ways,

COLLEGE OF LIBERAL ARTS AND SCIENCES

College of Liberal Arts and Sciences Graduate Degrees and Majors

Major	Degree	Concentration ¹	Administered By
Anthropology	MA	Archaeology, bioarchaeology, linguistics, museum studies, physical anthropology, or social-cultural anthropology	Department of Anthropology
	PhD	Archaeology, physical anthropology, or social-cultural anthropology	Department of Anthropology
Asian Languages and Civilizations—Chinese/Japanese	MA	—	Department of Languages and Literatures
Audiology	AuD	—	Department of Speech and Hearing Science
Biology	MS, PhD	Optional: ecology ¹	School of Life Sciences
Chemistry	MS, PhD	Analytical chemistry, biochemistry, geochemistry, inorganic chemistry, organic chemistry, physical chemistry, or solid-state chemistry	Department of Chemistry and Biochemistry
Communication	MA	—	Hugh Downs School of Human Communication
	PhD	Communicative development, intercultural communication, or organizational communication	Hugh Downs School of Human Communication
Communication Disorders	MS	—	Department of Speech and Hearing Science
Computational Biosciences	PSM	—	College of Liberal Arts and Sciences
Creative Writing ²	MFA	—	Creative Writing Committee
English	MA	Comparative literature, English linguistics, literature and language, or rhetoric and composition	Department of English
	PhD	Literature or rhetoric/composition and linguistics	Department of English
Exercise Science ²	PhD	Biomechanics, motor behavior/sport psychology, or physiology of exercise	Committee on Exercise Science
Family and Human Development	MS	Optional: family studies ¹	Department of Family and Human Development
Family Science	PhD	Optional: marriage and family therapy ¹	Department of Family and Human Development
French	MA	Comparative literature, linguistics, or literature	Department of Languages and Literatures
Geographic Information Systems	MAS	—	Department of Geography
Geography	MA, PhD	—	Department of Geography
Geological Sciences	MS, PhD	—	Department of Geological Sciences
German	MA	Comparative literature, language and culture, or literature	Department of Languages and Literatures
History	MA	Asian history, British history, European history, Latin American history, public history, U.S. history, or U.S. Western history	Department of History
	PhD	Asian history, British history, European history, Latin American history, or U.S. history	Department of History
Humanities ³	MA	—	Graduate Committee on Humanities

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

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

³ Applications are not being accepted at this time.

College of Liberal Arts and Sciences Graduate Degrees and Majors (continued)

Major	Degree	Concentration ¹	Administered By
Justice Studies	MS	—	School of Justice and Social Inquiry
	PhD	Optional: criminal and juvenile justice; dispute resolution; law, justice, and minority populations; law, policy, and evaluation; or women, law, and justice ¹	School of Justice and Social Inquiry
Kinesiology	MS	—	Department of Kinesiology
Liberal Studies	MLSt	—	College of Liberal Arts and Sciences
Materials Science ²	MS	—	Committee on the Science and Engineering of Materials
Mathematics	MA	—	Department of Mathematics and Statistics
	PhD	Optional: Computational biosciences ¹	Department of Mathematics and Statistics
Microbiology	MS, PhD	—	School of Life Sciences
Molecular and Cellular Biology	MS	—	Interdisciplinary Committee on Molecular and Cellular Biology
	PhD	Optional: Computational biosciences ¹	Interdisciplinary Committee on Molecular and Cellular Biology
Natural Science	MNS	Biology, microbiology, or plant biology	School of Life Sciences
		Chemistry	Department of Chemistry and Biochemistry
		Geological sciences	Department of Geological Sciences
		Mathematics	Department of Mathematics and Statistics
		Physics	Department of Physics and Astronomy
Philosophy	MA, PhD	—	Department of Philosophy
Physics	MS, PhD	—	Department of Physics and Astronomy
Plant Biology	MS, PhD	Optional: ecology or photosynthesis ¹	School of Life Sciences
Political Science	MA, PhD	American politics, comparative politics, international relations, or political theory	Department of Political Science
Psychology	PhD	Behavioral neuroscience, clinical psychology, cognitive/behavioral systems, developmental psychology, quantitative research methods, or social psychology	Department of Psychology
Religious Studies	MA, PhD	—	Department of Religious Studies
Science and Engineering of Materials ²	PhD	High-resolution nanostructure analysis or solid-state device materials design	Committee on the Science and Engineering of Materials
Sociology	MA, PhD	—	Department of Sociology
Spanish	MA	Comparative literature, language and culture, linguistics, or literature	Department of Languages and Literatures
	PhD	Cultural studies or literature	Department of Languages and Literatures
Speech and Hearing Science	PhD	Developmental neurolinguistic disorders, neuroauditory processes, or neurogerontologic communication disorders	Department of Speech and Hearing Science

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

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

³ Applications are not being accepted at this time.

College of Liberal Arts and Sciences Graduate Degrees and Majors (continued)

Major	Degree	Concentration ¹	Administered By
Statistics ²	MS	—	Committee on Statistics
Teaching English as a Second Language	MTESL	—	Department of English

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

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

³ Applications are not being accepted at this time.

ranging from research activities in water resources, archaeology, and fluvial geomorphology to distinguished programs in Hispanic language, literature, culture, and history.

In addition to traditional and innovative programs within departments, there are multidisciplinary research centers within the college, bringing together faculty from various departments. These include the Centers for Asian Studies, Exercise and Sport Research, Hispanic Research, Latin American Studies, Medieval and Renaissance Studies, Meteorite Studies, and Solid-State Science. Centers sponsor colloquia, workshops, conferences, and visiting scholars. They administer international exchange programs, enhance library holdings and other collections, publish papers and monographs, maintain archives, and employ graduate research assistants.

COLLEGE FACILITIES

Strong and nationally funded research facilities, such as the Facility for High Resolution Electron Microscopy and the Planetary Geology Laboratory, have attained national and international prominence. Important research collections include one of the largest meteorite collections in the world, the holdings of the anthropology archives and museum, the space photography collection, the Herbarium, and extensive library holdings, including important manuscript collections in late 19th-century British literature and historical documents of the Southwest.

Graduate students in all disciplines have access to outstanding computer facilities. Mainframe computing for research is provided free of charge. There are substantial microcomputer facilities within individual academic units as well as clusters serving the humanities and social sciences. Minicomputer capabilities are found in various academic units. Also refer to “Computing Facilities and Services,” page 33.

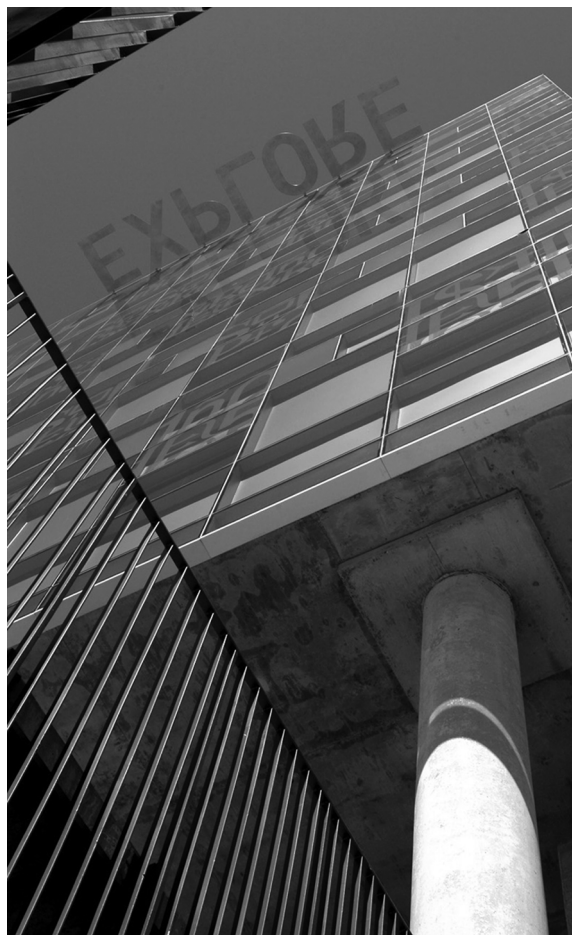
FINANCIAL ASSISTANCE AND SUPPORT

In addition to the usual support for graduate students in the form of stipends and teaching and research assistantships, there is a vigorous funding program to support graduate student research. Not only do graduate students obtain grants from external sources to support their research projects, they also receive support from the college and university to present papers at professional meetings.

ADVISING

Faculty advisors in each academic unit provide guidance to graduate students from admission through completion of the program. Consult the director of graduate studies in the

appropriate academic unit. Graduate students must follow an approved program of study filed with the Division of Graduate Studies. The calendar for enrollment activities is published in the schedule of classes for each semester. Teaching and research assistants, who are required to be enrolled in at least six hours, as well as those enrolled for individual project, thesis, and dissertation credit, are subject to the same calendar deadlines as students enrolled in regularly scheduled classes.



Lattie F. Coor Hall is home to many College of Liberal Arts and Sciences graduate degree programs, including Audiology, History, Philosophy, and Political Science.

Tim Trumble photo

African and African Diaspora Studies

Interdisciplinary Certificate Program

www.asu.edu/clas/afamstu

480/965-4399

COWDN 224

Okechukwu Iheduru, Director

African and African American Studies

Professors: Boulin Johnson, Iheduru, Reyes

Associate Professors: Bontemps, Neff

Assistant Professors: Hinds, Usman

Clinical Associate Professor: Cox

English

Professors: Lester, Miller

Associate Professor: DeLamotte

Assistant Professor: Lockard

History

Associate Professor: El Hamel

Assistant Professor: Whitaker

Human Communication

Professor: Jain

Associate Professor: Davis

Humanities

Assistant Professor: Lund

Justice and Social Inquiry

Professor: Romero

Political Science

Associate Professor: Mitchell

Sociology

Associate Professor: Keith

The graduate Certificate in African and African Diaspora Studies is an interdisciplinary program with four areas of emphasis: African studies, African diaspora studies, women and gender in African and African diaspora studies, and comparative studies. These areas of emphases provide students with access to an extensive range of information and systematic knowledge committed to the new model of African and African diaspora studies that focuses on the intersections of race, culture, and gender with interdisciplinary perspectives. The required course, AFR 500 RM: Theory and Methods, offers students an overview of the focus and explicates relevant methodologies and theories. This required course, along with the courses within the areas of emphasis and the capstone course, complete the certificate. As this certificate program offers students an international dimension to the study of peoples and cultures of African descent, students will invigorate their knowledge about glo-

bal issues and further expand their research pursuits. This certificate program characterizes the faculty's intellectual and research strengths and the curriculum's interdisciplinary strategies and research approaches that highlight the continuities and disjuncture of history and experiences throughout Africa and the diaspora.

Admission. Admission to the graduate Certificate Program in African and African Diaspora Studies is open to any student who has completed a bachelor's degree at an accredited U.S. institution or equivalent. Students who are regularly admitted to a graduate degree program may pursue the certificate in tandem with their degree program. Students who are not regularly admitted to a graduate degree program may still pursue the certificate as nondegree graduate students.

To be considered for admission, students should submit the following documents to the African and African American Studies program office (COWDN 224):

1. a completed application form (available in COWDN 224);
2. a personal statement describing interest in the certificate, academic objectives, and career goals;
3. a résumé or curriculum vitae;
4. an official transcript showing the completion of a bachelor's degree in any academic field; and
5. two letters of recommendation.

After reviewing the application materials, the coordinator of the certificate program contacts the student to set up an interview.

Program of Study. The certificate program requires 18 hours of course work.

AFR 500 RM: Theory and Methods	3
Emphasis courses*	9
Capstone project.....	3
Elective.....	3
Total	18

* Students choose one of the following emphases: African studies, African diaspora studies (includes African American studies), women and gender in African and African diaspora studies, or comparative studies.

Prerequisites. One upper-division history course and one upper-division literature course, each related to African and African diaspora studies, are required.

Courses. For course information, contact the African and African American Studies office in COWDN 224, or access the Web site at www.asu.edu/clas/afamstu.

AFRICAN AND AFRICAN AMERICAN STUDIES (AFR)

AFR 500 Research Methods. (1-12)

selected semesters

Topics may include the following:

- Theory and Methods. (3)
Overview of interdisciplinary research methodologies and explication of the relevant analyses of theory and praxis. Interactive lecture/discussions.

COLLEGE OF LIBERAL ARTS AND SCIENCES

AFR 508 Colonial Rule and the African Experience. (3)

selected semesters

Impact of European colonial rule on the shaping of African consciousness. Interactive lecture/discussions.

AFR 525 Foundations of Caribbean Studies. (3)

selected semesters

Broad interdisciplinary understanding of the Caribbean that surveys the region's history, politics, economy, and culture. Interactive lecture/discussions.

AFR 526 Selected Topics in Caribbean Politics. (3)

selected semesters

In-depth understanding of the impact of selected topics on the political economy and social infrastructure of the Caribbean. Interactive lecture/discussions.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Anthropology

Master's and Doctoral Programs

www.asu.edu/clas/anthropology

480/965-6213

ANTH 233

Sander van der Leeuw, Chair

Ben Nelson, Associate Chair

Regents' Professor: Clark

Professors: Barton, Bolin, Brandt, Carr, Chance, Eder, Falconer, Hegmon, Hudak, Johanson, Kimbel, Kintigh, Marean, Martin, Nash, B. Nelson, M. Nelson, Redman, Spielmann, Stark, van der Leeuw, Williams

Associate Professors: Abbott, Baker, Reed, Stone, Welsh, Winkelman

Assistant Professors: Haenn, Isaac, Jonsson, Scharwtz, Spencer

Associate Research Professors: Simon, Sugiyama

The faculty in the Department of Anthropology offer graduate programs leading to the MA and PhD degrees in Anthropology.

Admission. In addition to the general requirements for admission to the Division of Graduate Studies, the Department of Anthropology requires applicants to provide a statement of their interests and professional goals and three letters of recommendation. Applicants who received their BA during the past ten years must also submit scores on the Graduate Record Examination. Undergraduate course work in anthropology is not a prerequisite for admission to the MA program. Admission to the PhD program normally presumes an MA in Anthropology; students may be admitted without such a background on the condition that they acquire a knowledge of general anthropology in a manner to be specified at the time of admission.

Program of Study. Special training programs designed to terminate with a master's degree are possible at the discretion of the student and faculty advisors. For example, the concentrations in linguistics and museum studies are at the master's level. The primary purpose and scope of the graduate program in Anthropology are intended to lead to the PhD degree.

The doctoral program is divided into three phases. The first consists of 24 semester hours of course work and readings, usually within a subdiscipline and closely allied areas, followed by six semester hours for the MA thesis (or publishable paper). The faculty may require additional hours of course work or other preparation for entering students who are unfamiliar with the concepts of general anthropology at a level equivalent to that of the ASU undergraduate anthropology core. Mastery of the phase I course material is demonstrated by successful completion of a sequence of core courses.

Admission to phase II of the doctoral program is granted to students on the basis of performance in phase I, the quality of MA research, prior course work, faculty recommendations, and other relevant information. The second phase consists of 30 semester hours of course work, readings in anthropology and related fields, and directed research designed to prepare the student for the dissertation project. Proficiency in one foreign language or quantitative methods may be required by the supervisory committee. The second phase is completed when the following have been met: (1) passing a written comprehensive examination and (2) passing the oral defense of the dissertation proposal. The successful student is then advanced to candidacy.

The final phase consists of 24 semester hours of research and dissertation.

Certificate in Museum Studies. The certificate is awarded to nondegree or graduate students who are accepted into the certificate program and who complete 12 semester hours of required course work and a six-semester hour internship at an approved museum. The certificate may be taken independently or in conjunction with the MA degree in Anthropology with a concentration in museum studies.

MASTER OF ARTS

Concentrations are available at the master's level in archaeology, museum studies, physical anthropology, and social-cultural anthropology.

See "Master's Degrees," page 67, for general requirements. A concurrent MA degree in Anthropology and MS degree in Justice Studies is also available. See "Concurrent MA Anthropology/MS Justice Studies," page 286.

DOCTOR OF PHILOSOPHY

Concentrations are available at the doctoral level in archaeology, physical anthropology, and social-cultural anthropology.

For more information on the PhD degree, see "Doctor of Philosophy," page 69.

Concentrations

Anthropology faculty are organized into two sets of cross-cutting units: subdiscipline-based academic concentrations and thematically based research groups. Graduate

students may pursue curricula associated with a single academic concentration (listed below) or may design a program of study that cuts across the traditional subdisciplines or is interdisciplinary in nature.

Archaeology. Graduate studies in archaeology provide training leading to MA and PhD degrees; these emphasize a solid methodological and theoretical foundation coupled with a practical approach to field and laboratory applications. Major theoretical course offerings are concerned with the archaeology of complex societies, hunter-gatherer adaptations, settlement patterns and locational analysis, intrasite spatial analysis, cultural ecology, economic archaeology, ideation, and style. Analytical topics are covered in courses dealing with quantitative and formal methods, simulation, geoarchaeology, field methods and the analysis of ceramics, lithics, fauna, and pollen. The university's location in an archaeologically rich area has resulted in an especially strong emphasis on U.S. Southwest research. Other geographic emphases are on Mesoamerica, the circum-Mediterranean Old World, sub-Saharan Africa, and other parts of North America.

Bioarchaeology. Bioarchaeology, a theoretical and applied interface of archaeology and physical anthropology, is concerned with reconstructing the cultural, biological, and environmental conditions of past human lifeways and their roles in human adaptation. The bioarchaeology concentration can be pursued as part of the archaeology or physical anthropology concentration. The ASU program leads to an MA or PhD degree and emphasizes a dual theoretical and methodological foundation in the relevant aspects of archaeology and in skeletal biology and dental anthropology. Course offerings include archaeological method and theory, comparative anatomy, death and dying in cross-cultural perspective, demography, dental anthropology, disease and human evolution, economic archaeology, faunal analysis, fossil hominids, human origins, human osteology, mortuary analysis, prehistoric diet, quantitative analysis, and a variety of topical and areal courses in archaeology and physical anthropology.

Museum Studies. Museum studies encompasses theoretically oriented analyses of museums as cultural institutions (including the activities of staff members, visitors, represented peoples, and all implicated others) as well as applied aspects of working in museums and related agencies. Drawing on all subdisciplines of anthropology, special emphasis is placed on connecting material culture and ideation in a variety of institutional and field settings. Museum studies students apply museum philosophy, principles, practices, and current critiques to explore the many dimensions of curatorship, including research, collections management, exhibition work, educational programming, and administration. The department offers an MA degree in Anthropology with a concentration in museum studies and a nondegree certificate in Museum Studies at the graduate level.

Physical Anthropology. The graduate program in physical anthropology provides training leading to the MA and PhD degrees. MA students are introduced to current data, methods, and theories in six core areas of physical anthropology:

anthropological genetics, dental anthropology, fossil hominids, health and disease, osteology, and primatology. The PhD program focuses on the student's area of interest, which may fall within one of seven areas of study in which faculty are actively involved and collaborating, or may bridge and extend these areas. Areas of study for which special course lists and groups of faculty have been organized include anthropological genetics, dental anthropology, health and disease, peopling of the Pacific basin and adjoining areas, primate ecology and social behavior, primate functional morphology, paleoanthropology, and skeletal biology.

Social-Cultural Anthropology. The sociocultural program provides education leading to the MA and PhD degrees in most topics of sociocultural anthropology. Strong resources for studies in ecology, demography, religion, social organization, and political economy are available. An emphasis in method and theory crosscuts all of these topics. Special areas of strength include the U.S. Southwest, Mesoamerica, and Southeast Asia. Sociocultural faculty also share interests with faculty in physical anthropology and archaeology, especially in the study of disease, sociobiology, and native societies of the New World. MA and PhD concentrations in anthropological linguistics are also available.

RESEARCH ACTIVITY

For current information about research activity, access the Department of Anthropology Web site at www.asu.edu/clas/anthropology.

ANTHROPOLOGY (SOCIAL AND BEHAVIORAL) (ASB)

ASB 400 Cultural Factors in International Business. (3)

spring

Anthropological perspectives on international business relations; applied principles of cross-cultural communication and management; regional approaches to culture and business.

ASB 412 History of Anthropology. (3)

fall

Historical treatment of the development of the culture concept and its expression in the chief theoretical trends in anthropology between 1860 and 1950. Prerequisite: ASB 102 or instructor approval.

ASB 416 Economic Anthropology. (3)

fall

Economic behavior and the economy in preindustrial societies; description and classification of exchange systems; relations between production, exchange systems, and other societal subsystems. Prerequisite: ASB 102 or instructor approval.

ASB 417 Political Anthropology. (3)

selected semesters

Comparative examination of the forms and processes of political organization and activity in primitive, peasant, and complex societies. Prerequisite: ASB 102 or instructor approval.

ASB 462 Medical Anthropology: Culture and Health. (3)

fall

Role of culture in health, illness, and curing; health status, provider relations, and indigenous healing practices in United States ethnic groups. Lecture, discussion.

ASB 466 Peoples and Cultures of Africa. (3)

fall and spring

Survey of African peoples and their cultures, external contact, and changes. Meets non-Western requirement. Lecture, discussion. Cross-listed as AFS 466. Credit is allowed for only AFS 466 or ASB 466.

COLLEGE OF LIBERAL ARTS AND SCIENCES

ASB 471 Introduction to Museums. (3)

fall

History, philosophy, and current status of museums. Explores collecting, preservation, exhibition, education, and research activities in different types of museums. Prerequisites: both ASB 102 and ASM 104 or only instructor approval.

ASB 480 Introduction to Linguistics. (3)

fall and spring

Descriptive and historical linguistics. Survey of theories of human language, emphasizing synchronic linguistics.

ASB 481 Language and Culture. (3)

spring

Applies linguistic theories and findings to nonlinguistic aspects of culture; language change; psycholinguistics. Prerequisite: ASB 102 or instructor approval.

ASB 483 Sociolinguistics and the Ethnography of Communication. (3)

selected semesters

Relationships between linguistic and social categories; functional analysis of language use, maintenance, and diversity; interaction between verbal and nonverbal communication. Prerequisites: both ASB 480 and ENG 213 (or FLA 400) or only instructor approval.

ASB 485 U.S.-Mexico Border in Comparative Perspective. (3)

spring in odd years

Explores the multicultural and social dimensions of communities along the U.S.-Mexico border, emphasizing social organization, migration, culture, and frontier ideology. Prerequisite: 6 hours in anthropology or instructor approval.

ASB 501 Applied Medical Anthropology. (3)

fall

Overview of anthropology's applications in medicine and its adaptations to U.S. ethnic populations. Requires research project in medical setting. Lecture, seminar. Prerequisite: graduate standing or instructor approval.

ASB 502 Health of Ethnic Minorities. (3)

spring

Prevalence of illness, risk factors, health ecology, and medical and indigenous treatments. Lecture, seminar. Prerequisite: graduate standing or instructor approval.

ASB 503 Advanced Medical Anthropology. (3)

fall

Theory in medical anthropology and cross-cultural studies that illustrate particular theories. Lecture, seminar. Prerequisite: graduate standing or instructor approval.

ASB 504 Ethnic Relations. (3)

fall

Structural processes of intergroup relations, methods for investigating psychocultural dimensions of ethnicity with focus upon U.S. ethnic groups. Lecture, seminar. Prerequisite: graduate standing or instructor approval.

ASB 506 Gender, Emotions, and Culture. (3)

spring

Relationships among gender and emotion across cultures. Lecture, seminar. Prerequisite: graduate standing or instructor approval.

ASB 529 Culture and Political Economy. (3)

selected semesters

Origin and spread of Western capitalism and its impact on non-Western societies. Utilizes ethnographic and historical case studies. Prerequisite: graduate standing.

ASB 530 Ecological Anthropology. (3)

once a year

Relations among the population dynamics, social organization, culture, and environment of human populations, with special emphasis on hunter-gatherers and extensive agriculturalists.

ASB 531 Anthropology of Development. (3)

selected semesters

Theories of development and the human and environmental consequences of development, with particular emphasis on rural Southeast Asia. Seminar.

ASB 532 Graduate Field Anthropology. (2–8)

spring

Independent research on a specific anthropological problem to be selected by the student in consultation with the staff. May be repeated

for credit. Prerequisites: ASM 338 (or its equivalent); instructor approval.

ASB 536 Ethnohistory of Mesoamerica. (3)

selected semesters

Indigenous societies of southern Mexico and Guatemala at Spanish contact and their postconquest transformation. Emphasizes the Aztec Empire. Prerequisite: graduate standing.

ASB 537 Topics in Mesoamerican Archaeology. (3)

selected semesters

Explores changing organization of pre-Columbian civilizations in Mesoamerica through interpretive issues, such as regional analysis, chiefdoms, urbanism, and exchange. Prerequisite: instructor approval.

ASB 540 Method and Theory of Sociocultural Anthropology and Archaeology. (3)

fall

Basic issues concerning concepts of social and ethnic groups, cultural and sociological theory, and the nature of anthropological research. Prerequisite: instructor approval.

ASB 541 Method and Theory of Social and Cultural Anthropology. (3)

spring

Continuation of ASB 540. Prerequisite: ASB 540 or instructor approval.

ASB 542 Method and Theory of Archaeology I. (3)

spring

Models of human evolution, culture change, and interpretation of hunter-gatherer and tribal societies, ceramic, lithic, and faunal materials. Prerequisite: instructor approval.

ASB 543 Method and Theory of Archaeology II. (3)

fall

Covers concepts of social complexity along with economy, demography, and social dynamics, followed by archaeological research design. Prerequisite: instructor approval.

ASB 544 Settlement Patterns. (3)

selected semesters

Spatial arrangement of residences, activity sites, and communities over landscape. Emphasizes natural and cultural factors influencing settlement patterns. Prerequisite: instructor approval.

ASB 546 Pleistocene Prehistory. (3)

fall

Development of society and culture in the Old World during the Pleistocene epoch, emphasizing technological change through time and the relationship of people to their environment. Prerequisite: ASB 361 (or its equivalent).

ASB 547 Issues in Old World Domestication Economies. (3)

spring

Archaeological evidence for transitions in Old World subsistence economies from hunting and gathering to dependence on domesticated plants and animals. Prerequisite: ASB 362 (or its equivalent).

ASB 550 Economic Archaeology. (3)

selected semesters

Prehistoric economies in hunter-gatherer, tribal, and complex societies. Covers subsistence strategies, craft production and specialization, and exchange. Prerequisite: instructor approval.

ASB 551 Prehistoric Diet. (3)

selected semesters

Critical review of techniques for recovering dietary information and theoretical models concerned with explaining diet and nutrition. Prerequisite: instructor approval.

ASB 555 Complex Societies. (3)

spring

Examines structural variations in hierarchically organized societies, along with origins, dynamics, and collapse. Seminar.

ASB 559 Archaeology and the Ideational Realm. (3)

selected semesters

"Postprocessual" and other views concerning relevance of mental phenomena for understanding sociocultural change. Various approaches to inferring prehistoric meanings.

ASB 563 Hunter-Gatherer Adaptations. (3)

selected semesters

Evolution of prehistoric hunter-gatherer societies in the Old and New Worlds from the most ancient times through protohistoric chiefdoms. Prerequisite: instructor approval.

ASB 567 Southwestern Archaeology. (3)

spring

Broad coverage of Southwestern cultural developments focusing on current debates and rigorous use of archaeological data in making cultural inferences.

ASB 568 Intrasite Research Strategies. (3)

fall

Research issues within a single site context. Topics include quantitative spatial analysis, site definition, sampling, distributional analysis, and substantive interpretation.

ASB 571 Museum Principles. (3)

fall

History, philosophy, and current status of museums. Explores collecting, preservation, exhibition, education, and research activities in different types of museums. Prerequisites: both ASB 102 and ASB 104 or only instructor approval.

ASB 572 Museum Collection Management. (3)

spring

Principles and practices of acquisition, documentation, care, and use of museum collections; registration, cataloging, and preservation methods; legal and ethical issues. Prerequisite: ASB 571 or instructor approval.

ASB 573 Museum Administration. (3)

spring

Formal organization and management of museums, governance, personnel matters, fund raising and grantsmanship, legal and ethical issues. Prerequisite: ASB 571 or instructor approval.

ASB 574 Exhibition Planning and Design. (3)

spring

Exhibition philosophies and development; processes of planning, designing, staging, installing, evaluating, and disassembling temporary and long-term exhibits. Prerequisites: both ASB 571 and 572 or only instructor approval.

ASB 575 Computers and Museums. (3)

fall

Basics of museum computer application; hardware and software; fundamentals of database management; issues of research, collections management, and administration.

ASB 576 Museum Interpretation. (3)

fall

Processes of planning, implementing, documenting, and evaluating educational programs in museums for varied audiences—children, adults, and special interest groups. Lecture, discussion. Prerequisite: ASB 571.

ASB 577 Principles of Conservation. (3)

spring

Preservation of museum objects: nature of materials, environmental controls, and causes of degradation; recognizing problems, damage, and solutions; proper care of objects. Prerequisites: both ASB 571 and 572 or only instructor approval.

ASB 579 Critical Issues in Museum Studies. (3)

fall

Current debates of museum practice from an anthropological perspective. Addresses issues of collection, presentation, authenticity, and authority. Seminar. Prerequisite: ASB 571 or instructor approval.

ASB 591 Seminar. (1–12)

selected semesters

Selected topics in archaeology, linguistics, and social-cultural anthropology. Topics may include the following:

- Archaeological Ceramics. (3)
- Archaeology of North America. (3)
- Cultural Anthropology. (3)
- Culture and Personality. (3)
- Evolution and Culture. (3)
- Historical Archaeology. (3)
- Interdepartmental Seminar. (3)
- Language and Culture. (3)
- Linguistics. (3)
- Museum Studies. (3)
- Problems in Southwestern Archaeology. (3)
- Problems in Southwestern Ethnology. (3)
- Social Anthropology. (3)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see “Omnibus Courses,” page 56.

**ANTHROPOLOGY
(SCIENCE AND MATHEMATICS) (ASM)**

ASM 435 Archaeological Pollen Analysis. (3)

selected semesters

Theory, methodology, and practice of pollen analytic techniques. Compares uses in botany, geology, and archaeology. 2 hours lecture, 3 hours lab, possible field trips. Prerequisite: instructor approval.

ASM 448 Geoarchaeology. (3)

fall and spring

Geologic context relevant to archaeological research. Topics include sediments, deposition environments, soils, anthropogenic and biogenic deposits, and quaternary chronology. Lecture, discussion, field experiences. Prerequisites: ASB 222 (or 223) or GLG 101 (or 103) or GPH 111; instructor approval.

ASM 450 Bioarchaeology. (3)

spring

Surveys archaeological and physical anthropological methods and theories for evaluating skeletal and burial remains to reconstruct biocultural adaptation and lifeways. Prerequisite: ASM 104 or instructor approval.

ASM 452 Dental Anthropology. (4)

fall

Human and primate dental morphology, growth, evolution, and genetics. Within- and between-group variation. Dental pathology and behavioral-cultural-dietary factors. 3 hours lecture, 3 hours lab. Prerequisite: instructor approval.

ASM 454 Comparative Primate Anatomy. (4)

spring

Functional anatomy of the cranial, dental, and locomotor apparatus of primates, including humans, emphasizing the relation of morphology to behavior and environment. 3 hours lecture, 3 hours lab, dissections, demonstrations. Prerequisite: instructor approval.

ASM 455 Primate Behavior Laboratory. (3)

selected semesters

Instruction and practice in methods of observation and analysis of primate behavior. Discussion of the relationship between class work on captive animals and field techniques for studying free-ranging groups. Directed readings, 6 hours lab. Prerequisites: ASM 343; instructor approval.

ASM 456 Infectious Disease and Human Evolution. (3)

once a year

Study of infectious disease and humanity, using evidence from anthropology, history, medicine, and ancient skeletons. Prerequisite: ASM 345.

ASM 472 Archaeological Ceramics. (3)

selected semesters

Analysis and identification of pottery wares, types, and varieties. Systems for ceramic classification and cultural interpretation. 2 hours lecture, 3 hours lab. Prerequisite: instructor approval.

ASM 548 Geoarchaeology. (3)

fall

Geologic context relevant to archaeological research. Topics include sediments, deposition environments, soils, anthropogenic and biogenic deposits, and quaternary chronology. Prerequisite: instructor approval.

ASM 555 Advanced Human Osteology. (3)

selected semesters

Laboratory and field techniques in dealing with the human skeleton. Emphasizes preparation, identification, radiography, sectioning, microscopy, and data processing. 1 hour lecture, 6 hours lab. Prerequisite: ASM 341 or instructor approval.

ASM 565 Quantitative Archaeology. (3)

spring

Formal methods of structuring, codifying, and analyzing data for archaeological problems. Designing research to yield data amenable to productive analysis.

ASM 566 Advanced Topics in Quantitative Archaeology. (3)

fall

Archaeological issues associated with quantitative analysis, e.g., Bayesian and Monte Carlo approaches, simulation, diversity. May be repeated for credit. Prerequisite: ASM 565 or instructor approval.

ASM 573 Lithic Analysis. (3)

selected semesters

Analysis and interpretation of chipped stone artifacts. Focuses on both techniques and underlying concepts and their application to real collections. Prerequisite: instructor approval.

ASM 591 Seminar. (1–12)

selected semesters

Selected topics in archaeology and physical anthropology. Topics may include the following:

- Bioarchaeology. (3)
- Evolution and Culture. (3)
- Interdepartmental Seminar. (3)
- Physical Anthropology. (3)
- Primates and Behavior. (3)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see “Omnibus Courses,” page 56.

Asian Languages and Civilizations— Chinese/Japanese

See “Department of Languages and Literatures,” page 291.

Asian Studies

Certificate Program

www.asu.edu/asian

480/965-7179

COOR 6668

Marie Osterman, Advisor

Graduate students in any discipline may pursue a Certificate in Asian Studies in conjunction with their degree programs. This program is also open to students who already hold graduate degrees or who are admitted as nondegree students. The graduate Certificate in Asian Studies offers graduate students an interdisciplinary specialization in Asian language and area studies. Students may pursue an East Asian or Southeast Asian track. The certificate requires the completion of 18 semester hours distributed among a language requirement, core course requirements, electives, and a thesis or capstone project on a topic related to East Asia or Southeast Asia. Some courses may be applied to both the certificate and the student’s degree program. For more information, contact the Asian Studies advisor in the Center for Asian Studies, COOR 6668, or call 480/965-7179.

Atmospheric Science

Interdisciplinary Certificate Program

geography.asu.edu/atmocert/

480/965-3051

SCOB 145

Anthony J. Brazel, Codirector, Executive Committee

Joseph A. Zehnder, Codirector, Executive Committee

Chemical and Materials Engineering

Assistant Professors: Allen, Dillner

Civil and Environmental Engineering

Assistant Professors: Allen, Dillner, Peccia

Geography

Professors: Balling, Brazel, Cerveny, Zehnder

Assistant Professor: Ellis

Geological Sciences

Regents’ Professors: Christensen, Greeley

Life Sciences

Professor: Klopatek

Associate Professor: Day

Mathematics and Statistics

Professors: Nicolaenko, Ringhofer

Associate Professors: Gelb, Lopez, Mahalov

Mechanical and Aerospace Engineering

Professors: Boyer, Fernando

Assistant Professor: Calhoun

The interdisciplinary certificate program in Atmospheric Science is administered by an Executive Committee composed of faculty from the Ira A. Fulton School of Engineering and the College of Liberal Arts and Sciences. The objective of this program is to recognize ASU graduate students who specialize in a thesis or dissertation topic related to the atmospheric or oceanic sciences.

A minimum of 16 semester hours consisting of three core courses and two electives, plus a capstone seminar (one semester hour), are required to complete the certificate. Students must also complete a dissertation on a topic related to the atmospheric or oceanic sciences under the supervision of a faculty member from one of the cooperating departments. A full description of the program is available on the Web at geography.asu.edu/atmocert.

Students qualify for admission to the certificate program by maintaining good standing in a cooperating department and completing an application specific to the Atmospheric Science Certificate. Admission is subject to approval of the Executive Committee.

For more information, access the program Web site, or call 480/965-3051.

Audiology

Doctoral Program

www.asu.edu/clas/shs/AuD

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

The Doctor of Audiology (AuD) degree program is designed to prepare audiologists for autonomous clinical practice. The clinical doctorate model at ASU stresses the integration of academic classroom learning and practical experience across a broad spectrum of clinical specialties and practice environments. The AuD program is designed for full-time students over a period of 45 months, including four fall and four spring semesters and three summers. The four-year course of study includes both academic and clinical practicum components. The AuD program requires a minimum of 101 semester hours, of which 66 are required academic credits provided through the Department of Speech and Hearing Science, and 35 are required clinical credits.

The AuD program is accredited by the Council on Academic Accreditation of the American Speech-Language-Hearing Association.

The Department of Speech and Hearing Science also offers the MS degree in Communication Disorders (see "Communication Disorders," page 259) and the PhD degree in Speech and Hearing Science (see "Speech and Hearing Science," page 328).

Admission Requirements. An applicant to the AuD program must hold a baccalaureate degree in Speech and Hearing Science or another discipline. All applicants must also have a cumulative GPA of 3.00 or higher and a GRE score of 1000 or higher (total of verbal and quantitative tests). Applicants are to submit official transcripts, GRE scores, three letters of recommendation, and a statement of intent containing evidence of proficiency in written communication. All application materials must be submitted to the Graduate Admissions office by January 15; enrollment begins in the fall semester only.

Graduation Requirements. Eligibility for graduation is based upon the following: achieving a passing score on a comprehensive written and/or oral examination administered midway through the program, successful completion of 66 semester hours of required academic course work, successful completion of 35 semester hours of clinical experiences, and achieving a passing score on the ASHA Praxis national certification examination in audiology.

COURSES

For courses, see "Speech and Hearing Science (SHS)," page 259.

Chemistry

Master's and Doctoral Programs

chemistry.asu.edu

480/965-4664

PS D102A

Petra Fromme, Assistant Chair for Graduate Studies

Regents' Professors: Angell, Buseck, Pettit

Professors: Allen, Blankenship, Fromme, Fuchs, Gust, Holloway, Kouvetakis, Lindsay, Lohr, A. Moore, T. Moore, Munk, Petuskey, Rose, Shock, Skibo, Steimle, Thorpe, Wang, Williams, Wolf, Woodbury

Associate Professors: Booksh, Gould, Hayes, Richert

Assistant Professors: Anbar, Caudle, Chaput, Chen, Francisco, Ghirlanda, Hartnett, Herckes, Levitus, Matyushov, Seo, Wachter, Yan, Yarger

The faculty in the Department of Chemistry and Biochemistry offer programs leading to the MS and the PhD degrees in Chemistry. Areas of concentration include analytical chemistry, biochemistry, geochemistry, inorganic chemistry, organic chemistry, physical chemistry, and solid-state chemistry.

The faculty also participate in offering programs leading to the Master of Natural Science degree when one of the concentrations is chemistry (see "Natural Science," page 309), and the interdisciplinary programs, leading to the PhD degrees with majors in Molecular and Cellular Biology (see "Molecular and Cellular Biology," page 301) and the Science and Engineering of Materials (see "Science and Engineering of Materials," page 326).

Students admitted to the Master of Education degree program with a major in Secondary Education may also elect chemistry as the subject matter field.

The graduate programs offered by the faculty in the Department of Chemistry and Biochemistry prepare students for professional careers in chemistry and related fields in industry, government, and educational institutions. All

COLLEGE OF LIBERAL ARTS AND SCIENCES

students applying for admission to one of these programs must submit scores for the Graduate Record Examination.

MASTER OF SCIENCE

See "Master's Degrees," page 67, for general requirements.

Program of Study. A minimum of 30 semester hours of credit is required. A thesis carrying six semester hours is also included in the total. The remaining courses are selected by the student in consultation with the supervisory committee.

Thesis Requirements. A thesis is required.

Final Examinations. A general oral examination is required of all candidates for the master's degree. A written examination may also be required.

DOCTOR OF PHILOSOPHY

See "Doctor of Philosophy," page 69, for general requirements.

Program of Study. A minimum of 84 semester hours, including dissertation, is required. Approximately 20 to 30 hours of this total is formal course work. Courses, including research and dissertation, are selected by the student in consultation with the supervisory committee.

Oral/Written Examinations. An examination is required that includes a written and oral report of current research, and an original research proposal prepared by the student.

Foreign Language Requirements. There is no departmental foreign language requirement.

Dissertation Requirements. A dissertation based on original work of high quality and demonstrating proficiency in the student's special field is required. (See "Research and Dissertation Requirements," page 70.)

Final Examination. The final oral examination is a defense of the dissertation, during which the candidate presents a summary of the dissertation research. Evidence of a publishable contribution of original research must be presented.

BIOCHEMISTRY (BCH)

BCH 461 General Biochemistry. (3)

fall and spring

Structure, chemistry, and metabolism of biomolecules and their role in the biochemical processes of living organisms. Credit is allowed for only BCH 461 or 361. Prerequisite: CHM 318 or 332. Corequisite: CHM 341 or 346.

BCH 462 General Biochemistry. (3)

spring

Continuation of BCH 461. Prerequisite: BCH 461 or instructor approval.

BCH 463 Biophysical Chemistry. (3)

spring

Principles of physical chemistry as applied to biological systems. Prerequisite: CHM 341 or 346.

BCH 465 Protein and Nucleic Acid Biochemistry. (3)

spring

Structure and function of proteins and nucleic acids, including protein folding, enzymology, proteomics, DNA/RNA structure, replication, transcription, and genomics. Prerequisite: BCH 462 or instructor approval.

BCH 467 Analytical Biochemistry Laboratory. (3)

fall and spring

Quantitative analysis, separation and purification of biological molecules. Applies chemical and physical methods to the characterization of biological macromolecules. 1 conference, 1 hour lecture, 5 hours lab. Prerequisite: BCH 461. Corequisite: BCH 462.

BCH 501 Current Topics in Biochemistry. (1)

fall and spring

May be repeated for credit. Seminar. Prerequisite: instructor approval.

BCH 561 Advanced Topics in Biochemistry. (3)

spring

Topics selected from emerging areas of biochemistry based primarily on current literature. Prerequisite: BCH 462.

BCH 563 Biophysical Chemistry. (3)

selected semesters

Physical chemistry of macromolecules, especially proteins, nucleic acids, and polysaccharides. Thermodynamics, hydrodynamics, and spectroscopy of and their relation to structure. Prerequisites: BCH 462; CHM 346.

BCH 568 Molecular Mechanisms of Photosynthesis. (3)

spring

Structure and function of photosynthetic complexes; mechanism of energy conversion in plants, bacteria, and model systems. Cross-listed as PLB 558. Credit is allowed for only BCH 568 or PLB 558. Prerequisite: instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

CHEMISTRY (CHM)

CHM 424 Separation Science. (3)

selected semesters

Basic theory and practical aspects of gas, liquid, ion-exchange, and gel-permeation chromatographies, and other important industrial and research techniques. 2 hours lecture, 4 hours lab. Fee. Prerequisite: CHM 318 or 332 or 346 or instructor approval.

CHM 431 Qualitative Organic Analysis. (3)

spring

Systematic identification of organic compounds. 1 hour lecture, 6 hours lab. Fee. Prerequisites: both CHM 118 (or 327) and 320 (or 336) or only instructor approval.

CHM 435 Medicinal Chemistry. (3)

spring

Principles of medicinal and pharmaceutical chemistry. Drug design, synthesis, and mechanism of action. Prerequisites: a combination of BCH 361 (or 461) and BIO 353 and CHM 318 (or 332) or only instructor approval.

CHM 452 Inorganic Chemistry Laboratory. (1–2)

spring

Preparation and characterization of typical inorganic substances, emphasizing methods and techniques. 1 conference, 5 hours lab. Fee. Prerequisite: instructor approval.

CHM 453 Inorganic Chemistry. (3)

fall

Principles and applications of inorganic chemistry. Prerequisite: CHM 341 or 346.

CHM 460 Biological Chemistry. (3)

spring

Structure and function of macromolecules and their involvement in the processing of energy and information by living cells. Prerequisites: CHM 318, 346, 453.

CHM 471 Solid-State Chemistry. (3)

fall

Crystal chemistry, thermodynamics and electrochemistry of solids, nonstoichiometric compounds, diffusion and solid-state reactions, crystal growth, and selected topics. Pre- or corequisite: CHM 346 or instructor approval.

CHM 480 Methods of Teaching Chemistry. (3)

spring

Organization and presentation of appropriate content of chemistry; preparation of reagents, experiments, and demonstrations; organization of stock rooms and laboratories; experience in problem solving. Fee. Prerequisite: instructor approval.

CHM 481 Geochemistry. (3)*spring*

Origin and distribution of the chemical elements. Geochemical cycles operating in the earth's atmosphere, hydrosphere, and lithosphere. Cross-listed as GLG 481. Credit is allowed for only CHM 481 or GLG 481. Prerequisite: CHM 341 (or 346) or GLG 321.

CHM 483 Astrobiology. (3)*fall and spring*

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

CHM 485 Meteorites and Cosmochemistry. (3)*selected semesters*

Chemistry of meteorites and their relationship to the origin of the earth, solar system, and universe. Cross-listed as GLG 485. Credit is allowed for only CHM 485 or GLG 485.

CHM 494 Special Topics. (1–4)*selected semesters*

Topics may include the following:

- Chemistry of Global Climate Change. (3)

CHM 501 Current Topics in Chemistry. (1)*fall and spring*

May be repeated for credit. Prerequisite: instructor approval.

CHM 521 Chemometrics. (3)*selected semesters*

Overview of chemometric tools in analytical chemistry, including multivariate calibration, spectral deconvolution, and experimental design. 2 hours lecture, 4 hours lab.

CHM 523 Advanced Analytical Chemistry. (3)*once a year*

Theoretical principles of analytical instrumentation and measurements. Prerequisites: both CHM 325 and 346 or only instructor approval.

CHM 524 Separation Science. (3)*selected semesters*

Addresses principles and applications for all areas of chemical separations. Emphasizes separations principles in microfluidics and its interface with nanotechnology and traditional electronic materials. 2 hours lecture, 4 hours lab.

CHM 525 Analytical Spectroscopy. (4)*spring*

Theoretical and practical considerations involving the use of optical instruments for chemical analyses. 3 hours lecture, 3 hours lab. Prerequisite: CHM 346 or instructor approval.

CHM 526 X-Ray Methods of Analysis. (4)*selected semesters*

Theoretical and practical considerations involving the use of x-ray diffraction and spectroscopy for chemical and structural analyses. 3 hours lecture, 3 hours lab. Prerequisite: CHM 346.

CHM 527 Electroanalytical Chemistry. (4)*selected semesters*

Theoretical and practical considerations for modern electroanalytical chemistry, including voltammetry, potentiometry, and microelectrode analysis. 2 hours lecture, 6 hours lab. Prerequisite: CHM 346.

CHM 531 Advanced Organic Chemistry I. (3)*fall*

Reaction mechanisms, reaction kinetics, linear free energy relationships, transition state theory, molecular orbital theory, and Woodward-Hoffmann rules. Prerequisites: CHM 318 (or 332), 346.

CHM 532 Advanced Organic Chemistry II. (3)*spring*

Organic mechanisms, thermodynamic and kinetic control, structure/activity relationships, isotope effects, multistep reactions, reactive intermediates, radical reactions, electron transfer. Prerequisite: CHM 531.

CHM 535 Medicinal Chemistry. (3)*spring*

Principles of medicinal and pharmaceutical chemistry. Drug design, synthesis, and mechanism of action. Prerequisites: a combination of

BCH 361 (or 461) and BIO 353 and CHM 318 (or 332) or only instructor approval.

CHM 537 Organic Reactions. (3)*spring*

Organic synthetic methodologies and important synthetic reactions emphasizing recently discovered reactions of preparative value. Protection/deprotection synthetic strategies; peptide synthesis. Prerequisite: CHM 531.

CHM 541 Advanced Thermodynamics. (3)*fall*

Equilibrium thermodynamics. Chemical reactions, phase equilibria, and stability in multicomponent systems. Aqueous solutions and electrochemistry. Introduction to statistical thermodynamics. Prerequisite: CHM 346.

CHM 543 Computational Chemistry. (3)*selected semesters*

Provides basic concepts and practical experience in computational chemistry. Covers electronic structure methods and computer simulation techniques. Prerequisite: CHM 345 or 545.

CHM 545 Quantum Chemistry. (3)*spring*

Wave and matrix formulation of quantum mechanics applied to the vibrational, rotational, and electronic states of polyatomic molecules. Hartree-Fock, electron correlation, and molecular orbital theory. Selection rules and introduction to group theory. Prerequisite: CHM 346.

CHM 546 Molecular Spectroscopy and Group Theory. (3)*spring*

Applies quantum mechanics to the general problem of the interaction of light with molecular systems. Angular momentum and group theory. Symmetry classifications. Overview of the formalism and experimental techniques in different resonant-based spectroscopies. Prerequisite: CHM 545.

CHM 548 Chemical Kinetics and Dynamics. (3)*spring in odd years*

Experimental and theoretical aspects of time-dependent processes in chemical kinetics. Topics include kinetics of chemical reactions, diffusion, and relaxation phenomena in ordered and disordered materials. Prerequisite: CHM 545.

CHM 549 Advanced Topics in Physical Chemistry. (3)*selected semesters*

Various advanced and special topics in physical chemistry. Previous topics included: supercooled liquids and the glass transition, vibrational spectroscopy of solids, phase transitions and critical phenomena. May be repeated for credit. Prerequisite: CHM 345 or 545.

CHM 552 Advanced Inorganic and Materials Synthesis Laboratory. (2)*fall*

Preparation and characterization of inorganic compounds and materials, emphasizing advanced methods and techniques of importance in inorganic and materials chemistry. Schlenk-line and glovebox manipulations, solvothermal syntheses, and gas-phase reactions. Lab. Prerequisites: CHM 345; instructor approval. Pre- or corequisite: CHM 453 or instructor approval.

CHM 553 Advanced Inorganic Chemistry. (3)*fall*

Principles of modern inorganic chemistry applied over the entire periodic system. Bonding theory, chemical reactivity, spectroscopic and magnetic properties. Prerequisites: CHM 345, 346, 453.

CHM 571 Structure, Bonding, and Symmetry in Materials. (3)*fall*

Principles of structural and materials chemistry, emphasizing crystal chemistry. Symmetry of periodic structures (space groups), factors determining bond lengths and coordination geometries, and the role of structure in determining physical properties.

CHM 579 Topics in Inorganic and Materials Chemistry. (3)*selected semesters*

Various advanced and special topics in inorganic and materials chemistry. May be repeated for credit. Prerequisite: instructor approval.

CHM 582 Topics in Geochemistry and Cosmochemistry. (3)*selected semesters*

Topics of current interest for students in chemistry and other fields. Sampling of data and thought concerning phase equilibria, element

COLLEGE OF LIBERAL ARTS AND SCIENCES

distribution, meteorites, the Earth, and other planets. May be repeated for credit. Prerequisite: instructor approval.

CHM 583 Phase Equilibria and Geochemical Systems. (3) *selected semesters*

Natural reactions at high temperatures and pressures; silicate, sulfide, and oxide equilibria. Prerequisite: instructor approval.

CHM 593 Applied Project. (1–12) *selected semesters*

Topics may include the following:

- Glass Blowing Fee.

CHM 598 Special Topics in Organic Chemistry. (1–4) *selected semesters*

Topics may include the following:

- Biological Photochemistry. (3)
Photochemistry and photophysics of pigment molecules. Emphasizes photobiological processes. Topics may include: dipole transition moment, electronic structure and relaxation of excited states, time-resolved spectroscopy, excimers, charge-transfer complexes and exciplexes, photoinduced energy and electron transfer, photoisomerization in vision, photochemistry of DNA.
- Bioorganic Chemistry. (3)
- Organic Photochemistry. (3)
- Organic Problems. (3)
- Special Topics in Organic Chemistry. (3)

fall

Two topics selected from and rotating among the following: NMR spectroscopic techniques as applied to organic problems, medicinal chemistry, bioorganic chemistry, organic photochemistry, and supramolecular chemistry.

- Supramolecular Chemistry. (3)

May be repeated for credit. Prerequisite: instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

tive interactions. Teaching, research, and service are directed to the continued development of knowledge and application of the principles of communication. Courses of study are designed to provide students with relevant programs adapted to individual academic and professional goals.

MASTER OF ARTS

Faculty in the Hugh Downs School of Human Communication offer a program leading to the MA degree in Communication. Current areas of study within the major are intercultural communication, interpersonal communication, performance studies, organizational communication, and rhetorical studies.

Admission Requirements. Admission is competitive, based upon evidence of the applicant's scholarly and research abilities. All applicants must submit the following:

1. a Division of Graduate Studies application, completed either online or on paper, along with official undergraduate and graduate transcripts;
2. a statement of professional goals (approximately 500 words);
3. Graduate Record Examination scores (verbal, quantitative, and analytical writing) taken within the past five years, plus other relevant test data provided by the applicant;
4. three letters of recommendation prepared within the preceding 12 months;
5. a writing sample; and
6. all applicants whose native language is not English must submit TOEFL scores; minimum scores are 600 on the paper and pencil version of this test or 250 on the computer version of this test.

A completed application for admission and official transcripts of all undergraduate and graduate work must be submitted to the Graduate Admissions Office. See "Admission to the Division of Graduate Studies," page 58, for Division of Graduate Studies general requirements. All application materials must be received by February 1. Late applications cannot be considered.

Program of Study. The program consists of a minimum of 30 semester hours of graduate course work, which includes six semester hours of thesis credit. All students must successfully complete the following:

1. COM 501 Research Methods in Communication with a minimum grade of "B" (3.00);
2. COM 504 Theories and Models in Communication with a minimum grade of "B" (3.00);
3. at least one of the following three courses: COM 508 Quantitative Research Methods in Communication, COM 509 Qualitative Research Methods in Communication, or COM 521 Rhetorical Criticism of Public Discourse with a minimum grade of "B" (3.00);
4. at least three content seminars;

Communication

Master's Program

asu.edu/clas/communication/masters

480/965-5096

STAUF A412

**Harold Goodall, Director, Hugh Downs School
of Human Communication**

Kory Floyd, Director of the Master's Program

Professors: Alberts, Broome, Canary, Carlson, Corman, Guerrero, Jain, Martin, McPhee, Mongeau, Nakayama

Associate Professors: Corey, Davey, Davis, De la Garza, Floyd, Martinez, Mayer, Trethewey

Assistant Professors: Brouwer, Messman, Park-Fuller, Tracy

Instructional Professional: Olson

Assistant Instructional Professional: McDonald

The Hugh Downs School of Human Communication strives to advance the understanding of message-related human behavior, for the purpose of improving communica-

5. a written comprehensive examination on theory and methodology, and an area of study (an oral examination may be required); and
6. a thesis, which is an account of original research, and an oral examination in defense of the thesis.

Applicants with undergraduate deficiencies must remove them, and these courses do not count toward the master's degree. The student's program of study is the mutual responsibility of the student and the supervisory committee. A foreign language is not required but is encouraged. Descriptions of current program options and requirements are available from the school office, STAUF A412.

RESEARCH ACTIVITY

Both applied and theoretical research are an integral part of the master's and doctoral degree programs in Communication. The general areas of study include intercultural communication, interpersonal communication, organizational communication, performance studies, and rhetoric. A variety of metatheoretical approaches are used for studying communication issues, including traditional social science perspectives as well as interpretive and critical approaches. Various methodologies are employed, including quantitative methods such as surveys and questionnaires, ethnographic methods such as interviewing and participant observation, and discourse and textual analyses. Attention is also given to the integration of theory and practice.

For more information, visit the school's Web site at www.asu.edu/clas/communication.

HUGH DOWNS SCHOOL OF HUMAN COMMUNICATION (COM)

For more COM 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 COM 400 CIP: Communication in Professions. (3)

fall, spring, summer

Specialized study of communication processes in professional and organizational settings. Open to BIS majors only. May be repeated for credit. Lecture, discussion. Prerequisites: both COM 100 and 225 or only COM 259; minimum ASU cumulative GPA of 2.00.

M COM 404 Research Apprenticeship. (3)

fall and spring

Direct research experience on faculty projects. Student/faculty match based on interests. Lecture, apprenticeship. Prerequisites: COM 308 (or instructor approval); minimum ASU cumulative GPA of 2.50; application required.

M COM 407 Advanced Critical Methods in Communication. (3)

fall, spring, summer

Examines critical approaches relevant to communication, including textuality, social theory, cultural studies, and ethnography. Lecture, discussion. Prerequisites: COM 308; minimum ASU cumulative GPA of 2.50.

M COM 408 Quantitative Research Methods in Communication. (3)

fall and spring

Advanced designs, measurement techniques, and methods of data analysis of communication research. Prerequisites: COM 308 and a course in generic statistics (EDP 454 or POS 401 or PSY 230 or QBA 221 or SOC 390 or STP 226); minimum ASU cumulative GPA of 2.50.

M COM 410 Interpersonal Communication Theory and Research. (3)

fall, spring, summer

Survey and analysis of major research topics, paradigms, and theories dealing with message exchanges between and among social peers. Prerequisites: COM 110 (or 310), 308; minimum ASU cumulative GPA of 2.50.

M COM 411 Communication in the Family. (3)

once a year

Broad overview of communication issues found in marriage and family life, focusing on current topics concerning communication in the family. Prerequisites: COM 110 (or 310), 207; minimum ASU cumulative GPA of 2.50.

M COM 414 Crisis Communication. (3)

selected semesters

Role of communication in crisis development and intervention. Prerequisite: minimum ASU cumulative GPA of 2.50.

M COM 421 Rhetoric of Social Issues. (3)

fall and spring

Critical rhetorical study of significant speakers and speeches on social issues of the past and present. Prerequisites: COM 308, 321 (or 323).

M COM 422 Advanced Argumentation. (3)

selected semesters

Advanced study of argumentation theories and research as applied to public forum, adversary, scholarly, and legal settings. Prerequisites: COM 222; minimum ASU cumulative GPA of 2.50.

M COM 426 Political Communication. (3)

fall

Theories and criticism of political communication, including campaigns, mass persuasion, propaganda, and speeches. Emphasis on rhetorical approaches. Prerequisite: minimum ASU cumulative GPA of 2.50.

M COM 430 Leadership in Group Communication. (3)

selected semesters

Theory and process of leadership in group communication, emphasizing philosophical foundations, contemporary research, and applications to group situations. Prerequisites: COM 230; minimum ASU cumulative GPA of 2.50.

M COM 441 Performance Studies. (3)

fall, spring, summer

Theory, practice, and criticism of texts in performance. Emphasis on the interaction between performer, text, audience, and context. Prerequisites: COM 241, 308; minimum ASU cumulative GPA of 2.50.

M COM 442 Identity, Performance, and Human Communication. (3)

selected semesters

Explores communication dimensions of self and others as performance. Examines topics that include gender, race, sexuality, age, and ethnicity through performance. Lecture, workshops. Prerequisites: COM 225 (or 241); minimum ASU cumulative GPA of 2.50.

M COM 445 Narrative Performance. (3)

selected semesters

Theory and practice of performing narrative texts (e.g., prose fiction, oral histories, diaries, essays, letters). Includes scripting, directing, and the rhetorical analysis of storytelling. Prerequisites: COM 241; minimum ASU cumulative GPA of 2.50.

M COM 446 Performance of Literature Written by Women. (3)

selected semesters

Explores, through performance and critical writing, literature written by women. Prerequisite: minimum ASU cumulative GPA of 2.50.

M COM 450 Theory and Research in Organizational Communication. (3)

fall, spring, summer

Critical review and analysis of the dominant theories of organizational communication and their corollary research strategies. Prerequisites: COM 250, 308; minimum ASU cumulative GPA of 2.50.

M COM 453 Communication Training and Development. (3)

once a year

Examines the procedures and types of communication training and development in business, industry, and government. Prerequisites: COM 250; minimum ASU cumulative GPA of 2.50.

COLLEGE OF LIBERAL ARTS AND SCIENCES

M COM 463 Intercultural Communication Theory and Research. (3)

fall, spring, summer

Surveys and analyzes major theories and research dealing with communication between people of different cultural backgrounds, primarily in international settings. Lecture, discussion, small group work. Prerequisites: COM 263, 308; minimum ASU cumulative GPA of 2.50.

M COM 465 Intercultural Communication Workshop. (3) *selected semesters*

Experientially based study of communication between members of different cultures designed to help improve intercultural communication skills. Prerequisites: minimum ASU cumulative GPA of 2.50; instructor approval.

M COM 494 Special Topics. (1–3)

fall, spring, summer

Prerequisite: minimum ASU cumulative GPA of 2.50.

M COM 501 Research Methods in Communication. (3)

fall

Critical analysis of systems of inquiry in communication, focusing on the identification of variables and approaches to conducting research in communication. Prerequisite: instructor approval.

M COM 504 Theories and Models in Communication. (3)

fall

Theory construction, metatheoretical concerns, models, construct definition, and comparative analysis of current theories in communication. Prerequisite: instructor approval.

M COM 508 Quantitative Research Methods in Communication. (3)

fall

Empirical research designs, measurements, and statistical strategies and techniques in analyzing and evaluating experimental and descriptive research in communication. Prerequisites: both COM 501 and 504 or only instructor approval.

M COM 509 Qualitative Research Methods in Communication. (3) *spring*

Qualitative research methods, including interviewing, field methods, and other nonquantitative techniques for analyzing communication. Prerequisites: both COM 501 and 504 or only instructor approval.

M COM 521 Rhetorical Criticism of Public Discourse. (3)

selected semesters

History and significance of rhetorical theory and criticism in the analysis of public discourse. Prerequisites: both COM 501 and 504 or only instructor approval.

M COM 584 Communication Internship. (1–12)

fall, spring, summer

Fee.

M COM 604 Theory Construction in Communication. (3)

fall

Review and analysis of philosophical problems inherent in communicative research and of metatheories designed to deal with these problems. Prerequisite: COM 504 or instructor approval.

M COM 607 Contemporary Rhetorical Methods. (3)

spring

Analysis of issues in the practice of rhetorical communication research, including criticism and scholarship. Seminar.

M COM 608 Multivariate Statistical Analysis of Data in Communication. (3)

spring

Statistical analysis of communication research data. Multivariate procedures used in communication research and methods of causal analysis. Prerequisites: COM 501 and 508 (or their equivalents).

M COM 609 Advanced Qualitative Research Methods in Communication. (3)

fall

Analysis of issues in the practice of qualitative communication research, including data gathering, fieldwork issues, analysis strategies, and reporting results. Prerequisite: COM 509 or instructor approval.

M COM 691 Seminar. (1–12)

fall, spring, summer

Lecture, discussion. Topics may include the following:

- Current Organizational Approaches to Communication. (3)
- Intercultural Aspects of Communication. (3)

- Interpersonal and Relational Communication. (3)
- Research in Performance Studies. (3)
- Rhetorical Issues. (3)
- Social Influence. (3)

Prerequisite: instructor approval.

M COM 792 Research. (1–12)

selected semesters

Topics may include the following:

- Prospectus/Dissertation Practicum. (3)
- Seminar Assistant. (3)

M COM 799 Dissertation. (1–15)

selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Communication

Interdisciplinary Doctoral Program

asu.edu/clas/communication/doctoral

480/965-5096

STAUF A412

**H. L. "Bud" Goodall, Director, Hugh Downs School
of Human Communication**

Paul A. Mongeau, Director, Doctoral Program

Community Resources and Development

Professor: Allison

Educational Leadership and Policy Studies

Associate Professor: Margolis

English

Professors: Roen, Miller

Associate Professor: Goggin

Family and Human Development

Professors: Christopher, Fabes

Human Communication

Professors: Alberts, Broome, Canary, Carlson, Corman,
Guerrero, Jain, Martin, McPhee, Mongeau, Nakayama

Associate Professors: Corey, Davey, Davis, De la Garza,

Floyd, Martinez, Mayer, Trethewey

Assistant Professors: Brouwer, Messman, Park-Fuller, Tracy

Journalism and Mass Communication

Professor: Godfrey

Justice and Social Inquiry

Regents' Professor: Altheide

Professors: Johnson, Romero

DOCTOR OF PHILOSOPHY

The Committee of Faculty offers an interdisciplinary graduate program leading to the PhD degree in Communication. Concentrations are available in communicative development, intercultural communication, and organizational communication.

The program is housed in the Hugh Downs School of Human Communication and is designed to prepare scholars for research-oriented careers in universities and in the public or private sectors. Students are provided training in communication theory, research methodology, and a specialization in one or more areas of concentration. The goal of the program is to meet the needs of students whose interests transcend traditional disciplinary boundaries.

See “Doctor of Philosophy,” page 69, for general requirements.

Admission Requirements. Admission to the program is competitive. Applications are considered once a year for fall admission with a supplemental admission deadline late in the spring term. Applicants must have earned either a bachelor’s or master’s degree and must present evidence of scholarly writing (e.g., an undergraduate honors thesis, a master’s thesis, or their equivalent). All applicants should be knowledgeable in the basic principles of both qualitative and quantitative methods of research, social statistics, and communication theory. If course work in these areas has not been completed, admitted students are required to successfully complete COM 501 Research Methods in Communication and COM 504 Theories and Models in Communication (plus any other courses stipulated by the admissions committee) before enrolling in the required theory and methodology sequence. Knowledge in statistics must be demonstrated either by completion of a graduate-level statistics course within two years before admission to the program, by completion of COM 508 within the first two years of course work, or by some other option approved by the director of the doctoral program. In addition to meeting the minimum Division of Graduate Studies admission requirements, the applicant’s scholastic and professional record must indicate special interest in and aptitude for systematic research in communication. All applicants must submit the following:

1. a completed Division of Graduate Studies application and official undergraduate and graduate transcripts;
2. a formal *curriculum vitae*, including a statement of career goals and the relevance of this degree program to those goals;
3. Graduate Record Examination (GRE) scores (verbal, quantitative, and analytical writing) taken within the past five years, plus other relevant test data volunteered by the applicant;
4. three letters of recommendation written within the preceding 12 months, including at least one letter from a previous faculty member;
5. a sample of writing (e.g., master’s thesis, course paper); and
6. a minimum score of 600 on the Test of English as a Foreign Language for all applicants whose native language is not English.

All application materials must be in the program office by January 15 to be considered. Late applications are processed once late in the spring term.

Supervisory/Dissertation Committee. This committee consists of a chair and at least two other members appointed

by the dean of graduate studies based upon the director’s recommendation. At least two-thirds of the committee must be full-time faculty at the Tempe campus and at least two-thirds of the committee must be from the communication faculty. At least one member must be from an academic discipline outside of communication. The chair of the supervisory committee, who serves as the student’s advisor, must be knowledgeable in the student’s area of concentration, have an active research agenda, publish regularly in appropriate refereed academic journals, and be experienced in graduate education. Members of the committee must represent more than one academic discipline. The purpose of the committee is to guide the student through the completion of the program of study, the comprehensive examinations, and the dissertation research.

Areas of Concentration. Students admitted to the program select a formal area of concentration in any of the three broad areas of communicative development, intercultural communication, and organizational communication. However, the interdisciplinary nature of the program and breadth of its faculty allow students to design individual programs of study geared toward more specialized topics in human communication. As a rule, these cut across the formal areas of concentration and generally follow the areas of expertise of program faculty. Program graduates study areas such as interpersonal communication, organizational communication, performance studies, rhetoric, critical/cultural studies, relational communication, and information technology. Because of the interdisciplinary nature of the PhD program, students may explore relevant course work in disciplines such as communication, social and development psychology, family studies, educational psychology, cultural anthropology, comparative sociology, linguistics, justice studies, industrial psychology, management, and public administration, among others. Contact the director for an up-to-date list of program faculty and their areas of interest.

Communicative Development. The communicative development emphasis includes three distinct specialty areas: interpersonal communication, performance studies, and rhetoric/public communication. *Interpersonal communication* refers to the exchange of messages between people in a variety of contexts, most of which concern relational aspects of communication. *Performance studies* focuses on activism and advocacy through performance with special emphasis on contemporary issues related to diversity, justice, sexuality, health, and other social and cultural concerns. *Rhetoric/public communication* considers how discourses function persuasively as social, cultural and political phenomena, and a variety of discourses are engaged, including social movements, political campaigns, legal argument, and popular culture.

Intercultural Communication. Intercultural communication focuses on the theoretical and conceptual relationships between culture and communication.

Organizational Communication. Organizational communication focuses on the conditions, impacts, and implications of communicative processes and systems for both public and private sector organizations.

COLLEGE OF LIBERAL ARTS AND SCIENCES

Program of Study. If the student has completed an appropriate master's degree, the PhD requires a minimum of 66 hours beyond the master's degree. Course work for a typical program of study is distributed as follows: required core courses (9 semester hours), area of concentration (33 semester hours), dissertation (COM 799) and research (COM 792) (24 semester hours) for a total of 66 hours (minimum). Up to 12 semester hours of research (COM 792) may be taken before admission to candidacy. Three interdisciplinary theory and methodology courses are required of all students entering the program. The required theory course is COM 604 Theory Construction in Communication. Students are required to take three semester hours of COM 792 R: Prospectus/Dissertation Practicum and three semester hours of COM 792 R: Seminar Assistant. In addition, students must take two of the three methods courses, which consist of COM 607 Contemporary Rhetorical Methods, COM 608 Multivariate Statistical Analysis of Data in Communication, and COM 609 Advanced Qualitative Research Methods in Communication.

The student is also required to demonstrate proficiency in research methods (statistics, computer languages, content analysis methods, participant observation, etc.) which, in the judgment of the supervisory committee, is needed for the student's dissertation research. Evidence of required proficiency may be demonstrated by established university examination procedures or by successful completion of a sequence of courses designated by the student's program committee.

For students who have completed only the bachelor's degree before admission to the PhD program, a minimum of 90 hours of interdisciplinary graduate work is required for the program, including the same 66-hour requirement for students with the master's degree. The initial course work for students admitted with only a bachelor's degree is similar to the MA degree requirements in Communication except that no thesis is required. These requirements include a general overview of research in communication (COM 501), an overview of theories and models of communication (COM 504), a statistics course (COM 508), and electives from communication or other disciplines to total 24 hours of course work. The methods, theory, and statistics courses must be completed before beginning the required theory and methodology sequence for the PhD (i.e., they are prerequisites for the required courses).

Foreign Language Requirements. None.

Comprehensive Examination. Upon completion of course work and before the formal approval of the dissertation proposal, the student is examined in the relevant area of concentration and research methods. The examination consists of written and oral components designed to test the student's interdisciplinary knowledge in the field and chosen

area of concentration and the student's readiness to undertake interdisciplinary dissertation research. The examination is conducted by the student's supervisory committee.

Admission to Candidacy. After the student has passed both the written and oral portions of the comprehensive examination and the student's dissertation topic has been approved, the student may apply to the Division of Graduate Studies for admission to candidacy. Before admission to candidacy, it is expected that students have completed a mixture of academic experiences, including formal course work, participation in doctoral seminars, research with faculty, and independent research that are related to the topic of the dissertation and lead up to the dissertation. It is also expected that students have been exposed to both quantitative and qualitative methods of research before candidacy. No dissertation hours (COM 799) may be taken before admission to candidacy, but research hours (COM 792) may be taken before admission to candidacy. Students must enroll for 12 hours of dissertation (COM 799) credit following the semester in which they are advanced to candidacy.

Dissertation Proposal. Before conducting the research for the dissertation, each student must submit a dissertation proposal that is defended orally and approved by the student's dissertation committee.

Research and Dissertation. The dissertation consists of a fully documented written analysis of a problem that extends the knowledge and/or theoretical framework of the field and reflects the student's creativity and competence in independent, interdisciplinary research using an appropriate research methodology.

Final Examination. An oral examination in defense of the dissertation, conducted by the dissertation committee, is required.

RESEARCH ACTIVITY

Both applied and theoretical research are an integral part of the master's and doctoral degree programs in Communication. The general areas of study include intercultural communication, interpersonal communication, organizational communication, performance studies, and rhetoric. A variety of metatheoretical approaches are used for studying communication issues, including traditional social science perspectives as well as interpretive and critical approaches. Various methodologies are employed, including quantitative methods such as surveys and questionnaires, ethnographic methods such as interviewing and participant observation, and discourse and textual analyses. Attention is also given to the integration of theory and practice. For more information, visit the school's Web site at asu.edu/clas/communication/research.

Communication Disorders

Master's Program

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

MASTER OF SCIENCE

The faculty in the Department of Speech and Hearing Science offer a program leading to the MS degree in Communication Disorders. Thesis and nonthesis degree options are available. The speech-language pathology program is accredited by the Council on Academic Accreditation of the American Speech-Language-Hearing Association. The Department of Speech and Hearing Science also offers the Doctor of Audiology degree and the PhD degree.

Admission Requirements. Students applying for admission to this program should have their undergraduate transcripts, Graduate Record Examination scores, a statement of professional and academic goals not to exceed 200 words, and three letters of recommendation mailed to the Graduate Admissions Office. All materials must be received by January 15 for fall admission, which is the only term in which students may begin their program of study. Candidates who have undergraduate deficiencies may need to take required prerequisite courses.

Academic Requirements. A student must complete 37 semester hours of graduate course work, exclusive of credit for practicum, as approved by the supervisory committee.

Clinical Requirements. A student in the MS program must complete at least 375 clock hours of supervised clinical practicum experience, plus 25 observation hours. A minimum of 325 clock hours must be obtained at the graduate level.

Thesis Option. Students wishing to pursue the thesis option must complete 37 semester hours of course work, six hours of which must be thesis credit, excluding practicum and internship hours. The thesis must meet requirements established by the Division of Graduate Studies.

Nonthesis Option. Students choosing the nonthesis option must complete 37 semester hours of course work, excluding practicum and internship hours.

Final Examinations. For a candidate for the MS degree (thesis option), two final examinations are required: (1) the ASHA Praxis national certification examination in speech-language pathology, and (2) an oral defense of the thesis. For a candidate for the MS degree (nonthesis option), two final examinations are required: (1) the ASHA Praxis national certification examination in speech-language pathology, and (2) a four-hour comprehensive written examination administered in October and March of each year by the departmental graduate faculty.

Students should expect to spend two years completing the academic, practicum, and research requirements for either degree option.

RESEARCH ACTIVITY

The Department of Speech and Hearing Science conducts active research programs, many federally funded, in a broad range of areas of speech, language, and hearing. Specific topics include early intervention studies, normal and disordered language acquisition, adult language disorders, cochlear implants, pediatric amplification, psychoacoustics, and speech perception. Research interests of individual faculty members may be found on the department's Web site at www.asu.edu/clas/shs.

SPEECH AND HEARING SCIENCE (SHS)

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).

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 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).

COLLEGE OF LIBERAL ARTS AND SCIENCES

SHS 500 Research Methods in Communication Disorders. (3)

spring

Surveys research methods in areas related to speech, language, and hearing.

SHS 501 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 501 or 401. Lecture, discussion, case studies. Prerequisites: both SHS 311 and 376 or only instructor approval.

SHS 502 Basic Audiometry. (4)

fall or spring

Covers the bases, purposes, rationales, and procedures for the core clinical tests of auditory function in adults and children. Lecture, lab, discussion, case studies, student presentations. Pre- or corequisite: SHS 513 or instructor approval.

SHS 504 Amplification I. (4)

fall or spring

Operation, electroacoustic measurement, selection, and prescriptive fitting of amplification devices. Lecture, lab, discussion, case studies, guest lecturers, seminar, student presentations. Prerequisites: a combination of SHS 502 and 513 and 515 or only instructor approval.

SHS 505 Survival Sign Language. (2)

fall or spring

Facilitates effective manual and alternative methods of communication with deaf individuals in clinical settings. Discussion, case studies, demonstrations, interactive, student presentations.

SHS 508 Pediatric Audiology. (3)

fall or spring

Emphasizes the principles and procedures for early identification and management of congenital and early-onset hearing loss. Lecture, discussion, case studies, seminar, student presentations. Prerequisite: SHS 502 or instructor approval.

SHS 510 Amplification II. (4)

fall or spring

Verification and validation of hearing aid performance, benefit, and satisfaction. Fitting considerations for pediatric and geriatric populations. Lecture, lab, discussion, case studies, guest lecturers, seminar, student presentations. Prerequisites: a combination of SHS 502 and 504 and 513 and 515 or only instructor approval.

SHS 511 Psychoacoustics of Hearing Impairment. (3)

fall or spring

Psychophysical methods and behavioral aspects of hearing, with an emphasis on the perceptual consequences of sensorineural hearing loss. Lecture, discussion, demonstrations, seminar, student presentations. Prerequisites: both SHS 376 and 513 or only instructor approval.

SHS 512 Topics in Management of Medical Aspects of Speech-Language Pathology. (3)

spring

Focuses on varying topics in management of medically based speech and language disorders.

SHS 513 Neurophysiology of the Auditory System. (3)

fall or spring

Focuses on the neurophysiology of the normal auditory system and on changes associated with hearing loss. Lecture, discussion, demonstrations. Prerequisite: instructor approval.

SHS 515 Instrumentation and Calibration. (2)

fall

Electronic instruments used to produce, modify, and measure characteristics of sound. Measurement standards and methods for calibration of audiologic equipment. Lecture, lab. Prerequisite: SHS 401 or instructor approval.

SHS 516 Auditory Evoked Potentials. (3)

fall or spring

Electrophysiologic assessment of the peripheral and central auditory nervous system. Lecture, lab. Prerequisites: both SHS 502 and 513 or only instructor approval.

SHS 517 Balance Assessment. (3)

fall or spring

Clinical analysis and treatment of balance disorders and dizziness. Lecture, discussion, case studies, seminar, student presentations. Pre- or corequisite: SHS 513 or instructor approval.

SHS 518 Auditory Rehabilitation. (3)

fall or spring

Study and clinical application of assistive technology and rehabilitative services for managing the effects of hearing impairment. Lecture, lab, discussion, case studies, seminar, student presentations. Pre- or corequisites: both SHS 502 and 504 or only instructor approval.

SHS 519 Auditory Pathologies and Disorders. (3)

fall or spring

Familiarizes students with major diseases, pathologies, and disorders of the human auditory system. Lecture, discussion, case studies, demonstrations, field trips, seminar, student presentations. Prerequisites: both SHS 502 and 513 or only instructor approval.

SHS 520 Otoneurologic Applications in Audiology. (3)

fall or spring

Advanced otologic, neurologic, and audiologic approaches in the differential diagnosis of peripheral and central disorders of the auditory system. Lecture, lab, discussion, case studies, seminar, student presentations. Prerequisites: a combination of SHS 502 and 513 and 516 and 552 or only instructor approval.

SHS 521 Auditory Aging. (2)

fall or spring

Focuses on aging and related effects on the auditory system and audition. Lecture, discussion, case studies, seminar, student presentations. Prerequisites: both SHS 502 and 513 or only instructor approval.

SHS 522 Hearing Conservation. (2)

fall or spring

Examines the prevention, identification, physiological effects, and management of hearing loss due to noise exposure. Lecture, discussion, seminar, student presentations. Prerequisites: both SHS 502 and 513 or only instructor approval.

SHS 524 Counseling in Communication Disorders. (2)

summer

Theories of counseling emphasizing the psychological and emotional impact and management of individuals with communication disorders and their families. Lecture, discussion, case studies, seminar, student presentations. Prerequisites: both SHS 502 and 504 or only instructor approval.

SHS 525 Audiology Practice Management. (3)

fall or spring

Business practice issues, quality assurance, and professional ethics for the practicing audiologist. Lecture, discussion, case studies, seminar, student presentations. Prerequisites: both SHS 502 and 504 or only instructor approval.

SHS 545 Speech Perception by the Hearing Impaired. (2)

fall or spring

Focuses on the perception of speech by normal-hearing and hearing-impaired listeners. Lecture, discussion, case studies, seminar, student presentations. Prerequisite: instructor approval.

SHS 552 Physiological Measures of Auditory Function. (3)

fall or spring

Focuses on the measurement of otoacoustic emissions and acoustic immittance. Lecture, discussion, student presentations. Prerequisite: SHS 513 or instructor approval.

SHS 555 Cochlear Implants. (3)

spring

Current status of cochlear implant research and development. Prerequisites: both SHS 504 and 545 or only instructor approval.

SHS 565 Speech and Language Acquisition. (3)

spring

Speech and language development in the normal child. Prerequisite: SHS 367 (or its equivalent).

SHS 566 Psychology of Language. (3)

spring

Psycholinguistic study of the production and comprehension of language across the lifespan.

SHS 567 Neural Bases of Communication Disorders. (3)

fall

Neuroscience and its application to matters of normal and disordered communication. Pre- or corequisite: SHS 310 (or its equivalent).

SHS 570 Communication Disorders and Multicultural Populations. (3)

fall

Studies racial and ethnic biases and the communication behaviors and disorders in various cultural groups.

SHS 571 Augmentative Communication and Language Programming. (3)

spring

Focuses on individuals across the age span who are unable or who are at risk for being unable to communicate with spoken language. Lecture, lab.

SHS 572 Language Assessment and Intervention in Infants and Toddlers. (3)

fall

Focuses on the birth to 3-year-old population who are at risk for or who have communication and language disabilities. Prerequisite: SHS 470 (or its equivalent).

SHS 573 Language Assessment and Intervention with School-Age Populations. (3)

fall

Focuses on later language development, linguistic demands of academic settings, assessment and intervention strategies for older children and adolescents. Prerequisite: SHS 565 (or its equivalent).

SHS 574 Management of Low-Incidence Speech Disorders. (3)

summer

Focuses on assessment and intervention of people with voice, fluency, and craniofacial disorders. Prerequisite: SHS 431 (or its equivalent).

SHS 575 Aphasia and Related Neurogenic Language Disorders. (3)

fall

Assessment and treatment of acquired neurolinguistic impairment. Prerequisite: SHS 567.

SHS 576 Management of Feeding, Swallowing, and Neuromotor Speech Disorders. (3)

spring

Focuses on the management of individuals across the lifespan who have feeding, swallowing, and neuromotor speech disorders. Prerequisite: SHS 567 or instructor approval.

SHS 577 Craniofacial Disorders of Communication. (3)

spring

Communication disorders related to anomalies of the craniofacial structures, including orofacial clefting of the lip and palate. Prerequisite: SHS 310 (or its equivalent).

SHS 578 Disorders of Voice. (3)

spring

Communication disorders related to dysfunction of the phonatory and resonance systems of voice production, assessment, and treatment. Prerequisite: SHS 310 or instructor approval.

SHS 579 Feeding and Swallowing Disorders Across the Lifespan. (3)

fall

Focuses on individuals across the age span who have feeding and/or swallowing disorders. Presents assessment and treatment strategies. Prerequisite: SHS 567.

SHS 580 Clinical Practicum. (1–6)

fall, spring, summer

Supervised practicum speech-language pathology or audiology. 1 hour staffing and 3 hours of client contact per week per hour of credit. May be repeated for credit. Prerequisites: instructor approval; student must not have provisional admission status.

SHS 581 Right Hemisphere Syndrome, Traumatic Brain Injury, and Dementia. (3)

fall

Studies the nature, characteristics, and clinical management of cognitive and communicative impairments accompanying right hemisphere damage, TBI, and dementia. Prerequisite: SHS 567.

SHS 582 Differential Diagnosis of Communication Disorders. (3)

spring

Procedures for assessing speech/language disorders in children and adults. 3 hours lecture, 2 hours lab. Prerequisites: SHS 250 and 310 and 465 and 567 (or their equivalents).

SHS 584 Internship. (1–6)

fall, spring, summer

Off-campus directed experiences in speech-language pathology or audiology. May be repeated for credit. Prerequisites: SHS 580; student must consult with coordinator before registration.

SHS 585 Articulation and Phonology: Assessment and Intervention. (3)

fall

Assessment and treatment of developmental articulation and phonological disorders. Prerequisites: SHS 250 and 310 (or their equivalents).

SHS 586 Language Sampling Methods in Speech-Language Pathology. (1)

spring

Focuses on the use of language sampling and analyzes techniques to assess children's language. Lecture, case studies, demonstrations, computer lab. Prerequisite: SHS 465 or 565.

SHS 589 Audiology Grand Rounds. (1)

fall or spring

Grand Rounds bridges clinical and academic knowledge through case studies, application of emerging research, and clinical workshops. Discussion, case studies, interactive, seminar, student presentations. Prerequisite: SHS 502 or instructor approval.

SHS 591 Seminar. (1–12)

fall, spring, summer

Topics may include the following:

- Bilingual Language Assessment and Intervention. (3)

fall

- Clinical Methods for Craniofacial Disorders. (1)

spring

- Clinical Methods for Fluency Disorders. (1)

fall

- Clinical Methods for Language Assessment. (1)

spring

- Clinical Methods for Motor Speech Disorders. (1)

spring

- Clinical Methods for Voice Disorders. (1)

fall

- Cognitive and Linguistic Interactions in Adult Neurogenic Disorders. (3)

fall

- Clinical Methods for Language Assessment. (1)

spring

- Preschool Language Disorders. (3)

spring

- Spanish Language Acquisition. (3)

spring

SHS 596 Aural Rehabilitation. (3)

spring

Approaches to aural rehabilitation in children and adults. Introduces educational audiology and assistive listening devices. Prerequisite: SHS 401 or 501 (or its equivalent).

SHS 597 Audiology Clerkship. (1–6)

fall or spring

Provides students with advanced, intensive clinical experiences within selected audiological facilities. May be repeated for credit. Practicum. Prerequisites: SHS 580; faculty coordinator approval.

SHS 792 Research. (1–12)

selected semesters

SHS 799 Dissertation. (1–15)

selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Computational Biosciences

Interdisciplinary Master's Program

www.asu.edu/compbiosci

480/965-9845

GWC 642

Rosemary Renaut, Director

Participating faculty from the colleges, departments, and schools of Chemistry and Biochemistry, Computer Science and Engineering, Health Management and Policy, Life Sciences, and Mathematics and Statistics offer a program leading to the Professional Science Master's (PSM) degree in Computational Biosciences.

The disciplines of the life sciences are rapidly requiring more mathematical and computational analyses than have typically been employed. While some mathematical approaches have been applied to biological questions for many years, the advance in computational capability has increased the pace of bioscience research to unprecedented levels of speed, precision, and detail, and thus dramatically transformed the kinds of problems tackled. The PSM degree serves to produce students capable of meeting the demands of today's bioinformatics/biomedical industries.

Admissions. In addition to the minimum requirements for admission established by the Division of Graduate Studies, the interdisciplinary nature of this program makes individual aptitudes and experiences important with regard to a student's competitive status.

Fees. In addition to tuition, program fees apply. For more information, call 480/965-9845.

Prerequisites. Requirements include genetics, cell biology, organic chemistry, biochemistry, modern differential equations, applied statics, and object-oriented design and data structures. Students deficient in a limited number of courses that can be taken over one summer may be admitted conditionally upon completion of the prerequisites in the preceding summer sessions.

Degree Requirements. The master's program requires a total of 30 semester hours of course work and an additional six hours for internship or further advanced study and six semester hours of graduate-level study on professional issues in biotechnology for a total of 42 semester hours of study. The core program (taken by everyone) is followed by electives designed around the specific interest of the student.

Core Program

CBS 520 Modeling and Computational Biology	4
CBS 521 Applications and Complex Problem Solving in Computational Biology	4
CBS 530 Introduction to Structural and Molecular Biology	4

CBS 584 Internship.....	6
CBS 598 ST: Experimental Design	3
CBS 598 ST: Multivariate Statistical Analysis	3

Professional Portion

CBS 598 ST: Business Issues and Ethics I	3
CBS 598 ST: Business Issues and Ethics II.....	3

Comprehensive Examinations. None.

Thesis Requirements. None.

Internships and Applied Projects. An internship with either a campus-based research group or a bioinformatics/biomedical facility approved by ASU, culminating in a written report and an oral presentation and examination, is required of all students.

COMPUTATIONAL BIOSCIENCES (CBS)

CBS 520 Modeling and Computational Biology. (4)

fall

Key mathematical and computational techniques for bioinformatics. Numerical and visualization software; scripting, database management. Lecture, computing lab. Prerequisites: both MAT 271 and 274 (or 275) or only instructor approval.

CBS 521 Applications and Complex Problem Solving in Computational Biology. (4)

spring

Continuation of CBS 520. Key mathematical concepts. Team solution of bioinformatics applications, project writing, and presentation. Lecture, computing lab. Prerequisite: CBS 520 or instructor approval.

CBS 530 Introduction to Structural and Molecular Biology. (4)

fall

Structure and function of cells, proteins, membranes, and the genome; gene expression and biogenesis of structures; application of computer imaging. Cross-listed as PLB 530. Credit is allowed for only CBS 530 or PLB 530. Prerequisites: one year of biology; one semester of organic chemistry.

CBS 572 Data Mining. (3)

spring

Advanced data mining techniques: classification, clustering, association, preprocessing; performance evaluation; information assurance, Web mining, security and privacy issues, and other applications. Cross-listed as CSE 572. Credit is allowed for only CBS 572 or CSE 572. Prerequisite: CSE 412 or 471 or ECE 380 (or their equivalents).

CBS 584 Internship. (6)

selected semesters

Internship with a local biotechnical/biomedical group culminating in a written and/or oral representation.

CBS 598 Special Topics. (1-4)

selected semesters

Topics may include the following:

- Business Issues and Ethics I. (3)
- Business Issues and Ethics II. (3)
- Experimental Design. (3)
- Multivariate Statistical Analysis. (3)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Creative Writing

Interdisciplinary Master's Program

See "Creative Writing," page 76.

English

Master's and Doctoral Programs

www.asu.edu/clas/english

480/965-3168

LL 542

Neal A. Lester, Chair

Regents' Professors: Carlson, Dubie, Ríos

Professors: Adams, Bjork, Boyer, Brack, Candelaria, Crowley, Goldberg, Gutierrez, Helms, Hogue, Horan, Lester, Major, Miller, A. Nilsen, D. Nilsen, Rhodes, Roen, Tobin, van Gelderen

Associate Professors: Bates, Bivona, Castle, Corse, DeLamotte, Gerson, M. Goggin, Lussier, Mahoney, McNally, Nelson, Perry, Pritchard, Ramage, Savard, Schwalm, Tohe, Voaden, Webb

Assistant Professors: Bernick, Blasingame, Fox, P. Goggin, Lockard, Milun, Parchesky, Sadowski-Smith, Thompson

Senior Lecturers: Cook, Cooper, Duerden, Dugan, Dwyer, Heenan, Norton, Sudol, Wheeler

Lecturers: Binkley, Duttagupta, Fuse

Academic Professionals: Glau, McNeil

The faculty in the Department of English offer the MA degree in English, the Master of Teaching English as a Second Language degree, and the PhD degree in English.

Students admitted to the Master of Education degree program with a major in Secondary Education may also elect English as the subject matter field. For more information, see "Master of Education," page 142.

Students may also pursue an interdisciplinary program leading to the Master of Fine Arts degree in Creative Writing, offered by the faculties in the Departments of English and Theater. See "Master of Fine Arts," page 225.

MASTER OF ARTS

This degree is designed to provide further cultural and professional advancement for students of English.

Admission Requirements. The department requires that applicants have an undergraduate degree and a 3.00 GPA in courses taken in the major field. Deadline for admission applications and requests for financial assistance, including teaching assistantships is February 1. Incomplete files are not considered.

Materials should be sent to

GRADUATE COORDINATOR
DEPARTMENT OF ENGLISH
ARIZONA STATE UNIVERSITY
PO BOX 870302
TEMPE AZ 85287-0302

Applicants for the MA program in English with a concentration in literature are required to have an undergraduate major in English. Those who do not have a major in English are encouraged to register as nondegree students while they take courses in areas of deficiency as identified by the advisor. Applicants must also submit Graduate Record Examination (GRE) general test scores, three letters of recommendation, a personal statement of aims and purposes, and an academic writing sample.

Applicants for the MA program in English with a concentration in linguistics and with a concentration in rhetoric and composition may have undergraduate majors in fields such as, but not limited to, anthropology, applied linguistics, cognitive science, communication, comparative languages and literatures, education, English literature, history, law, linguistics, modern languages, philosophy, political science, psychology, religion, rhetoric/composition, sociology, and speech and hearing science. Students should consult with an advisor to determine whether their preparation is deficient in any area. Applicants must also submit three letters of recommendation and a personal statement of aims and purposes. Applicants for the rhetoric and composition concentration must also submit Graduate Record Examination (GRE) general test scores and an academic writing sample. Applicants for the linguistics concentration must show completion of one upper-division course in a linguistics-related field.

Applicants for the MA program in English with a concentration in comparative literature must prove fluency in a foreign language to a level sufficient for graduate study. Applicants must also submit three letters of recommendation and a statement of aims and purposes.

Program of Study. A student may pursue a concentration in comparative literature, English linguistics, literature and language, or rhetoric and composition.

For the concentration in comparative literature, a candidate must complete 36 semester hours of graduate courses, with a minimum of 12 hours being taken in the Department of Languages and Literatures. Included in the hours must be ENG 500 Research Methods; ENG 503 Comparative Literature, Theory, and Practice; and ENG 599 Thesis.

For the concentration in English linguistics, a candidate must complete a minimum of 30 semester hours of graduate-level courses. Two tracks are available. The general linguistics track must include LIN 500, 511, 514, and 515 and one advanced linguistics course. The Applied Linguistics track must include LIN 500; 511 or 514; 515 or 516; and 520 and a course from a selection of advanced linguistics courses. Both tracks require six hours of LIN 599 Thesis. Electives are chosen in consultation with the advisor.

For the concentration in literature and language, a candidate must complete a minimum of 30 semester hours. The hours must include ENG 500 Research Methods; a course in literary theory; ENG 599 Thesis; and a nine-hour distribution requirement. Two courses selected must be graduate

COLLEGE OF LIBERAL ARTS AND SCIENCES

seminars at the 600-level. Electives are chosen in consultation with the advisor.

For the concentration in rhetoric and composition, a candidate must complete a minimum of 30 hours of graduate courses. These hours must include ENG 500 Research Methods, a course in rhetoric theory, a course in composition theory, a six-hour thesis, and 15 elective course hours that must include six semester hours of graduate seminars at the 600-level. Electives are chosen in consultation with the advisor.

Foreign Language Requirements. A reading knowledge of a suitable natural language is required and must be approved by the student's advisor.

Comprehensive Examination. A comprehensive examination is required for students in the comparative literature concentration. (A detailed description of its scope is available in the Department of English.)

Thesis Requirements. A thesis is required.

Final Examination. A final oral examination in defense of the thesis is required.

MTESL

The Master of Teaching English as a Second Language degree is designed for students who seek a professionally oriented graduate education. For information, see "Teaching English as a Second Language," page 330.

DOCTOR OF PHILOSOPHY

See "Doctor of Philosophy," page 69, for general requirements.

Admission Requirements. Applicants for the PhD degree in English must submit three letters of recommendation, a personal statement of aims and purposes, and an academic writing sample. GRE general scores are required for both concentrations. The GRE advanced literature section is required for the literature concentration. Deadline for admission applications and requests for financial aid, including teaching assistantships, is February 1. Incomplete files are not considered.

Materials should be sent to

GRADUATE COORDINATOR
DEPARTMENT OF ENGLISH
ARIZONA STATE UNIVERSITY
PO BOX 870302
TEMPE AZ 85287-0302

Areas of Concentration. The PhD degree in English offers concentrations in the following areas:

Literature. At least 60 semester hours of graduate courses (exclusive of dissertation) beyond the bachelor's degree constitute the formal course preparation. Specifically required are six semester hours in theory courses and ENG 500 Research Methods. Students must complete (or have completed at the Master's level or its equivalent) one graduate course in eight of the following 10 categories: Literature to 1500, Literature 1500-1660, Literature 1660-1900, Literature since 1900, Genre, Gender Studies, Ethnic

Studies, Postcolonial/Anglophone literatures, Cultural Studies, and History/Structure of the English Language. Students must take at least five graduate seminars at the 600-level en route to the PhD degree, at least three of which must be taken in the PhD program. Up to 12 semester hours taken outside the department may be counted toward the degree. Students should consult with their supervisory committees when choosing electives.

Foreign Language Requirements. Students must demonstrate evidence of a competent reading knowledge of two languages other than modern English. These are to be selected by the student, subject to the approval of the chair of the dissertation committee. One of the two language requirements must be completed before the student is eligible to take part in the PhD exams. This requirement may be met by

1. earning a "B" (3.00) or higher in a 400- or 500-level course in an appropriate (approved) language;
2. demonstrating comparable proficiency by taking a language examination approved by the student's supervisory committee;
3. demonstrating native speaker proficiency in a language approved by the student's supervisory committee;
4. earning a "B" (3.00) or higher in both ENG 530 Old English and ENG 531 Old English Literature or their equivalent.

Rhetoric/Composition and Linguistics. A minimum of 60 semester hours of graduate courses (exclusive of dissertation) beyond the bachelor's degree constitutes the formal course preparation. Specifically required are ENG 500 Research Methods, a 12-semester-hour foundation distribution (one course in rhetoric, one course in composition studies, and two courses in linguistics), and a 12-semester-hour advanced studies distribution requirement that consists of courses at the 600-level required by the distribution from one area of study (rhetoric, composition, or linguistics), or a combination of areas in which the student would like to concentrate. Up to 12 semester hours of course work taken outside the department may be counted toward the degree. Students should consult with an advisor when choosing these courses.

Foreign Language Requirements. Students must demonstrate evidence of a competent reading knowledge of a language other than modern English. The language can be selected by the student, in consultation with the supervisory committee. The language requirement must be completed before the student is eligible to take Part I of the PhD exams. This requirement may be met by

1. earning a "B" (3.00) or higher in a 400- or 500-level course in an appropriate (approved) language;
2. demonstrating comparable proficiency by taking a language examination approved by the student's supervisory committee;
3. demonstrating native speaker proficiency in a language approved by the student's supervisory committee;

4. earning a “B” (3.00) or higher in both ENG 530 Old English and ENG 531 Old English Literature or their equivalent.

PhD Examinations. The PhD examination consists of three parts.

Part I. Part I is a portfolio consisting of three essays

1. a scholarly paper within the student’s primary area of specialization;
2. a scholarly paper within a secondary area of specialization; and
3. a bibliographic essay that reviews the literature within the primary area of specialization.

Part II. After successful completion of Part I the student may advance to Part II, a four-hour written examination in the student’s area of specialization based on a bibliography compiled by the student and approved by the student’s supervisory committee. An oral component of the examination is administered no later than 10 days after the written examination.

Part III. Part III is a colloquy on the dissertation prospectus.

Dissertation Requirements. (See “Research and Dissertation Requirements,” page 70.) The subject of the dissertation is decided in consultation with the chair of the student’s supervisory committee, subject to approval of the director of the PhD program.

Final Examination. A final examination in defense of the dissertation, arguing for its method and conclusions, is required.

RESEARCH ACTIVITY

Research in English and its various subdisciplines fall into three broad areas of inquiry:

1. historical/textual studies;
2. comparative/interdisciplinary studies; and
3. pedagogical/theoretical studies.

The first category (historical/textual studies) concerns the production, preparation, and publication of texts and explores the historical context of publication. Work in this area encompasses the writing of the creative writing faculty as well as the historical/material criticism of rhetoricians, linguists, and literary historians.

Research in the second category (comparative/interdisciplinary studies) analyzes the dynamic play of language across cultures and disciplines and seeks to establish critical difference and similitude as the vehicle for comprehending the function of language and texts in a broadened context that includes all literatures and disciplines.

The third category (pedagogical/theoretical studies) involves the theory and practice of those subdisciplines currently defining “English Studies.” A concern for operative theories and efficacious practices involves every component of the department, encouraging the exploration of how language and literature interact in the subdisciplines and within wider spheres of cultural authority. For more information about faculty publications and specializations, access the Web site at www.asu.edu/clas/english/who/name.html.

ENGLISH (ENG)

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

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

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

ENG 400 History of Literary Criticism. (3)

selected semesters

Major critics and critical traditions in the Western world. See ENG Notes 1, 2, 3. Prerequisite: 6 hours in literature or instructor approval.

ENG 401 Topics in Critical Theory. (3)

selected semesters

Major critical schools of recent decades—postcolonialist, psychoanalytic, deconstructionist, feminist, new historicist. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: 6 hours in literature or instructor approval.

ENG 409 Advanced Screenwriting. (3)

selected semesters

Applies the principles taught in a complete feature-length screenplay. See ENG Notes 1, 2. Prerequisite: instructor approval.

ENG 411 Advanced Creative Writing. (3)

fall and spring

Poetry, fiction, and drama for experienced writers, emphasizing individual style. Each genre may be taken once. See ENG Notes 1, 2. Prerequisite: ENG 310 or instructor approval.

ENG 412 Creative Nonfiction. (3)

selected semesters

Lectures, discussion, and criticism concerning techniques of writing creative nonfiction for publication. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 411 or instructor approval.

ENG 413 History of the English Language. (3)

once a year

Development of English from the earliest times to the modern period. See ENG Notes 1, 2. Prerequisite: junior standing or instructor approval.

ENG 415 Topics in Medieval Literature and Culture. (3)

selected semesters

Interdisciplinary approach to medieval literature, emphasizing cultural and historical context. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.

ENG 416 Chaucer in Middle English. (3)

once a year

Yearly alternate between Chaucer’s *The Canterbury Tales* and *Troilus and Criseyde*. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.

ENG 418 Renaissance Literature. (3)

once a year

Selected topics, authors, contexts, and themes in Renaissance literature. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.

ENG 419 English Literature in the Early 17th Century. (3)

once a year

Topics, authors, and themes in English literature, 1603–1660. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.

ENG 423 Renaissance Drama. (3)

spring

Topics, authors, and themes in the drama of the Tudor and early Stuart periods. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.

ENG 424 Milton. (3)

once a year

Selected prose and poetry, emphasizing *Paradise Lost*, *Paradise Regained*, and *Samson Agonistes*. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or instructor approval.

COLLEGE OF LIBERAL ARTS AND SCIENCES

ENG 425 Studies in Romanticism. (3)

fall

Romanticism in continental, British, and American literature and culture. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or 241 or instructor approval.

ENG 427 Studies in 18th-Century Literature and Culture. (3)

selected semesters

Literary, social, and cultural issues of the period studied in an interdisciplinary format. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or 222 or instructor approval.

ENG 429 Studies in European Literature and Culture. (3)

selected semesters

Literary, cultural, and historical issues. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Topics may include the following:

- Feminist Political Writing in Contemporary Europe. (3)
Examines the discourse of gender-politics in Central Eastern Europe before and after Soviet hegemony. Cross-listed as FLA 461. Credit is allowed for only ENG 429 or FLA 461.
- Literature and Film in 20th-Century Eastern Europe. (3)
Evaluates literary texts and films as a massive propaganda machine of the totalitarian state. Cross-listed as FLA 476. Credit is allowed for only ENG 429 or FLA 476.
- Literature and Politics in Pre- and Post-Communist Europe. (3)
Interdisciplinary examination of the cultures of Eastern Europe from WWI to the present. Cross-listed as FLA 472. Credit is allowed for only ENG 429 or FLA 472.
- Politics of Drama in 20th-Century Europe. (3)
Interdisciplinary examination of European drama before and after WWII. Cross-listed as FLA 464. Credit is allowed for only ENG 429 or FLA 464.

ENG 430 Studies in Victorian Literature and Culture. (3)

once a year

Literary, social, and cultural issues of the period studied in an interdisciplinary format. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or instructor approval.

ENG 434 Studies in the Literature and Culture of the Americas. (3)

selected semesters

Literature and culture of North America, South America, and the Caribbean. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: ENG 241 or 242 or instructor approval.

ENG 436 Studies in Anglophone Literature and Culture. (3)

selected semesters

Literary, social, and cultural issues of English-speaking former colonial territories. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or 242 or instructor approval.

ENG 440 Studies in American Literature and Culture. (3)

once a year

Various genres in their literary, political, theoretical, and historical contexts. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 241 or 242 or instructor approval.

ENG 442 Studies in 20th-Century British and Irish Literature and Culture. (3)

once a year

Major literary genres (novel, poetry, and drama) in their cultural and historical contexts. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or instructor approval.

ENG 444 Studies in American Romanticism. (3)

once a year

Fiction, poetry, and essays of such 19th-century authors as Hawthorne, Emerson, Melville, Thoreau, Fuller, Whitman, and Dickinson. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 241 or instructor approval.

ENG 445 Studies in American Realism. (3)

once a year

Writers and influences that shaped the development of literary realism. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 242 or instructor approval.

ENG 446 Studies in Modernism. (3)

selected semesters

Cultural, historical, and literary problems in American and European modernism. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or 242 or instructor approval.

ENG 447 Studies in Postmodernism. (3)

selected semesters

Literary, social, and cultural issues. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or 242 or instructor approval.

ENG 448 Studies in Irish Literature and Culture. (3)

selected semesters

Themes and problems pertaining to Irish literature, film, and social and cultural history. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3. Prerequisite: ENG 222 or instructor approval.

ENG 452 Studies in the Novel. (3)

selected semesters

May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or 222 or 241 or 242 or instructor approval.

ENG 453 Studies in the American Novel. (3)

fall and spring

Poetics and politics of the novel, 18th through 21st centuries. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 241 or 242 or instructor approval.

ENG 457 Studies in American Poetry. (3)

selected semesters

May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Prerequisite: ENG 241 or 242 or instructor approval.

ENG 459 Studies in African American/Caribbean Literatures. (3)

selected semesters

May be repeated for credit when topics vary. See ENG Notes 1, 2, 3. Topics may include the following:

- African American Short Story
Studies in African American or Caribbean literatures according to genre, period, theory, or selected authors. Cross-listed as AFH 459. Credit is allowed for only AFH 459 or ENG 459.

ENG 461 Studies in Women and Literature. (3)

selected semesters

Advanced topics in literature by or about women. May be repeated for credit when topics vary. See ENG Notes 1, 2, 3.

ENG 464 Studies in Drama. (3)

selected semesters

Selected topics in the history and theory of the genre. See ENG Notes 1, 2, 3. Prerequisite: ENG 221 or 222 or 241 or 242 or instructor approval.

ENG 465 Studies in Film. (3-4)

selected semesters

Advanced topics in cinema. May be repeated for credit when topics vary. Lecture, viewing, discussion. See ENG Notes 1, 2.

ENG 469 Science and Literature. (3)

selected semesters

Historical and theoretical links between science and literature, from Francis Bacon to the present, examined in cultural context. May be repeated for credit when topics vary. Lecture, discussion. See ENG Notes 1, 2, 3.

ENG 470 Symbols and Archetypes in Children's Literature. (3)

fall

Various critical approaches and recurring themes studied in relation to classical and contemporary children's literature. Lecture, discussion, reading. See ENG Notes 1, 2, 3.

ENG 471 Literature for Adolescents. (3)

fall and spring

Prose and poetry that meet the interests and capabilities of junior high and high school students. Stresses recent literature. Requires passing grade of at least "C" (2.00) before students are permitted to student teach in English. See ENG Notes 1, 2, 3.

ENG 480 Methods of Teaching English: Composition. (3)

fall or spring and summer

Methods of instruction, organization, and presentation of appropriate content in the teaching of composition and other writing skills. See ENG Notes 1, 2.

ENG 482 Methods of Teaching English: Language. (3)*fall or spring and summer*

Methods of instruction, organization, and presentation of appropriate content in language and usage for junior and senior high schools. Lecture, discussion, lab. See ENG Notes 1, 2.

ENG 500 Research Methods. (3)*selected semesters*

Studies the methods and practices of the disciplines within the Department of English. Offered in discipline-specific formats. Lecture, discussion.

ENG 502 Contemporary Critical Theories. (3)*once a year*

Studies the principles and techniques of contemporary theory and criticism.

ENG 503 Comparative Literature, Theory, and Practice. (3)*selected semesters*

Problems, methods, and principles of comparative analysis, illustrated by selected critical essays and literary/cultural texts. Lecture, discussion.

ENG 504 Cross-Cultural Studies. (3)*selected semesters*

Theoretical and analytical issues for comparative research across distinct cultural regions and traditions. May be repeated for credit when topics vary.

ENG 505 Writing Workshops. (3)*selected semesters*

Intense poetry and fiction workshops for experienced writers, emphasizing individual style. May be repeated for credit when topics vary. Studio.

ENG 506 Methods and Issues in Teaching Language. (3)*selected semesters*

Methods, issues, and practices in teaching appropriate content in language usage for junior and senior high schools.

ENG 507 Methods and Issues in Teaching Composition. (3)*fall and spring*

Up-to-date theory, practice, and implementation of secondary writing instruction. Prerequisites: teaching experience; instructor approval.

ENG 517 History of the English Language. (3)*selected semesters*

Surveys the development of the English language, with an emphasis on major linguistic transformations. Cross-listed as LIN 517. Credit is allowed for only ENG 517 or LIN 517.

ENG 530 Old English. (3)*selected semesters*

Study of Old English grammar, syntax, and phonology, with selected readings.

ENG 531 Old English Literature. (3)*selected semesters*

Intensive literary, linguistic, and cultural study of Old English literature. May be repeated for credit when topics vary. Prerequisite: ENG 530.

ENG 532 Middle English Dialects. (3)*selected semesters*

Study of the principal dialects of Middle English, with selected readings. Prerequisite: graduate standing.

ENG 533 Studies in Medieval Literature. (3)*selected semesters*

Selected topics in English literature from the 11th through the 15th centuries. May be repeated for credit when topics vary. Prerequisite: graduate standing.

ENG 534 Studies in Renaissance Literature. (3)*selected semesters*

Selected topics and literary works studied in the contexts of English Renaissance culture. May be repeated for credit when topics vary.

ENG 535 Studies in 18th- and 19th-Century British Literature. (3)*selected semesters*

Selected topics, issues, figures, and genres in British literature and culture of the 18th and 19th centuries. May be repeated for credit when topics vary.

ENG 536 Studies in American Literature Before 1900. (3)*selected semesters*

Selected topics, issues, figures, and genres in 17th-, 18th-, and 19th-century American literature, including the literature of conquest and contact. May be repeated for credit when topics vary.

ENG 537 Studies in Modern and Contemporary British Literature. (3)*selected semesters*

Selected topics, issues, figures, and genres in British literature and culture after 1900. May be repeated for credit when topics vary.

ENG 538 Studies in Modern and Contemporary American Literature. (3)*selected semesters*

Selected topics, issues, figures, and genres in American literature and culture after 1900. May be repeated for credit when topics vary.

ENG 539 Studies in Modernist and Postmodernist Literature and Theory. (3)*selected semesters*

Selected topics in Modernist and Postmodernist studies. May include literary and theoretical texts. May be repeated for credit when topics vary.

ENG 540 Issues in Teaching Literature to Adolescents. (3)*selected semesters*

Issues and new approaches in teaching contemporary literature in high school.

ENG 542 Studies in North American Ethnic Literatures. (3)*selected semesters*

Selected works studied in their cultural contexts from authors representing ethnic experiences in the United States. May be repeated for credit when topics vary.

ENG 543 Studies in Anglophone Literatures. (3)*selected semesters*

Selected topics, texts, periods, literary trends in works by world authors writing in English. May be repeated for credit when topics vary.

ENG 544 Studies in Colonial and Postcolonial Literature. (3)*selected semesters*

Selected topics, periods, theories, and figures in works by authors representing colonial and postcolonial regions and/or experiences. May be repeated for credit when topics vary.

ENG 545 Studies in Women's Literatures. (3)*selected semesters*

Selected topics, texts, periods, and figures in works written by and/or about women, studied in their cultural contexts. May be repeated for credit when topics vary.

ENG 546 Gender Studies. (3)*selected semesters*

Selected topics, periods, and themes in the study of gender and sexuality, including attention to theoretical issues. May be repeated for credit when topics vary.

ENG 550 Translation. (3)*selected semesters*

Surveys theories and practices of translation into English. Considers target, audience and market. May be repeated for credit when topics vary. Lecture, studio.

ENG 551 Rhetorical Traditions. (3)*selected semesters*

Examines rhetorical traditions spanning ancient to contemporary rhetoric. May be repeated for credit when topics vary. Lecture, discussion.

ENG 552 Composition Studies. (3)*selected semesters*

Selected topics in the history and theories of composition. May be repeated for credit when topics vary. Lecture, discussion.

ENG 553 Technologies of Writing. (3)*selected semesters*

Critical study and cultural analysis of information technologies and their effects on various writing practices. May be repeated for credit when topics vary.

COLLEGE OF LIBERAL ARTS AND SCIENCES

ENG 554 Rhetorics of Race, Class, and Gender. (3)

selected semesters

Study of interdependent relationships of race, class, and gender in rhetorical constructions of self and community. May be repeated for credit when topics vary. Lecture, discussion.

ENG 556 Theories of Literacy. (3)

selected semesters

Examines various theories of literacy, their embedded values and assumptions, and their influences on academic scholarship and pedagogy. May be repeated for credit when topics vary. Lecture, discussion.

ENG 560 Genre Studies. (3)

selected semesters

Critical analysis and study of works from a single genre or comparative analysis and study of multiple genres. May be repeated for credit when topics vary.

ENG 561 Film Studies. (3)

selected semesters

Analysis and study of film genres, cinematic techniques, and problems of interpretation and representation. May be repeated for credit when topics vary.

ENG 562 Forms of Poetry. (3)

selected semesters

Types, history, criticism, and schools of theory of metrical form. Analyzes lyric, narrative, and dramatic poetry. May be repeated for credit when topics vary.

ENG 563 Forms of Fiction. (3)

selected semesters

Types, history, criticism, and schools of theory in the forms of fiction. Analyzes narrative and dramatic structure. May be repeated for credit when topics vary.

ENG 580 Practicum. (1–12)

selected semesters

ENG 591 Seminar. (3)

fall and spring

Selected topics regularly offered in the various areas of English studies.

ENG 594 Conference and Workshop. (1–12)

selected semesters

ENG 598 Special Topics. (1–4)

selected semesters

ENG 599 Thesis. (1–12)

selected semesters

ENG 602 Advanced Studies in Theory and/or Criticism. (3)

selected semesters

Seminar courses on the principles, strategies, and applications of critical, cultural, and/or literary theory and/or criticism. May be repeated for credit when topics vary.

ENG 603 Advanced Studies in Comparative Literature. (3)

selected semesters

Seminar courses on the problems, methods, and principles of comparative analysis. May be repeated for credit when topics vary.

ENG 604 Interdisciplinary Cultural Studies. (3)

selected semesters

Seminar courses on work from literature, anthropology, and/or other disciplines, with an emphasis on cultural influences and functions. May be repeated for credit when topics vary.

ENG 606 Advanced Studies in English Education. (3)

once a year

Current research, issues, and trends in English education. May be repeated for credit when topics vary.

ENG 632 Advanced Studies in Medieval and Renaissance Literature and Culture. (3)

selected semesters

Seminar in works of the Medieval or Renaissance periods, studied in their cultural contexts. May be repeated for credit when topics vary.

ENG 635 Advanced Studies in British Literature. (3)

selected semesters

Seminar courses on works produced in or about England, Scotland, and Wales, studied in their cultural contexts. May be repeated for credit when topics vary.

ENG 636 Advanced Studies in American Literature. (3)

selected semesters

Seminar courses on works produced in or about the United States, studied in their cultural contexts. May be repeated for credit when topics vary.

ENG 639 Advanced Studies in Modernism and Postmodernism. (3)

selected semesters

Seminar courses on topics in Modernist and Postmodernist studies. May include literary and theoretical texts. May be repeated for credit when topics vary.

ENG 642 Advanced Studies in Ethnic, Anglophone, or Post-Colonial Literatures. (3)

selected semesters

Seminar courses that consider the influence of cultural or geopolitical developments on the production and circulation of texts. May be repeated for credit when topics vary.

ENG 645 Advanced Studies in Gender Issues. (3)

selected semesters

Seminar courses that consider the influence of gender on the production and circulation of texts. May be repeated for credit when topics vary.

ENG 651 Advanced Studies in History and Theories of Rhetoric. (3)

selected semesters

Selected topics in the history and/or theory of rhetoric. May be repeated for credit when topics vary.

ENG 652 Advanced Composition Studies. (3)

selected semesters

Selected topics on particular composition theories, practices, pedagogies, and figures. May be repeated for credit when topics vary.

ENG 654 Advanced Studies in Rhetoric, Writing, Technology, and Culture. (3)

selected semesters

Advanced study of theoretical, methodological, and pedagogical issues concerning the interrelationships among rhetoric, culture, writing, and writing technologies. May be repeated for credit when topics vary. Seminar.

ENG 655 Disciplinary Discourses. (3)

selected semesters

Investigation of professional and disciplinary issues related to English studies. May be repeated for credit when topics vary. Cross-listed as LIN 655. Credit is allowed for only ENG 655 or LIN 655.

ENG 656 Studies in Cross-Cultural Discourse. (3)

selected semesters

Theoretical and methodological issues in the comparative study of discourses between cultures and communities of practice. May be repeated for credit when topics vary. Seminar. Cross-listed as LIN 656. Credit is allowed for only ENG 656 or LIN 656.

ENG 661 Advanced Studies in Film. (3)

selected semesters

Seminar courses on topics, genres, and figures in film studies, including technical and theoretical issues. May be repeated for credit when topics vary.

ENG 662 Poetic Genres. (3)

selected semesters

Creative writing courses in the long poem, the erotic image, death and transfiguration, reading and influence, and others. May be repeated for credit when topics vary.

ENG 663 Fiction Genres. (3)

selected semesters

Creative writing courses in time and fiction, gothic fiction, myth in fiction, science fiction, and others. May be repeated for credit when topics vary.

ENG 664 Mixed Genres. (3)

selected semesters

Creative writing courses in the prose poem, magical realism, the literature of obsession. May be repeated for credit when topics vary.

ENG 665 Creative Methods. (3)

selected semesters

Creative writing courses in theory of the novel, poetics, story into film, and others. May be repeated for credit when topics vary.

ENG 667 Issues in the Writing Professions. (3)*selected semesters*

Focuses on career preparation, resources, the role of writing in the community, creative writing, and the Internet. May be repeated for credit when topics vary.

ENG 680 Practicum. (1–12)*fall, spring, summer*

Topics may include the following:

- First Book Seminar/Applied Project. (3–6)

ENG 792 Research. (1–15)*selected semesters***ENG 799 Dissertation. (1–15)***selected semesters*

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see “Omnibus Courses,” page 56.

LINGUISTICS (LIN)**LIN 500 Research Methods. (3)***fall*

Studies the methods and practices of the disciplines within the Department of English. Offered in discipline-specific formats. Lecture, discussion.

LIN 510 Linguistics. (3)*fall*

Overview of linguistics, its subfields, and some of its applications.

LIN 511 Phonetics and Phonology. (3)*spring*

Current trends in phonological theory and its basis in acoustic and articulatory phonetics. Prerequisite: LIN 510.

LIN 513 Semantics. (3)*fall in even years*

Current approaches to linguistic meaning with particular attention to English. Prerequisite: LIN 510 (or its equivalent) or instructor approval.

LIN 514 Syntax. (3)*spring*

Analyzes syntactic structures using a generative theoretical model with a focus on English. Prerequisite: LIN 510 or instructor approval.

LIN 515 American English. (3)*spring*

Development of the English language in America, including regional and social varieties, and its relationship to other immigrant and native languages.

LIN 516 Pragmatics and Discourse Analysis. (3)*fall*

Studies language use in context and language structures in spoken and written texts. Prerequisite: LIN 510 (or its equivalent) or instructor approval.

LIN 517 History of the English Language. (3)*selected semesters*

Surveys the development of the English language, with an emphasis on major linguistic transformations. Cross-listed as ENG 517. Credit is allowed for only ENG 517 or LIN 517.

LIN 520 Second-Language Acquisition Theories. (3)*fall*

Theories of second-language acquisition, including the linguistic, cognitive, and sociocultural aspects.

LIN 521 Methods of Teaching English as a Second Language. (3)*spring*

Methods of teaching English as a second language, language teaching trends, practical applications, and the teaching of different skills. Prerequisite: LIN 520 or instructor approval.

LIN 522 Grammar for TESL. (3)*selected semesters*

Survey of major grammatical structures in English and how they can be taught to ESL speakers. Prerequisite: LIN 510.

LIN 523 Language Testing and Assessment. (3)*selected semesters*

Introduction to the theory and practice of language test construction. Prerequisite: LIN 520 or instructor approval.

LIN 524 Curriculum Design and Materials Development. (3)*once a year*

Practical guide to curriculum and materials development. Lecture, studio. Prerequisite: LIN 520 or instructor approval.

LIN 591 Seminar. (3)*fall and spring*

Selected topics.

LIN 593 Applied Project. (3)*fall and spring*

Preparation of a supervised applied project that is a graduation requirement in the TESL professional major. Independent study with consultation.

LIN 599 Thesis. (1–12)*selected semesters***LIN 610 Advanced Studies in Linguistics. (3)***selected semesters*

Different topics such as morphology, semantics, typology, history of linguistics. May be repeated for credit when topics vary.

LIN 614 Advanced Studies in Syntax. (3)*selected semesters*

Focuses on morphosyntactic feature checking, movement, phrase structure, and their crosslinguistic differences. May be repeated for credit when topics vary.

LIN 615 Advanced Studies in Sociolinguistics. (3)*selected semesters*

Language in its social setting, e.g., social variation among native speakers, sociolinguistics aspects of second-language acquisition, and language policy. May be repeated for credit when topics vary.

LIN 616 Advanced Studies in Discourse Analysis. (3)*selected semesters*

Advanced analysis of spoken and written discourse emphasizing different methodological and theoretical issues. May be repeated for credit when topics vary.

LIN 617 Advanced Studies in Historical Linguistics. (3)*selected semesters*

Overview of theories on language change, the history of languages, and of methods in historical linguistics. May be repeated for credit when topics vary.

LIN 620 Advanced Studies in Second-Language Acquisition. (3)*selected semesters*

Selected topics in second-language acquisition, such as phonetics and phonology, morphology, syntax, and discourse. May be repeated for credit when topics vary.

LIN 655 Disciplinary Discourses. (3)*selected semesters*

Investigation of professional and disciplinary issues related to English studies. May be repeated for credit when topics vary. Cross-listed as ENG 655. Credit is allowed for only ENG 655 or LIN 655.

LIN 656 Studies in Cross-Cultural Discourse. (3)*selected semesters*

Theoretical and methodological issues in the comparative study of discourses between cultures and communities of practice. May be repeated for credit when topics vary. Seminar. Cross-listed as ENG 656. Credit is allowed for only ENG 656 or LIN 656.

LIN 792 Research. (1–15)*selected semesters***LIN 799 Dissertation. (1–15)***selected semesters*

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see “Omnibus Courses,” page 56.

Exercise Science**Interdisciplinary Doctoral Program**

See “Exercise Science,” page 78.

Family and Human Development

Master's Program

www.asu.edu/clas/fhd

480/965-6978

COWDN 106

Richard A. Fabes, Chair

Professors: Christopher, Fabes, Griffin, Ladd, Martin, Roosa

Associate Professors: Dumka, Hanish, Madden-Derdich, Neff, Reiser, Updegraff

Assistant Professors: Gager, Liu, Simpkins, Spinrad, Umaña-Taylor, Valiente

Senior Lecturers: Bodman, Weigand

Students may pursue the MS degree in Family and Human Development with a concentration in family studies. Areas of study are available in child development and family relationships.

Students applying to this program are required to submit scores on the Graduate Record Examination (verbal, quantitative, and analytical sections).

MASTER OF SCIENCE

Admission. Admission to the MS degree program in Family and Human Development is determined by the following criteria:

1. official transcripts of all undergraduate and graduate course work;
2. verbal, quantitative, and analytical Graduate Record Examination scores;
3. statement of goals relevant to the Master of Science program;
4. three letters of recommendation; and
5. an application for admission to the Division of Graduate Studies.

A Test of English as a Foreign Language score of at least 600 is required of all applicants whose native language is not English.

Program of Study. Courses are selected by the student along guidelines of the specific areas, after consultation with the supervisory committee. The program of study should be completed and approved by the supervisory committee by the end of the second semester of full-time graduate study upon completion of 12 semester hours. A program of study may include more than 30 semester hours, and the exact number will be determined by program requirements and the student's supervisory committee. Acceptance of the proposed program of study must be verified by signature of

the student and committee members. After approval within the department or college, the program of study is submitted to the Division of Graduate Studies for final approval. The following requirements must be met for the concentration.

Family Studies. Students complete the requirements for a master's degree in either child development or family relationships.

Core Requirements. All students must take the following courses: FAS 500, FAS 531, CDE 531, CDE 534; or PSY 530 (or equivalent with the approval of the Graduate Committee).

Child Development. The required courses are CDE 533 and six semester hours of CDE elective selected (with approval of the student's advisor). Six semester hours of thesis work are also required.

Family Relationships. The required courses are FAS 539 and six semester hours of FAS electives (selected with approval of the student's advisor). Six semester hours of thesis work are also required.

Thesis Requirements. A thesis is required.

Final Examination. A final oral examination in defense of the thesis is required.

RESEARCH ACTIVITY

The research activities of the faculty and students in the Department of Family and Human Development (FHD) are devoted to understanding and finding solutions to some of the most contemporary and critical problems faced by children and families. These topics include issues related to the effects of social and cultural environments on children and families, such as the effects of poverty, schooling, community violence, and child care. For more information, access the Web site at www.asu.edu/clas/fhd.

In addition, FHD faculty research focuses on topics related to family and marital functioning. Specific areas include marital interaction, parenting and parent-child relationships, sexuality, dating relationships, family diversity, divorce, step families, and public policy. Research topics related to children, adolescents, and infants include the development of emotion, gender-role development, early intervention for children who are biologically or socially at risk, the factors that promote positive infant development, the causes and treatment of childhood autism, sibling and peer relationships, and how family relationships influence childhood development. Strong emphasis is placed on the acquisition of sophisticated theoretical, methodological, and statistical skills necessary to conduct and evaluate basic and applied research.

CHILD DEVELOPMENT (CDE)

CDE 430 Infant/Toddler Development in the Family. (3)

fall and spring

Examines the development of infants/toddlers, the socialization processes of families, and the interactions of these processes. Prerequisite: CDE 232 (or its equivalent).

CDE 437 Infant Family Assessment and Observation. (3)

fall

Examines strategies for implementing developmental assessments and observations of young children and their families. Cross-listed as

SWU 437. Credit is allowed for only CDE 437 or SWU 437. Prerequisite: CDE 232 or SWU 301 (or their equivalents).

CDE 444 Risk and Variation in Child Development. (3)

fall and spring

Impact that constitutional and environmental risk factors have on young children and their families. Cross-listed as SWU 446. Credit is allowed for only CDE 444 or SWU 446. Prerequisite: CDE 232 or SWU 301 (or their equivalents).

CDE 531 Theoretical Issues in Child Development. (3)

fall

Major developmental theories, related research, and their application to family interaction. Prerequisites: both CDE 430 and 437 (or their equivalents) or only instructor approval.

CDE 533 Research Issues in Child Development. (3)

spring

In-depth exploration and critique of research focusing on child development in a family setting. Prerequisites: CDE 531; FAS 500.

CDE 534 Applied Child Development. (3)

spring

Integrates child development, family theory, and research to understand developmental problems and provide a foundation for intervention. Prerequisites: CDE 531; FAS 500.

CDE 634 Advanced Applied Child Development. (3)

spring

Advanced training in research and theory-based approaches to developing and evaluating prevention programs for children at risk. Prerequisite: CDE 534 or instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

FAMILY STUDIES (FAS)

FAS 431 Parent-Adolescent Relationships. (3)

fall

Dynamics of the relationships between parents and adolescents. Developmental characteristics of adolescence and the corresponding adult stage. Prerequisites: CDE 232; FAS 331.

FAS 435 Advanced Marriage and Family Relationships. (3)

fall and spring

Recent research, issues, and trends relating to marriage and family interaction. Influence of family composition, physical environment, family patterns, and values on family dynamics. Prerequisites: FAS 331, 361.

FAS 440 Fundamentals of Marriage and Family Therapy. (3)

fall and spring

Introduces the fundamental orientations of marriage and family therapy.

FAS 500 Research Methods. (4)

fall

Purposes of research. Experimental design, methods of data collection, and thesis proposal development. Includes practical application research laboratory. 3 hours lecture, 3 hours lab.

FAS 530 Introduction to Marriage and Family Therapy. (3)

fall

Introduces major marriage and family therapy orientations. Reviews history, theory, application, and outcome research for each orientation. Prerequisite: admission to graduate program in Family and Human Development with a concentration in family studies or instructor approval.

FAS 531 Family Theory Development. (3)

spring

Historical and current approaches to theory development, evaluation, and application in family studies. Prerequisite: FAS 435 or instructor approval.

FAS 536 Dysfunctional Marriage and Family Relationships. (3)

fall

Critical review of current theory and empirical evidence connecting marital and family interaction patterns with aberrant behavior. Prerequisite: PGS 466 or PSY 573 (or its equivalent) or instructor approval.

FAS 537 Interpersonal Relationships. (3)

fall

Critical examination of current theoretical and research developments in the area of interpersonal relationships. Emphasizes applications for

research and intervention. Prerequisite: FAS 435 (or its equivalent) or instructor approval.

FAS 538 Advanced Techniques in Marriage and Family Therapy. (3)

spring

In-depth review of assumptions and advanced techniques associated with contemporary marriage and family therapy approaches. Prerequisite: a graduate-level course in marriage and family therapy or instructor approval.

FAS 539 Research Issues in Family Interaction. (3)

fall

Critical review of current and past research in the area of family dynamics. Emphasizes interactional processes within the family. Prerequisite: FAS 435 (or its equivalent) or instructor approval.

FAS 540 Assessment in Marriage and Family Therapy. (3)

spring

Assessment and outcome evaluation of couples and families involved in marital and family therapy. Lecture, lab. Prerequisites: FAS 500 (or its equivalent); PSY 530; instructor approval.

FAS 580 Marriage and Family Therapy Practicum. (1–12)

fall and spring

Supervised clinical experience in marriage and family therapy; includes development of assessment and outcome evaluation skills. Lecture, lab. Topics may include the following:

- First semester. (3)
- Second semester. (3)
- Third semester. (3)

Prerequisite: instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Family Science

Doctoral Program

www.asu.edu/clas/fhd

480/965-6978

COWDN 106

Richard A. Fabes, Chair

Professors: Christopher, Fabes, Griffin, Ladd, Martin, Roosa

Associate Professors: Dumka, Hanish, Madden-Derdich, Reiser, Updegraff

Assistant Professors: Gager, Liu, Simpkins, Spinrad, Umaña-Taylor, Valiente

The faculty in the Department of Family and Human Development offer a degree program leading to the PhD degree in Family Science. Programs of study are available in child development and family studies.

DOCTOR OF PHILOSOPHY

The PhD degree in Family Science prepares researchers in the fields of family processes, family relationships, and human development within the context of families. Students can receive advanced training in theory, research methodology, and several substantive fields that are part of family and human sciences.

COLLEGE OF LIBERAL ARTS AND SCIENCES

The program is designed to prepare graduates to assume leadership roles in public or privately funded mental health agencies, governmental posts, or as researchers and academicians in universities.

A description of the program, along with opportunities for assistantships and fellowships, may be obtained from the director of the program.

Admission. Admission to the PhD in Family Science is determined by the following criteria:

1. official transcripts of all undergraduate and graduate course work;
2. verbal, quantitative, and analytical Graduate Record Examination scores;
3. statement of goals relevant to the PhD program;
4. three letters of recommendation; and
5. an application for admission to the Division of Graduate Studies.

A Test of English as a Foreign Language score of at least 600 is required of all applicants whose native language is not English.

Program of Study. Each student must prepare and submit a program of study in conjunction with the chair and members of his or her supervisory committee during the first year in the program. The program of study consists of a minimum of 105 semester hours for students entering after the bachelor's degree and 63 semester hours for students entering after the master's degree. Of the 105 semester hours for a postbaccalaureate program, six are thesis credit and 24 are research and dissertation credit. Postbaccalaureate students complete a master's-in-passing before advancing to their doctoral studies. Correspondingly, the 63 semester hours of the postmaster's program include 24 semester hours of research and dissertation credit. The additional hours in both the postbaccalaureate and postmaster's tracks involve

1. family science courses,
2. statistics and research methods, and
3. a collateral area of study relating to family science taken outside the Department of Family and Human Development.

Foreign Language Requirements. None.

Evaluation and Comprehensive Examinations. Progress through the program involves (1) annual evaluations of the student's performance and (2) comprehensive written examinations at the end of the student's course work.

Dissertation Requirements. The doctoral dissertation must be a work of original scholarship, make a significant contribution to knowledge about families, and reflect a mastery of systemic research methods.

Final Examination. A final oral examination in defense of the dissertation is required.

Research Facilities. The department's research facilities include a marital interaction laboratory, children's social development laboratory, child development laboratory, and collaborative arrangements with the ASU Prevention Intervention Research Center. The Department of Family and Human Development also provides access to sophisticated microcomputing technology within the department as well as to centralized computing services at ASU. The department offers several fellowships that provide students with collaborative research experiences under the supervision of faculty members.

COURSES

For courses, see listings under "Family and Human Development," page 270.

French

See "Department of Languages and Literatures," page 291.

Geographic Information Science Interdisciplinary Certificate Programs

See "Geographic Information Science," page 79.

Geographic Information Systems

See "Master of Advanced Study," page 273.

Geography

Master's and Doctoral Programs

geography.asu.edu

480/965-7533

SCOB 330

Richard J. Aspinall, Chair

Professors: Arreola, Aspinall, Balling, Brazel, Cerveny, Dorn, Gober, Ó hUallacháin, Pasqualetti, Zehnder

Associate Professors: Ellis, Fall, Kuby, McHugh, Wentz

Assistant Professors: Edsall, Keys, Li, Lukinbeal, Schmeeckle

Lecturer: Shaeffer

The faculty in the Department of Geography offer graduate programs leading to the MA and PhD degrees in Geography. Departmental research and graduate education focus on seven areas of study: climatology, earth-surface processes, natural resources and environment, urban-economic geography, population, Latin America and the Southwestern United States, and spatial analysis methods.

Students admitted to the Master of Education degree program with a major in Secondary Education may also elect geography as the subject matter field. See "Master of Education," page 142, for information on the Master of Education degree.

MASTER OF ARTS

The MA program is designed to offer a specialized program of academic and professional training in geography so that the student may secure a sound graduate background for further specialization or for immediate employment. The program has sufficient flexibility to allow for individual needs and interests of the student. A minimum of 30 semester hours beyond the bachelor's degree is required. At least 24 semester hours must be in geography.

Admission. Applications for the MA program must be accompanied by the applicant's scores on the Graduate Record Examination (verbal and quantitative) and three letters of recommendation from professors. All applications are reviewed by the Graduate Recruiting and Admissions Committee and the chair of the Department of Geography. To be considered for financial assistance for the next academic year, students must be admitted by February 15.

It is presumed that all students entering the master's program have an adequate background in geography, including course work that is the equivalent of GPH 371 Introduction to Cartography and Georepresentation and GCU 495 Quantitative Methods in Geography. Additional prerequisite course work is required of students insufficiently prepared

in geography. The program of study consists of the following elements:

GCU 529 Contemporary Geographic Thought	3
GCU 585 Advanced Research Methods in Geography	3
GCU 591 Seminar	3
or GPH 591 Seminar (3)	
GCU 599 Thesis	6
or GPH 599 Thesis (6)	
Total	15

The remaining 15 semester hours are composed of a suitable combination of course work and/or research.

A student in the MA program is required to pass an oral and a written examination administered by the student's supervisory committee. The written examination consists of questions from the area of interest. The oral examination serves as a defense of the thesis.

MASTER OF ADVANCED STUDY

The Master of Advanced Study (MAS) degree in Geographic Information Systems (GIS) program is a compact one-year nonthesis degree fostering advanced study in management and the use of GIS technology in public and corporate environments. The degree meets important educational needs of working professionals and recent college graduates seeking to improve their career standing. The program provides a comprehensive professional degree that balances work in the theoretical aspects of GIS, the technical side of the discipline, and the applications domain. Students are exposed to cutting edge technology, management theory and practice, and several societal dimensions associated with the application of GIS technology. Courses are held in the evenings and on weekends, the curriculum is highly adaptable to the work environment, and thus the MAS degree is achievable in a one-year time period.

Admission. In addition to ASU Division of Graduate Studies standards, prospective students seeking the degree must (1) have successfully completed a bachelor's degree in a related area with a minimum GPA of 3.00 (4.00 scale) or (2) demonstrate a minimum of three years of related professional experience and the successful completion of a bachelor's degree in an unrelated area as determined by the MAS-GIS Steering Committee. Applicants must submit two letters indicating support from any combination of current/former instructors, supervisors, or professionals currently employed within GIS or a related discipline. Applicants must prepare a formal, written statement regarding relevant academic experience, professional experience, and overall interest in GIS. Application materials for the coming academic year are accepted and reviewed on a rolling basis until June 30. Applicants are notified of their status within six weeks of receipt of their application materials.

Program of Study. Enrolling students must complete three sequential semesters of course work totaling 30 semester hours. The first semester, offered during the fall, is composed of six two-semester-hour modules (12 hours total). Each module has a minimum of 30 hours of instructor contact time and 60 hours of out-of-class assignments; each module lasts two weeks. Students in the spring semester must complete one mandatory and three elective 15-week

COLLEGE OF LIBERAL ARTS AND SCIENCES

advanced courses, each worth three semester hours (12 hours total). During the final semester, offered through the eight-week summer session, students must complete six semester hours of internship in a GIS or closely allied position approved by the MAS-GIS Steering Committee.

DOCTOR OF PHILOSOPHY

Admission to the PhD program requires a completed master's degree in Geography or equivalent preparation. At a minimum this preparation should include competence in cartography and quantitative methods and basic course work in human and physical geography. Students who have not already acquired these basic skills or taken these basic courses must do so during the first year of their graduate program. These courses are considered prerequisites.

To be considered for financial assistance for the next academic year, students must be admitted by February 15.

The specific academic program is carefully planned by the student in consultation with a supervisory committee. Special efforts are taken to plan a course of study compatible with the student's career objectives.

See "Doctor of Philosophy," page 69, for general requirements.

Program of Study. A minimum of 30 semester hours of course work at ASU beyond the master's degree is required, plus a minimum of 24 semester hours of credit in research and dissertation. All PhD students are required to take

1. GCU 529 Contemporary Geographic Thought
2. GCU 585 Advanced Research Methods in Geography, and
3. two three-semester-hour seminars (GCU 591 or GPH 591).

Foreign Language Requirements. At the discretion of the student's supervisory committee, a reading proficiency in a foreign language may be required.

Research and Field Examination. The Department of Geography requires PhD students to pass a two-week research and field problem examination before taking the comprehensive examination.

Comprehensive Examinations. Written and oral comprehensive examinations are required. These are taken at the completion of all course work. After students have passed the comprehensive examinations and satisfied the other requirements, they are eligible to apply for candidacy.

Dissertation Requirements. A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required.

Final Examination. A final oral examination in defense of the dissertation is required.

CULTURAL GEOGRAPHY (GCU)

GCU 414 Teaching Geography Standards. (3)

fall and summer

Introduces Arizona Geography Standards for K–12 educators, emphasizing exciting curricula and illustrated with best practices by master teachers. Internet.

GCU 421 Geography of Arizona and Southwestern United States. (3)

fall and spring

Geography of the Southwest with an emphasis on Arizona. Divided into physical geography, history, people, and economy.

GCU 423 Geography of South America. (3)

selected semesters

Prerequisite: GCU 323 or instructor approval.

GCU 424 Geography of Mexico and Middle America. (3)

selected semesters

Central America and Mexico. Prerequisite: GCU 323 or instructor approval.

GCU 425 Geography of the Mexican American Borderland. (3)

spring

Geography of a binational and bicultural region. Examines settlement, boundary issues, ethnic subregions, population change, industrial development, and urban growth. Field trips. Fee.

GCU 426 Geography of Russia and Surroundings. (3)

selected semesters

Examines the geography of Russia and other post-Soviet states. Prerequisite: GCU 121 or instructor approval.

GCU 433 Geography of Southeast Asia. (3)

selected semesters

Examines the biophysical and social features of Southeast Asian nations and peoples. Prerequisite: GCU 326 or instructor approval.

GCU 441 Economic Geography. (3)

once a year

Spatial distribution of primary, secondary, and tertiary economic and production activities. Prerequisite: GCU 141 or instructor approval.

GCU 442 Geographical Analysis of Transportation. (3)

fall

Networks, modes, economics, and flows at the urban, national, and international scales. Prerequisite: GCU 141 or 441.

GCU 444 Geographic Studies in Urban Transportation. (3)

selected semesters

Current urban transportation issues in metropolitan Phoenix. Lecture, team project. Fee. Prerequisite: GCU 361.

GCU 453 Recreational Geography. (3)

selected semesters

Examines problems surrounding the organization and use of space for recreation. Introduces geographic field survey methods of data collection and analysis. Possible Saturday field trips.

GCU 455 Historical Geography of U.S. and Canada. (3)

selected semesters

Geographical perspective on the evolution of the United States and Canada from pre-Columbian times to early 20th century.

GCU 474 Public Land Policy. (3)

selected semesters

Geographic aspects of federal public lands, policy, management, and issues. Emphasizes western wilderness and resource development problems.

GCU 495 Quantitative Methods in Geography. (3)

fall and spring

Statistical techniques applied to the analysis of spatial distributions and relationships. Introduces models and theory in geography. Fee. Prerequisite: MAT 119.

GCU 496 Geographic Research Methods. (3)

fall and spring

Scientific techniques used in geographic research. Fee. Prerequisites: GCU 495; GPH 371, 491.

GCU 515 Human Migration. (3)

selected semesters

Economic, political, social, and geographic factors underlying population movements. Migration selectivity, streams and counter-streams, labor migration, and migration decision making. Lecture, seminar. Prerequisite: GCU 351 or instructor approval.

GCU 526 Spatial Land-Use Analysis. (3)

selected semesters

Determination, classification, and analysis of spatial variations in land-use patterns. Examines the processes affecting land-use change. Prerequisite: 15 hours in geography or instructor approval.

GCU 529 Contemporary Geographic Thought. (3)*fall*

Comparative evaluation of current philosophy concerning the nature and trends of geography. Prerequisites: 15 hours in geography; instructor approval.

GCU 585 Advanced Research Methods in Geography. (3)*spring*

Specialized research techniques and methodologies in economic, political, or cultural geography.

GCU 591 Seminar. (1–3)*fall, spring, summer*

Selected topics in economic, political, or cultural geography. Possible field trips. Topics may include the following:

- Transportation Systems Pro-Seminar
- Urban Geographic Information Systems

GCU 596 History of Geographic Thought. (3)*selected semesters*

Historical development of geographic thought from pre-Greek days to the early 20th century.

GCU 598 Special Topics. (1–4)*selected semesters*

Topics may include the following:

- Geography of the Mexican American Borderland. (3)
Fee.
- Urban Geography. (3)

fall and spring

External spatial relations of cities, internal city structure, and spatial aspects of urban problems in various parts of the world, particularly in the United States. Fee.

GCU 599 Thesis. (6)*fall and spring*

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

PHYSICAL GEOGRAPHY (GPH)**GPH 401 Topics in Physical Geography. (1–3)***selected semesters*

Open to students qualified to pursue independent studies. Possible field trips. Prerequisite: instructor approval.

GPH 405 Energy and Environment. (3)*spring*

Sources, regulatory and technical controls, distribution, and consequences of the supply and human use of energy. Fee. Prerequisite: a course in physical or life sciences or instructor approval.

GPH 409 Synoptic Meteorology I. (4)*selected semesters*

Diagnostic techniques and synoptic forecasting. Includes techniques of weather analysis, map interpretation, and satellite and radar analysis. Prerequisites: MAT 270; PHY 131, 132.

GPH 410 Synoptic Meteorology II. (4)*selected semesters*

Diagnostic techniques and synoptic forecasting. Includes techniques of weather analysis, map interpretation, and satellite and radar analysis. Prerequisite: GPH 409.

GPH 411 Physical Geography. (3)*once a year*

Introduces physiography and the physical elements of the environment. Credit is allowed for only GPH 411 or 111. Field trips.

GPH 412 Physical Climatology. (3)*once a year*

Physical processes in the earth-atmosphere system on regional and global scales; concepts and analysis of energy, momentum, and mass balances. Prerequisites: both GPH 212 and 213 or only instructor approval.

GPH 413 Meteorological Instruments and Measurement. (3)*once a year*

Design and operation of ground-base and aerological weather measurement systems. Collection, reduction, storage, retrieval, and analysis of data. Field trips. Prerequisites: both GPH 212 and 213 or only instructor approval.

GPH 414 Climate Change. (3)*once a year*

Survey of three climate research areas: paleoclimatology, theories (e.g., greenhouse warming), numerical modeling. Prerequisite: GPH 212 or instructor approval.

GPH 418 Landforms of the Western United States. (3)*once a year*

Studies landforms and geomorphic processes in the western United States, including lecture, topographical maps, aerial photographs, satellite imagery, and field trips. Lecture, critical inquiry, laboratory, field work. Fee. Prerequisites: GPH 211 (or its equivalent); a General Studies L course.

GPH 422 Plant Geography. (3)*once a year*

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

GPH 433 Alpine and Arctic Environments. (3)*selected semesters*

Regional study of advantages and limitations of the natural environment upon present and future problems involving resource distribution, human activities, and regional and interregional adjustments. Field trips. Prerequisite: GPH 111 or instructor approval.

GPH 471 Geographics: Interactive and Animated Cartography and Geovisualization. (3)*selected semesters*

Advanced cartography, stressing influence and application of the computer on geographic representation. Emphasizes creation of maps for the Internet. Lecture, lab. Fee. Prerequisite: GPH 371 or instructor approval.

GPH 473 Geographic Information Science II. (3)*fall*

GIS as a basis for microcomputer spatial analysis and synthesis. Includes digitizing, database organization, spatial retrieval, and graphics. Lecture, lab. Fee. Prerequisites: GPH 373 (or instructor approval); CSE 100.

GPH 474 Dynamic Meteorology I. (3)*selected semesters*

Large-scale atmospheric motion, kinematics, Newton's laws, wind equation, baroclinics, vorticity, and the midlatitude depression. Prerequisites: GPH 213, 215; MAT 271; PHY 131, 132.

GPH 475 Dynamic Meteorology II. (3)*selected semesters*

Topics in climate dynamics. General circulation, numerical modeling, teleconnection phenomena, and surface-atmosphere interaction. Prerequisite: GPH 474 or instructor approval.

GPH 481 Environmental Geography. (3)*selected semesters*

Problems of environmental quality, including uses of spatial analysis, research design, and field work in urban and rural systems. Field trips. Prerequisite: instructor approval.

GPH 483 Geographic Information Analysis. (3)*selected semesters*

Basics of spatial data analysis. Topics include point pattern analysis, spatial autocorrelation, spatial regression, and kriging. Lecture, lab. Fee. Prerequisites: both one 200-level or above course in geography or biology or plant biology or geology or planning and one basic statistics course (GCU 495).

GPH 491 Geographic Field Methods. (3)*once a year*

Field techniques, including use of aerial photos, large-scale maps, and fractional code system of mapping; urban and rural field analysis to be done off campus. Fee. Prerequisites: GCU 102, 121; GPH 111.

GPH 494 Special Topics. (1–4)*selected semesters***GPH 511 Fluvial Processes. (3)***selected semesters*

Geographical aspects of processes of river erosion, transportation, sedimentation: emphasizing spatial characteristics of forces, resistance, landforms, sediment; includes computer applications. Prerequisites: both GPH 111 (or GLG 101) and 211 (or GLG 362) or only instructor approval.

COLLEGE OF LIBERAL ARTS AND SCIENCES

GPH 533 Snow and Ice. (3)

selected semesters

Processes, distribution, climatic interactions of snow/ice emphasizing mass balance, snow stratigraphy/metamorphism and glacier/snow-pack climatology. Lecture, field work. Prerequisite: instructor approval.

GPH 573 Geographic Information Science III. (3)

spring

In-depth look at programming within GIS. Focuses on programming and methodology, utilizing specific software, and basic scientific computing. Lecture, lab. Fee. Prerequisite: GPH 473 or instructor approval.

GPH 575 Geographic Applications of Remote Sensing. (3)

selected semesters

Uses imaging and nonimaging methods of remote acquisition of data, including satellite sensors, airborne radar, multiband scanning, conventional photographic sensors, and ground-based equipment. Field trips. Prerequisites: GCU 585 (or GPH 491); GPH 372.

GPH 591 Seminar. (1–3)

fall and spring

Selected topics in physical geography. Possible field trips.

GPH 596 Advanced Spatial Statistics. (3)

spring

Multivariate and advanced statistical techniques, including Box-Jenkins modeling and spectral analysis. Requires project papers and presentations. Seminar. Prerequisite: GCU 495 (or its equivalent).

GPH 598 Special Topics. (1–4)

selected semesters

Topics may include the following:

- Energy and Environment
Fee.
- Geographic Information Science I
Fee.
- Geographic Information Science II

GPH 599 Thesis. (6)

fall and spring

GPH 601 Introduction to Geographic Information Systems. (2)

fall

Introduces GIS theory and practice for professionals. Module 1 of the fall semester for MAS-GIS professional degree program. Lecture, lab. Prerequisite: acceptance into the MAS-GIS program.

GPH 602 Intermediate GIS. (2)

spring

Intermediate GIS for the MAS-GIS program. Lecture, hands-on training. Prerequisite: GPH 601.

GPH 603 Spatial Statistics and Modeling. (2)

fall

Spatial statistics and modeling for the MAS-GIS program. Lecture, hands-on training. Prerequisite: GPH 602.

GPH 604 GIS Implementation in the Corporate and Public Sectors. (2)

fall

Uses GIS in the corporate and public sectors. GIS ethics. Required for the MAS-GIS program. Lecture, hands-on training. Prerequisite: GPH 603.

GPH 605 GIS Project: Real-World GIS Project Planning and Implementation for Public Sector Agencies. (2)

fall

GIS project development for the public sector. Required for the MAS-GIS program. Lecture, lab. Prerequisite: GPH 604.

GPH 606 GIS Project Presentation. (2)

fall

Mastering technical project presentation for GIS professionals. Required for the MAS-GIS program. Lecture, hands-on training. Prerequisite: GPH 605.

GPH 610 Programming the GIS Environment. (3)

spring

Programming the GIS environment for the MAS-GIS program. Required for the MAS-GIS program. Lecture, hands-on training. Prerequisite: GPH 606.

GPH 620 Remote Sensing. (3)

spring

Remote sensing for the MAS-GIS program. Lecture, hands-on training. Prerequisite: GPH 606.

GPH 630 Air Photo Interpretation for MAS-GIS. (3)

spring

Air photo interpretation for the MAS-GIS program. Lecture, hands-on training. Prerequisite: GPH 606.

GPH 640 GIS for Business. (3)

spring

Uses GIS in business for the MAS-GIS program. Lecture, hands-on training. Prerequisite: GPH 606.

GPH 650 GIS for the Internet. (3)

spring

GIS for the Internet. Lecture, hands-on training. Prerequisite: GPH 606.

GPH 684 MAS-GIS Internship. (6)

summer

Internship for the MAS-GIS program. Prerequisite: instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Geological Sciences

Master's and Doctoral Programs

geology.asu.edu

480/965-5081

PS F686

James A. Tyburczy, Chair

Regents' Professors: Buseck, Christensen, Greeley

Edgar and Helen Korrick Presidential Professor:
Christensen

Dee and John Whiteman Dean's Distinguished Professor: Leshin

Professors: Burt, Farmer, Fink, Holloway, Knauth, Peacock, Reynolds, Shock, Stump, Tyburczy, Williams

Associate Professors: Anbar, Arrowsmith, Leshin, Sharp

Assistant Professors: Clarke, Fouch, Garner, Hartnett, Semken

The faculty in the Department of Geological Sciences offer graduate programs leading to the MS and PhD degrees in Geological Sciences.

Students admitted to the Master of Education degree program in Secondary Education may also elect geological sciences as the subject matter field. See "Master of Education," page 142, for information on the Master of Education degree.

The faculty also participate in the programs leading to the Master of Natural Science degree when one of the concentrations is geological sciences. See "Natural Science," page 309, for information on the Master of Natural Science degree.

Students applying for admission to the MS, MNS, or PhD degree program must submit scores on the Graduate Record Examination (GRE) Aptitude Test. The deadline for applications for the fall term is December 15.

MASTER OF SCIENCE

The MS degree consists of a minimum of 30 semester hours of work beyond the bachelor's degree; 20 or more semester hours consist of course work other than research and thesis. The program is designed to provide fundamental graduate training in geology and to prepare the student for certain careers in geology or for further graduate study.

Program of Study. The student, with the approval of the advisor, selects courses that make a coherent program of study. Each MS candidate must include on the program of study one hour of GLG 500 Geology Colloquium and six hours of GLG 592 Research and GLG 599 Thesis, at least three of which must be GLG 599 Thesis. A maximum of six hours of thesis may appear on a program of study. One-half of the credits applicable toward the degree must be in geological sciences courses; the remainder may include work either in geological sciences or related fields.

Thesis Requirements. A thesis based on field, laboratory, and library study is required.

Final Examination. A final oral examination in defense of the thesis is required.

DOCTOR OF PHILOSOPHY

The PhD degree consists of a minimum of 54 semester hours of work beyond the master's degree. At least 25 semester hours must consist of course work other than research and dissertation. The program is designed to develop creative scholarship and to prepare the student for a professional career in geology.

See "Doctor of Philosophy," page 69, for general requirements.

Program of Study. The program of study is selected with the recommendation of the student's supervisory committee. Each PhD candidate must include on the program of study one hour of GLG 500 Geology Colloquium and at least 24 semester hours of a combination of GLG 792 Research and GLG 799 Dissertation.

Foreign Language Requirements. None.

Comprehensive Examination. The student's supervisory committee must determine the content of the comprehensive examination, consisting of a written and an oral examination. Students are required to take the comprehensive examination during their third semester in residence in the PhD program.

Dissertation Requirements. A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required.

Final Examination. A final oral examination in defense of the dissertation is required.

RESEARCH ACTIVITY

Recent faculty and student research topics include the following.

Biogeochemistry. Sources, cycles, and fates of biogenic elements; cycles of metals and trace nutrients; signatures of

microbial life preserved in the rock record; organic geochemistry; microbial geochemistry; combining genomics and proteomics with geochemical processes; subsurface biosphere; hydrothermal ecosystems; abiotic organic synthesis; development of sensors for continuous observation of biogeochemical reactions; application of thermodynamics to bioenergetics; impact of human activities on natural biogeochemical processes; urban biogeochemical fluxes and processes; dynamics of transport of organic compounds, nutrients, and cells; life detection; habitability; astrobiology; characterization of dissolved organic matter in aquatic and marine systems; bioavailability of dissolved organic compounds in surface waters; electrospray-ionization mass spectrometric methods for quantifying dissolved organic compounds; correlation of in situ rates of geochemical processes; and molecular measures of microbial genetic expression.

Geochemistry. Isotope geochemistry; environmental and aqueous geochemistry; geochemistry and microbiology of hydrothermal systems; paleoclimate records; thermodynamics of fluid-mineral interfaces; synchrotron-based x-ray spectroscopies; secondary ion mass spectrometry; analytical and theoretical chemical studies of meteorites with application to Mars and early solar system evolution; geochemical exploration for ore deposits; trace element partitioning between minerals, fluids, and magmas; atmospheric geochemistry; paleoceanography; and stable isotopic applications in geobiology.

Geomorphology. Fault zone landforms and structure; earthquake surface rupture and paleoseismology; theoretical studies of faulting and hillslope development; engineering geologic field methods.

Geophysics. Seismology; mantle anisotropy; core-mantle boundary region; geodynamics, mantle flow and rheology; seismotectonics; earthquake surface rupture and paleoseismology; environmental geophysics; high pressure experimental geophysics; mantle structure; physics and chemistry of earth and planetary interiors; thermal modeling of subduction zones.

Geoscience Education. Educational research on the learning and teaching of geoscience; studies of geoscience learning in the field, lab, classroom, and online environments; innovative teaching methods; applications of instructional technologies; design of competencies and assessment instruments; spatial and temporal visualization; place-based and culturally-mediated teaching; ethnogeology; mathematics in the geoscience curriculum; teacher preparation and enhancement; curriculum development; and geoscience reform.

Mineral Physics. Electrical properties of silicate minerals, melts, and partial melts; effects of shock on hydrous minerals; shock-induced metamorphism and phase transitions in meteorites; grain boundary diffusion; kinetic processes and reaction mechanisms; mineral deformation and deformation microstructures; high temperature, high pressure studies of mantle materials.

Mineralogy. High-resolution transmission electron microscopy; order/disorder in clays and related minerals; amorphous to crystalline transitions; graphitic carbon and the structures of poorly crystalline materials; polytypism and

stacking sequences in sheet silicates (micas, chlorites, clays); mechanisms of phase transitions; surface studies: scanning tunneling and atomic force microscopy of mineral surfaces; determination of oxidation states and specific site environments through electron energy-loss spectroscopy (EELS); TEM cathodoluminescence studies of defects; airborne minerals: small airborne particles, air quality, air pollution; mineral thermodynamics and spectroscopy; high pressure mineralogy; phase transformation studies.

Paleontology/Paleoecology. Geobiology and the role of organisms in sedimentary processes; early biosphere evolution and the fossil record of early multicellular life; invertebrate paleontology; evolutionary paleoecology; stable isotopic and geochemical techniques; biological response to global change; ichnology; exopaleontology and the exploration for fossil records of extraterrestrial life.

Petrology. High temperature, high pressure phase equilibrium experiments, and models for the origin of major igneous rock types; volatile diffusion in silicate melts; experimental determination of mantle minerals and melts; field and analytical studies of temperature, pressure, and fluids during metamorphism; computer modeling of heat and mass transfer at convergent plate margins; subduction zones; continental extension; mineral equilibria in ore deposits.

Planetary Studies. Compositional and physical properties of the terrestrial planets; comparative geomorphology of the moon, Earth, Mars, Mercury, Venus, and the outer planet satellites; Venus tectonics; thermal infrared spectroscopy of planetary materials; planetary volcanic processes; laboratory simulation of eolian processes on Venus, Mars, and Earth; impact cratering experiments; meteorite studies; micro- and isotopic analysis of meteorites and planetary materials.

Remote Sensing. Geologic mapping based on integrated field and remote sensing studies; multispectral mineralogical investigations; urban environmental studies.

Structure and Tectonics. Structural and tectonic evolution of Arizona and the North American Cordillera; regional geology of the Transantarctic Mountains; Cordilleran tectonics; relation between fluid and tectonic processes; active tectonic processes.

Volcanology. Explosive eruption processes; mechanisms of dike intrusion; structures in lava flows; multiphase flow in volcanic and geothermal systems; textures and volatile contents of volcanic domes; mineralization related to rhyolite domes; laboratory simulation of lava flow processes; field studies throughout the western United States, Hawaii, and Central and South America.

For details about the most current research activity, see the Geological Sciences Web site at geology.asu.edu.

Astrobiology Institute. Astrobiology is broadly defined as “the study of the origin, evolution, and distribution of life in the universe.” ASU is one of 11 partnering institutions in the United States composing the NASA Astrobiology Institute (NAI). In addition to supporting basic research in astrobiology, the NAI seeks to enhance opportunities for graduate students desiring cross-disciplinary training in such areas as the organic chemistry of extraterrestrial materials, origin of life studies, early biosphere evolution, and the exploration

for life elsewhere in our solar system and beyond. The ASU Astrobiology Program is made up of a distributed faculty drawn from the Departments of Geological Sciences, Chemistry and Biochemistry, Biology, Physics and Astronomy, and the School of Life Sciences. The ASU Astrobiology Program also provides opportunities for regular interactions with other institute partners around the country through the use of advanced telecommunications and the next generation Internet.

Center for Solid State Science, Materials Research Science and Engineering Center, and Affiliated Departments. Analytical equipment routinely used by Geological Sciences students includes a JEOL JSX-8600 electron microprobe analyzer/SEM equipped with an image analysis system; 10 transmission electron microscopes specialized for high-resolution imaging ($\leq 1.7 \text{ \AA}$ resolution), EELS and EDS chemical analysis; and surface analytical microscopies (XPS, Auger and probe microscopies). Automated x-ray diffraction and fluorescence facilities are available, as is an ion microprobe. The high-pressure laboratory for experimental petrology is equipped with a complete range of vessels for investigations ranging from hydrothermal alteration to partial melting of planetary mantles.

Space Photography Laboratory. The Space Photography Laboratory contains an extensive research collection of photographs of the moon, Mars, Mercury, and outer planet satellites. A dedicated image processing facility with interactive and hardcopy capabilities is available for research utilizing spacecraft images.

Center for Meteorite Studies. The Department of Geological Sciences houses one of the largest collections of meteorites in the world. Geochemical and cosmochemical research is being undertaken in the Center for Meteorite Studies, including the following topics: trace element geochemistry, nature of asteroidal interiors, computer models of condensation in the nebula, meteorite mineralogy, organic compound investigations, chemical fractionation in meteorites, elemental partitioning in meteoritic minerals, transmission electron microscopy of chondritic meteorites, and fluid-rock interactions on asteroids and Mars.

GEOLOGICAL SCIENCES (GLG)

GLG 404 Fundamentals of Planetary Geology. (3)

fall

Surveys planetary topics, including impacts, tectonics, and volcanism on planetary objects, and use of spacecraft data, including geological mapping. Lectures, problem sets, weekend field trip. Fee. Prerequisite: Geology major or degree or instructor approval.

GLG 405 Geology of the Moon. (3)

selected semesters

Current theories of the origin and evolution of the moon through photogeological analyses and consideration of geochemical and geophysical constraints. Possible field trips to examine Arizona geology. Fee. Prerequisite: GLG 105 or instructor approval.

GLG 406 Geology of Mars. (3)

selected semesters

Geological evolution of Mars through analyses of spacecraft data, theoretical modeling, and study of terrestrial analogs; emphasizes current work. Possible field trips to examine Arizona geology. Fee. Prerequisite: GLG 105 or instructor approval.

GLG 410 Computers in Geology. (3)

fall

Geological computer skills, including data processing, visualization, presentation, numerical analysis, software and hardware applications. 2 hours lecture, 3 hours lab. Prerequisites: both GLG 101 and an upper-division course in geology or only instructor approval.

GLG 412 Geotectonics. (3)

selected semesters

Earthquakes, earth's interior, formation of oceanic and continental crust, and plate tectonics. Emphasizes current work. Prerequisite: GLG 310.

GLG 416 Field Geophysics. (3)

spring

Methods of applied geophysical exploration; seismic refraction, gravity, electrical resistivity, geomagnetics. Includes survey planning, data acquisition, processing, analysis, and interpretation. Lecture, field exercises. Prerequisite: a course in geology or instructor approval.

GLG 418 Geophysics. (3)

fall

Solid earth geophysics; geomagnetism, gravity, seismology, heat flow. Emphasizes crust and upper mantle. Prerequisites: a combination of GLG 310 and MAT 272 and PHY 131 or only instructor approval.

GLG 419 Geodynamics. (3)

selected semesters

Emphasizes application of continuum principles to geological problems, including lithospheric stresses, heat transfer, fluid mechanics, and rock rheology. Prerequisite: PHY 131.

GLG 420 Volcanology. (3)

once a year

Distribution of past and present volcanism, types of volcanic activity, mechanism of eruption, form and structure of volcanoes, and geochemistry of volcanic activity. Possible weekend field trips. Fee. Prerequisite: GLG 424.

GLG 424 Petrology. (3)

fall

Origin of igneous and metamorphic rocks. Optical mineralogy, hand specimen identification, and thin-section analysis. 2 hours lecture, 3 hours lab, possible weekend field trips. Fee. Prerequisite: GLG 321.

GLG 430 Paleontology. (3)

fall

Introduces concepts and analytical techniques in biogeology, paleobiology, paleoecology, and paleoenvironmental reconstruction from the fossil record. 2 hours lecture, 3 hours lab. Fee. Prerequisites: both GLG 102 and MAT 270 (or 290) or only instructor approval.

GLG 435 Sedimentology. (3)

spring

Origin, transport, deposition, and diagenesis of sediments and sedimentary rocks. Physical analysis, hand specimen examination, and interpretation of rocks and sediments. 2 hours lecture, 3 hours lab, possible weekend field trips. Fee. Prerequisites: GLG 102, 321.

GLG 441 Ore Deposits. (3)

selected semesters

Origin, occurrence, structure, and mineralogy of ore deposits. Possible weekend field trips. Fee. Prerequisite: GLG 424 or instructor approval.

GLG 451 Field Geology I. (3)

spring

Geological mapping techniques using topographic maps and aerial photos. Intensive field-based instruction. Lab. Fee. Prerequisites: GLG 310, 321.

GLG 452 Field Geology II. (3)

summer

Continuation of GLG 451. Lab. Fee. Prerequisite: GLG 451.

GLG 455 Advanced Field Geology. (3-4)

once a year

Geologic mapping in igneous, sedimentary, and metamorphic terrains of the Basin and Range province of Arizona. May be repeated for credit. Weekend field trips. Fee. Prerequisite: instructor approval.

GLG 456 Cordilleran Regional Geology. (3)

selected semesters

Systematic coverage through space and time of the geological development of western North America, emphasizing the western United

States. Fee. Prerequisite: senior major or graduate student in Geological Sciences or instructor approval.

GLG 460 Astrobiology. (3)

fall and spring

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

GLG 461 Geomicrobiology. (3)

spring

Past and present interactions among microbial life, geological materials, and biogeochemical cycles involving carbon, sulfur, phosphate, nitrogen, and minerals. Cross-listed as MIC 461. Credit is allowed for only GLG 461 or MIC 461. Prerequisites: introductory courses in chemistry and microbiology (or geological sciences); instructor approval.

GLG 470 Hydrogeology. (3)

spring

Geology of groundwater occurrence, aquifer and well hydraulics, water chemistry and quality, contaminant transport, remediation. Emphasizes quantitative methods. Prerequisites: GLG 101 (or 103); MAT 270; PHY 121.

GLG 481 Geochemistry. (3)

spring

Origin and distribution of the chemical elements. Geochemical cycles operating in the earth's atmosphere, hydrosphere, and lithosphere. Cross-listed as CHM 481. Credit is allowed for only CHM 481 or GLG 481. Prerequisite: CHM 341 (or 346) or GLG 321.

GLG 485 Meteorites and Cosmochemistry. (3)

selected semesters

Chemistry of meteorites and their relationship to the origin of the earth, solar system, and universe. Cross-listed as CHM 485. Credit is allowed for only CHM 485 or GLG 485.

GLG 490 Topics in Geology. (1-3)

fall, spring, summer

Special topics in a range of fields in geology. May be repeated for credit. Fee. Prerequisite: instructor approval.

GLG 500 Geology Colloquium. (1)

fall and spring

Presentation of recent research by faculty and invited guests. 1 semester required for all Geological Sciences graduate students. May be repeated for a total of 2 semester hours. Requires research paper. Prerequisite: instructor approval.

GLG 501 Geology of Arizona. (3)

once a year

Basic and historical geology, fossils, mining, energy resources, environmental problems, landscape development, and meteorites, cast in examples from Arizona. Requires research paper.

GLG 504 Geology of the Grand Canyon. (2)

selected semesters

Reviews the discovery, history, origin, and geology of the Grand Canyon of the Colorado River in Arizona. Requires 6-day field trip down the river (first 6 days after commencement in May) at student's expense. Requires field research and term paper on trip.

GLG 510 Advanced Structural Geology. (3)

selected semesters

Mechanics of rock deformation, emphasizing relationship between field observation, theory, and experiment. Stress, strain, simple constitutive relationships, failure criteria, and the basis of continuum methods. Possible field trips. Fee. Prerequisites: both GLG 310 and 424 or only instructor approval.

GLG 520 Advanced Physical Volcanology. (2-3)

selected semesters

Selected volcanologic topics, including explosive eruption processes, lava flow mechanics, and intrusive mechanisms. Possible field trips. Fee. Prerequisite: GLG 420 or instructor approval.

GLG 524 Advanced Igneous Petrology. (3)

selected semesters

Theoretical and practical aspects of the genesis of igneous rocks. Study of selected sites. Modern laboratory techniques. 2 hours lecture, 3 hours lab, possible weekend field trips. Fee. Prerequisite: GLG 424.

COLLEGE OF LIBERAL ARTS AND SCIENCES

GLG 547 Science, Technology, and Public Affairs. (3)

selected semesters

Explores the political, economic, cultural, and moral foundations of science and technology policy and governance in democratic society. Cross-listed as BIO 515/PAF 547. Credit is allowed for only BIO 515 or GLG 547 or PAF 547.

GLG 581 Isotope Geochemistry. (3)

selected semesters

Geochemistry and cosmochemistry of stable and radioactive isotopes; geochronology; isotope equilibria. Prerequisite: instructor approval.

GLG 582 Physical Geochemistry. (3)

selected semesters

Applies thermodynamic and kinetic principles to geochemical processes. Prerequisite: CHM 341 (or 346) or GLG 321.

GLG 591 Seminar. (1–3)

fall, spring, summer

Topics in a range of fields in geology. May be repeated for credit. Fee. Prerequisite: instructor approval.

GLG 592 Research. (1–12)

fall, spring, summer

GLG 598 Special Topics. (1–4)

fall, spring, summer

Special topics in geological sciences. May be repeated for credit. Topics may include the following:

- Advanced Field Geology. (1–3)
Fee.
- Clastic Sedimentology and Petrology. (1–3)
Fee.
- Cordilleran Regional Geology. (1–3)
Fee.
- Fundamental Planetary Geology. (1–3)
- Geology of Mars. (1–3)
Fee.
- Methods in Geoscience Teaching. (1–3)
- Ore Deposits. (1–3)
Fee.
- Orogenic Systems. (1–3)
- Petrology-Petrography. (1–3)
Fee.
- Principles of Stratigraphy. (1–3)
Fee.
- Remote Sensing. (1–3)
- Sedimentology. (1–3)
Fee.
- Volcanology. (1–3)
Fee.

Prerequisite: instructor approval.

GLG 599 Thesis. (1–12)

fall, spring, summer

GLG 792 Research. (1–12)

fall, spring, summer

GLG 799 Dissertation. (1–15)

fall, spring, summer

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see “Omnibus Courses,” page 56.

German

See “Department of Languages and Literatures,” page 291.

History

Master’s and Doctoral Programs

www.asu.edu/clas/history/graduate/graduate.html

480/965-5778

COOR 4595

Noel J. Stowe, Chair

CORE FACULTY

Regents’ Professor: Iverson

Professors: Adelson, Batalden, Burg, Davis, Fuchs, Gratton, Green, Hirt, Lavrin, MacKinnon, Rosales, Simpson, Stowe, Tillman, Warnicke

Associate Professors: Barnes, Carroll, El Hamel, Gray, Gullett, Longley, Powers, Rush, Samuelson, Smith, Soergel, Stoner, Thompson, Thornton, VanderMeer, Warren-Findley, Wright

Assistant Professors: Holian, Kaplan, Koopmans, Manchester, Miller, Pitti, Wilson

Senior Instructional Professional: Luey

AFFILIATED FACULTY

Art

Associate Professor: Brown

Chicana and Chicano Studies

Associate Professor: Escobar

Humanities

Associate Professor: Taylor

Women and Gender Studies

Professor: Rothschild

The faculty in the Department of History offer graduate programs leading to the MA and PhD degrees in History. MA candidates are offered an opportunity to develop knowledge of a specific historical field, to study comparative history, and to learn research techniques. Students with various goals benefit from this degree program, including those planning to advance to PhD study, those seeking positions in the public sector, or in business, and those now holding or looking for educational posts in elementary and secondary schools and community colleges.

Students admitted to the Master of Education (MEd) degree program with a major in Secondary Education may elect history as the subject matter field.

MASTER OF ARTS

See “Master’s Degrees,” page 67, for general requirements.

Admission. Applications for the master’s program must be accompanied by the applicant’s scores on the Graduate Record Examination (GRE); three letters of recommendation from faculty members or others who are qualified to

judge the applicant's potential for advanced study in history; a résumé; a writing sample; and a statement of purpose.

Forms and instructions for filling them out are available from the graduate administrative assistant, the Division of Graduate Studies Web site (www.asu.edu/graduate), and the Department of History Web site (www.asu.edu/clas/history). MEd applicants must submit scores from both the GRE aptitude and advanced history tests. For MEd program requirements, see "MEd Degree in Secondary Education," on this page.

All applications and supporting materials are reviewed by the graduate committee of the department. The committee recommends to the Division of Graduate Studies that the student be granted regular or provisional admission or be denied admission.

Areas of Concentration. In consultation with the supervisory committee, the candidate may select a field of history from the following: Asian, British, European, Latin American, public history, United States, and U.S. Western. For information on the concentration in public history, see "Public History Concentration," on this page. Under the United States concentration, students may choose to specialize in a variety of areas; some examples are African-American, American Indian, Chicana/Chicano, and women.

Program of Study

MA Degree in History. A minimum of 30 semester hours of graduate course work are required for the MA in History. Upon matriculation, the student, in consultation with the graduate director, selects a faculty advisor in the student's area of concentration. The faculty advisor directs the student toward completion of required course work. The 30 semester hours must conform to the following guidelines:

1. At least 24 semester hours of course work in history is required. With the approval of the supervisory committee, candidates may add to the 24 semester hours, six semester hours of closely related course work in another academic unit (this does not apply to students in the public history concentration).
2. Eighteen of the 24 semester hours must be in 500-level history courses. If 400-level courses are included in the program of study, documented proof must be provided that they were taken for graduate credit. Contact the graduate administrative assistant for details.
3. At least three of the 24 semester hours must be in HST 591 Seminar (in the major field of study).
4. At least six semester hours of HST 599 Thesis are required of students writing an MA thesis. The thesis equivalent substitutes six semester hours of HST 592 in place of six semester hours of HST 599 and incorporates an additional three semester hours of HST 591 into the program.

Public History Concentration. Candidates admitted to the MA degree in History with a concentration in public history select two areas of emphasis, one of which is public history, and must complete HST 502 and at least two short courses (of one semester hour each). Beyond these requirements,

each of the six emphases within public history has other specific requirements, which are listed in the department's graduate handbook. The following is a list of the differing minimum number of semester hours for a degree in each of the six emphases: business, 41 semester hours; community history, 40; historic preservation, 40; historical administration, 37; historical editing and publishing, 44; public sector, 39. Course work taken outside of the department for inclusion in the program of study must be approved in advance by the appropriate program director.

MEd Degree in Secondary Education. Candidates for the MEd degree in Secondary Education with an emphasis in history must complete 15 semester hours of history course work. Overall, 12 of the 15 semester hours must be in 500-level history courses. If 400-level courses are included in the program of study, documented proof must be provided that they were taken for graduate credit. Contact the department for specific details. All candidates for the MEd must maintain at least a 3.00 G.P.A. in HST courses.

Foreign Language Requirements. The student is expected to have a reading knowledge of one foreign language, but some other research skills may be substituted for this requirement by the supervisory committee.

Thesis Requirements. A master's thesis or its equivalent is required. Students have two options: They can either write an MA thesis or take the MA thesis equivalent. The MA thesis is approximately 100 pages in length and is based on original research. Students who choose this option must enroll for six semester hours of thesis work (HST 599).

The MA thesis equivalency is composed of two parts: (1) two three semester hour seminars (HST 591) on a broad topic and (2) two three semester hour research courses (HST 592) on a topic derived from the first research course.

Both the MA thesis and the MA thesis equivalent must be prepared according to Division of Graduate Studies requirements, defended, and approved by a thesis committee. Candidates must supply bound copies of the thesis that will be placed in Hayden Library and in the Department of History.

Final Examination. A final oral defense of the thesis or the thesis equivalent is required.

DOCTOR OF PHILOSOPHY

The PhD degree in History offers candidates the opportunity to study past and contemporary civilizations and to learn research and writing techniques that may be used in scholarly careers at leading academic institutions, in historical societies and agencies, in the public sector, and in business.

Major emphasis is placed upon developing a disciplined and inquiring mind, expertise in a chosen subject area, and competence in research methodology. The program is composed of small classes that bring students into a close working relationship with faculty and other students and offers flexibility in designing degree programs.

The five areas of concentration are Asian history, British history, European history, Latin American history, and United States history. Students must select a minimum of three historical fields for examination.

COLLEGE OF LIBERAL ARTS AND SCIENCES

See “Doctor of Philosophy,” page 69, for general requirements.

Admission. Applications for the PhD degree in History must be accompanied by the applicant’s scores on the Graduate Record Examination, three letters of recommendation from faculty members or others who are qualified to judge the applicant’s potential for doctoral study, a writing sample, a résumé, and a statement of purpose. Applications and supporting materials are reviewed by the graduate committee of the Department of History. The committee recommends to the Division of Graduate Studies that the applicant be granted regular or provisional admission or be denied admission.

Program of Study. For students admitted to the doctoral program with a master’s degree or other graduate credits in hand, the requirements for the PhD are an additional 54 semester hours of credit in residence, which should consist of 30 semester hours of historical study and 24 semester hours of dissertation research and writing. All 54 semester hours have to be taken after admission to the program. A minimum of 84 semester hours is required for the doctorate.

For students admitted to the doctoral program directly from a baccalaureate program, the requirements for the PhD are 84 semester hours of course work, which should consist of 60 semester hours of historical study and 24 semester hours of dissertation research and writing. A minimum of 54 semester hours must be taken while the student is in residence after admission to the doctoral program. These hours should conform to the expectations of students who enter with a master’s degree or other graduate credits in hand.

Upon matriculation, the student, in consultation with the graduate director, selects a faculty advisor in the area of concentration. Together the faculty advisor and student select a PhD program committee consisting of at least three faculty members. In consultation with the student, the committee draws up the program of study and helps direct the student to the completion of required course work.

The program of study (a minimum of 60 graduate semester hours of history) required of all students in the doctoral program must conform to the following guidelines:

1. At least 36 semester hours must be at the 500-level or above;
2. If 400-level courses are taken as part of the program of study, the student must have documented proof that they were taken for graduate credit, contact the graduate administrative assistant for details;
3. At least nine semester hours must be in research seminars (HST 591); and
4. 24 semester hours of dissertation research and writing are required.

Foreign Language Requirements. Demonstration of a satisfactory reading knowledge of two foreign languages is required before the student may take the comprehensive examinations. For the second language, the student’s program committee is free to approve the substitution of a demonstrated capacity in some other research skill, such as quantitative or statistical analysis, archival management,

historical preservation, oral history, or educational technology.

Preliminary Reviews. During the first academic year of residence, students are required to schedule a preliminary review with their program committee. A preliminary review is an oral interview during which a student defends the program of study and his or her progress in the program to that point. Students who fail this review must withdraw from the program.

It is recommended that students make arrangements for the preliminary review by February 1 and have the preliminary review completed by March 1. It is further recommended that the student demonstrates a satisfactory reading knowledge of at least one foreign language before scheduling the review.

Comprehensive Examinations. Candidates for the doctoral degree must display a command of the historical knowledge in their chosen fields of study. This command is determined through a series of written and oral assessments known collectively as the comprehensive examinations. Comprehensive examinations are taken after the student has completed 60 semester hours of graduate course work. Students are allowed to retake the written portions of the comprehensive examination only once. Only upon successful completion of the written portions of the examination are students allowed to sit for the oral portion. The comprehensive examinations are conducted by the program committee.

Dissertation Committee. Upon satisfactory completion of the comprehensive examination, a supervisory committee for the dissertation is selected. In consultation with the director of Graduate Studies, the student chooses a chair of the dissertation committee. In consultation with the chair, the student then chooses two other faculty members to serve on the dissertation committee. The role of the committee is to approve the subject and title of the dissertation and to advise the candidate during the completion of the research and writing of the dissertation.

Dissertation Prospectus. Before a candidate is permitted to begin researching a dissertation topic, the candidate must prepare a prospectus of four to seven pages outlining the thesis. The prospectus presents the connection between the thesis and relevant historiography. The prospectus must be presented to the dissertation committee by the end of the semester following the comprehensive exams. The topic must be in one of the candidate’s fields of study and should include the following:

1. a thesis statement;
2. a discussion of relevant literature;
3. a discussion of possible research material and availability of sources;
4. a secondary bibliography; and
5. a historiographical statement.

Consult the graduate handbook for more information on the composition of a dissertation prospectus.

Dissertation Requirements. The dissertation must be an original contribution to knowledge and demonstrate the student's proficiency in independent research.

Final Examination. A final oral defense of the dissertation is required.

Graduate Preparation in Public History

The department offers several public history emphases preparing students to apply the skills of the historian in careers beyond the classroom. Public historians focus their historical insight, expertise, and critical abilities in the broad—that is, public—community. Six areas of emphasis are offered within public history: business applications, community history, scholarly publishing, historic preservation, historical administration, and the public sector. Graduate course work in public history may be included in both master's and doctoral programs of study.

The public history core combines specially designed course work and specific program requirements with traditional degree requirements. The department imposes additional admission requirements and includes periodic evaluations of public history students' progress. (The business applications emphasis requires prerequisites in the business field.) Enrollment is limited to provide careful preparation and advising. The curriculum integrates required course work in a public history component with courses in a geographic area concentration. As a special feature of the program, short courses are taught each year by visiting public historians. Each emphasis requires completion of two short courses. Courses from other disciplines, such as anthropology, business, public administration, fine arts, geography, political science, and architecture (architectural history and preservation planning) may be included in a program of study when students have the necessary prerequisites and if the courses meet particular student needs or are required within the various emphases of the concentration. Students who select the scholarly publishing option must be admitted to the Scholarly Publishing Certificate program and complete all certificate requirements. (See "Scholarly Publishing," page 326, for more information.)

Course work for all areas of the program *begins each fall semester with a required* special workshop during the fall orientation week before classes start. Students are admitted for the fall semester, though some class work outside the public history field may be started earlier. With concentrated full-time study, the master's public history component may be completed in four semesters, depending on the public history area selected for emphasis. In some instances, the mandatory internship or other program requirements must be completed during the *summer* months.

Each student in the program completes a core of courses appropriate to an area of emphasis. Basic to each core is the completion of HIS 502 Public History Methodology during the first semester of study. The work introduced in this methodology class is continued in the public history research seminar (HIS 591), required or optional, depending on the area of emphasis.

At the satisfactory completion of the training work and upon the recommendation of the appropriate director and the department, a certificate of completion is issued by the department. Assistance is provided in job placement.

Students interested in this curriculum should consult the department's graduate handbook, which provides detail about public history work.

HISTORY (HST)

HST 405 Colonial American History to 1763. (3)

once a year

Political, economic, social, and cultural history of the colonial era. Concentrates on English colonies, with some consideration of Spanish, French, and other colonial regions in North America.

HST 406 The American Revolution, 1763–1789. (3)

once a year

Causes, course, and consequences of the American Revolution culminating in the ratification of the Constitution.

HST 407 The Early U.S. Republic, 1789–1850. (3)

once a year

Political, social, economic, and cultural development of the United States from the Revolution to 1850.

HST 408 Civil War and Reconstruction. (3)

once a year

Explores the causes, conduct, and consequences of the American Civil War, concentrating on the years 1848 to 1877.

HST 409 The Emergence of the Modern United States, 1877 to 1918. (3)

once a year

Triumph of modern political, social, and economic structures and values, 1877–1918; role of region, religion, race, and ethnicity.

HST 410 The Modern United States, 1918 to 1945. (3)

once a year

1920s boom and the crash, the Depression and the New Deal response. The Second World War at home and abroad.

HST 411 The Postwar United States, 1945 to 1973. (3)

once a year

Cold War, prosperity, reform, and immense social and political change in the U.S.

HST 412 The Contemporary United States, 1973 to the Present. (3)

once a year

End of the Cold War, political crises, and cultural transformations in the U.S.

HST 414 The Modern U.S. Economy. (3)

selected semesters

Origins of 19th-century slavery and industrialization; 20th-century crisis and regulation: political economy of an advanced capitalist democracy. Prerequisite: ECN 111 (or 112) or HST 109 (or 110).

HST 415 Unequal Sisters: Women and Political and Cultural Change. (3)

once a year

Examines race, ethnic, and class differences among women, focusing on the political and cultural experiences of women in the U.S.

HST 416 Indian History of the Southwest. (3)

once a year

Reviews historical events from prehistoric peoples, the Spanish and Mexican periods, and the U.S. period from 1846 to present.

HST 417 Topics in Mexican American History. (3)

once a year

Focuses on specific topics in Mexican American history, including immigration, civil rights, the Chicano Movement, union activism, and regional and generational differences.

HST 423 The Tudor Monarchy. (3)

once a year

Political, cultural, and social foundations of 16th-century England.

HST 424 The Stuart Transformation of England. (3)

once a year

Political, social, economic, and cultural developments in 17th-century England.

HST 426 The British Empire. (3)

once a year

British imperialism and colonialism in Africa, the Americas, Asia, and the South Pacific. Prerequisite: upper-division standing or instructor approval.

COLLEGE OF LIBERAL ARTS AND SCIENCES

HST 427 The French Revolution and the Napoleonic Era. (3)

once a year

Conditions in Pre-Revolutionary and Revolutionary France; organization of France under Napoleon and impact of French changes upon Europe.

HST 428 Modern France. (3)

selected semesters

Social, political, economic, and cultural transformations of French society, 1815–present. Impact of industrialization, war, and revolution on people's lives. Prerequisite: upper-division standing or instructor approval.

HST 429 Modern Germany. (3)

once a year

Germany since 1871.

HST 430 Hitler: Man and Legend. (3)

once a year

Biographical approach to the German Third Reich emphasizing nature of Nazi regime, sociocultural issues, World War II, and historiography.

HST 431 Eastern Europe and the Balkans Before 1914. (3)

selected semesters

Empire and nation in Eastern Europe and the Balkans before World War I, emphasizing Hapsburg and Ottoman lands.

HST 432 Eastern Europe and the Balkans in the 20th Century. (3)

selected semesters

Politics and culture in Eastern Europe and the Balkans from World War I to the present.

HST 435 The Russian Empire. (3)

fall

Development of Russian imperial institutions and civil society from the 17th to the early 20th centuries. Lecture, discussion.

HST 436 The Soviet Experiment. (3)

spring

Communist revolutionaries' rule of Russia, focusing on utopian culture, Stalinist terror, heroism in war, and the breakup of the former USSR.

HST 437 Spain Through the Golden Age. (3)

selected semesters

Cultural, economic, political, and social development of Spain from antiquity to the late 17th century.

HST 438 Modern Spain. (3)

selected semesters

Cultural, economic, political, and social development of modern Spain.

HST 443 The United States and Latin America. (3)

once a year

Latin American struggle for diplomatic recognition, attempts at political union, participation in international organizations since 1810, and relations between the United States and Latin America.

HST 445 20th-Century Cuba. (3)

once a year

History of Cuba from colonial era to formation of the early republic; political, economic, social development in late 20th century. Lecture, discussion.

HST 446 Colonial Mexico. (3)

once a year

Political, economic, social, and cultural developments from pre-Columbian times to 1810.

HST 447 Modern Mexico. (3)

once a year

Political, economic, social, and cultural developments from 1810 to the present.

HST 451 Chinese Cultural History. (3)

selected semesters

China's classics in translation studied both for their intrinsic ideas and for the origins of Chinese thought.

HST 452 Chinese Cultural History. (3)

selected semesters

Evolution of Confucian thought, its synthesis with Taoism and Buddhism, and modern reactions against, and uses of, Confucian traditions.

HST 453 The People's Republic of China. (3)

selected semesters

Analyzes major political, social, economic, and intellectual trends in China since the founding of the People's Republic in 1949.

HST 455 The United States and Japan. (3)

fall

Cultural, political, and economic relations in the 19th and 20th centuries. Emphasizes post-World War II period.

HST 456 The Vietnam War. (3)

once a year

Intersection of American and Asian histories in Vietnam, viewed from as many sides as possible.

HST 460 History of Fire. (3)

fall

Global survey of the natural and cultural history of fire. Lecture, discussion.

HST 480 Methods of Teaching History: Classroom Resources. (3)

fall

Methods in instruction, organization, and presentation of the subject matter of history and closely allied fields. Prerequisites: HST 300; ITC admission. Pre- or corequisites: SED 403, 598.

HST 481 Methods of Teaching History: Community Resources. (3)

spring

Identify community-based resources for teaching history, work with resources, and learn how to integrate them into the secondary classroom. Lecture, lab. Prerequisite: HST 480.

HST 484 Internship. (1–6)

selected semesters

HST 492 Honors Directed Study. (1–6)

selected semesters

HST 493 Honors Thesis. (3)

selected semesters

HST 494 Special Topics. (1–4)

selected semesters

HST 498 History Pro-Seminar. (3)

fall and spring

Required course for majors on topic selected by instructor; writing-intensive course related to the development of research skills and writing tools used by historians. Prerequisites: HST 300; History major.

HST 499 Individualized Instruction. (1–3)

selected semesters

HST 500 Methods of Historical Investigation. (1–12)

selected semesters

HST 502 Public History Methodology. (3)

fall

Introduces historical research methodologies, techniques, and strategies used by public historians. Readings, short papers, and guest speakers. Required for students in the public history concentration.

HST 512 Western Civilization to the Enlightenment. (3)

fall

Systematically examines various interpretations of Western civilization from the ancient Middle Eastern civilizations to the European Enlightenment. Seminar.

HST 513 Western Civilization Since the French Revolution. (3)

selected semesters

Systematically examines various interpretations of Western civilization since the French Revolution. Seminar.

HST 514 Historians of the United States. (3)

selected semesters

Study of the history of American historical writing from the early colonial days to the 20th century.

HST 515 Studies in Historiography. (3)

selected semesters

Methods and theories of writers of history. May be repeated for credit.

HST 525 Historical Resource Management. (3)

fall

Identification, documentation, and interpretation of historic period buildings, sites, and districts. Emphasis on interdisciplinary efforts among historians, architects, and anthropologists.

HST 526 Historians and Preservation. (3)

spring

Preparation of historians for public and private historic preservation programs. Prerequisite: HST 525 or instructor approval.

HST 527 Historical Administration. (3)

fall

Preparation of historians in administration of archives and historical sites, museums, societies, and offices in government agencies.

HST 532 Community History. (3)*selected semesters*

Techniques and methods of community history emphasizing local resources. Required for community history option. Seminar.

HST 551 Comparative Histories of War and Revolution. (3)*selected semesters*

Comparative field course of the themes of war and revolution.

HST 552 Comparative History of Family and Community. (3)*selected semesters*

Comparative course with a focus on family, including minority and ethnic groups, in society.

HST 553 Comparative History of State and Institutions. (3)*selected semesters*

Comparative course that explores the changing nature of central institutions and government.

HST 554 Comparative Historical Population Studies: Ethnicity, Economy, and Migration. (3)*selected semesters*

Comparative course that explores the impact of social, cultural, or economic changes in the population.

HST 555 Comparative Historical Topics. (3)*selected semesters*

Analyzes a variety of specific social, political, cultural, and intellectual topics.

HST 584 Internship. (1–12)*selected semesters***HST 590 Reading and Conference. (1–12)***selected semesters***HST 591 Seminar. (3)***fall and spring*

May be repeated for credit.

HST 592 Research. (1–12)*selected semesters***HST 595 Continuing Registration. (1)***selected semesters***HST 598 Special Topics. (1–4)***selected semesters*

Reading courses designed to increase familiarity with a particular topic and the important writing concerning it. May be repeated for credit. Topics may include the following:

- Asian History. (3)
- English and British History. (3)
- European History. (3)
- Latin American History. (3)
- U.S. History. (3)

HST 599 Thesis. (1–12)*selected semesters***HST 684 Internship. (1–12)***selected semesters***HST 690 Reading and Conference. (1–12)***selected semesters***HST 695 Continuing Registration. (1)***selected semesters***HST 700 Public History Research Methods. (1–12)***selected semesters***HST 790 Reading and Conference. (1–12)***selected semesters***HST 791 Seminar. (1–12)***selected semesters***HST 792 Research. (1–12)***selected semesters***HST 795 Continuing Registration. (1)***selected semesters***HST 799 Dissertation. (1–15)***selected semesters*

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see “Omnibus Courses,” page 56.

Humanities

HUMANITIES (HUM)

Applications for the MA degree program in Interdisciplinary Humanities are not being accepted at this time. A limited number of HUM courses are offered each semester. Access www.asu.edu/aad/catalogs/courses for the most current list of courses.

Justice Studies

Master's Programwww.asu.edu/clas/justice

480/965-7682

WILSN 331

Doris Marie Provine, Director, School of Justice and Social Inquiry

Regents' Professor: Altheide**Professors:** Cavender, Haynes, Hepburn, Johnson, Jurik, Lauderdale, Provine, Romero, Schneider, Walker, Zatz**Associate Professors:** Bortner, Lujan, Riding In**Assistant Professors:** Adelman, Hanson, Kupchik, Lopez, Milun, Monahan

The faculty in the School of Justice and Social Inquiry offer a program leading to the MS degree in Justice Studies. Information about the interdisciplinary PhD degree in Justice Studies may be obtained from the graduate coordinator's office. See “Justice Studies,” page 287.

MASTER OF SCIENCE

The study of justice is an interdisciplinary field of scholarship, research, and teaching, embracing those aspects of social and behavioral sciences relevant to an understanding of law, justice, crime, and social deviance. It includes a critical examination of the policies and organizational processes that have evolved for handling attendant problems. The MS degree has been designed to prepare students for professional positions in justice-related agencies, for teaching in community colleges, and for further study and research in the justice field.

Admission. In addition to meeting Division of Graduate Studies requirements, applicants must submit Graduate Record Examination (GRE) scores or their Law School Admission Test (LSAT) score; a one- or two-page statement outlining their educational and career goals related to Justice Studies and their areas of interest; and three letters of recommendation, preferably from academic referees.

COLLEGE OF LIBERAL ARTS AND SCIENCES

Because of enrollment limits, candidates who meet minimum requirements are not automatically admitted into the program.

Selection Criteria. In selecting promising candidates, the admissions committee evaluates past academic performance, scores from the GRE, and potential for success as indicated by recommendations and personal statements.

Applications to the program may be made at any time; however, complete files must be submitted to the Division of Graduate Studies by January 1 for fall admission.

International Applicants. In addition to admission material, international applicants whose native language is not English must submit scores from the Test of English as a Foreign Language. Evidence that sufficient funds are available for financing the student's academic program also must be submitted. See "Admission to the Division of Graduate Studies," page 58, for more information.

Advisory Committee. Typically, by the end of the first year, students form an advisory committee consisting of a chair and two members. The chair and at least one member must be faculty of the School of Justice and Social Inquiry.

The committee members must be appointed by the dean of graduate studies upon the recommendation of the director of the School of Justice and Social Inquiry. The advisory committee works with the student to establish a program of study, to direct the thesis or applied project, and to administer the oral examination.

Program of Study. The MS degree in Justice Studies has two options: a thesis or an applied project. The thesis option requires the completion of 36 semester hours, of which six are thesis hours. The applied project option requires the completion of 42 semester hours, of which three are JUS 593 Applied Project. Each student's program is developed in concert with the advisory committee. The program of study has three major categories: foundation courses, elective courses, and thesis or applied project requirements.

Foundation Courses. The required foundation courses provide students with a fundamental understanding of the theories, methods, and analytic techniques associated with the study of justice. Foundation courses include

JUS 500 Justice Research Methods	3
JUS 501 Justice Theory.....	3
JUS 509 Statistical Problems in Justice Research	3
JUS 521 Qualitative Data Analysis and Evaluation.....	3

Elective Courses. Offered by the School of Justice and Social Inquiry and other academic units, elective courses develop a unique research area in justice studies. Students may choose these courses in consultation with their advisory committees. Alternatively, students may choose one of the following areas within justice studies:

1. adolescence and justice;
2. American Indian justice;
3. comparative justice;
4. crime and justice;
5. dispute resolution;
6. gender and justice;
7. law, ecology, and society;

8. law, policy, and evaluation;
9. race, ethnicity, and justice; or
10. social and economic justice.

Thesis Requirements. To satisfy the research requirement for the Master of Science degree, candidates must write a thesis and defend it in an oral examination.

Applied Project Requirements. Candidates pursuing the applied project option must present their applied project and defend it in an oral examination conducted by the faculty member who supervises the project. The project should be an analytical report.

Concurrent MA Anthropology/MS Justice Studies.

Graduate students in the School of Justice and Social Inquiry and the Department of Anthropology are able to receive a concurrent Master of Science degree in Justice Studies and Master of Arts degree in Anthropology with a concentration in sociocultural anthropology. The program is designed for individuals with combined and complementary knowledge and skills. It prepares them for basic and applied research and administrative and educational activities related to justice studies and anthropology. Students must apply and be admitted separately to each program in accordance with the guidelines of the Division of Graduate Studies, the Department of Anthropology, and the School of Justice and Social Inquiry.

Foreign Language Requirements. None.

Financial Assistance. A limited number of assistantships are available on a competitive basis for well-qualified students at the master's level. To be eligible for an assistantship, students must be admitted to a graduate degree program with regular admission status.

JUSTICE STUDIES (JUS)

JUS 500 Justice Research Methods. (3)

once a year

Theories and methods of research with emphasis on development of designs most relevant to justice data and problems.

JUS 501 Justice Theory. (3)

once a year

Theories and philosophies of social, economic, political, and criminal justice. Applications of theories to contemporary justice issues. Lecture, discussion.

JUS 503 Crime and Social Causation. (3)

once a year

Theories of deviance and crime as they relate to social policies and specific response of the justice complex.

JUS 509 Statistical Problems in Justice Research. (3)

once a year

Methodological problems of research design and statistical methods specific to justice studies.

JUS 521 Qualitative Data Analysis and Evaluation. (3)

once a year

Analyzes qualitative data, e.g., field notes, in-depth interview transcripts, document analysis, coding, and retrieval with a microcomputer; qualitative evaluation.

JUS 542 American Indian Justice. (3)

once a year

Provides a broad overview of American Indian and Alaskan Native issues of justice and injustice in contemporary society.

JUS 555 Migration/Immigration and Justice. (3)

selected semesters

Explores the causes and consequences of immigration to the United States and the incorporation of immigrants into the American economy and society. Seminar.

JUS 560 Women, Law, and Social Control. (3)*once a year*

Gender issues in the exercise of formal and informal mechanisms of social control, including economic, social, legal factors, both violent and nonviolent.

JUS 570 Juvenile Delinquency. (3)*once a year*

Study of delinquency, including causation theories. Alternative definitions of delinquency, official statistics, and the critique and analysis of the interaction between social institutions and youth.

JUS 575 Race, Gender, and Crime. (3)*fall and spring*

Current theoretical and methodological debates and controversies regarding race, ethnicity, gender, class, crime, and the criminal justice system; policy implications. Seminar.

JUS 579 Political Deviance. (3)*once a year*

Seminar examines the politics of deviance by integrating the study of conflict with aspects of social organization, especially state formation.

JUS 584 Internship. (3 or 6)*fall, spring, summer*

Assignments in a justice agency designed to further the integration of theory and practice. Placements are arranged through consultation with students and agencies. Fee.

JUS 588 Justice and the Mass Media. (3)*once a year*

Analyzes the nature and impact of mass media messages about justice concerns for social order. Lecture, discussion.

JUS 591 Seminar. (1–3)*once a year*

Topics chosen from various fields of justice studies. May be repeated for credit.

JUS 593 Applied Project. (1–12)*selected semesters***JUS 610 Law and the Social Sciences. (3)***once a year*

Analyzes the theoretical grounds underlying diverse studies of law and society; creation and administration of law; and jurisprudence and politics.

JUS 620 Justice Research and Methods. (3)*once a year*

Concept development, research design, data collection strategies, legal research, and building computer databases relevant to the study of justice.

JUS 630 Data Analysis for Justice Research. (3)*once a year*

Bivariate and multivariate techniques of data analysis and hypothesis testing for justice-related research and use of information and statistical programs.

JUS 640 Theoretical Perspectives on Justice. (3)*once a year*

Analyzes philosophical perspectives of justice; linkages between social science theory and justice constructs; application of justice to social issues.

JUS 650 Advanced Qualitative Data Analysis. (3)*spring*

Advanced qualitative data collection and analysis techniques, including ethnography, in-depth interviews, field notes, coding, transcribing, content analysis, textual analysis. Seminar.

JUS 669 Political Trials and Indigenous Justice. (3)*once a year*

Focuses upon research on political trials, deviance, and conceptions of indigenous and contemporary justice. Lecture, discussion.

JUS 691 Seminar. (1–3)*fall, spring, summer*

Topics chosen from various fields of justice studies. May be repeated for credit.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Justice Studies

Interdisciplinary Doctoral Programwww.asu.edu/clas/justice

480/965-7682

WILSN 316

Doris Marie Provine, Director, School of Justice and Social Inquiry

The School of Justice and Social Inquiry offers an interdisciplinary graduate program leading to the PhD degree in Justice Studies. Faculty are from a large number of academic units and provide students with an opportunity to tailor their courses of study to fit individual needs and goals. Committee members represent the College of Law; the Departments of Anthropology, History, Languages and Literatures, Management, Philosophy, Political Science, Psychology, Recreation Management and Tourism, Religious Studies, and Sociology; the Hugh Downs School of Human Communication; and the Schools of Justice and Social Inquiry, Public Affairs, and Social Work.

DOCTOR OF PHILOSOPHY

The PhD degree in Justice Studies integrates philosophical, legal, historical, and social science approaches to the study of law and justice in society.

This interdisciplinary program aims to produce scholars whose research activities contribute to the knowledge and understanding of conflicts and dilemmas surrounding social change. Courses on the study of justice are a part of the curriculum of many academic disciplines, and academic books and journals increasingly stress issues of justice and injustice. In addition to the interdisciplinary programs featuring justice, students may enter academic programs that focus on business administration, class, ecology, gender, law, public administration, and race. Justice Studies graduates from the interdisciplinary PhD program have a strong theoretical background, interdisciplinary training in law, humanities, and the social sciences, and possess the technical skills associated with both qualitative and quantitative research methodologies. These qualifications provide graduates with the opportunity to successfully compete for a variety of positions in academic and justice-related fields.

Admission. Applications are reviewed on an annual basis by the Graduate Programs committee. Recommendations for admission are made by the director of the committee to the dean of graduate studies. In addition to meeting minimum Division of Graduate Studies admission requirements, each applicant must provide a statement of educational and career goals and the reasons for seeking this degree, a sample of written work, and three letters of recommendation, preferably from academic referees. Application to the program may be made at anytime. However, complete files

COLLEGE OF LIBERAL ARTS AND SCIENCES

must be submitted to the Division of Graduate Studies and the School of Justice and Social Inquiry by January 1 for the following fall semester. Because of enrollment limits, candidates who meet minimum requirements are not automatically admitted.

Advisory Committee. An advisory committee consisting of the committee chairperson and at least two other members, must represent a minimum of two disciplines and be from two different academic units. The dean of graduate studies, upon the recommendation of the director of graduate programs, appoints this committee. The advisory committee assists students in developing programs of study, assumes primary responsibility for assessing the students' academic progress, and prepares and evaluates the comprehensive examination.

Core Courses. Five core courses are required of all students in the program. The core courses are taken within the first three semesters of the student's program of study. Each core course is interdisciplinary in nature.

JUS 610	Law and the Social Sciences	3
JUS 620	Justice Research and Methods.....	3
JUS 630	Data Analysis for Justice Research	3
JUS 640	Theoretical Perspectives on Justice	3
JUS 650	Advanced Qualitative Data Analysis.....	3
Total.....		15

Areas of Concentration. Students use elective courses to develop a specialization in an area relevant to justice studies from a law and social sciences perspective. The specialization is developed through consultation with the student's advisory committee. Five areas of concentration have been established, based on the research and teaching expertise of participating faculty.

1. criminal and juvenile justice;
2. dispute resolution;
3. law, justice, and minority populations;
4. law, policy, and evaluation; and
5. women, law, and justice.

From these broad concentrations, students can develop areas of study emphasizing

1. adolescence and justice;
2. American Indian justice;
3. comparative justice;
4. crime and justice;
5. dispute resolution;
6. gender and justice;
7. law, ecology, and society;
8. law, policy, and evaluation;
9. race, ethnicity, and justice; and
10. social and economic justice.

Students may develop other areas of study in consultation with their advisory committee.

Program of Study. Students entering the program with a master's degree in the social sciences, philosophy, a relevant interdisciplinary field, or a Juris Doctor (JD), must complete

a minimum of 54 semester hours of study beyond the master's or JD degree, including 24 semester hours of dissertation and research. Applicants holding only the baccalaureate degree are required to complete a total of 84 semester hours. At least 30 hours of the approved PhD program of study must be completed after admission into the program. The Division of Graduate Studies also requires that two consecutive semesters, subsequent to admission to the program, must be spent in full-time residence at ASU.

Foreign Language Requirements. None.

Comprehensive Examination. Upon completion of course work and before the start of dissertation research, the student is given a written examination. The examination evaluates the student's accumulation of interdisciplinary knowledge and ability to communicate across disciplines. The exam is developed and administered by the student's advisory committee.

Dissertation Committee. After passing the comprehensive examination, a dissertation committee is formed and approved by the dean of graduate studies upon the recommendation of the director of graduate programs. The dissertation committee must consist of at least three faculty members, including the dissertation committee chair. At least one member of the dissertation committee must be a faculty member from the School of Justice and Social Inquiry. The three-member committee must represent at least two disciplines and two different academic units. The dissertation and advisory committees may have different memberships.

Advancement to Candidacy. PhD students will achieve candidacy status in a letter from the dean of Graduate Studies upon (1) passing the comprehensive examination, and (2) successfully defending the dissertation prospectus.

Dissertation Requirements. The dissertation consists of a fully documented written analysis demonstrating an appropriate level of interdisciplinary skills and competence associated with a justice issue. Each student must register for a minimum of 24 semester hours of dissertation and research, 12 of which must be completed in semesters following the one in which the student is advanced to candidacy.

Final Examination. The dissertation must be defended in an oral examination. A candidate must pass the final examination within five years after completing the comprehensive examination.

Concurrent PhD in Justice Studies/JD. The purpose of the concurrent PhD in Justice Studies/JD is to provide a rigorous education for highly qualified students interested in pursuing academic careers in law, law and the social sciences, or law and philosophy. To seek concurrent degrees, the prospective student must first gain separate admission to the College of Law and the interdisciplinary PhD program in Justice Studies. The student must then obtain special approval to pursue concurrently the JD and PhD degrees. No more than three students a year are admitted into the concurrent degree program.

COURSES

For courses, see "Justice Studies (JUS)," page 286.

Kinesiology

Master's Programs

www.asu.edu/clas/kines

480/965-3875

PEBW 218

Lawrence J. Mandarino, Chair

Regents' Professor: Landers

Professors: Darst, Mandarino, Matt, Stelmach

Associate Professors: Hinrichs, Santello, Willis

Assistant Professors: Dounskaia, Kulinna, Ringenbach

The faculty in the Department of Kinesiology offer graduate programs leading to the MS degree in Kinesiology and the Master of Physical Education. Faculty also participate in two interdisciplinary PhD programs: (1) Exercise Science with concentrations in biomechanics, motor behavior/sport psychology, and physiology of exercise, and (2) Curriculum and Instruction with a concentration in physical education.

The Committee on Exercise Science offers an interdisciplinary graduate program leading to the PhD degree in Exercise Science. The present committee is composed of members from several academic units. For more information about this program, see "Exercise Science," page 269.

The Committee on Curriculum and Instruction offers an interdisciplinary graduate program leading to the PhD degree in Curriculum and Instruction. For more information, see "Division of Curriculum and Instruction," page 146.

MASTER OF SCIENCE

Applicants for the MS degree program in Kinesiology may choose from five areas of study: biomechanics, exercise physiology, physical education (elementary, secondary, and adapted), motor behavior (motor learning and control, motor development), and sport and exercise psychology. All applicants are required to submit scores from the Graduate Record Examination (GRE). Admission decisions are based upon previous academic training and performance, GRE scores, recommendations, and the ability of potential mentors to devote time to an additional student. International applicants whose native language is not English must also submit a Test of English as a Foreign Language score. Applications are reviewed by department faculty only once a year. To be considered for admission in the fall semester, all application materials must be received by the department by December 1. The program requires a minimum of 30 semester hours, at least 21 of which must be KIN courses. Required courses with corresponding semester hours include KIN 500 (three), 501 (three), and 599 (six). Remaining course work is selected by the student in consultation with an advisor and supervisory committee.

Deficiencies. All applicants recommended for admission are evaluated for deficiencies in their academic preparation. Deficiencies are divided into two areas: (1) those associated with the discipline of kinesiology (human anatomy and physiology, biomechanics, exercise physiology, motor learning and development, and psychosocial aspects of physical activity) and (2) those associated with the area of study (a maximum of six deficiency semester hours pertinent to study may be specified).

Foreign Language Requirements. None.

Thesis Requirements. A thesis is required.

Final Examination. A final oral examination in defense of the thesis is required.

MASTER OF PHYSICAL EDUCATION

The faculty in the Department of Kinesiology offer a program leading to the Master of Physical Education (MPE) degree. The MPE degree is designed to prepare scholarly professionals (i.e., teachers of physical education). Emphasis is placed on improving instructional effectiveness and developing a quality physical education curriculum in a school setting. Three areas of study are available: elementary, secondary, and adapted physical education.

Admission. Applicants who hold a bachelor's degree in education and who are certified to teach may apply to the MPE degree directly. Applicants with a bachelor's degree in physical education but who are not certified to teach apply to the postbaccalaureate/MPE degree. Deficiencies are assessed where applicable.

Program of Study. A minimum of 33 semester hours of course work is required for the MPE program, with 18 semester hours of required core courses, six semester hours of cognate area courses, and nine semester hours of recommended electives. A total of 58 semester hours is required of students completing both the postbaccalaureate program and the MPE.

Foreign Language Requirements. None.

Final Examination. A final written comprehensive examination is required.

KINESIOLOGY (KIN)

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).

KIN 413 Qualitative Analysis in Sport Biomechanics. (3)

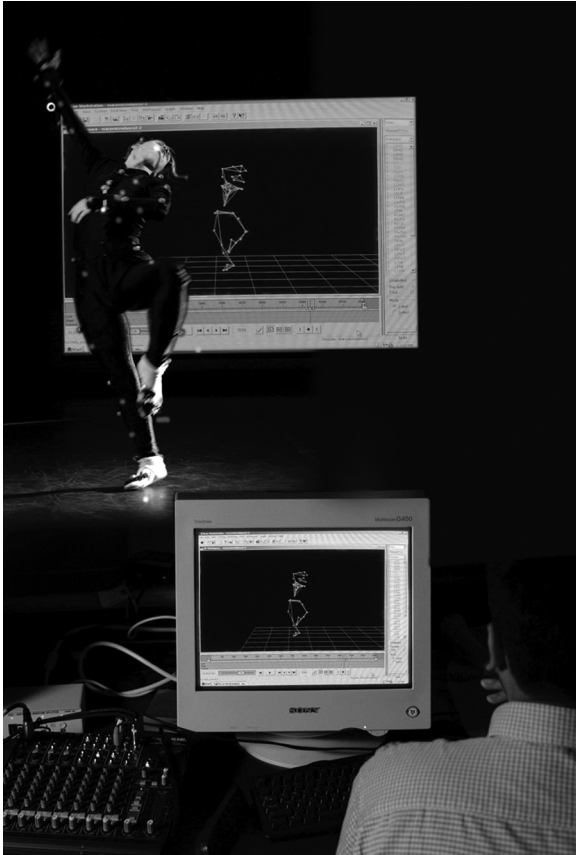
spring

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.



The Arts, Media, and Engineering graduate program is offered collaboratively by the Katherine K. Herberger College of Fine Arts and the Ira A. Fulton School of Engineering.

Tim Trumble photo

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.

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.

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 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 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.

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.

KIN 500 Research Methods. (3)

fall

Introduces the basic aspects of research, including problem selection, literature review, instrumentation, data handling, methodology, and the writing of research reports and articles.

KIN 501 Research Statistics. (3)

spring

Statistical procedures; sampling techniques; exercise testing, exercise prescription, hypothesis testing, and experimental designs as they relate to research publications.

KIN 505 Applied Exercise Physiology Techniques. (3)

fall

Investigative techniques used in the applied exercise physiology laboratory. Emphasizes pulmonary function, body composition, and cardiorespiratory assessment. Lecture, lab. Prerequisite: KIN 340.

KIN 510 Introduction to Biomechanics Research Methods. (3)

fall

Applies mechanics to human movement analysis. Includes consideration of 2-D imaging techniques, force measurement, electromyography, and data processing methods. Lecture, discussion, some labs. Prerequisite: KIN 335 or instructor approval.

KIN 512 Biomechanics of the Skeletal System. (3)

fall

Biomechanics of tissues, structures, and major joints of the musculoskeletal system. Discusses injury mechanisms. Lecture, discussion, some labs. Prerequisite: KIN 335 or instructor approval.

KIN 520 Sport Psychology. (3)

fall

Current research in sport psychology with an emphasis on performance enhancement. Includes questionnaire, psychophysiological, and behavioral research methods. Lecture, discussion. Prerequisites: KIN 448, 500.

KIN 521 Motor Development, Control, and Learning. (4)

spring

Theory and research on motor skill acquisition, including learning/control and development (i.e., growth, children and exercise, and development learning). Lecture, discussion, some labs. Prerequisites: KIN 345, 500, 501.

KIN 522 Exercise Psychology. (3)

spring

Contemporary research and theory as related to human behavior and health in an exercise setting. Lecture, discussion. Prerequisite: KIN 500.

KIN 524 Motivation in Sport and Exercise. (3)

fall

Focuses on various issues in human motivation, identifying basic processes and examining their application in sport, exercise, and physical education.

KIN 530 Exercise Physiology. (3)

fall

Immediate and long-term adaptations to exercise with special reference to training and the role of exercise in cardiovascular health. Prerequisite: KIN 340.

KIN 531 Physiology of Women in Sport. (3)*spring*

Physiological aspects of women engaging in physical activity. Emphasizes factors affecting performance and health throughout life. Prerequisite: KIN 340.

KIN 532 Exercise Biochemistry. (3)*fall*

Understanding the basic biochemical principles and enzyme pathways involved in energy transduction during exercise. Lecture, discussion. Prerequisite: KIN 340 or instructor approval.

KIN 533 Exercise Endocrinology. (3)*fall*

Discusses current research and theory concerning hormonal changes during exercise. Lecture, discussion. Prerequisite: KIN 340 or instructor approval.

KIN 535 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 535 or 445. Lecture, discussion. Prerequisite: KIN 340 or 530 or instructor approval.

KIN 536 Fuel Metabolism. (3)*fall*

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

KIN 561 Administration of Athletics. (3)*selected semesters*

Managing an athletic program, including financing, budget policies, staging, and promotion of athletic contests, schedules, travel insurance, and current athletic trends.

KIN 570 Programs and Special Topics in Adapted Physical Education. (3)*fall and spring*

Contemporary adapted, developmental, remedial, and corrective physical education programs; understanding of principles, problems, and recent developments in this area.

KIN 572 Trends and Issues in Physical Education. (3)*spring*

Literature, research, and practices in contemporary physical education, including finances, Title IX, teaching and coaching philosophies, school organization, and nonteaching physical education programs.

KIN 573 Curriculum and Instruction in Secondary Physical Education. (3)*fall and spring*

Current curriculum and instruction practices and research in secondary school physical education. Prerequisite: Kinesiology major or teaching experience.

KIN 576 Physical Education for Elementary School Children. (3)*fall and spring*

Current practices and research pertaining to elementary school physical education programs.

KIN 578 Student Teaching in Secondary Schools. (6–12)*fall and spring*

Practice of teaching. Relationship of theory and practice in teaching. Fee. Prerequisite: completion of all required course work (or its equivalent) before student teaching.

KIN 599 Thesis. (1–12)*selected semesters***KIN 610 Advanced Topics in Biomechanics. (3)***spring*

3-D imaging techniques, data analysis theory, and integration of biomechanics research tools; includes original research project. Lecture, discussion, some labs. Prerequisite: KIN 510 or instructor approval.

KIN 621 Motor Learning/Control. (3)*fall*

Discussion of contemporary research issues in motor learning and control. Includes behavioral and neurophysiological issues. Lecture, discussion. Prerequisite: KIN 521.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Department of Languages and Literatures

Master's and Doctoral Programswww.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, Lafford, Losse, M. Sanchez, Volek, West, Wetsel, T. Wong

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

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

Senior Lecturers: Foard, Hendrickson

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

Academic Associate: Glessner-Calkins**Research Associate Professor:** Sipka**Distinguished Scholars:** Martinez-Assad, Sefchovich

The faculty in the Department of Languages and Literatures offer graduate programs leading to the MA degree in Asian Languages and Civilizations—Chinese/Japanese, French, German, and Spanish. For concentrations available under each major, see the "College of Liberal Arts and Sciences Graduate Degrees and Majors" table, page 242.

Students admitted to the Master of Education degree program in Secondary Education may elect foreign languages as the subject matter field. See "Master of Education," page 142, for information on the Master of Education degree.

The faculty also offer a graduate program leading to the PhD degree in Spanish. See "Doctor of Philosophy," page 69, for general requirements.

It is recommended, but not required, that students applying for admission to the MA, MEd, or PhD program submit scores on the Graduate Record Examination.

The department also offers a Certificate in Translation.

MASTER OF ARTS

Candidates for the MA degree should, upon entrance, present the equivalent of an undergraduate major in the

COLLEGE OF LIBERAL ARTS AND SCIENCES

language in which the degree is sought. Those who lack this background, but who show strong potential and meet Division of Graduate Studies admissions requirements, may be admitted to a graduate program on a provisional basis, pending removal of specified deficiencies. These deficiencies must be completed in addition to the regular program of study for the master's degree.

Students in all graduate programs are expected to maintain a high level of linguistic fluency acceptable to a native speaker. Before acceptance in the program, applicants may be requested to furnish evidence of their proficiency.

The program of study for the MA degree includes a minimum of 30 semester hours of graduate-level work, as approved by the candidate's supervisory committee. The program must include a 500-level Bibliography and Research Methods course offered by the department. When approved by the candidate's supervisory committee, in some programs, nine hours in another language or in closely related courses may be included in the program.

Students who are primarily interested in teaching on the secondary or community college levels may select a program of study with a concentration in language and cultures. Students seeking an MA degree in Asian Languages and Civilization or in Spanish, should consult with the respective director of Graduate Studies.

Comprehensive Examination. All candidates are required to pass a comprehensive written or oral examination designed to evaluate the candidate's knowledge in the area of specialization. A reading list is provided as a guide to preparation for this examination.

Thesis Requirements. There are two options. The thesis option is required for students intending to pursue doctoral studies. In French, there is an applied project option for students intending to teach in K-12 or the community colleges; however, such students may also choose the thesis option. See the director of graduate studies to inquire about the two options. A thesis is required of students seeking an MA degree in Spanish. Consult the *Spanish Graduate Handbook* for more information.

Final Examination. A final oral examination in defense of the thesis is required.

DOCTOR OF PHILOSOPHY

The PhD degree is offered with a major in Spanish with concentrations in literature or cultural studies.

Program of Study. A student's individual program of courses covering the various periods of Spanish and Latin American literature and/or culture, as well as the historical and political background of both areas, is determined in consultation with the supervisory committee. Specifically required as prerequisites are SPA 500 Bibliography and Research Methods, SPA 545 Concepts of Literary Criticism (for a concentration in literature), and SPA 598 ST: Cultural Studies/Semiotics of Culture (for a concentration in cultural studies).

At least 15 graduate credits must be earned in the subfield, and the candidate's program of study in the subfield must be approved by the subfield department. Normally the

comprehensive examination on the subfield, administered by the subfield department, must be satisfied before the comprehensive examination in Spanish. Students are urged to consult the *Spanish Graduate Handbook*.

Foreign Language Requirements. Each candidate is expected to demonstrate a reading knowledge of two languages other than Spanish. The language requirements must be satisfied before the candidate is eligible to take the comprehensive examination.

Comprehensive Examination. A written and oral comprehensive examination, designed to ascertain the candidate's knowledge and orientation in the field of study and competency to proceed with the dissertation, is required at or near the end of course work.

Dissertation Requirements. The candidate must present an acceptable dissertation based on original investigation. The dissertation must represent a significant contribution to knowledge and demonstrate the candidate's ability to do independent, scholarly research.

Final Examination. A final oral examination is required. This examination covers the subject matter of the dissertation and appropriate field.

UNDERGRADUATE CERTIFICATE IN TRANSLATION

The Department of Languages and Literatures offers an undergraduate certificate in translation. The certificate may be of personal or professional interest to graduate students. For more information, see the *ASU General Catalog* (accessible on the Web at www.asu.edu/catalog).

RESEARCH ACTIVITY

Faculty in the Department of Languages and Literatures conducts a wide array of research on topics relating to languages and cultures of the world. Of particular interest are contemporary and urban topics relating to the 20th-century and beyond, with special emphasis on urban studies, gender issues/sexual identities, popular culture, film, theater, and print media. Current pedagogical issues relating to language acquisition figures prominently in the department, as do technological developments. These include the teaching of languages and cultures, and the accessibility to and distribution of information regarding regions and topics of interest to faculty and students.

Asian Languages and Civilizations Research Activity. Within the two areas of China and Japan, the research activity of the faculty in Asian Languages and Civilizations covers a range of disciplines. These include historical as well as applied linguistics (especially language pedagogy), literary history and theory, and literary translation. Current research of the faculty explores such areas as Japanese sinology, the use and transformation of Chinese characters in Japan, premodern and modern fiction in both China and Japan, and the Chinese tradition of pastime fiction.

Spanish Research Activity. In addition to broad coverage of peninsular and Spanish-American literary and cultural topics, particular regional emphases lie within the U.S.

Southwest, Mexico, Central America, the Caribbean, the Andes, and the River Plate. Specific research projects by Spanish faculty members include topics in Chicano and Latino literature, literary translation, Hispanic literary bibliography, contemporary literary theory, Spanish-American colonial literature, Argentine narrative, contemporary Mexican and Centro-American literature, contemporary Spanish and Spanish-American poetry, Spanish-American oral tradition, Hispanic women writers, Latin American popular culture, Spanish-American Jewish writers, gender and queer studies, contemporary Spanish and Spanish-American theater and film, Spanish-American postmodern culture, prose narrative of the Golden Age, Hispanic linguistics and bilingualism/sociolinguistics, second language acquisition, applied linguistics, discourse analysis, and various topics in Brazilian literature.

CHINESE (CHI)

CHI 500 Bibliography and Research Methods. (3)

selected semesters

Introduces research materials on China in Chinese, Japanese, and Western languages. Overview of research methods. Lecture, discussion.

CHI 514 Advanced Classical Chinese. (3)

selected semesters

Close readings in selected premodern texts, with focus on special grammatical features, and increased vocabulary. Lecture, discussion.

CHI 520 Teaching of Chinese as a Second Language. (3)

selected semesters

Theory and practice of teaching Chinese, including presentation, interaction, and evaluation, with consideration given to cultural factors. Lecture, discussion.

CHI 535 Advanced Readings. (3)

selected semesters

Readings in primary and secondary sources in history, art, religious studies, economics, or other fields. Lecture, discussion.

CHI 543 Chinese Language and Linguistics. (3)

fall

Analysis and discussion, within the framework of linguistic theory, of selected problems in Chinese phonetics, morphology, and syntax. Lecture, discussion.

CHI 585 Problems of Translation. (3)

selected semesters

Theories and practice of translation: strategies for handling a variety of Chinese texts. Lecture, discussion.

CHI 591 Seminar. (3)

selected semesters

Topics in literary, linguistic, or cultural studies.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

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 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 515 Second-Language Acquisition. (3)

spring

Discusses and applies theories of second-language acquisition. Prerequisite: FLA 400 (or its equivalent).

FLA 525 Trends and Issues in Foreign Language Teaching. (3)

selected semesters

Advanced methods seminar, designed for experienced teachers.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

FRENCH (FRE)

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.

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.

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.

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.

COLLEGE OF LIBERAL ARTS AND SCIENCES

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.

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.

FRE 462 Modern Poetry. (3)

spring

Representative authors from Mallarmé to Bonnefoy. Lecture, discussion. Prerequisites: both FRE 322 and 6 hours of 300-level French or only instructor approval.

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.

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 500 Research and Critical Methods. (3)

fall

Overview of major critical and theoretical frameworks used to study French and Francophone literature. Required of all French graduate students in French literature.

FRE 510 Introduction to Textual Analysis. (3)

fall

Introduces various oral and written techniques aimed at explicating literary texts. Required of all French graduate students focusing on literature. Lecture, discussion.

FRE 521 History of the French Language. (3)

spring

Principal phonological, morphological, and semantic developments of French from Latin to present, with emphasis on Old and Middle French. Prerequisite: some familiarity with Latin recommended.

FRE 531 Medieval French Literature. (3)

fall

Readings in the epics, early drama, Roman courtois, and other representative literary genres of the Middle Ages.

FRE 535 Identity, Gender, and Society in Early Modern French Literature. (3)

fall

Readings in French Renaissance literature with special focus on Rabelais, Montaigne, Marguerite de Navarre. Lecture, discussion.

FRE 580 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 585 Literary Translation. (3)

spring

Theory and practice of literary translation with emphasis on application through individual translation project. Lecture, seminar. Prerequisite: FRE 480.

FRE 591 Seminar. (1–12)

selected semesters

Topics may include the following:

- Advanced Problems in French Literature. (3)
- Balzac. (3)
- Corneille, Molière, and Racine. (3)
- Diderot, Voltaire, and Rousseau. (3)
- Flaubert. (3)
- French Existential Literature. (3)
- French Literary Criticism. (3)
- Proust. (3)
- Realism and Naturalism. (3)
- Romanticism. (3)
- Stendhal and Zola. (3)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

GERMAN (GER)

GER 421 German Literature. (3)

fall

From the beginning to Classicism. Prerequisite: 6 hours of 300-level German.

GER 422 German Literature. (3)

spring

From Romanticism to the present. Prerequisite: 6 hours of 300-level German.

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.

GER 500 Bibliography and Research Methods. (3)

selected semesters

Required of all graduate students.

GER 521 History of German Language. (3)

selected semesters

Linguistic development of German from the earliest records to the present.

GER 523 German Drama. (3)

selected semesters

Drama of the 19th and 20th centuries.

GER 527 The *Novelle*. (3)

selected semesters

Special studies in the German short story.

GER 591 Seminar. (1–12)

selected semesters

Special topics are concerned with a figure, theme, or work in German literature or Germanic studies. Topics may include the following:

- Faust. (3)
- Germanic Studies. (3)
- Goethe. (3)
- Grass and Böll. (3)
- Hesse. (3)
- Kafka. (3)
- Kleist. (3)
- Schiller. (3)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

JAPANESE (JPN)

JPN 500 Bibliography and Research Methods. (3)

selected semesters

Introduces research materials on Japan both in Japanese and in Western languages. Overview of research methods. Lecture, discussion.

JPN 514 Advanced Premodern Japanese. (3)

selected semesters

Close readings of selected premodern texts, with focus on grammatical and stylistic features. Lecture, discussion. Prerequisite: JPN 414 (or its equivalent).

JPN 520 Teaching of Japanese as a Second Language. (3)*selected semesters*

Theory and practice of teaching Japanese, including presentation, interaction, and evaluation, with consideration given to cultural factors. Lecture, discussion.

JPN 535 Advanced Readings. (3)*selected semesters*

Readings in primary and secondary sources in history, art, religious studies, literature, or other fields. Lecture, discussion. Prerequisite: JPN 414 (or its equivalent).

JPN 543 Japanese Language and Linguistics. (3)*selected semesters*

Analysis and discussion of linguistic theories applied to Japanese phonology, morphology, and syntax, including psychological, sociological, and historical aspects.

JPN 585 Advanced Problems of Translation. (3)*selected semesters*

Theories and practice of translation; strategies for handling a variety of Japanese texts. Lecture, discussion. Prerequisite: JPN 435 (or its equivalent).

JPN 591 Seminar. (3)*selected semesters*

Topics in literary, linguistic, or cultural studies.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

RUSSIAN (RUS)**RUS 591 Seminar. (3)***selected semesters*

Topics in literary, linguistic, or other cultural studies.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

SPANISH (SPA)**SPA 500 Bibliography and Research Methods. (3)***fall*

Required of all graduate students.

SPA 536 Generation of 1898. (3)*selected semesters*

Works of Unamuno, Baroja, Azorín, and their contemporaries, studied against the ideological background of the turn of century in Spain.

SPA 540 History of the Spanish Language. (3)*spring*

Analyzes and discusses the development of Spanish from Vulgar Latin to the present day. Prerequisite: FLA 400 (or its equivalent).

SPA 541 Spanish Language in America. (3)*fall*

Discusses and analyzes various regional and social varieties of Spanish in the Americas. Prerequisite: FLA 400 (or its equivalent).

SPA 542 Studies in the Spanish of the Southwest. (3)*spring*

Examines bilingualism and the social and regional dialects of Spanish in the Southwest. Prerequisite: FLA 400 (or its equivalent).

SPA 543 Structure of Spanish. (3)*spring*

Analyzes and discusses data on selected topics in Spanish morphology, semantics, and syntax. Prerequisite: FLA 400 (or its equivalent).

SPA 544 Spanish Phonology. (3)*spring*

Surveys problems of Spanish phonology within the context of recent phonological theory. Prerequisite: FLA 400 (or its equivalent).

SPA 545 Concepts of Literary Criticism. (3)*spring*

Aims and methods of modern literary scholarship. Discusses major theories of literary analysis.

SPA 555 Spanish American Modernism. (3)*selected semesters*

Principal works and figures of literary modernism, 1880–1920, with emphasis on international literary context of the movement.

SPA 557 Contemporary Spanish American Poetry. (3)*selected semesters*

Major works and problems in contemporary poetry and poetics, with emphasis on Paz, Parra, Cardenal, and new poetry since 1960.

SPA 560 Medieval Spanish Literature. (3)*selected semesters*

Major figures and works of the Middle Ages in Spain.

SPA 561 Golden Age Spanish Prose Fiction. (3)*selected semesters*

Major figures and works of the 16th and 17th centuries, with emphasis on the picaresque novel.

SPA 562 Golden Age Spanish Poetry. (3)*selected semesters*

Major figures and works of the 16th and 17th centuries, with emphasis on lyric poetry.

SPA 563 Spanish Romanticism. (3)*selected semesters*

Principal figures and works of Spanish romanticism, with emphasis on international literary context of the movement.

SPA 564 19th-Century Spanish Prose Fiction. (3)*selected semesters*

Principal figures and works of realism in the 19th-century novel, with emphasis on Galdós.

SPA 565 20th-Century Spanish Drama. (3)*selected semesters*

Principal figures and works of Spanish dramatic literature from the Generation of 1898 to the present.

SPA 566 Generation of 1927. (3)*selected semesters*

Major poets of the Generation of 1927, with emphasis on works of Lorca, Guillén, Salinas, and Aleixandre.

SPA 567 Contemporary Spanish Novel. (3)*selected semesters*

Major works of post-Civil War Spanish fiction.

SPA 568 Cervantes. (3)*selected semesters*

Extensive analysis of the prose and theater of Cervantes as a key figure of the Spanish Golden Age. Lecture, seminar.

SPA 570 Indigenous Literatures of Spanish America. (3)*selected semesters*

Indigenous literary traditions, with emphasis on Nahuatl, Mayan, and Quechua literatures through readings in Spanish translations.

SPA 571 Colonial Spanish American Literature. (3)*selected semesters*

Major figures and works from conquest to independence.

SPA 572 Spanish American Drama. (3)*selected semesters*

Major contributions of Spanish American drama, with emphasis on contemporary dramatists.

SPA 573 Spanish American Essay. (3)*selected semesters*

Major works of the essay, within the framework of intellectual history and literary movements.

SPA 574 Spanish American Vanguard Poetry. (3)*selected semesters*

Examines poetic developments, 1920–1940, with emphasis on Huidobro, Vallejo, Neruda, and the international context of their works.

SPA 575 Contemporary Spanish American Novel. (3)*selected semesters*

Principal novels of the *Nueva Narrativa Hispanoamericana*, within the context of contemporary theories of the narrative.

SPA 576 Contemporary Spanish American Short Story. (3)*selected semesters*

Principal short stories of the *Nueva Narrativa Hispanoamericana*, within the context of contemporary theories of the narrative.

SPA 577 Regional Spanish American Literature. (3)*selected semesters*

Figures and works of major national (Peru, Argentina, Chile, and Mexico) and regional (Caribbean) literatures. Topics offered on a rotating basis. May be repeated when topics vary.

COLLEGE OF LIBERAL ARTS AND SCIENCES

SPA 578 Novel of the Mexican Revolution. (3)

selected semesters

Representative works and authors of this genre (Guzmán, Azuela, Urquiza, Muñoz, and Romero), including related or peripheral offshoots in indigenous novels.

SPA 581 Latin American Popular Culture. (3)

selected semesters

Studies in selected topics of Latin American popular culture, with emphasis on appropriate academic models for the critical analysis of these materials.

SPA 582 Studies in Latin American Film. (3)

selected semesters

Examines the role of film in contemporary Latin American culture; films viewed and analyzed as casebook examples. Seminar.

SPA 583 Latin American Feminist Filmmaking. (3)

selected semesters

Examines major Latin American films grounded in theories of women's lives. Seminar.

SPA 591 Seminar. (3)

selected semesters

Spanish and Spanish American literary, cultural, and linguistic topics.

SPA 598 Special Topics. (1–4)

selected semesters

Topics may include the following:

- Cultural Studies/Semiotics of Culture

SPA 601 Latin American Feminist Cultural Production. (3)

selected semesters

Latin American feminist theory and studies as viewed through cultural production such as literature, film, photography, art. Seminar. Prerequisite: SPA 545 (or its equivalent).

SPA 691 Figures and Works Seminar. (3)

selected semesters

Topics may be selected from Spanish and Spanish American literatures.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Liberal Studies

The College of Liberal Arts and Sciences offers a master's degree designed for students interested in a multidisciplinary approach to human ideas and values. The program is intended for students seeking a graduate degree that explores the integration of the humanities with political, religious, social, and scientific questions within their cultural contexts. The distinctive feature consists of the three integrated core seminars specifically designed for the Master of Liberal Studies. This core series provides a graduate-level, integrated, interdisciplinary, and transdisciplinary approach to problems and issues articulated by the study of individuals in society. Initially, three concentrations are being offered in

1. borders: migration, health, and cultural identity;
2. gender, religion, and culture; and
3. science, society, and creative nonfiction writing.

This master's program has a program fee (in addition to graduate tuition) to cover alternative course delivery methods to accommodate the needs of working adults. For more information, access the CLAS Web site at clas.asu.edu.

MASTER OF LIBERAL STUDIES (MLS)

MLS 501 Writing About Social Issues: Culture, Gender, Society, and Well-being in the Southwest. (3)

fall, spring, summer

Reading and discussion of nonfiction writing on social issues that integrate cultural, gender, and societal issues that affect the well-being of urban communities with special attention to the Southwest. Lecture, in-class and online discussion.

MLS 502 Religion, Culture, and Health: Where Cultures Intersect. (3)

fall, spring, summer

Focuses on how cultural and religious notions may come into conflict around issues of health. Contrasts two societies, not necessarily contemporary, from different continents. Lecture, in-class and online discussion, writing.

MLS 503 Ethics, Science, and Culture. (3)

fall, spring, summer

Introduces ethics related to the practice of art, science, and medical practice in modern and premodern society. Lecture, in-class and online discussion, writing.

MLS 580 Practicum. (1–12)

selected semesters

MLS 584 Internship. (1–12)

selected semesters

MLS 593 Applied Project. (1–4)

selected semesters

MLS 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 56.

School of Life Sciences

Master's and Doctoral Programs

sols.asu.edu

480/965-1768

LSE 229

Robert E. Page, Director

Andrew N. Webber, Associate Director for Graduate Programs

Regents' Professors: Alcock, Arntzen, Maienschein, Pyne

Ullman Professors: Collins, Hedrick

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

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

Assistant Professors: Anderies, Chen, Crook, DeNardo, Gadau, Gerber, Kinzig, Laubicher, Liebig, McGraw, Minter,

Mor, Newfeld, Rhoads, Robert, Rosenberg, Sabo, Touchman, Verrelli, Wilson-Rawls, Wojciechowski

Research Professors: Cardineau, Davidson, Mahoney, Pearson

Associate Research Professors: Lopez, Pettit

Assistant Research Professors: Bertram, Hope, Hu, Langland, Walmsley

Research Scientists: Bingham, LoBrutto

Herbarium Curator: Landrum

Museum Curator: Gill

The faculty in the School of Life Sciences offer programs leading to the MS and PhD degrees in biology, microbiology, molecular and cellular biology, and plant biology. A concentration in ecology is available, among other areas of study.

The faculty also participate in the program leading to the Master of Natural Science degree when one of the concentrations is biology, microbiology, or plant biology (see “Natural Science,” page 309).

These programs are designed to prepare students for careers in teaching and research in educational, medical, industrial, and governmental institutions.

Graduate Record Examination. Applicants must submit Graduate Record Examination (GRE) scores. GRE scores in the advanced subject area are required for PhD applicants and are highly recommended for MS applicants.

Application Deadline. Complete college and School of Life Sciences supplemental application materials should be received by December 15 for admission in the fall semester.

FACILITIES

The modern Life Sciences center and Arizona Biodesign Institute house well-equipped research laboratories and teaching facilities. The W. M. Keck Bioimaging Laboratory includes a laser-equipped scanning confocal microscope and an LFO high resolution scanning electronic microscope. The Life Sciences Electron Microscopy Laboratory includes both scanning and transmission electron microscopes as well as a freeze-fracture unit. Housing of laboratory animals and maintenance of breeding colonies are provided by the Animal Research Center. Arizona fauna is well represented in the school’s collections. Desert, montane, riparian, and lacustrine habitats are within driving distance; species diversity is high.

RESEARCH ACTIVITY

Faculty in the School of Life Sciences perform research encompassing all aspects of life sciences, ranging from functions inside of individual cells to the interaction of units within entire ecosystems. Topics include investigations in areas such as behavior; biology education; botany; cell and molecular biology; computational, statistical and mathematical biology; conservation biology; developmental biol-

ogy; ecology; evolution; genetics; history and philosophy of biology; microbiology; neuroscience; and physiology. Faculty and students utilize advanced technology (e.g., confocal microscopes, automated sequencers, etc.) to add to the knowledge base by addressing important fundamental and novel questions and to disseminate this knowledge to a wide audience. For more details, access the Web site at sols.asu.edu.

Biology

JOINT BACHELOR AND MASTER OF SCIENCE

This program allows students to pursue a joint MS degree and BS degree in Biology (including those students in the biology and society concentration). Students admitted to the program are concurrently enrolled in both the undergraduate and graduate classes and seminars. The students are not eligible for graduate perquisites, including teaching and research assistantships, related health insurance, financial aid, or graduate award programs until the BS degree is complete. (See the *General Catalog* for distribution and credit requirements.) The graduate program requires a minimum of 30 semester hours above the 120 required for the undergraduate degree. Consistent with Division of Graduate Studies guidelines, no more than six semester hours of 400-level courses may be applied to the MS degree. Students follow the guidelines provided in the MS summary (see “Master’s Degrees,” page 67). A thesis and final oral examination are required at the same level as students in the regular MS program.

Students must be in the BS program in Biology with a GPA of 3.40 or greater at time of admission and should have completed 90 semester hours toward the BS, including at least 16 semester hours in BIO courses, three semester hours of calculus, and 11 semester hours of physical sciences (chemistry or physics preferred).

It is recommended that, by the time of admission, students complete a 300- or 400-level course in the area of the proposed thesis, a biometry or equivalent statistics course, and an upper-division chemistry course.

For more information, call the School of Life Sciences at 480/965-1768.

MASTER OF SCIENCE

The program of each student is prepared in consultation with the supervisory committee, consisting of a major professor and two additional faculty members. A minimum of 30 semester hours is required. The program must include six hours of thesis and one hour of seminar. The remainder of the program of study usually consists of (1) a mixture of course work, readings and conference, and seminars in the student’s primary field and related fields and (2) research credits. Courses and research credits can be distributed in any combination appropriate to the student’s individual educational goals. A typical program of study consists of six semester hours of thesis, one semester hour of seminar, nine to 15 hours of course work and additional seminars, and eight to 14 semester hours of research credit. A final oral examination covering the thesis and related subject matter is administered by the supervisory committee.

COLLEGE OF LIBERAL ARTS AND SCIENCES

DOCTOR OF PHILOSOPHY

The PhD degree program in Biology allows the student to acquire high research competency in one or more specialized areas while receiving a broad, solid grounding in biological sciences.

See "Doctor of Philosophy," page 69, for general requirements.

Program of Study. The program of study is planned by the student and the supervisory committee, consisting of a major professor and four additional faculty members. The program is tailored to the needs of the individual student.

Foreign Language Requirements. None.

Comprehensive Examination. The comprehensive examination consists of a written and oral component. To advance to candidacy for the PhD, the student must successfully complete three graduate seminars in areas different from the major area of emphasis. A synthetic, detailed research proposal must be completed by the fourth semester. The student must defend the proposal orally to the supervisory committee within three weeks after successful completion of the written research proposal.

Dissertation Requirements. A dissertation based on original research is required. (See "Doctoral Dissertations," page 68.)

Final Examination. A final defense of the dissertation is required. (See "Open Dissertation Defenses," page 69.)

BIOLOGY (BIO)

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.

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.

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 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).

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.

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 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.

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.

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.

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.

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 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 502 Transmission Electron Microscopy. (3)

selected semesters

Theory, use, and methods of preparing biological materials for transmission electron microscopy. Lecture, lab. Materials fee. Prerequisite: instructor approval.

BIO 505 Scanning Electron Microscopy. (3)

selected semesters

Theory, use, and methods of preparing biological materials for scanning electron microscopy. 2 hours lecture, 3 hours lab. Materials fee. Prerequisite: instructor approval.

BIO 508 Scientific Data Presentation. (2)

spring

Techniques necessary for presentation of scientific data used in journal publications, grant proposals, and visual presentations. Lecture, lab. Fee. Prerequisite: instructor approval.

BIO 515 Science, Technology, and Public Affairs. (3)

selected semesters

Explores the political, economic, cultural, and moral foundations of science and technology policy and governance in democratic society. Cross-listed as GLG 547/PAF 547. Credit is allowed for only BIO 515 or GLG 547 or PAF 547.

BIO 520 Biology of the Desert. (2)

selected semesters

Factors affecting plant and animal life in the desert regions and adaptations of the organisms to these factors. Prerequisite: 10 hours in biological sciences or instructor approval.

BIO 522 Populations: Evolutionary Ecology. (3)

selected semesters

Principles of population biology and community ecology within an evolutionary framework. 2 hours lecture, 2 hours recitation. Prerequisites: BIO 320, 415 (or MAT 210), 545.

BIO 524 Ecosystems. (3)

selected semesters

Structure and function of terrestrial and aquatic ecosystems, with emphasis on productivity, energetics, biogeochemical cycling, and systems integration. Prerequisite: BIO 320 (or its equivalent).

BIO 526 Quantitative Ecology. (3)

selected semesters

Sampling strategies, spatial pattern analysis, species diversity, classification, and applications of multivariate techniques to ecology. 2 hours lecture, 3 hours lab. Prerequisites: BIO 415 (or its equivalent); a course in ecology.

BIO 529 Advanced Limnology. (3)

selected semesters

Recent literature, developments, methods, and limnological theory; field and lab application to some particular topic in limnology. Prerequisite: BIO 426.

BIO 543 Molecular Genetics. (3)

fall

Nature and function of the gene; emphasis on the molecular basis of inheritance and gene expression in prokaryotes and eucaryotes. Prerequisites: BIO 340; a course in organic chemistry.

BIO 545 Populations: Evolutionary Genetics. (3)

selected semesters

Mathematical models in the description and analysis of the genetics of populations. Prerequisites: a combination of BIO 320 and 345 and 415 or only instructor approval.

BIO 547 Techniques in Evolutionary Genetics. (4)

selected semesters

Practical experience in modern techniques for the study of evolution. Lecture, lab. Prerequisites: BIO 340, 345; instructor approval.

BIO 550 Advanced Cell Biology. (3)

spring

Applications of contemporary electron microscopic and biochemical/molecular techniques for studying eukaryotic cell functions. Mechanisms of intracellular protein trafficking. Prerequisites: BIO 353 (or 360 or its equivalent or ABS 360); CHM 231 (or 331 or its equivalent).

BIO 551 Biomembranes. (3)

selected semesters

Structure and function of biological membranes, emphasizing synthesis, fluidity, exocytosis, endocytosis, and cell responses to hormones and neurotransmitters. Prerequisites: BIO 353 and CHM 231 (or 331) (or their equivalents).

BIO 552 Developmental Genetics. (3)

spring

Genetic approaches to the analysis of development during the life cycle of eukaryotic organisms, and the role of genes in the unfolding of the differentiated phenotype. Prerequisite: BIO 340.

BIO 560 Comparative Physiology. (3)

selected semesters

Analyzes function in invertebrates and vertebrates, emphasizing evolutionary trends in physiological systems. Prerequisite: BIO 360 (or its equivalent).

BIO 566 Environmental Physiology. (3)

selected semesters

Physiological responses and adaptations of animals to various aspects of the physical environment. Prerequisites: BIO 320, 360.

COLLEGE OF LIBERAL ARTS AND SCIENCES

BIO 569 Cellular Physiology. (3)

selected semesters

Emphasizes the molecular basis for cell structure and function. Prerequisites: BIO 360; a course in organic chemistry.

BIO 583 OTS: Fieldwork in Tropical Biology. (6–8)

spring and summer

Intensive field-orientated classes with Organization for Tropical Studies (OTS) in Costa Rica with emphasis on research in ecology and systematics. Lecture, lab, fieldwork. Cross-listed as PLB 583. Credit is allowed for only BIO 583 or PLB 583. Prerequisites: graduate standing; a course in basic ecology.

BIO 584 Internship. (1–12)

fall and spring

BIO 591 Seminar. (1–12)

fall and spring

May be repeated for credit. Topics may include the following:

- Adaptations. (1–3)
- Behavior. (1–3)
- Cell Biology. (1–3)
- Ecology. (1–3)
- Evolution. (1–3)
- Genetic Engineering. (1–3)
- Genetics. (1–3)
- Physiology. (1–3)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see “Omnibus Courses,” page 56.

Microbiology

Applicants are expected to have completed the requirements for an undergraduate major in Biology, Chemistry, or Microbiology or have an adequate background in related courses in biology, chemistry, mathematics, physics, and plant biology.

The graduate programs are designed to prepare students for careers in teaching and in research on various aspects of microbiology in educational institutions, industry, or government agencies.

MASTER OF SCIENCE

See “Master’s Degrees,” page 67, for general requirements.

Program of Study. A minimum of 30 semester hours of graduate credit are required, of which at least six hours must be thesis and research credit. The program is planned by the student in consultation with the supervisory committee.

Foreign Language Requirements. None.

Comprehensive Examination. Students are expected to achieve, through 18 semester hours of course work, a fundamental understanding of the following subdisciplines: bacterial genetics, immunology, molecular biology, physiology and metabolism, and virology. Alternatively, the student may demonstrate this fundamental understanding through the combination of a comprehensive examination, prepared by the student’s supervisory committee, and 12 semester hours of formal course work.

Thesis Requirements. A thesis is required.

Final Examination. A final oral examination covering the thesis and related subject matter is required.

DOCTOR OF PHILOSOPHY

See “Doctor of Philosophy,” page 69, for general requirements.

Program of Study. At least 60 semester hours of graduate credit, in addition to 24 hours of dissertation and research, are required; a minimum of 18 semester hours of this total is in formal course work. The program is planned in consultation with the supervisory committee.

Foreign Language Requirements. None.

Comprehensive Examinations. Written and oral comprehensive examinations are required.

Dissertation Requirements. A dissertation based on original work of high quality, demonstrating proficiency in the student’s area of interest, is required. (See “Doctoral Dissertations,” page 68.)

Final Examination. A final oral examination in defense of the dissertation is required.

MICROBIOLOGY (MIC)

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; mutagenesis; 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 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**fall*

Fundamental principles of viruses, their molecular biology, replication, genetics, and pathogenesis. Prerequisites: a combination of BCH 361 and MIC 206 and 220 or only instructor approval.

MIC 527 Neuroimmunology. (3)*selected semesters*

Studies the mind's influence on immunity and the immune system's influence on the mind, neuroimmunologic diseases, and the neuroimmunological circuitry involved. Seminar. Prerequisite: MIC 420 or instructor approval.

MIC 585 Molecular Virology. (3)*fall*

Selected topics concerning molecular aspects of eukaryotic virus replication and pathogenesis. Prerequisite: instructor approval.

MIC 591 Seminar. (1–12)*fall and spring*

Topics may include the following:

- Advanced Bacterial Studies
- Bacterial Ecology. (1–3)
- Current Research in Microbiology. (1–3)
- Enzymology. (1–3)
- Genetic Engineering. (1–3)
- Genetics. (1–3)
- Immunology. (1–3)
- Molecular Virology. (1–3)
- Neuroimmunology. (1–3)
- Pathogenic Bacteriology. (1–3)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Molecular and Cellular Biology

The interdisciplinary MS and PhD degrees in Molecular and Cellular Biology are administered by the School of Life Sciences. The participating faculty are drawn primarily from the Department of Chemistry and Biochemistry and the School of Life Sciences, with additional faculty from the Departments of Anthropology, Bioengineering, Chemical

and Materials Engineering, Kinesiology, Physics and Astronomy and Psychology. See the Web site for a list of participating faculty from other departments. One striking aspect of studies in this broad area of biological science is the interdisciplinary nature of the field. Similar approaches and techniques are used for studies of biological systems whether they are viral, bacterial, plant, or animal.

The graduate degrees offered by the faculty through this program prepare students for careers that span traditional disciplinary boundaries. The broad-based training provides the necessary skills for professional careers in academic institutions, governmental institutions, and industry, particularly those related to health and chemical sciences.

TOEFL and SPEAK Test. Students whose native language is not English are required to take the Test of English as a Foreign Language (TOEFL). A TOEFL score of 630 (paper) or 267 (computer) is required for admission to the program. Students whose native language is not English must pass the Speaking Proficiency English Assessment Kit (SPEAK) test with a score of at least 55 if they wish to be considered for teaching assistantship support.

MASTER OF SCIENCE

See "Master's Degrees," page 67, for general requirements.

Program of Study. Thirty semester hours are required. A minimum of 10 designated semester hours of MCB courses and six hours of research and thesis are required. The remaining courses are selected by the student in consultation with the supervisory committee.

Thesis Requirements. A written thesis based on original research is required.

Final Examination. A final oral examination in defense of the thesis is required.

DOCTOR OF PHILOSOPHY

See "Doctor of Philosophy," page 69, for general requirements.

Program of Study. Eighty-four semester hours are required. A minimum of 12 designated semester hours of MCB courses, six semester hours of elective course work, and 24 semester hours of research and dissertation are required. The remaining courses are selected by the student in consultation with the supervisory committee.

Comprehensive Examinations. Written and oral comprehensive examinations are required.

Dissertation Requirements. A written dissertation based on original research of high quality that demonstrates proficiency in the area of specialization is required.

Final Examination. The final oral examination in defense of the dissertation is required. Evidence must be presented that the research contribution is publishable in the primary literature.

COLLEGE OF LIBERAL ARTS AND SCIENCES

MOLECULAR AND CELLULAR BIOLOGY (MCB)

MCB 500 Research Methods in Molecular and Cellular Biology. (2)

fall and spring

Rotation laboratory experiences in which students participate in research under the direction of an MCB faculty member. May be repeated for credit.

MCB 501 Seminar: Molecular and Cellular Biology Colloquium. (1)

fall and spring

Presentation of current research by noted researchers in the field. May be repeated for credit.

MCB 555 Advanced Molecular and Cellular Biology I. (3)

fall

Study of structural and functional organization of biomolecules and cells, based on current literature. May be repeated once for credit. 3 hours lecture, discussion. Pre- or corequisites: BCH 461; BIO 543 (or its equivalent).

MCB 556 Advanced Molecular and Cellular Biology II. (3)

spring

Continuation of MCB 555. May be repeated once for credit. 3 hours lecture, discussion. Pre- or corequisites: BCH 462; BIO 543 (or its equivalent).

MCB 576 Functional Genomics. (2)

spring

Functional relevance of genomic sequences; DNA arrays, proteomics, analysis of genomic information for metabolic physiology of organisms. Cross-listed as PLB 576. Credit is allowed for only MCB 576 or PLB 576. Prerequisite: MAT 351.

MCB 591 Seminar: Current Literature in Molecular and Cellular Biology. (1)

fall and spring

Presentation and discussion of current research in the areas of molecular and cellular biology. May be repeated for credit.

MCB 598 Special Topics. (1–4)

selected semesters

MCB 555 and 556 may be taken as one-semester-hour sections listed by the instructor.

MCB 700 Research Methods in Molecular and Cellular Biology. (2)

fall and spring

Rotation laboratory experiences in which students participate in research under the direction of an MCB faculty member. May be repeated for credit.

MCB 701 Seminar: Molecular and Cellular Biology Colloquium. (1)

fall and spring

Presentation of current research by noted researchers in the field. May be repeated for credit.

MCB 791 Seminar: Current Literature in Molecular and Cellular Biology. (1)

fall and spring

Presentation and discussion of current research in the areas of molecular and cellular biology. May be repeated for credit.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Plant Biology

MASTER OF SCIENCE

Prerequisites. Applicants should have completed the requirements for an undergraduate major in the plant sciences, biology, or related discipline, with an adequate background in related courses in chemistry, mathematical, and physical sciences.

Program of Study. A minimum of 30 semester hours of graduate credit is required. The program must include at least three semester hours of research, three semester hours of thesis, one semester of the core course PLB 502 Perspec-

tives in Plant Biology and one hour of participatory seminar (PLB 591). The program is planned by the student in consultation with the supervisory committee.

Foreign Language Requirements. None.

Comprehensive Examination. Not required.

Thesis Requirements. A thesis is required.

Final Examination. A final research seminar and an oral examination covering the thesis and related subject matter are required.

DOCTOR OF PHILOSOPHY

See "Doctor of Philosophy," page 69, for general requirements.

Program of Study. A minimum of 84 semester hours of graduate credit is required. The program must include at least 24 hours of research and dissertation credit and at least 30 hours of formal graduate course work. One semester of the core course PLB 502 Perspectives in Plant Biology and two hours of participatory seminar (PLB 591) are included in the required course work. Courses numbered 590 or 790 (Reading and Conference) are not considered formal courses. The program is planned by the student in consultation with a program committee that also administers and evaluates the comprehensive examinations.

Foreign Language Requirements. None.

Comprehensive Examinations. Written and oral comprehensive examinations administered and evaluated by the student's program committee are required.

Dissertation Requirements. A dissertation based on original work of high quality, demonstrating proficiency in the student's area of interest, is required. (See "Doctoral Degrees," page 68.)

Final Examination. A final oral examination in defense of the dissertation is required.

MOLECULAR BIOSCIENCES/BIO TECHNOLOGY (MBB)

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.

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 56.

PLANT BIOLOGY (PLB)

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 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.

PLB 502 Perspectives in Plant Biology. (3)

fall

Introduces major areas of research within the department with the goal of broadening knowledge to enable multidisciplinary research and communication. Prerequisite: instructor approval.

PLB 583 OTS: Fieldwork in Tropical Biology. (6–8)

spring and summer

Intensive field-orientated classes with Organization for Tropical Studies (OTS) in Costa Rica with emphasis on research in ecology and systematics. Lecture, lab, fieldwork. Cross-listed as BIO 583. Credit is allowed for only BIO 583 or PLB 583. Prerequisites: graduate standing; a course in basic ecology.

PLB 591 Seminar. (1)

fall and spring

Environmental Science and Ecology

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).

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.

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).

PLB 520 Plant Structural Adaptation. (1–3)

selected semesters

Adaptive traits of leaf size/unique growth form on energy transfer efficiency; stomatal architecture and water-use efficiency; applications of stable isotopes. Prerequisite: BIO 320 or PLB 306 (or 308 or its equivalent).

PLB 522 Plant Photosynthetic Adaptation. (1–3)

selected semesters

Evolution and ecology of C4 and CAM; adaptive traits improving competitive ability in natural environments; comparative physiology of desert plants. Prerequisite: PLB 308 or instructor approval.

PLB 524 Methods in Environmental Plant Physiology. (3)

spring in odd years

Techniques to measure and quantify microclimate and mass transfer. Supporting principles. 2 hours lecture, 3 hours lab. Prerequisite: BIO 320 or PLB 308.

Plant Biochemistry and Molecular Biology

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.

PLB 530 Introduction to Structural and Molecular Biology. (4)

fall

Structure and function of cells, proteins, membranes, and the genome; gene expression and biogenesis of structures; application of computer imaging. Cross-listed as CBS 530. Credit is allowed for only CBS 530 or PLB 530. Prerequisites: one year of biology; one semester of organic chemistry.

PLB 540 Plant Biochemistry. (3)

selected semesters

Structure/function relationships of molecules, emphasizing processes unique to plants: carbon fixation, synthesis of storage products, pigments, and secondary metabolites. Prerequisites: both BCH 361 and PLB 308 or only instructor approval.

PLB 550 Plant Molecular Biology. (2)

spring in odd years

Biochemistry and molecular biology of plant organelles, including protein targeting, plant viruses, and molecular designs for plant improvements. Prerequisite: instructor approval.

PLB 552 Plant Genetic Engineering. (3)

spring

Plant transformation utilization of transgenic plants, transient gene expression assays, and applications of plant genetic engineering. Prerequisite: instructor approval.

PLB 553 Plant Genetic Engineering Laboratory. (2)

spring

Plant transformation, utilization of transgenic plants, transient gene expression assays, and applications of plant genetic engineering. 6 hours lab. Prerequisite: instructor approval.

PLB 554 Plant Biotechnology. (3)

selected semesters

Aseptic, clonal propagation of plants and in vitro culture of cells, organs, and tissues. 2 hours lecture, 3 hours lab. Prerequisite: ABS 363 or PLB 308.

PLB 558 Molecular Mechanisms of Photosynthesis. (3)

spring

Structure and function of photosynthetic complexes; mechanism of energy conversion in plants, bacteria, and model systems. Cross-listed as BCH 568. Credit is allowed for only BCH 568 or PLB 558. Prerequisite: instructor approval.

PLB 576 Functional Genomics. (2)

spring

Functional relevance of genomic sequences; DNA arrays, proteomics, analysis of genomic information for metabolic physiology of organisms. Cross-listed as MCB 576. Credit is allowed for only MCB 576 or PLB 576. Prerequisite: MAT 351.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Linguistics

Certificate Program

For information on the Graduate Certificate in Linguistics, access the Web site at linguistics.asu.edu, or call 480/965-0792. For LIN courses, see "Linguistics (LIN)," page 269.

Materials Science

Interdisciplinary Master's Program

See "Materials Science," page 79.

Mathematics

Master's and Doctoral Programs

math.la.asu.edu

480/965-3951

PS A216

Andrew Bremner, Chair

Professors: Armbruster, Barcelo, Bremner, Castillo-Chavez, Gardner, Ihrig, 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: Chen, Crook, Czygrinow, Majumdar, Oehrtman, Roudenko, Zandieh

The faculty in the Department of Mathematics and Statistics offer graduate programs leading to the MA and PhD degrees in Mathematics.

The faculty also participate in the program leading to the Master of Natural Science (MNS) degree when one of the concentrations is mathematics. In collaboration with the College of Education, the department offers an option for the MNS degree that leads to high school certification.

In addition, the faculty participate in the interdisciplinary program leading to the MS degree in Statistics (see "Statistics," page 83).

It is required that students applying to one of these programs submit scores on the Graduate Record Examination.

Students in the College of Education admitted to the Master of Education (see "Master of Education," page 142) or Doctor of Education (see "Doctor of Education," page 143) degree program in Secondary Education may elect mathematics as the subject matter field. These programs are offered through the College of Education.

MASTER OF ARTS

This degree is designed for students who wish to extend their knowledge of mathematics or prepare for certain careers related to mathematics. To be admitted without deficiencies, the student's background should include an undergraduate mathematics major or an equivalent preparation such as may be obtained in certain undergraduate programs in engineering or the sciences. In particular, the student's preparation must include courses in linear algebra and foundations of analysis. A certain degree of familiarity with computer languages may also be required for some areas of study.

Students pursuing the MA degree in Mathematics may choose one of the following areas: general mathematics,

applied mathematics, statistics and probability, mathematics education, and computational mathematics. Information concerning the requirements for each area may be obtained from the department. See “Master’s Degrees,” page 67, for general requirements.

Program of Study. The program of study, including courses in mathematics and related subjects, is selected with the recommendation of the student’s supervisory committee. Ordinarily, a program of study consists of a minimum of 30 semester hours.

Foreign Language Requirements. None.

Thesis Requirements. Students can choose a thesis or a nonthesis MA degree. For details, contact the department.

Comprehensive Examinations. Written examinations are required for both thesis and nonthesis options—one for the thesis option and two for the nonthesis option. For the thesis option, course work can be substituted for the exam. For more information, contact the department.

Final Examination. For students who choose the thesis option, a final oral examination in defense of the thesis is required.

MASTER OF NATURAL SCIENCE

The faculty of the department participate in programs leading to the MNS degree (see “Natural Science,” page 309). This degree is intended for the student who is interested in an interdisciplinary program with a major emphasis in mathematics and a minor emphasis in a related subject. The student’s supervisory committee consists of two faculty members of the department and one faculty member of the department in the related area. The supervisory committee designs a program of study of at least 36 semester hours that is appropriate for the type of interdisciplinary work the student wishes to pursue. One option of the MNS degree leads to high school certification and another focuses on mathematics education. The intention is to develop high school teachers with an excellent subject knowledge in mathematics. For more information, contact the Department of Mathematics and Statistics.

DOCTOR OF PHILOSOPHY

This PhD is intended for the student with superior mathematical ability, emphasizing the development of creative scholarship and breadth and depth in background knowledge. Admission to the degree program is normally granted after completion of the master’s degree. See “Doctoral Degrees,” page 68, for general requirements.

Program of Study. The program of study is constructed with the recommendation of the student’s supervisory committee.

Qualifying Examinations. Qualifying examinations are required. They test a student’s mastery of basic material in two of the following seven areas: algebra, differential equations, discrete mathematics, mathematical statistics, mathematical biology, numerical methods, and real analysis. Each qualifying exam covers a year-long sequence of courses.

Foreign Language Requirements. None.

Comprehensive Examinations. Written and oral comprehensive examinations are required.

Dissertation Requirements. A dissertation reporting significant, original research suitable for publication in a professional research journal is required. See “Doctoral Dissertations,” page 68.

Final Examination. A final oral examination in defense of the dissertation is required.

RESEARCH ACTIVITY

With more than 50 faculty members in the Department of Mathematics and Statistics, research interests cover most aspects of mathematics. In particular, the department has strengths in algebra, analysis, computational mathematics, control and system science, differential equations, discrete mathematics, dynamical systems and chaos, mathematical biology, mathematics education, number theory, and statistics. Research interests of the faculty may be seen by accessing the department’s Web site at math.la.asu.edu.

In addition to the following standard courses, the department also offers many graduate-level special topic courses in most subject areas, especially in the area of mathematical biology.

MATHEMATICS (MAT)

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 relations, 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.

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.

MAT 421 Applied Computational Methods. (3)

fall and spring

Numerical methods for quadrature, differential equations, roots of non-linear 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.

COLLEGE OF LIBERAL ARTS AND SCIENCES

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.

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.

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.

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.

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 \mathbb{R}^n : implicit function theorem, introduction to manifolds, Lebesgue 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, Poincaré-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 502 Neural Modeling. (3)

fall and spring

Mathematical modeling electrochemical processes in nerve. Cable theory, neuronal branching, spines, bifurcation analysis of excitable membrane models. Prerequisite: MAT 274 or 275.

MAT 503 Mathematical Cell Physiology. (3)

fall and spring

Mathematical modeling of dynamical aspects of cell physiology. Diffusion, membrane transport, intracellular calcium channel kinetics, calcium oscillations and waves. Lecture, computing lab.

MAT 504 Mathematical Aspects of Biotechnology. (3)

fall and spring

Bacterial growth, bacterial genetics, gene expression, stoichiometry of metabolic pathways, random walks, diffusion processes, biofilms. Prerequisite: instructor approval.

MAT 505 Perturbation Methods. (3)

selected semesters

Nonlinear oscillations, strained coordinates, renormalization, multiple scales, boundary layers, matched asymptotic expansions, turning point problems, and WKBJ method. Cross-listed as MAE 505. Credit is allowed for only MAE 505 or MAT 505.

MAT 514 Enumerative Combinatorics I. (3)

fall

First semester of a systematic development of enumerative combinatorics, including elementary counting techniques, sieve methods, and partially ordered sets. Prerequisite: graduate standing or instructor approval.

MAT 515 Enumerative Combinatorics II. (3)

spring

Second semester of a systematic development of enumerative combinatorics, including lattices, exponential structures, symmetric functions, and selected special topics. Prerequisite: MAT 514 or instructor approval.

MAT 516 Graph Theory I. (3)

fall

First semester of a systematic development of graph theory, including matchings, connectivity, arboricity, planarity, coloring, network flows. Prerequisite: graduate standing or instructor approval.

MAT 517 Graph Theory II. (3)

spring

Second semester of a systematic development of graph theory, including dense and sparse graphs, Ramsey theory, hamiltonicity, random graphs, minors. Prerequisite: MAT 516 or instructor approval.

MAT 518 Combinatorial Optimization I. (3)

fall

First semester of a systematic development of combinatorial optimization, including linear programming, duality, primal-dual algorithms, network flow algorithms, weighted matchings. Prerequisite: graduate standing or instructor approval.

MAT 519 Combinatorial Optimization II. (3)

spring

Second semester of a systematic development of combinatorial optimization, including matroid algorithms, theory of NP-completeness, polynomial time approximation, dynamic programming. Prerequisite: MAT 518 or instructor approval.

MAT 520 Numerical Linear Algebra. (3)

fall

Direct solution of linear systems, iterative methods, eigenvalues and eigenvectors, singular value decomposition, the QR algorithm, error propagation, arithmetic, and stability. Prerequisites: both MAT 342 (or 343) and 421 (or 423) or only instructor approval.

MAT 521 Iterative Methods. (3)

spring

Numerical methods for solving linear/nonlinear systems of equations (symmetric, nonsymmetric). Iterative methods for linear systems, conjugate gradients, multigrid methods, preconditioning, Krylov methods. Prerequisites: both MAT 371 and 423 (or 421) or only instructor approval.

MAT 523 Numerical Optimization. (3)

selected semesters

Linear programming, unconstrained nonlinear minimization, line search algorithms, conjugate gradients, quasi-Newton methods, constrained nonlinear optimization, gradient projection, and penalty methods. Prerequisite: MAT 342 or 343 or 371 or 460 or 520 (or its equivalent) or instructor approval.

MAT 524 Parallel Numerical Algorithms. (3)

selected semesters

Algorithms for massively parallel, hypercube architectures; "parallel" FORTRAN; solution of linear, nonlinear systems; partial differential equations; iterative methods; multigrid; domain decomposition. Prerequisites: both MAT 371 and 423 (or 421) or only instructor approval.

MAT 530 Numerical Solution of Ordinary Differential Equations. (3)

fall

One-step, linear multistep methods; consistency, order, stability, convergence; discretization, roundoff errors, error estimation, adaptive strategy; implementation, software for nonstiff equations. Prerequisites: both MAT 371 and 423 (or 421) or only instructor approval.

MAT 531 Numerical Solution of Stiff Differential Systems. (3)

spring

Runge-Kutta methods, order conditions, construction of highly stable methods, order stars, error estimation, stepsize selection, contractivity properties, linear multistep methods. Prerequisites: both MAT 371 and 423 (or 421) or only instructor approval.

MAT 533 Computational Elliptic and Parabolic Partial Differential Equations. (3)

fall

Parabolic and elliptic equations, finite difference, finite element methods, stability, consistency, convergence, practical aspects, applications, software. Prerequisites: both MAT 371 and 423 (or 421) or only instructor approval.

MAT 534 Computational Hyperbolic Partial Differential Equations. (3)

spring

Numerical solutions of hyperbolic PDEs, finite difference methods, well-posedness, stability, consistency, convergence, adaptive grids; Maxwell's equations, elastic wave propagation; Navier-Stokes. Prerequisites: both MAT 371 and 423 (or 421) or only instructor approval.

MAT 535 Spectral Methods for Partial Differential Equations. (3)

selected semesters

Spectral, pseudospectral theory; Galerkin, collocation methods; Tau-methods, global approximation properties, stability; convergence; solutions for linear, nonlinear systems. Prerequisites: both MAT 371 and 423 (or 421) or only instructor approval.

MAT 543 Abstract Algebra. (3)

fall

Groups, modules, rings and fields, Galois theory, homological algebra, and the representation theory. Prerequisite: MAT 444 or instructor approval.

MAT 544 Abstract Algebra. (3)

spring

Continuation of MAT 543. Prerequisite: MAT 543 or instructor approval.

MAT 551 Linear Operators and Integral Equations. (3)

spring

Bounded linear and compact operators on Hilbert spaces. Linear integral equations, Fredholm and Hilbert-Schmidt theory, and approximate methods. Distributions. Prerequisites: MAT 242 and 462 (or their equivalents).

MAT 555 Fractal Geometry. (3)

selected semesters

Geometry and analysis of fractal sets; definitions of dimensions; calculating dimensions; projections, products of fractals; random fractals; multifractal measures; and applications. Prerequisites: MAT 371, 455; MAT 472 recommended.

MAT 560 Dynamical Systems Methods in Fluid Dynamics. (3)

fall

Applies modern dynamical systems methods to fluid mechanics: bifurcations, normal forms, nonlinear dynamics, pattern formation, mixing, and Lagrangian chaos. Prerequisite: graduate standing or instructor approval.

MAT 562 Nonlinear Analysis of PDEs in Fluids. (3)

spring

Sobolev spaces; incompressible Euler and Navier-Stokes equations; weak and strong solutions; attractors and the connection with turbulence; geophysical applications. Prerequisite: graduate standing or instructor approval.

MAT 570 Real Analysis. (3)

spring

Lebesgue integration, selected function spaces, differentiation, abstract measure theory, and elements of functional analysis. Prerequisite: MAT 372 or instructor approval.

MAT 571 Real Analysis. (3)

fall

Continuation of MAT 570. Prerequisite: MAT 570 or instructor approval.

MAT 572 Complex Analysis. (3)

fall

Analytic functions, series and product representations, entire and meromorphic functions, normal families, Riemann mapping theorem, harmonic functions, and Riemann surfaces. Prerequisite: MAT 371 or instructor approval.

MAT 573 Complex Analysis. (3)

spring

Continuation of MAT 572. Prerequisite: MAT 572 or instructor approval.

MAT 574 Theory of Ordinary Differential Equations. (3)

selected semesters

Systems, existence proofs, singularities, asymptotic behavior of solutions, boundedness of solutions, eigenvalues and eigenfunctions, and perturbation theory. Prerequisite: MAT 372 or instructor approval.

MAT 575 Theory of Ordinary Differential Equations and Dynamical Systems. (3)

selected semesters

Geometric approach to ODEs and dynamical systems; (un)stable, center manifolds; structural stability; normal forms; averaging; chaos; persistence. May be repeated for credit with instructor approval. Prerequisites: both MAT 452 and 475 or only MAT 574 or only instructor approval.

COLLEGE OF LIBERAL ARTS AND SCIENCES

MAT 576 Theory of Partial Differential Equations. (3)

selected semesters

Existence and uniqueness theorems, boundary value and initial value problems, characteristics, Green's functions, maximum principle, distributions, and weak solutions. Prerequisite: knowledge of Lebesgue integration or instructor approval.

MAT 577 Theory of Partial Differential Equations. (3)

selected semesters

Continuation of MAT 576. Prerequisite: MAT 576 or instructor approval.

MAT 578 Functional Analysis. (3)

selected semesters

Locally convex, normed, and Hilbert spaces. Linear operators, spectral theory, and application to classical analysis. Prerequisite: MAT 472 or 571 or instructor approval.

MAT 579 Functional Analysis. (3)

selected semesters

Continuation of MAT 578. Prerequisite: MAT 578 or instructor approval.

MAT 591 Seminar. (1–12)

selected semesters

Topics may include the following:

- Algebra. (1–3)
- Analysis. (1–3)
- Applied Mathematics. (1–3)
- Combinatorial Mathematics. (1–3)
- Mathematical Logic. (1–3)
- Numerical Analysis. (1–3)
- Topology. (1–3)

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

MATHEMATICS EDUCATION (MTE)

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 585 Modern Geometry for Teachers. (3)

once a year

Euclidean, projective, and non-Euclidean geometries. Fee. Prerequisite: instructor approval.

MTE 587 Analysis for Teachers. (3)

selected semesters

Subject matter in mathematics appropriate for accelerated programs in secondary schools, including analytic geometry and calculus. Prerequisite: instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

STATISTICS AND PROBABILITY (STP)

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).

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 non-parametric procedures. Prerequisite: STP 420 (or its equivalent).

STP 525 Advanced Probability. (3)

selected semesters

Measure-theoretic foundations of probability, distribution functions and characteristic functions, laws of large numbers and central limit theorems, conditional probabilities, martingales, and topics in stochastic processes. Prerequisites: both MAT 571 and STP 421 or only instructor approval.

STP 526 Theory of Statistical Linear Models. (3)

fall

Multinomial distribution, distribution of quadratic forms, full and nonfull rank models, generalized inverses, unbalanced data, variance components, and the large sample theory. Prerequisites: STP 427; knowledge of matrix algebra.

STP 530 Applied Regression Analysis. (3)

fall

Method of least squares, simple and multiple linear regression, polynomial regression, analysis of residuals, dummy variables, and model building. Prerequisite: STP 420 (or its equivalent).

STP 531 Applied Analysis of Variance. (3)

spring

Factorial designs, balanced and unbalanced data, fixed and random effects, randomized blocks, Latin squares, analysis of covariance, and multiple comparisons. Prerequisite: STP 420 (or its equivalent).

STP 532 Applied Nonparametric Statistics. (3)

fall

One-sample test, tests of 2 or more related or independent samples, measures of correlation, and tests of trend and dependence. Prerequisite: STP 420 (or its equivalent).

STP 533 Applied Multivariate Analysis. (3)

spring

Discriminant analysis, principal components, factor analysis, cluster analysis, and canonical correlation. Prerequisite: STP 420 (or its equivalent).

STP 534 Applied Discrete Data Analysis. (3)

selected semesters

Models for discrete and count data, measures of association, and log-linear and regression models for contingency tables. Prerequisite: STP 420 (or its equivalent).

STP 535 Applied Sampling Methodology. (3)

spring

Simple random, stratified, cluster sampling; variance estimation in complex surveys; nonparametric superpopulation approaches; non-response models; computational methods. Prerequisite: STP 420 (or its equivalent).

STP 591 Seminar. (1–12)

selected semesters

Topics may include the following:

- Probability. (1–3)
- Statistics. (1–3)

STP 593 Applied Project. (1–12)

selected semesters

STP 599 Thesis. (1–12)

selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Medieval and Renaissance Studies

Interdisciplinary Certificate Programs

www.asu.edu/clas/acmrs

480/965-5900

COOR 4432

Robert E. Bjork, Director

Architecture and Landscape Architecture

Professor: Meunier

Art

Associate Professors: Schleif, Wolfthal

Barrett Honors College

Senior Lecturer: Facinelli

English

Professors: Bjork, Gutierrez

Associate Professors: Corse, Mahoney, Perry, Voaden

Assistant Professors: Fox, Thompson

History

Professors: Batalden, Burg, Green, Lavrin, Tillman, Warnicke

Associate Professors: Barnes, Soergel, Thornton

Assistant Professor: Koopmans

Languages and Literatures

Professors: Alexander, Losse

Associate Professors: Candela, Sanchez, Vitullo

Assistant Professor: George

Language, Cultures, and History (West campus)

Associate Professor: Moulton

Law

Professors: Kader, Rose

Music

Associate Professors: Haefer, Holbrook

Assistant Professor: Lingas

Philosophy

Professor: White

Religious Studies

Associate Professor: Clay

Theatre

Professor: Knapp

Graduate students admitted to a degree program in any field may earn one of two MA- or PhD-level certificates: the Certificate in Medieval Studies or the Certificate in Renaissance Studies. Since medieval and Renaissance studies are by nature interdisciplinary, students in the certificate program receive interdisciplinary training. Besides the course work and examinations required in their major field, students take six to nine semester hours outside their discipline

and receive training in a medieval vernacular language or a modern European language.

The core of the program has two components: (1) Latin, the international language for both the Middle Ages and Renaissance, and (2) paleography, the study of the physical medium through which Latin and other languages were transmitted.

The certificate program prepares students for advanced study or for academic positions by augmenting their skills and knowledge, thereby making them more equipped to handle the demands of their fields. For more information, contact the Arizona Center for Medieval and Renaissance Studies.

COURSES

For course information, contact the Arizona Center for Medieval and Renaissance Studies.

Museum Studies

See "Certificate in Museum Studies," page 246.

Natural Science

Master's Program

The Master of Natural Science (MNS) degree offers the opportunity for interdisciplinary graduate training in the natural sciences (biological sciences, mathematics, and physical sciences) and cognate areas. The degree program is especially suited for individuals who desire professional training rather than research training. Because of designed flexibility, the degree also offers the opportunity for individualized professional graduate programs depending upon the backgrounds and goals of the students. The major is Natural Science. Students are expected to emphasize course work in two or more areas of concentration. The program must be interdisciplinary.

More information can be found under the various majors in the natural sciences and by contacting faculty offering these concentrations:

1. biology,
2. chemistry,
3. geological sciences,
4. mathematics,
5. microbiology,
6. physics, and
7. plant biology.

Admission. See "Admission to the Division of Graduate Studies," page 58. A prerequisite for admission is the availability of resources for the proposed program and having a

COLLEGE OF LIBERAL ARTS AND SCIENCES

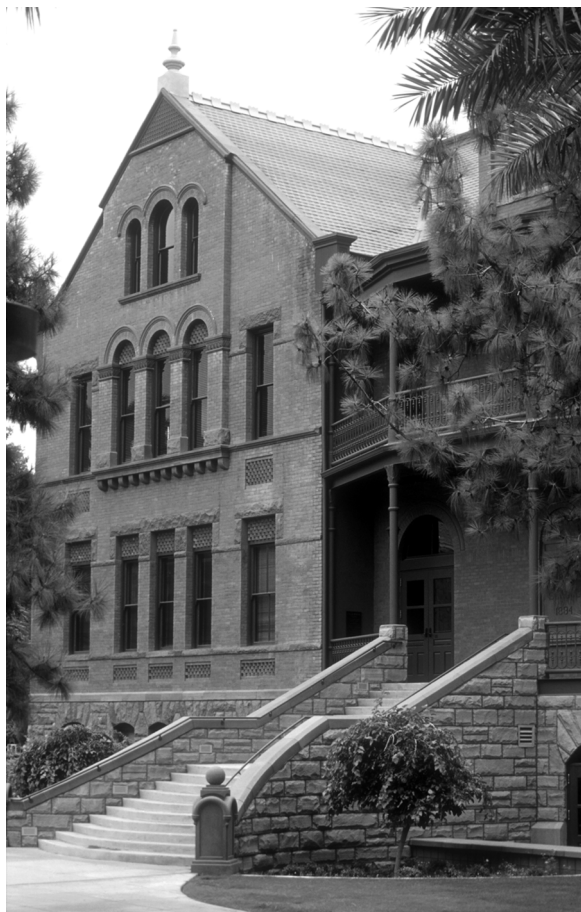
faculty member in one of the departments serve as a graduate advisor. The submission of scores on the GRE (verbal, quantitative, and analytical) is required of all applicants.

Supervisory Committee. The supervisory committee, consisting of three faculty members, is appointed by the dean of graduate studies upon the recommendation of the chair of the academic unit in which the graduate advisor serves as a faculty member. The supervisory committee is formed soon after the student has been admitted to the degree program. The graduate advisor and student suggest names of persons to serve on the supervisory committee. The composition of the supervisory committee must reflect the interdisciplinary nature of the program.

Program of Study. A program of study is recommended by the supervisory committee after conferring with the student. The minimum number of semester hours required for the degree is 30. More may be required by the supervisory committee depending upon the background of the student and the nature of the proposed program. In some cases undergraduate courses may be required to remove deficiencies.

Foreign Language Requirements. None.

Thesis Requirements. A thesis is optional.



Old Main

Tim Trumble photo

Final Examinations. A final written or oral examination, or both, is required. Each examination is administered by the supervisory committee.

COURSES

For course information, refer to the catalog sections of the majors corresponding to the MNS concentrations.

Philosophy

Master's and Doctoral Programs

www.asu.edu/clas/philosophy

480/965-3394

COOR 3309

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

The faculty in the Department of Philosophy offer a graduate program leading to the MA or PhD degree in Philosophy.

MASTER OF ARTS

See "Master's Degrees," page 67, for general requirements.

Prerequisites. At least 15 semester hours of upper-division course work in philosophy, including history of ancient and modern philosophy, epistemology, metaphysics, and the equivalent of PHI 333 Introduction to Symbolic Logic are required. No course credits in which a grade of less than "B" (3.00) has been earned may count toward meeting this 15-semester-hour requirement. Persons otherwise qualified for admission but lacking the above prerequisites may make up this deficiency by enrolling as a nondegree graduate student and taking those philosophy courses necessary to complete the prerequisite. If some or most of the prerequisites have already been met, the student may be admitted into the program under "provisional status" or under "regular status with deficiencies." All applicants for admission to the program must submit scores for the general section of the Graduate Record Examination.

Admission. All applications for admission to the MA degree program in Philosophy must be accompanied by complete transcripts, the applicant's score in the GRE aptitude exam, three letters of recommendation from persons

qualified to judge the applicant's potential for graduate work in philosophy, a sample of philosophical writing, and a statement of purpose.

Program of Study. The MA degree program in Philosophy is designed to prepare students either to teach philosophy at the community college level, to enter doctoral programs in philosophy at other institutions, or to be employed in any areas that require critical, analytical thinking (such as medicine, law, government, or publishing). The program of study includes at least 30 semester hours of approved graduate-level courses, not including PHI 599 Thesis. An additional six hours of PHI 599 Thesis is required. The student's program of study is selected by the student in consultation with the graduate director and the supervisory committee and is approved by the graduate director and the supervisory committee.

Course Requirements. Each student is required to take an approved graduate-level course of three semester hours or more in each of the following areas and to obtain at least a "B" (3.00) in each course: metaphysics/epistemology, value theory and logic; and any two of the following: history of early philosophy, history of modern philosophy, and history of contemporary philosophy.

Foreign Language Requirements. None.

Thesis Requirements. A thesis is required. This written work must demonstrate the ability to carry out independent research in philosophy.

Final Examination. A final oral examination in defense of the thesis is required.

DOCTOR OF PHILOSOPHY

See "Doctoral Degrees," page 68, for general requirements.

Prerequisites. At least 15 semester hours of upper-division course work in philosophy, including history of ancient and modern philosophy, epistemology, metaphysics, and the equivalent of PHI 333 Introduction to Symbolic Logic are required. No course credits in which a grade of less than "B" (3.00) has been earned may count toward meeting this 15-semester-hour requirement. If some or most of the prerequisites have already been met, the student may be admitted into the program under "provisional status" or under "regular status with deficiencies."

Admission. All applications for admission to the PhD degree program in Philosophy must be accompanied by complete transcripts, the applicant's score in the GRE aptitude exam, three letters of recommendation from persons qualified to judge the applicant's potential for graduate work in philosophy, a sample of philosophical writing, and a statement of purpose.

Program of Study. The PhD degree program in Philosophy is designed to prepare students for careers as philosophers and teachers of philosophy, and in areas that may benefit from advanced training in philosophy, such as law, civil service, and publishing. The program of study includes 60 semester hours (30 beyond the MA) of graduate credit

plus 24 semester hours of research and dissertation. The student's program of study is selected by the student in consultation with the graduate director and the supervisory committee and is approved by the graduate director and the supervisory committee.

Course Requirements. To ensure breadth in the traditional areas of philosophy, students are required to pass these courses with a grade of "B" (3.00) or higher:

1. two graduate courses in history of philosophy in two different areas chosen from ancient, modern, and contemporary;
2. two graduate courses in value theory;
3. four graduate courses in metaphysics and epistemology (including areas such as philosophy of language, philosophy of science, and philosophy of mind); and
4. one advanced course in symbolic logic at the 400 or 500 level (students may satisfy the logic requirement by examination).

Foreign Language Requirement. None.

Comprehensive Examination. Students are examined in their area of specialization and competence. The written and oral examinations are based on a bibliography compiled by the student and approved by the student's advisory committee. Normally these examinations are taken after the student has completed at least 60 hours of graduate course work.

Dissertation Prospectus. Each doctoral candidate prepares a prospectus of four to seven pages for the dissertation. The format and design of the prospectus are determined by the candidate and committee chair. The prospectus should include a

1. thesis statement,
2. discussion of relevant literature,
3. discussion of the approach to the project, and
4. bibliography.

Dissertation. A dissertation based on original research is required. Research for the dissertation is supervised by a committee of at least three faculty members, appointed by the graduate director in consultation with the student. Students must enroll for a minimum of 12 semester hours of research or dissertation credit after admission to candidacy.

Final Examination. An oral examination in defense of the dissertation is required.

RESEARCH ACTIVITY

The department offers a solid program in traditional and contemporary philosophy. General areas of research include ethics, political philosophy, metaphysics, epistemology, philosophy of law, philosophy of science, philosophy of language, philosophy of religion, and the history of philosophy. The topics treated in recent and current faculty research include moral psychology and moral emotions, environmental ethics, feminist analysis of law, liberty and paternalism, causation, rational choice theory, contextualism in epistemology, perceptual knowledge, the nature of consciousness, the role of the *a priori* in science and philosophy, truth, reference, externalist theories of mental content, and free will.

PHILOSOPHY (PHI)

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).

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).

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 590 Reading and Conference. (1–12)

selected semesters

PHI 591 Seminar. (1–12)

once a year

Topics may include the following:

- Aesthetics. (1–3)
- Epistemology. (1–3)
- Ethics. (1–3)
- History of Philosophy. (1–3)
- Logic. (1–3)
- Metaphysics. (1–3)
- Philosophy of Language. (1–3)
- Philosophy of Law. (1–3)
- Philosophy of Science. (1–3)
- Social and Political Philosophy. (1–3)

Prerequisite: Philosophy graduate student or instructor approval.

PHI 592 Research. (1–15)

selected semesters

PHI 599 Thesis. (1–12)

fall and spring

PHI 790 Reading and Conference. (1–12)

selected semesters

PHI 792 Research. (1–15)

selected semesters

PHI 799 Dissertation. (1–15)

selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see “Omnibus Courses,” page 56.

Physical Education

See “Master of Physical Education,” page 289.

Physics

Master’s and Doctoral Programs

phy.asu.edu

480/965-3561

PS F470

Barry G. Ritchie, Chair

Regents’ Professors: Smith, Spence, Starfield

Professors: Alarcon, Bauer, 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

The faculty in the Department of Physics and Astronomy offer graduate programs leading to the MS and PhD degrees in Physics. In the MS program, options are available in physics, physics with an emphasis in astronomy, interdisciplinary physics, technical physics, or physics teaching. In the PhD program, options are available in physics or applied physics. Within the physics program, students may pursue a wide range of studies, including an emphasis in astronomy and astrophysics, biophysics, condensed matter and materials physics, physics education, or subatomic physics.

The faculty in the Department of Physics and Astronomy also participate in the program leading to the Master of Natural Science degree (see “Natural Science,” page 309) when one of the concentrations is physics, and in the interdisciplinary program leading to the PhD degree in the Science and Engineering of Materials (see “Science and Engineering of Materials,” page 326).

Students admitted to the Master of Education degree program with a major in Secondary Education may elect physics or science education as the subject matter field. A Doctor of Education degree program option is also available. The MEd (see “Master of Education,” page 142) and EdD (see “Doctor of Education,” page 143) are offered and administered through the College of Education.

The master’s and doctoral programs are designed to prepare students for professional research careers in

governmental, industrial, or academic institutions and for teaching at the university, college, or secondary school levels.

An evaluation of the progress of all graduate students is made during the spring semester by the Graduate Program Committee. Students whose progress is considered to be unsatisfactory are placed on probation. Failure to maintain a GPA of 3.00 in courses taken while enrolled as a graduate student, exclusive of research, thesis, and dissertation, is an indication of unsatisfactory progress and may result in dismissal from the program.

Courses can include up to six semester hours of 400-level courses (see “Graduate Credit Courses,” page 63). Timely attempts at examination are also required.

Teaching experience in undergraduate physics, astronomy laboratories, and recitations is valuable training for graduate students and is considered part of the graduate program.

Departmental colloquia are an integral part of the graduate program. Regular attendance at colloquia is expected of all graduate students intending to earn graduate degrees.

MASTER OF SCIENCE

See “Master’s Degrees,” page 67, for general requirements.

Admission. To be admitted without deficiencies, entering graduate students should have adequate undergraduate preparation equivalent to an undergraduate major of 30 semester hours in physics and 20 semester hours in mathematics. Courses in analytic mechanics, electromagnetism, and modern physics, including quantum mechanics, are particularly important. Students applying for admission must submit scores for the verbal, quantitative, and analytical sections of the Graduate Record Examination (GRE).

Applicants for financial support must submit a score on the physics advanced examination of the GRE. Subsequent financial support in the form of teaching or research assistantships is contingent upon satisfactory performance in course work, timely completion of the final examination for the MS degree, and need and availability of such support. Students on probation are offered financial support only under exceptional circumstances.

Program of Study. The faculty in the Department of Physics and Astronomy offer the MS degree, emphasizing either physics solely or in combination with one of the following fields:

1. astronomy and astrophysics,
2. interdisciplinary physics (e.g., with chemistry),
3. technical physics, or
4. physics teaching.

A supervisory committee is formed for each student, usually during the first year of study. In each case an appropriate program of study is selected with the approval of the supervisory committee. A research project resulting in a thesis is required of all students enrolled in the MS program.

Physics. An individual program of study, including courses in physics, astronomy, mathematics, or related subjects, is selected with the approval of the supervisory committee to

make up a coherent program of graduate study. The courses and research project are to be conducted primarily within the Department of Physics and Astronomy.

Astronomy and Astrophysics. The AST graduate courses are taken in addition to the required graduate physics courses for the MS program. The research project must be in the area of astronomy and astrophysics, conducted under the supervision of one or more faculty members of the Department of Physics and Astronomy who specialize in this subject.

Interdisciplinary Physics. The courses taken are approximately half in physics and half in some other subject area. The research project must be in an interdisciplinary area and conducted under the joint supervision of one faculty member from the Department of Physics and Astronomy and one faculty member from another department.

Technical Physics. The research project involves active collaboration with an industrial or government laboratory under the supervision of a faculty member from the Department of Physics and Astronomy and may be conducted either in the Department of Physics and Astronomy or in the outside laboratory. At least half the courses taken must be in physics.

Physics Teaching. The course of study and research are designed to prepare students for a career in physics teaching, with appropriate modifications for teaching at the high school or community college level. At least half the courses taken must be in physics. Students participate in directed, evaluated teaching experiences.

Foreign Language Requirements. None.

Thesis Requirements. A thesis is required of all students obtaining the MS degree. Every student must complete at least six semester hours of PHY 592 or PHY 599. However, no more than nine semester hours in these courses can be counted toward the 30 semester hours required for the MS degree.

Final Examination. The final examination for the MS degree is an oral examination on the subject of the student’s thesis and on graduate course work taken.

MASTER OF NATURAL SCIENCE

The Master of Natural Science (MNS) degree curriculum provides interdisciplinary graduate training in physics, physical science, or physics education. The degree is especially suited for individuals who desire professional training rather than research training. Designed for flexibility, the curriculum also features individualized professional graduate programs. These programs are well-suited to the backgrounds and goals of students. The major is Natural Science and students are expected to emphasize course work in two or more areas of concentration. The program must be interdisciplinary.

See “Master’s Degrees,” page 67, for general requirements. See “Natural Science,” page 309, for Master’s of Natural Science degrees based in subjects other than physics.

COLLEGE OF LIBERAL ARTS AND SCIENCES

Admission. Requirements for admission are the availability of resources for the proposed program and a Department of Physics and Astronomy faculty member designated to serve as a graduate advisor. The submission of scores on the GRE (verbal, quantitative, and analytical) is required of all applicants. To obtain application forms, access the department Web site at phy.asu.edu.

Supervisory Committee. The supervisory committee, consisting of three faculty members, is appointed by the dean of graduate studies upon the recommendation of the chair of the Department of Physics and Astronomy. The supervisory committee is formed soon after the student has been admitted to the degree program, and must reflect the interdisciplinary nature of the program. The graduate advisor and the student suggest names of persons to serve on the supervisory committee.

Program of Study. The supervisory committee recommends the program of study, after conferring with the student. A minimum of 30 semester hours is required for the degree. The supervisory committee may require more courses, depending upon the background of the student and the nature of the proposed program. In some cases undergraduate courses may be required to overcome deficiencies. Additional information about the MNS for high school physics teachers is available on the department Web site at phy.asu.edu.

Foreign Language Requirements. None.

Thesis Requirement. A thesis is optional.

Final Examinations. A final written or oral examination, or both, is required. Each examination is administered by the supervisory committee.

DOCTOR OF PHILOSOPHY

See “Doctor of Philosophy,” page 69, for general requirements.

Admission. This program is designed for students with a high-level of ability who show promise for independent research. An applicant holding a baccalaureate degree should have the same undergraduate preparation as for admission to the master’s program. An applicant presenting acceptable graduate credit, earned at this or another institution must demonstrate mastery of this material. See “Written Comprehensive Examination,” page 315, and “Oral Comprehensive Examination,” page 315.

Students applying for admission must submit scores for the verbal, quantitative, and analytical sections of the GRE.

Applicants for financial support must submit a score on the physics advanced examination of the GRE. Subsequent financial support in the form of teaching or research assistantships is contingent upon satisfactory performance in course work, timely completion of examinations, including the written and oral PhD comprehensive examinations, and need and availability of such support. Students on probation are offered support only under exceptional circumstances. The period for which a PhD candidate may receive financial support through the Department of Physics and Astronomy does not normally exceed six years.

Program of Study. In order to accommodate the need for training in preparation for the wide variety of occupations of professional physicists and astrophysicists, in areas ranging from academic faculty to industrial research to administrative positions, doctoral degree programs are offered in physics or applied physics. Within the physics program a wide range of options are offered, as stated below. The goal is to provide, through course work and independent study, competence at advanced levels in fundamental, applied and interdisciplinary branches of physics and astronomy, and demonstrated ability in independent research.

Students enrolled in the PhD program may obtain an “MS degree in passing” by satisfactorily filing and completing an MS Program of Study, obtaining a GPA of at least 3.00 in a set of designated core courses, within a total of at least 30 semester hours, and passing a written comprehensive examination. The courses selected may include those designated as appropriate for the particular emphasis chosen for the student’s doctoral program. Graduate core courses satisfactorily completed at other institutions may be waived upon petition by the Graduate Program Committee. Up to nine semester hours of classroom-based courses may be substituted for core courses that are waived by the Graduate Program Committee.

Each student’s progress is overseen by a supervisory committee appointed for the student usually during the first year of study. This committee also approves the student’s program of study.

The student’s individual program includes courses selected, with the approval of the supervisory committee, to make up a coherent program for the achievement of these goals. Students may pursue a wide range of options, including emphasis on one of the following: astronomy and astrophysics, biophysics, condensed matter and materials physics, physics education, or subatomic physics. The program may be directed toward either theoretical or experimental aspects, and frequently includes courses in cognate fields, particularly mathematics, depending on the student’s selected field.

Applied Physics. With advising from the supervisory committee, a program of study is selected with a major portion in physics and a minor portion (nine semester hours or more to be passed with at least a 3.00 average) in another area. The supervisory committee should include appropriate representation from the minor area.

Astronomy and Astrophysics. The following six graduate courses are required for all students enrolled in the emphasis in astronomy and astrophysics.

AST 521 Stars and Interstellar Medium I.....	3
AST 522 Stars and Interstellar Medium II.....	3
AST 523 Stars and Interstellar Medium III	3
AST 531 Galaxies and Cosmology I	3
AST 532 Galaxies and Cosmology II.....	3
AST 533 Galaxies and Cosmology III.....	3

Condensed Matter and Materials Physics. The following courses are required for all students enrolled in the emphasis on condensed matter and materials physics.

PHY 511 Materials Physics I.....	3
PHY 512 Materials Physics II.....	3

PHY 576 Quantum Theory	3
PHY 577 Quantum Theory	3
PHY 581 Quantum Theory of Solids I	3

Subatomic Physics. The following courses are required for all students enrolled in the emphasis on subatomic physics.

PHY 567 Relativistic Quantum Mechanics and Field Theory	3
PHY 568 Particle Physics Phenomenology	3
PHY 576 Quantum Theory	3
PHY 577 Quantum Theory	3
Select two of the following three courses	6
PHY 462 Subatomic Physics (3)	
PHY 561 Nuclear Physics (3)	
PHY 569 The Standard Model and Beyond (3)	

Course Requirements. The following basic core of courses or their equivalents is required of all students:

PHY 521 Classical Mechanics	3
PHY 531 Advanced Electricity and Magnetism	3
PHY 532 Electrodynamics	3
PHY 541 Statistical Physics	3
PHY 571 Quantum Physics	3
or PHY 576 Quantum Theory (3)*	
Total	15

* PHY 576 is the first half of a two-course sequence with PHY 577, which is taken in its entirety.

Additional course work is selected according to emphasis, with the advice and approval of the supervisory committee. Students should ensure that they have sufficient mathematical experience, and if in any doubt, should take PHY 501 Methods of Theoretical Physics.

Foreign Language Requirements. None.

Comprehensive Examinations. The following examinations are required of all students intending to earn the PhD degree.

Written Comprehensive Examination. The subject matter of this examination is classical and quantum mechanics, statistical mechanics, and electricity and magnetism, as represented by the courses PHY 521, 531, 532, 541 and 571 or 576. The examination is given in two five-hour sessions on separate days, but there is no division of subject matter for the separate sessions.

The written comprehensive examination is normally given twice yearly, approximately during registration weeks of the fall and spring semesters. PhD candidates must attempt the examination before the beginning of their third semester as full-time students in the physics graduate program and must pass the examination before the beginning of the fourth semester. Students enrolled in the PhD degree may be awarded the MS degree in passing.

Additional written examinations may be set to examine areas of emphasis. Any further written examinations will be given at least once yearly and must be passed by the beginning of the sixth semester.

Oral Comprehensive Examination. PhD candidates are required to pass the oral comprehensive examination by the end of their sixth semester as full-time students in the physics graduate program. The examination is administered and graded by the student's supervisory committee. It tests the

student's general knowledge of one broad area of current activity in physics, such as:

1. astronomy and astrophysics
2. atomic and molecular physics,
3. biophysics,
4. condensed matter and materials physics, or
5. subatomic physics.

The area tested is to be chosen by the student at the time of scheduling the examination. The student may request to be examined on specific subjects in addition to one of the areas. A proposal for the dissertation topic may be included in the material covered by the examination, subject to prior agreement between the student and the supervisory committee.

Dissertation Requirements. A dissertation representing an original contribution to the field, as a result of independent work suitable for publication in a refereed physics or astronomy journal, is required.

Final Examination. A final oral examination that covers, but is not necessarily limited to, the subject of the dissertation is required.

RESEARCH ACTIVITY

Faculty in the Department of Physics and Astronomy perform frontier research that spans the largest and smallest scales—from the galaxies of the cosmos to the substructure of subatomic particles. Topics include investigations in areas such as astrophysics, biophysics, condensed matter physics, surface physics and materials science, and subatomic physics. Faculty and students regularly conduct experiments using state-of-the-art instruments such as electron microscopes, lasers, computers, space-borne and ground-based observatories, and detector facilities at international accelerator laboratories. This experimental work is completed by theoretical investigations associated with the phenomena explored by these experiments as well as other cutting-edge topics. A major effort in physics education research is influential both locally and nationally. For more details, visit the department's Web site at phy.asu.edu.

ASTRONOMY (AST)

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.

COLLEGE OF LIBERAL ARTS AND SCIENCES

AST 521 Stars and Interstellar Medium I. (3)

spring

Radiative transfer, atomic and molecular properties, stellar atmospheres, line profiles, nonlocal thermodynamic equilibrium, interstellar gas and dust, star formation. Prerequisites: PHY 521, 531, 571 (or its equivalent).

AST 522 Stars and Interstellar Medium II. (3)

fall

Stellar structure, radiative transport, boundary conditions, equations of state, nuclear reactions, opacity, nucleosynthesis, chemical evolution of the galaxy, stellar evolution. Prerequisite: AST 521 or instructor approval.

AST 523 Stars and Interstellar Medium III. (3)

spring

Structure of the interstellar medium, gaseous nebulae, recombination theory, ionization fronts and shocks waves, galactic magnetic fields, magnetohydrodynamics, molecular clouds. Prerequisite: AST 522 or instructor approval.

AST 531 Galaxies and Cosmology I. (3)

spring

Structure and evolution of the Milky Way, stellar properties, populations and associations/clusters, interstellar medium, dark matter. Prerequisites: PHY 521, 531, 571 (or its equivalent).

AST 532 Galaxies and Cosmology II. (3)

fall

Structure of galaxies and the nearby universe, Hubble sequence, kappa-space, stellar populations, active galaxies, galaxy environments. Prerequisite: AST 531 or instructor approval.

AST 533 Galaxies and Cosmology III. (3)

spring

Issues in modern cosmology, the distance scale, cosmological parameters, cosmological tests, cosmic background radiation, early universe, galaxy formation and evolution. Prerequisite: AST 532 or instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

PHYSICAL SCIENCES (PHS)

PHS 505 Energy and the Environment. (3)

summer

Current problems in energy resources, production, consumption, and conservation. Studio. Prerequisite: instructor approval.

PHS 530 Methods of Physics Teaching I. (3)

summer

Inquiry approach to high school physics teaching. Studio. Prerequisite: instructor approval.

PHS 531 Methods of Physics Teaching II. (3)

summer

Extension of modeling techniques introduced in PHY 580. Studio. Prerequisite: PHS 530 or instructor approval.

PHS 534 Methods of Teaching Physical Science I, II, III. (3)

summer

Design of curriculum and conduct of instruction for physical science courses. Studio. Prerequisite: instructor approval.

PHS 540 Integrated Physics and Chemistry. (3)

summer

Collaborative inquiry methods for teaching and coordinating physics and chemistry. Studio. Prerequisite: CHM 480 or PHS 530 or PHY 480 or instructor approval.

PHS 542 Integrated Mathematics and Physics. (3)

summer

Mathematical models and modeling as an integrating theme for secondary mathematics and physics. Studio. Prerequisite: instructor approval.

PHS 550 Physics and Astronomy. (3)

summer

Astronomy curricula and projects for secondary school, with emphasis on the role of physics in astronomy. Studio. Prerequisite: instructor approval.

PHS 556 Astrophysics. (3)

summer

Structure and evolution of stars, galaxies, and the universe. For secondary school teachers. Studio. Prerequisite: instructor approval.

PHS 560 Matter and Light. (3)

summer

Interactions of light with matter. Lasers and spectroscopy. Studio. Prerequisite: instructor approval.

PHS 564 Light and Electron Optics. (3)

summer

Principles and practice of electron-optical instruments. Studio. Prerequisite: instructor approval.

PHS 570 Spacetime Physics. (3)

summer

Special and general theories of relativity with implications for space and time travel. Studio. Prerequisite: instructor approval.

PHS 581 Structure of Matter and Its Properties. (3)

summer

Models of matter and its properties. Studio. Prerequisite: instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

PHYSICS (PHY)

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.

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 498 Pro-Seminar. (1–7)*selected semesters***PHY 501 Methods of Theoretical Physics. (3)***fall*

Provides mathematical foundations for graduate students in basic and applied physics. Complex variables, vector spaces, operators, matrices, ordinary differential equations, integral equations and transforms, and special functions. May include additional topics.

PHY 502 Methods of Theoretical Physics. (3)*spring*

Continuation of PHY 501. Prerequisite: PHY 501.

PHY 511 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 511 or 481. Prerequisites: PHY 311, 315 (or its equivalent).

PHY 512 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 512 or 482. Prerequisite: PHY 511.

PHY 521 Classical Mechanics. (3)*fall*

Variational principles, Lagrange's and Hamilton's equations, rigid body motion, canonical transformations, Hamilton-Jacobi theory.

PHY 523 Relativity. (3)*selected semesters*

Special and general theories of relativity. Prerequisite: PHY 532 or instructor approval.

PHY 531 Advanced Electricity and Magnetism. (3)*fall*

Electrostatics and magnetostatics; potential theory and theory of constitutive relations; Maxwell's equations; the wave equation, plane electromagnetic waves, cavities, and wave guides.

PHY 532 Electrodynamics. (3)*spring*

Special theory of relativity, covariant formulation of electromagnetic interactions; inhomogeneous wave equations, Lienard-Wiechert potentials, and radiation fields; interactions of charged particles and electromagnetic waves, scattering, dispersion. Prerequisites: both PHY 412 and 531 or only instructor approval.

PHY 541 Statistical Physics. (3)*spring*

Probability theory and principles of statistical inference; evaluating experimental data; foundations of statistical mechanics; general laws of thermodynamics from microscopic theories; calculation of specific properties of bulk matter.

PHY 551 X-Ray and Electron Diffraction. (3)*spring*

Fresnel and Fraunhofer diffraction in integral formulation; diffraction of x rays and neutrons by crystal lattices; structures of solids, including crystal structure analysis; theory and techniques of electron microscopy/diffraction of crystalline/noncrystalline specimens. Prerequisite: PHY 481 or instructor approval.

PHY 552 Electron Microscopy I. (3)*fall*

Kinematical and dynamical electron diffraction and microscopy. Defect structure and composition using STEM imaging, x-ray and electron-energy-loss spectroscopy. Cross-listed as MSE 552/SEM 552. Credit is allowed for only MSE 552 or PHY 552 or SEM 552. Prerequisite: instructor approval.

PHY 553 Electron Microscopy Laboratory I. (3)*fall*

Lab support for PHY 552. Cross-listed as MSE 553/SEM 553. Credit is allowed for only MSE 553 or PHY 553 or SEM 553. Pre- or corequisite: MSE 552 or PHY 552 or SEM 552.

PHY 554 Electron Microscopy II. (3)*spring*

Determination of structure and composition of materials using high-resolution imaging, convergent-beam diffraction, and electron holography. Novel developments and applications. Cross-listed as MSE 554/SEM 554. Credit is allowed for only MSE 554 or PHY 554 or SEM 554. Prerequisite: instructor approval.

PHY 555 Electron Microscopy Laboratory II. (3)*spring*

Lab support for PHY 554. Cross-listed as MSE 555/SEM 555. Credit is allowed for only MSE 555 or PHY 555 or SEM 555. Pre- or corequisite: MSE 554 or PHY 554 or SEM 554.

PHY 561 Nuclear Physics. (3)*fall and spring*

Properties of nuclei, conservation laws, internucleon forces, nuclear structure models, reactions and decays, quark model with applications to nuclei. Prerequisite: PHY 576 or instructor approval.

PHY 562 Nuclear Physics. (3)*fall and spring*

Continuation of PHY 561. Prerequisite: PHY 561 or instructor approval.

PHY 567 Relativistic Quantum Mechanics and Field Theory. (3)*fall*

Relativistic quantum mechanics and introduction to the quantum field theory of scalar, spinor, and electromagnetic fields. QED through renormalization theory. Prerequisite: PHY 577.

PHY 568 Particle Physics Phenomenology. (3)*spring*

Hadron physics, internal symmetry groups, weak interactions, lepton and quark phenomenology. Prerequisite: PHY 577.

PHY 569 The Standard Model and Beyond. (3)*fall*

Introduces and applies the standard model of strong and electroweak interactions. Special topics include recent developments. Prerequisites: PHY 567, 568.

PHY 571 Quantum Physics. (3)*fall and spring*

Reviews modern physics, chemistry, math. Differential equation, operator, matrix formulations. Free particle, bound-state problems. Examples across physics and astronomy. Prerequisites: a combination of modern physics and linear and complex algebra and differential equations or only instructor approval.

PHY 576 Quantum Theory. (3)*spring*

Abstract approach to quantum mechanics in Hilbert space; observables and their corresponding operators, eigenstates, and eigenvalues; quantum dynamics; approximation methods; systems of identical particles; angular momentum and group representation theory; collision processes; relativistic quantum theory. Prerequisite: PHY 521.

PHY 577 Quantum Theory. (3)*fall*

Continuation of PHY 576. Prerequisite: PHY 576.

COLLEGE OF LIBERAL ARTS AND SCIENCES

PHY 580 Practicum. (1–12)

selected semesters

PHY 581 Quantum Theory of Solids I. (3)

fall

Band structure models: pseudopotentials, density functional theory; optical and magnetic response; elementary excitations; transport theory, electron-photon interactions and superconductivity. Prerequisites: PHY 511 (or instructor approval), 576.

PHY 582 Quantum Theory of Solids II. (3)

spring

Continuation of PHY 581: broken symmetry; phase transitions; disorder, topological defects; nano-structures topics; soft condensed matter and current research. Prerequisites: PHY 511 (or instructor approval), 576. Corequisite: PHY 512 or instructor approval.

PHY 587 Quantum Optics. (3)

selected semesters

Quantization of the electromagnetic field. Quantum theory of coherence, photon counting, photon states, lasers, density operators, and atomic Raman scattering. Prerequisite: PHY 576.

PHY 588 Quantum Optics. (3)

selected semesters

Continuation of PHY 587. Prerequisite: PHY 587.

PHY 592 Research. (1–12)

selected semesters

PHY 598 Special Topics. (1–4)

fall and spring

Topics may include the following:

- Surface and Thin Films. (3)

spring

See ASU Online or phy.asu.edu/classes for details. Internet course.

- Topics in Biophysics. (3)

fall

See phy.asu.edu/classes for details.

PHY 599 Thesis. (1–12)

selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Students admitted to the Master of Education degree with a major in Secondary Education may also elect political science as the subject matter field.

JOINT BACHELOR/MASTER'S PROGRAM

Program of Study. The Division of Graduate Studies has approved a plan whereby undergraduates can "share" credits for both their undergraduate and graduate degrees. Students can count one 400-level course and two 500-level courses as credit hours for both degrees. Using this system of shared credits, undergraduates will be able to complete both degrees in five years.

Once all existing degree requirements for the undergraduate degree have been completed students will have completed enough courses to be able to finish their master's degree in one academic year. Students are only eligible for research or teaching assistantships, health insurance, financial aid, or graduate awards once they have completed all requirements for the undergraduate degree and the undergraduate degree has been posted.

A minimum of 30 semester hours is required for the Master of Arts degree. All candidates must take POS 503 and the core courses in their major and minor fields. Additional hours must be taken in graduate-level courses and seminars. Students are expected to take seminars each semester until their major, minor, and elective course work is completed. If the thesis option is followed, the program must include a combination of at least six semester hours of research (POS 592) and thesis (POS 599) credit. A maximum of six semester hours in approved courses taken outside of the department or six hours of reading and conference (POS 590) courses may count toward the 30-hour requirement.

Admission. Any undergraduate political science major with a GPA of 3.40 or higher, who has accumulated at least 90 hours toward the undergraduate degree, or who is on the verge of doing so, and who has taken at least one 400-level political science course at ASU can be considered for admission into the joint program.

The following items should be submitted to the director of graduate studies of the Department of Political Science by April 15 in order to ensure recommendation for admission to the five-year program beginning the following fall:

1. the department's graduate application, available in our Graduate Office or online;
2. a statement of purpose that describes the applicant's educational objectives and identifies a faculty member who will serve as an advisor;
3. an official transcript;
4. a writing sample that best represents the applicant's analytical and writing skills;
5. three letters of recommendation, two of which must be written by members of our political science faculty.

Students applying for the five-year program do not need to take the Graduate Record Examination.

Please note that students must also apply for admission to the Division of Graduate Studies at the same time they

Political Science

Master's and Doctoral Programs

www.asu.edu/clas/polisci

480/965-6551

COOR 6801

Patrick J. Kenney, Chair

Professors: 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, Guston, Hindman, Hoekstra, Kittilson, Lewis, Pantoja, Schatzman

The faculty in the Department of Political Science offer graduate programs leading to the MA and PhD degrees in Political Science. Concentrations are available in American politics, comparative politics, international relations, and political theory.

submit materials to the director of graduate studies of the department.

Foreign Language Requirement. None.

Thesis Option Requirements. MA students seeking admission to the PhD program are expected to complete the thesis early in their fourth semester. A copy of the *Format Manual* is available in the Division of Graduate Studies. A careful review of this document well in advance of preparation of the final copy of the thesis is recommended. An oral examination in defense of the thesis is required.

Non-Thesis Option Requirements. The program of study must include 27 hours of approved course work and at least one three-hour reading and conference course (POS 590) in the fourth semester to enhance the student's research capabilities. A research paper must be defended before a faculty committee appointed by the director of graduate studies, by the end of the third semester.

MASTER OF ARTS

See "Master's Degrees," page 67, for general requirements.

Admission. The MA degree provides advanced education for those students preparing for teaching, research, or applied careers in political science. It may be taken as a terminal program or as a step toward eventual fulfillment of the requirements for the PhD. Students may apply directly to the doctoral program or master's program.

In addition to the materials sent to the Division of Graduate Studies, the following items should be submitted to the graduate secretary of the Department of Political Science by February 1 in order to ensure recommendations for admission to the MA program beginning the following fall:

1. scores from the verbal, quantitative, and analytical sections of the Graduate Record Examination (GRE);
2. three letters of recommendation from persons who can evaluate the applicant's academic performance and potential;
3. a career overview statement which describes the applicant's educational objectives; and
4. a writing sample that best represents the applicant's thinking and writing skills.

Applicants for financial aid should submit these items and complete the application form for graduate assistantships by February 1. The department also has an early admission deadline of November 1. Candidates who have submitted a complete application by that date will be notified of their status by the end of the calendar year.

Undergraduate course work in political science is not a prerequisite for admission.

However, MA students should have a basic understanding of elementary statistics and the undergraduate content of the political science fields of concentration that they wish to study. Students should allow sufficient time to acquire such a background.

Program of Study. A minimum of 30 semester hours is required for the Master of Arts degree. All candidates must take POS 503 and the core course in the student's major and minor fields. Additional hours must be taken in graduate-level courses and seminars. Each student is expected to take seminars each semester in his/her major field, minor field, and an elective until course work is completed. If the thesis option is followed, the program must include a combination of at least six semester hours of research (POS 592) and thesis (POS 599) credit. A maximum of six semester hours in approved courses taken outside the department or six hours of reading and conference (POS 590) courses may count toward the 30-hour requirement.

Foreign Language Requirement. None.

Thesis Option Requirements. MA students seeking admission to the PhD program are expected to complete the thesis early in their fourth semester. A copy of the *Format Manual* is available in the Division of Graduate Studies. A careful review of this document well in advance of preparation for the final copy of the thesis is recommended. An oral examination in defense of the thesis is required.

Non-Thesis Option Requirements. The program of study must include 27-hours of approved course work and at least one three-hour reading and conference course (POS 590) in the fourth semester to enhance the student's research capabilities. A research paper must be defended by the end of the third semester before a faculty committee appointed by the director of Graduate Studies.

DOCTOR OF PHILOSOPHY

See "Doctor of Philosophy," page 69, for general requirements.

Admission. In addition to meeting Division of Graduate Studies requirements, an applicant for the PhD program must take the verbal, quantitative, and analytical sections of the GRE; supply a career overview statement that describes the applicant's educational objectives; submit three letters of recommendation from persons who can evaluate the applicant's undergraduate and graduate work; and provide a sample of writing. These items should be submitted to the graduate secretary of the Department of Political Science by February 1. Applicants for financial aid should also complete and submit the application form for graduate assistantships by February 1. The department also has an early admission deadline of November 1. Candidates who have submitted a complete application by that date will be notified of their status by the end of the calendar year.

PhD students should have a basic understanding of elementary statistics and the content of the areas of concentration that they wish to study. Students should allow sufficient time to acquire such a background.

Program of Study. A minimum of 60 semester hours of graduate courses beyond the baccalaureate degree and approved by the student's supervisory committee shall constitute the formal course preparation, followed by a minimum of 24 semester hours of research and dissertation work. The supervisory committee has three members, including the committee chair from the student's major

COLLEGE OF LIBERAL ARTS AND SCIENCES

field, and two members from a minor field. As part of the 60 semester hours, the student must take POS 503 and 603. A maximum of 12 semester hours of approved course work outside the department and 12 semester hours of approved reading and conference courses (POS 590 and 790) may count toward the 60 semester hours. Grades of "A" (4.00), "B" (3.00), or "Y," must be obtained in all course work counted for the PhD degree.

Master's in Passing. For students without an MA who are admitted directly into the PhD program, the department offers a Master's in Passing. Students opting for the Master's in Passing must, in the third semester of residence, pass an oral examination of their work. The examination is conducted by a committee composed of members of the Graduate Committee who represent each student's primary and secondary subfields. Students who pass the oral examination and have completed 30 semester hours of course work toward the PhD are then awarded the MA.

Research Skills/Foreign Language Requirements. All PhD students must show proficiency in research and methodological skills. This requirement may be met by showing proficiency in one or more of the following areas: foreign language, quantitative, or qualitative methods. Supervisory committees determine which among those research tools are appropriate for students in their fields of study.

Comprehensive Examinations. The student is required to take three examinations from the fields and subfields of American politics, international relations, comparative politics, and political theory. In the major field, the student takes a written general examination. Additionally, the student takes a written field or subfield examination in one of the remaining fields of political science. An oral examination over the dissertation proposal follows the written examinations.

Dissertation Requirements. The dissertation must be an original contribution of knowledge and demonstrate the student's proficiency as an independent investigator. The dissertation proposal is approved by the chair of the department upon the recommendation of the student's dissertation committee. The department chair also approves the dissertation committee. This committee must have a minimum of three members from the department of political science, including a chair from the student's major field.

Final Examination. A final oral examination is required. This examination is the occasion for the student to defend the dissertation, both as to methods and conclusions, and to demonstrate general competence in the area of concentration.

RESEARCH ACTIVITY

Political science faculty and the department's curriculum are organized into four areas of concentration. The faculty offer courses and conduct research from a variety of methodological orientations, all with a common thread of theoretically oriented scholarship.

American Politics. Faculty emphasize political behavior and use survey research, experimental designs, and content anal-

ysis to collect data and conduct statistical analyses of mass voting patterns, campaign strategies, party politics, the role of the media in political communication, agenda setting and policy development in Congress, and elite-mass linkages. Other faculty emphasize public law and policy with a focus primarily at the state and local levels of government.

International Relations. One group focuses on foreign policy theory and international security, using event chronologies, institutional differences, archival materials, and public records to guide comparative analyses of foreign policy decision-making by different types of regimes, case studies of leaders and their decision-making strategies, state and nation building, nationalism, and policy analyses of issues in the Asia-Pacific region. Another cluster of faculty emphasize critical theory and the international political economy, employing archival sources, statistical data, and texts of legal norms and state practices to conduct analyses of global inequalities in wealth and income, the evolution of statecraft, and the impact of hierarchically-ordered gender and race categories in North-South relations.

Political Theory. Faculty research interests in the area of political theory cover a range of topics in the history of political thought and contemporary political theory. Historical topics include Rousseau, conceptual history, and positive liberalism of the 19th and 20th centuries. Research in contemporary political theory focuses on such themes as autonomy and freedom, rights and obligations, civic virtues, and the idea of the common good; various issues in democratic theory (with particular attention to education), aspects of political and legal theory regarding corporate personality, conceptions of self in various cultures, analysis of myths in aboriginal societies and politics, social ecology, and peace and nonviolence.

Comparative Politics. Faculty in the area of comparative politics investigate a variety of topics in several regions of the globe. Research interests include the political economy of uneven development in Africa, democratization processes within formerly authoritarian regimes in Europe, Latin America, and East Asia, church and state relations in the Philippines, ethnic minority problems in Brazil, problems of federalism in India, and party leadership in France and Italy.

POLITICAL SCIENCE (POS)

POS 501 Methods of Political Science. (3)

selected semesters

Problems of method and knowledge in political science, strategies of political inquiry, and issues in philosophy of social science.

POS 502 Philosophy of Political Inquiry. (3)

once a year

Problems of knowledge and method in political science, with attention to both empirical and evaluative analysis.

POS 503 Empirical Political Inquiry. (3)

once a year

Research methods and techniques of the discipline, emphasizing empirical foundations and analytic methods employed in subfields. Prerequisites: POS 401 (or its equivalent); instructor approval.

POS 530 American Politics. (3)

once a year

Examines major debates in the study of American political processes and institutions. Covers parties, media, elections, public opinion, interest groups, and the three branches of government. Seminar.

POS 545 Themes in Political Thought. (3)*selected semesters*

Examines a particular theme or problem in political thought from both a historical and contemporary perspective. May be repeated with approval of the director of graduate studies. Seminar. Prerequisite: instructor approval.

POS 550 Comparative Politics. (3)*once a year*

Surveys major approaches across topical areas such as revolutions, authoritarianism, policy processes, interest groups, and electoral politics. Focus varies with instructor. Seminar.

POS 560 International Relations. (3)*once a year*

Surveys major theoretical approaches and debates in international relations. Seminar.

POS 563 Comparative Asian Security Policies. (3)*selected semesters*

Analyzes domestic and international constraints, belief systems, and economic components in security decisions by major powers and Asian nations. Seminar. Prerequisite: instructor approval.

POS 590 Reading and Conference. (1–12)*selected semesters***POS 591 Seminar. (1–12)***once a year*

Topics may include the following:

- American Politics. (3)
- Comparative Politics. (3)
- Global Politics. (3)
- Political Theory. (3)

POS 592 Research. (1–12)*selected semesters***POS 598 Special Topics. (1–4)***once a year*

Topics may include the following:

- American Politics. (3)
- Comparative Politics. (3)
- Global Politics. (3)
- Political Theory. (3)

POS 599 Thesis. (1–12)*selected semesters***POS 601 Advanced Experimental Research. (3)***selected semesters*

Introduces experimental and quasi-experimental research designs in political research, including laboratory techniques and topics in the analysis of variance. Prerequisite: POS 503 (or its equivalent).

POS 602 Advanced Survey Research. (3)*selected semesters*

Presents design and conduct of political surveys, including sampling, instrument design, scaling, and statistical and graphical analysis of survey data. Prerequisite: POS 503 (or its equivalent).

POS 603 Polimetrics I. (3)*once a year*

Introduces theory and practice of linear regression analysis. Provides skills to read, understand, and evaluate professional literature using regression analysis. Prerequisites: both POS 401 and 503 or only instructor approval.

POS 604 Polimetrics II. (3)*once a year*

Applies quantitative techniques to research topics producing publishable papers through exposure to time-series, logit and probit, and simultaneous equations. Prerequisites: a combination of POS 401 and 503 and 603 or only instructor approval.

POS 606 Qualitative and Textual Analysis. (3)*spring in odd years*

Method and theory for the analysis of qualitative materials, systematic approaches for case studies, content analysis, critical analysis of texts. Discussion, seminar.

POS 635 State Politics and Public Policy. (3)*selected semesters*

Introduces comparative state policy emphasizing policy or performance differences among the states and the reasons for these differences. Seminar. Prerequisites: both POS 530 and 603 or only instructor approval.

POS 636 Electoral Behavior. (3)*selected semesters*

Introduces fundamental concepts of electoral behavior. Emphasizes presidential elections and examines why people vote and how their votes are determined. Seminar. Prerequisites: both POS 530 and 603 or only instructor approval.

POS 638 Law and Politics. (3)*selected semesters*

Emphasizes research into such topics as constitutional law, women and the law, American legal system, judicial process, and judicial selection. Seminar. Prerequisite: instructor approval.

POS 651 Politics of Change and Development. (3)*selected semesters*

Examines contending approaches to national, social, and political change. Seminar. Prerequisite: instructor approval.

POS 660 The Modern World System. (3)*selected semesters*

Theoretically driven, historical analysis of the organization and operation of the international political economy since the 16th century. Seminar. Prerequisite: instructor approval.

POS 661 The State. (3)*selected semesters*

Examines theories of state, state-society relations, and interstate politics emphasizing questions of sovereignty, territoriality, violence, representation, democracy, and change. Seminar. Prerequisite: instructor approval.

POS 662 International Organization. (3)*selected semesters*

History, practical political significance, and future of international institutions, transnational regimes, and other approaches to international organization. Seminar. Prerequisite: instructor approval.

POS 664 War, Peace, and Conflict Processes. (3)*selected semesters*

Systematic analysis of the causes of war, the preconditions for peace, and approaches to the resolution of conflict. Seminar. Prerequisite: instructor approval.

POS 665 Foreign Policy Theory. (3)*selected semesters*

Examines foreign policy theory and methods. Development and critique of research designs analyzing foreign policy processes within and among nations. Seminar. Prerequisite: instructor approval.

POS 691 Seminar. (1–12)*selected semesters***POS 790 Reading and Conference. (1–12)***selected semesters***POS 792 Research. (3)***fall and spring*

Projects in various areas of political science. Prerequisite: doctoral student.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Psychology

Doctoral Program

www.asu.edu/clas/psych

480/965-3326

PSY 237C

Keith 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 faculty in the Department of Psychology offer graduate programs leading to the PhD degree in Psychology. Concentrations are available in clinical, developmental, and social psychology, as well as in cognitive/behavioral systems, behavioral neuroscience, and quantitative research methods. (Applications to the concentration in environmental psychology are not being accepted at this time.)

Although there is no terminal master's program as such, doctoral students are required to complete a nonterminal master's degree as part of their training.

NONTERMINAL MASTER'S

Program of Study. A minimum of 30 semester hours is required for the nonterminal master's degree.

Foreign Language Requirements. None.

Thesis Requirements. A thesis is required.

Final Examination. A final oral examination in defense of the thesis is required.

DOCTOR OF PHILOSOPHY

See "Doctor of Philosophy," page 69, for requirements.

Application Deadline. Completed applications for the clinical areas, including all letters and supporting documents, must be received by December 15. For all other areas, applications are accepted until January 5.

All applicants are required to submit scores on the Graduate Record Examination (an advanced test in psychology is also required for clinical psychology), as well as transcripts, three letters of reference, and a statement of purpose.

Program of Study. At present, the department offers the PhD degree in the following research areas: clinical, developmental, cognitive/behavioral systems, behavioral neuroscience, quantitative, and social psychology. A minimum of 60 semester hours beyond the bachelor's degree is required, plus 24 semester hours in research and dissertation.

In addition to a core curriculum, students take courses related to their area of interest as determined in consultation with their supervisory committees. Requirements vary across training areas.

Annual Evaluations. At the end of each year of study, each student receives a comprehensive evaluation by the faculty based upon performance in courses, research, and professional or laboratory assignments and upon the evidence of professional responsibility and ethical behavior.

Foreign Language Requirements. None.

Comprehensive Examinations. Written and oral examinations are required near the end or upon completion of all course work. After passing the comprehensive examinations and meeting other requirements (e.g., dissertation prospectus), the student is eligible to apply for candidacy.

Dissertation Requirements. The dissertation must be an original contribution to knowledge, demonstrating the student's proficiency as an independent investigator. (See "Doctoral Degrees," page 68.)

Final Examination. A final oral examination in defense of the dissertation is required.

PSYCHOLOGY (SOCIAL AND BEHAVIORAL) (PGS)

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.

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.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

PSYCHOLOGY (SCIENCE AND MATHEMATICS) (PSY)

For more PSY courses, see the list of E PSY courses under "Applied Psychology."

M PSY 420 Analysis of Behavior. (3)

selected semesters

Research, applications, and philosophy of the analysis and control of human behavior. Prerequisite: PSY 320.

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.

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.

M PSY 425 Biological Bases of Behavior. (3)

selected semesters

Critical study of physiological psychology; brain mechanisms underlying motivation and learning. Prerequisite: PSY 325.

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.

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.

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 501 Supervised Teaching. (3)

fall

Experience in and examination of perspectives on teaching undergraduate psychology. Prerequisites: graduate standing in psychology; instructor approval.

M PSY 506 Survey of Research in Environmental Psychology. (3)

fall

Major topics and paradigms in the study of person-environment relationships. Prerequisite: instructor approval.

M PSY 512 Advanced Learning. (3)

selected semesters

Principles and theories of learning, emphasizing research literature. Prerequisite: instructor approval.

M PSY 524 Advanced Physiological Psychology. (3)

selected semesters

Contributions of physiological processes and brain function to fundamental behavioral processes. Prerequisite: instructor approval.

M PSY 528 Sensation and Perception. (3)

selected semesters

Principles of sensory and perceptual processes, emphasizing research literature. Prerequisite: instructor approval.

M PSY 530 Analysis of Variance in Psychological Research. (3)

fall

One-way and factorial designs, contrasts, post-hoc tests, probing of interactions, mixed designs, power, computer applications. Prerequisite: undergraduate statistics or instructor approval.

M PSY 531 Multiple Regression in Psychological Research. (3)

spring

Multiple regression and correlation, hierarchical regression, interactions, curvilinear relationships, categorical predictors, ANOVA in regression, regression diagnostics, regression graphics. Prerequisite: PSY 530 or instructor approval.

M PSY 532 Analysis of Multivariate Data. (3)

fall

Matrix algebra for multivariate procedures, component and factor analysis, canonical and discriminant analysis, classification, MANOVA, logistic regression, hierarchical linear model. Prerequisites: both PSY 530 and 531 or only instructor approval.

M PSY 533 Structural Equation Modeling. (3)

spring

Path analysis; exploratory and confirmatory factor analysis; recursive and nonrecursive latent variable models; mean and covariance struc-

tures; latent growth models. Prerequisite: PSY 532 or instructor approval.

M PSY 534 Psychometric Methods. (3)

fall and spring

Theory and practice of psychological measurement using classical and modern test theories. Reliability assessment, test validation, test construction, test usage. Prerequisites: both PSY 530 and 531 or only instructor approval.

M PSY 535 Cognitive Processes. (3)

selected semesters

Theoretical/empirical treatment of the human organism as a processor of information, including abstraction, memory structure, problem solving, and thinking. Prerequisite: instructor approval.

M PSY 536 Statistical Methods in Prevention Research. (3)

fall and spring

Statistical methods used in prevention research, including epidemiological methods, logistic regression, program effect estimation, estimation, and mediation analysis. Prerequisites: both PSY 530 and 531 or only instructor approval.

M PSY 537 Longitudinal Growth Modeling. (3)

selected semesters

Growth modeling methodology to describe individual variation in development over time. Employs multilevel and structural equation modeling frameworks. Prerequisite: PSY 533 or instructor approval.

M PSY 538 Advanced Structural Equation Modeling. (3)

selected semesters

Mean and covariance structure analysis. Includes multiple-group modeling, two-level hierarchical modeling, longitudinal growth modeling, analysis with categorical outcomes. Prerequisite: PSY 533 or instructor approval.

M PSY 541 Research in Cognitive Development. (3)

selected semesters

Theoretical and empirical issues in the study of children's knowledge and cognitive processes. Comparison of research in Piagetian and other traditions. Prerequisite: admission to Psychology PhD program or instructor approval.

M PSY 542 Social Development. (3)

selected semesters

Reviews and critiques major issues in the area of social development. Covers theory, research, and content. Prerequisite: instructor approval.

M PSY 550 Advanced Social Psychology. (3)

fall and spring

Theory and research concerning interpersonal perception, decision making, attitude formation and change, group processes, social motivation, and interaction processes. Prerequisite: instructor approval.

M PSY 551 Advanced Social Psychology. (3)

fall and spring

Continuation of PSY 550. Prerequisite: PSY 550 or instructor approval.

M PSY 553 Social Influence. (3)

selected semesters

Researches literature relevant to attitude formation and change, conformity, obedience, power, compliance, altruism, and others. Prerequisite: PSY 551 or instructor approval.

M PSY 555 Experimental and Quasi-Experimental Designs for Research. (3)

selected semesters

Reviews research techniques. Analyzes laboratory and field research; applications to specific topics. Prerequisite: instructor approval.

M PSY 569 Advanced Study of Personality. (3)

selected semesters

Personality as a theoretical concept in psychology, including definitional problems, behavioral and traditional approaches, the measurement of personality, and current research issues. Prerequisite: instructor approval.

M PSY 572 Psychological Assessment. (3)

fall

Theory and research on assessment of personality, psychopathology, and intelligence; construction of psychological assessment instruments. Prerequisite: admission to clinical PhD program or instructor approval.

M PSY 573 Psychopathology. (3)

fall

Theory and research relating to the contribution of psychological, social, physiological, and genetic factors to the development and persistence of abnormal behavior. Prerequisite: admission to Psychology PhD program or instructor approval.

M PSY 574 Psychotherapy. (3)

spring

Detailed survey of the theoretical and empirical literature relating to verbal psychotherapy. Prerequisite: admission to the clinical PhD program or instructor approval.

M PSY 578 Developmental Psychopathology. (3)

selected semesters

Covers major theories and research related to the development of psychological disorders of childhood and adolescence.

M PSY 582 Community Psychology. (3)

summer

Community systems, intervention techniques, consultation models, history and current status of community mental health movement, and conceptualization of the roles of community psychologists in social system intervention. Prerequisite: advanced standing in Psychology PhD program or instructor approval.

M PSY 624 Clinical Neuroscience. (3)

spring

Examines the biological underpinnings of psychological disorders at the molecular, cellular, and system levels (schizophrenia, depression, anxiety, etc.). Lecture, pro-seminar. Prerequisites: graduate standing; instructor approval.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Religious Studies

Master's and Doctoral Programs

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, Henn, Moore, Schober, Swanson, Woodward

Assistant Professors: Aguilera, Benn, Carlson, Damrel, Duncan, Espinosa, Park, Umar

The faculty of the Department of Religious Studies offer a graduate program leading to the MA degree in Religious Studies. This program is designed to serve three main purposes. It offers intensive training in research methods and in select special fields for students who seek to qualify for doctoral programs at leading universities. It serves as specialized training for those who plan to teach religious studies subject matter in colleges and high schools or who wish to bring cultural and cross-cultural analytical tools to professions such as business, social work, government, and journalism. It allows qualified persons in nonacademic occupations the opportunity to acquire competence in the study of religions, broadly defined, and in areas of special interest.

For information about the new PhD program in Religious Studies, contact the department.

Course offerings and faculty appointments reflect the commitment of the department to a balance of Western and Asian, historical and conceptual, methodological, and subject-oriented areas of study. This programmatic diversity is maintained in a context of scholarly collegiality involving both faculty and graduate students.

MASTER OF ARTS

See "Master's Degrees," page 67, for general requirements. The graduate program leading to the MA degree provides two options: (1) a thesis option and (2) a portfolio option. While admission requirements and procedures are identical for both options, requirements for degree completion vary as indicated.

Admission. To be eligible for admission to the graduate program in Religious Studies, an applicant must meet Division of Graduate Studies requirements (see "Admission to the Division of Graduate Studies," page 58) and provide the following:

1. The student must submit test scores from the Graduate Record Exam (older returning students may petition the department to have this requirement waived).
2. The student must have completed the equivalent of 15 hours of undergraduate work in the study of religions, including advanced courses in both Western and Asian or other non-Western religions. Students without the necessary background in religious studies may remove deficiencies by taking additional specified courses (which may or may not count toward the fulfillment of degree requirements) at the beginning of their program of study.
3. The student must request three academic letters of reference to be sent to the graduate coordinator of the department.
4. The student must submit an essay of approximately 1,000 words outlining the academic background, career goals, and specific area of interest in religious studies in relation to fields offered by the faculty.

Complete applications are due by February 1. Students will receive notification from the department by April 1. Graduate assistantship awards are also announced on or about April 1. Late applications and applications for spring semester are reviewed on an individual basis.

For more information, send e-mail to religious_studies@asu.edu.

GRADUATE PROGRAM REQUIREMENTS

Thesis Option. This option is recommended for students intending to seek admission to a doctoral program upon completion of the MA degree or planning to teach in the discipline at community colleges. For the thesis option, the student must satisfy the following requirements:

1. reading knowledge of French, German, or another language relevant to the proposed thesis topic is normally required. At the discretion of the student's supervisory committee, the requirement may be

waived for students who either are not planning to enter a doctoral program or are planning to pursue doctoral work that does not require proficiency in foreign languages;

2. 24 hours of course work, including six hours in methods and theory (REL 501, 502); six hours of graduate seminar (REL 591), offered each semester on varying topics within the academic study of religion; and three hours of research (REL 592) in the field of the thesis topic;
3. a thesis that earns six semester hours of 599 Thesis credit; and
4. an oral defense of the thesis.

Portfolio Option. This option is recommended for students intending to augment their primary area of expertise and professional training in fields such as journalism, law, teaching K–12, counseling, social work, the ministry, and others. For the portfolio option, the student must satisfy the following requirements:

1. reading knowledge of a foreign language relevant to the proposed area of concentration. At the discretion of the student's supervisory committee, the requirement may be waived;
2. 30 hours of course work, including six hours in methods and theory (REL 501, 502); six hours of graduate seminar (REL 591); four courses in a major area of concentration; and two courses in a minor area;
3. a portfolio consisting of three papers: one on theory and method, one on the student's minor area of study, and one on the major area of study. Although portfolio papers may germinate from ideas generated in graduate seminars, they will be of publishable quality and make substantive contributions to the scholarship of the field. Credit toward completing the portfolio may be earned as part of the required credit hours outlined in item 2; and
4. an oral defense of the portfolio.

RESEARCH ACTIVITY

For information on current research activity, access the Department of Religious Studies Web site at www.asu.edu/clas/religious_studies.

RELIGIOUS STUDIES (REL)

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.

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).

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).

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.

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.

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.

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.

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.

REL 501 Research Methods in Religious Studies. (3)

fall

Explores the major themes and methods in the study of religion, with primary focus on classical texts. Lecture, discussion.

REL 502 Research Methods in Religious Studies. (3)

spring

Explores the major themes and methods in the study of religion, with primary focus on contemporary texts. Lecture, discussion.

REL 591 Seminar. (3)

fall and spring

Topics on methodological issues in the study of religion. Prerequisite: Religious Studies graduate student or instructor approval.

REL 592 Research. (1–12)

fall and spring

REL 598 Special Topics. (1–4)

fall and spring

May be repeated for credit. Topics may include the following:

- Christianity. (3)
- Islam. (3)
- Judaism. (3)
- Native American Religion. (3)
- Problems in Religious Studies. (3)
- Religion in America. (3)
- Religion in East Asia. (3)
- Religion in South and Southeast Asia. (3)
- Study of Religion, Comparative Religion. (3)
- Western Religious Thought, Ethics. (3)

REL 599 Thesis. (1–12)

selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.

Renaissance Studies

See “Medieval and Renaissance Studies,” page 309.

Scholarly Publishing

Certificate Program

[www.asu.edu/clas/history/graduate/
area_publishing.html](http://www.asu.edu/clas/history/graduate/area_publishing.html)

480/965-5775

COOR 4497

Beth Luey, Director

Senior Instructional Professional: Luey

Graduate students in any discipline may pursue a Certificate in Scholarly Publishing in conjunction with their degree programs. The program is also open to students who already hold graduate degrees. Students gain an understanding of the structure of scholarly publishing (scholarly books, journals, reference books, college textbooks, and scholarly electronic media), its role and responsibility in society, the legal and ethical issues that impinge upon it, and its economics. They also learn to perform the responsibilities of editors, designers, or producers of scholarly publications. Course work includes a required core, required courses in editing or design, and electives from a variety of disciplines. The certificate requires 28 hours of course work, including six internship hours. Some courses may be applied to both the certificate and the student’s degree program. Applicants are strongly urged to submit Graduate Record Examination aptitude scores; a writing sample is required. The application deadline is February 1. For more information, contact the director, Scholarly Publishing Program, COOR 4497, 480/965-5775.

SCHOLARLY PUBLISHING (PUB)

PUB 501 Introduction to Scholarly Publishing. (3)

once a year

Introduces the purpose, organization, and operation of scholarly publishing, including its history, societal role, and current issues. Lecture, discussion. Prerequisite: graduate standing.

PUB 502 Scholarly Editing. (3)

once a year

Publishing procedures, proofreading, and manuscript editing of scholarly books, textbooks, and scholarly journals. Lecture, discussion. Prerequisite: admission to scholarly publishing certificate program. Pre- or corequisite: PUB 501.

PUB 503 Advanced Scholarly Editing. (3)

once a year

Advanced manuscript editing, acquisitions, developmental editing, and indexing of scholarly books, textbooks, and scholarly journals. Lecture, discussion. Prerequisites: PUB 501, 502.

PUB 510 Research in Scholarly Publishing. (3)

once a year

Individual or group research projects on issues in scholarly publishing, including legal, economic, design, technological, and related topics. Directed research, discussion. Prerequisites: PUB 501; admission to scholarly publishing certificate program.

PUB 584 Scholarly Publishing Internship. (1–6)

once a year

Structured, supervised, practical experience with a scholarly publisher or other appropriate publishing enterprise. Internship. Prerequisites: PUB 501; 9 hours in scholarly publishing core; instructor approval.

PUB 598 Special Topics in Scholarly Publishing. (1)

spring

One-week short courses covering special topics in scholarly publishing, to be taught by visiting publishing professionals. Lecture, discussion. Prerequisites: PUB 501; admission to scholarly publishing certificate program.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see “Omnibus Courses,” page 56.

Science and Engineering of Materials

Interdisciplinary Doctoral Program

See “Science and Engineering of Materials,” page 80.

Sociology

Master’s and Doctoral Programs

asu.edu/clas/sociology/graduate/graduate.html

480/965-3546

COOR 5681

Jennie Jacobs Kronenfeld, Chair

Professors: Cobas, Kronenfeld, Kulis

Associate Professors: Agadjanian, Benin, Glick, Keith, Menjivar, Miller-Loessi, Sullivan

Assistant Professor: Yabiku

Senior Lecturer: Fine

The faculty in the Department of Sociology offer graduate programs leading to the MA and PhD degrees in Sociology.

MASTER OF ARTS

This degree program provides advanced training for those preparing for teaching, research, or applied careers in sociology, and may be taken either as a terminal program or as a step toward eventual fulfillment of requirements for the PhD. A detailed description of the graduate program, including opportunities in teaching and research assistantships, may be obtained from the department chair.

Admission. Admission to the program is determined by the following criteria: Graduate Record Examination (GRE) scores (verbal, quantitative, and analytical), three letters of appraisal from persons familiar with the applicant's academic background, valid transcripts of the student's academic record, and a statement of purpose provided by the applicant. The application deadlines are January 31 for preferential consideration for funding, March 31 for fall admission, and October 15 for spring admission, which is limited to students who have completed at least six semester hours of graduate-level course work in sociology.

Program of Study. A master's degree in Sociology requires the successful completion of a minimum of 32 semester hours, including a 14-hour core curriculum, six hours of theory (SOC 585 and 586), six hours of research methods (SOC 500 and 505), and two hours of Sociology as a Profession (SOC 503 and 504), with the balance to be drawn from substantive courses and six hours earned through the MA thesis (SOC 599).

Foreign Language Requirements. None.

Thesis Requirements. A thesis or applied project is required.

Final Examination. A final oral examination in defense of the thesis is required. This oral examination also tests the student's comprehension of the area of sociology exemplified by the thesis.

DOCTOR OF PHILOSOPHY

This degree provides advanced training in theory, research methodology, and substantive fields to prepare sociologists for teaching and research with special emphasis on family, global political and cultural processes, health, and work issues. A detailed description of this program (including opportunities in teaching and research assistantships) may be obtained from the graduate secretary or viewed on the department's Web site. See "Doctor of Philosophy," page 69, for general requirements.

Admission. Admission to the program is determined by the following criteria: GRE scores (verbal, quantitative, and analytical), three letters of appraisal from persons familiar with the applicant's academic background, valid transcripts of the applicant's academic record, and a statement of purpose provided by each applicant. Applicants should have an MA or its equivalent in Sociology or a related field. The option is available for a few outstanding undergraduates to apply directly to the PhD program. These students must obtain an MA in passing. The application deadline is January 31.

Program of Study. The PhD requires 54 semester hours beyond the master's degree. Three hours each of theory, methods, and statistics are required, and 24 hours are earned through dissertation and research. The remaining 21 hours are in substantive courses reflecting the student's specialization. First-year PhD students are required to take Sociology as a Profession (503 and 504). A minimum of 30 semester hours of the approved PhD program, exclusive of

dissertation and research hours, must be completed after admission to the PhD at ASU.

Foreign Language Requirements. None.

Comprehensive Examinations. Written comprehensive examinations focusing on two areas chosen by the student, and an oral defense of the dissertation proposal are required. Exams are currently offered in demography, family, health, and a statistics course sequence is an option to one written exam. After passing the comprehensive examinations and obtaining a formal approval of the dissertation proposal, the student is eligible to apply for candidacy.

Dissertation Requirements. A dissertation based on original work demonstrating creativity in research and scholarly proficiency in the subject area is required.

Final Examination. A final oral examination in defense of the dissertation is required.

Research Facilities. The department is affiliated with the Institute for Social Science Research, which conducts local and national surveys. The department also has a computer laboratory.

SOCIOLOGY (SOC)

For more SOC 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 SOC 500 Research Methods. (1–12)

spring

M SOC 501 Practicum in Survey Research. (3)

fall

Research practicum in survey field work, analysis, and reporting in the Phoenix Area Study. Prerequisite: SOC 391 (or its equivalent).

M SOC 502 Practicum in Survey Research. (3)

spring

Continuation of SOC 501. Prerequisite: SOC 501.

M SOC 503 Sociology as a Profession I. (1)

fall

Becoming and working as a sociologist, including how to write a vita, choose a thesis topic, or find dissertation data. Prerequisite: graduate Sociology major.

M SOC 504 Sociology as a Profession II. (1)

spring

Becoming and working as a sociologist, including how to write a vita, choose a thesis topic, or find dissertation data. Prerequisite: graduate Sociology major.

M SOC 505 Applied Regression Analysis. (3)

fall and spring

Multiple linear regression topics relevant to sociological data analysis. Computer applications. Prerequisites: SOC 390 (or its equivalent); proficiency examination.

M SOC 507 Social Statistics IIA: Categorical Data Analysis. (3)

fall or spring

Logistic regression and related topics relevant to categorical data analysis in sociology. Computer applications. Prerequisite: SOC 505 or instructor approval.

M SOC 508 Social Statistics IIB: Structural Equation Analysis. (3)

fall or spring

Structural equation models using LISREL and other computer packages. Topics include multiple group analyses and ordinal endogenous variable models. Prerequisite: SOC 505 or instructor approval.

COLLEGE OF LIBERAL ARTS AND SCIENCES

M SOC 509 Social Statistics IIC: Event History Analysis. (3)

fall or spring

Proportional hazards models and other methods for analyzing longitudinal data and establishing hazard rates of events for exploratory variables. Prerequisite: SOC 505 (or its equivalent).

M SOC 515 Studies of the Family. (3)

spring

Current developments in the study of marriage and the family. Prerequisite: instructor approval.

M SOC 585 Development of Sociology. (3)

fall

Major sociological theorists, including Durkheim, Weber, Marx, Parsons, Merton, Dahrendorf, Homans, and Mead. Prerequisite: instructor approval.

M SOC 586 Contemporary Sociological Theory. (3)

spring

Analyzes major theories, including structural-functional, conflict, social exchange, symbolic interaction, and role theory. Prerequisite: instructor approval.

M SOC 588 Methodological Issues in Sociology. (3)

fall

Basic methodological issues in the study of human social life. Emphasizes a limited number of key issues and approaches to research.

M SOC 599 Thesis. (1–12)

selected semesters

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see “Omnibus Courses,” page 56.

Spanish

See “Department of Languages and Literatures,” page 291.

Speech and Hearing Science

Doctoral Program

www.asu.edu/clas/shs

480/965-2373

COOR 2211

Julie M. Liss, Director, Executive Committee

Professors: Bacon, Dorman, Ingram, Wilcox

Associate Professors: Azuma, Liss, Restrepo

Assistant Professors: Edgar, Gray, Pittman

Clinical Professor: Wiley

The committee on Speech and Hearing Science offers a graduate program leading to the PhD degree in Speech and Hearing Science.

The program is designed to prepare scholars for careers of basic and applied research in educational, industrial, or health care delivery environments. The student pursues a program with the unifying theme of the influence of the neurologic

system on human communication and its disorders. After a core curriculum, which may include aspects of neuroscience, methodology, or speech and hearing science, the student completes a program of study under the guidance of the program committee. As part of the PhD program, a programmatic research experience prepares the student for basic or applied research leading to the dissertation.

Note: The Department of Speech and Hearing Science offers the MS degree in Communications Disorders and the Doctor of Audiology degree.

DOCTOR OF PHILOSOPHY

Admittance and continuation in the PhD program in Speech and Hearing Science is based on the requirements for admission to the Division of Graduate Studies and for the completion of the PhD degree program as set forth in this catalog. In addition, applicants must meet the following departmental requirements for acceptance into the PhD program.

See “Doctor of Philosophy,” page 69, for general requirements.

Admission Requirements. Applicants typically have completed a master’s degree or equivalent in speech and hearing science, psychology, linguistics, or a related discipline. Applicants with a bachelor’s degree, strong research interests, and a strong academic record are also considered.

Applicants must submit the following evidence for admission review:

1. application for admission to the Division of Graduate Studies and official transcripts of undergraduate and graduate study;
2. Graduate Record Examination (GRE) scores, including the writing score, taken within the last three years;
3. professional résumé or curriculum vitae;
4. a statement describing academic and professional goals, specifying the focus of study desired in the PhD program, and listing the faculty member(s) with whom research interests most closely align;
5. three letters of recommendation, preferably from individuals who are qualified to comment on potential for success in a rigorous PhD program; and
6. one copy of any publications, research manuscripts, and other relevant samples of writing.

All applicants whose native language is not English must submit a score from the Test of English as a Foreign Language and the Test of Spoken English. The department expects scores to meet or exceed those required by the Division of Graduate Studies.

The application form and official copies of transcripts should be submitted to the Division of Graduate Studies. Other application materials should be sent to

DIRECTOR, PHD PROGRAM
DEPARTMENT OF SPEECH AND HEARING
SCIENCE
ARIZONA STATE UNIVERSITY
P O BOX 870102
TEMPE AZ 85287-0102

Applications are reviewed by a three-member admissions committee (the PhD Executive Committee), beginning February 1 for fall admission. Applications received after this date are also reviewed; however, applicants should be aware that the availability of mentors and funding opportunities diminish over the course of the semester. Criteria for admission include

1. evidence of high scholarship and research potential from GRE scores and previous academic record;
2. professional goals compatible with the degree program; and
3. scholarly interests compatible with one or more of the faculty, at least one of whom agrees to serve as the primary mentor and chair of the student's program committee.

General Requirements. The general requirements for the PhD include a minimum of 54 semester hours of graduate work beyond the master's degree or 84 semester hours of graduate work beyond the bachelor's degree. Of the required semester hours, at least 24 are research (SHS 792) and dissertation (SHS 799) credits completed at ASU. A minimum of 30 hours of the approved PhD program, exclusive of dissertation and research hours, are to be completed at ASU. However, students transferring from a doctoral program at another institution may petition the PhD Executive Committee to accept up to 12 transfer credits for application to the program of study.

Full-Time/Part-Time Status. Students admitted to the PhD program are expected to enroll in at least nine semester hours (full-time graduate school status). In rare circumstances, students who wish to take fewer than 9 semester hours per semester may be admitted to the program, pending the approval of the mentor(s) and the PhD Executive Committee.

Master's in Passing. Students admitted to the PhD program without previously earning a master's degree in Communication Disorders or a related field may be eligible to pursue a master's in passing during the course of their PhD program.

Specific Requirements

Advisor (Mentor) and Program Committee. The PhD program in Speech and Hearing Science is a mentor-based program, whereby admission is contingent upon a faculty member agreeing to serve as a mentor for the student. The mentor functions as the chair of the Program Committee. The Program Committee consists of the chair and at least two other members whose areas of expertise reflect both the range and depth of the student's academic focus areas. The purpose of this three-member committee is to guide the student through the completion of the program of study, the initiation of programmatic research, the preliminary examination, and along with a fourth member, the comprehensive examination.

Program of Study. During the first semester of study the student, in conjunction with his/her Program Committee, designs a program of study. This program is tailored to each student's individual interest area(s), and may be modified

throughout the first and second years to best meet the student's educational goals. The curriculum must reflect

1. course work in one or more *areas of concentration*;
2. course work to meet the *research methods and statistics* requirement;
3. continuous enrollment in the *PhD seminar* (one semester hour per semester); and
4. *fulfillment of the research credit* (SHS 792) requirements (12 semester hours).

Areas of Concentration Courses. Eighteen semester hours are required in an area of concentration that focuses on issues related to human communication and its disorders. These credits may be completed in regular graduate-level (500+) courses, in special topic seminars, and independent studies.

Research Methods and Statistics. The student is required to demonstrate proficiency in (a) research methods by successfully completing one or more *graduate-level* courses in research design and (b) two additional *graduate-level* courses in statistics taken during his/her enrollment in the PhD program.

PhD Seminar. Students are required to enroll in a one-semester-hour PhD seminar each semester during their enrollment in the PhD Program; up to three of these seminar hours may be applied toward the 54 hours required for the PhD degree.

Research Experience. Twelve semester hours of research (SHS 792) are required before the dissertation prospectus meeting. At least 12 semester hours of research credits (SHS 799) are required for the PhD dissertation work.

Additional Learning Requirements. Students engage in teaching activities during their PhD program. This may include guest lecturing in courses; assuming responsibility for teaching or developing a section of a course, or an entire course; supervising master's students in their clinical work; and participating in teaching seminars and forums offered by the Division of Graduate Studies.

Preliminary Examination (First-Year Project). The preliminary examination is composed of the first-year research project, a written manuscript in journal style, and an oral presentation and defense of the research project. The first-year project is to be completed by the end of the second semester of the first year of enrollment for all students.

Comprehensive Examination. Near the completion of course work and before commencing dissertation research, the student must pass a comprehensive written examination covering the field of study, which is orally defended. The comprehensive examination is administered and evaluated by the Comprehensive Examination Committee, which consists of the three members of the Program Committee and an additional fourth faculty member.

The Written Examination. The written examination should be completed during the fall semester of the student's third year. Successful completion of the written examination qualifies the student to advance to the oral defense.

The Oral Defense. Students participate in an oral defense within two weeks of passing the written examination.

COLLEGE OF LIBERAL ARTS AND SCIENCES

Successful completion of the oral defense advances the student to doctoral candidacy.

PhD Dissertation. Unless a petition for change is submitted to the Division of Graduate Studies, the Comprehensive Examination Committee members serve as the Dissertation Committee. Before conducting the research for the dissertation, each student must submit a dissertation proposal, or prospectus, that is defended orally and approved by the dissertation committee. The dissertation consists of a fully documented written product of mature and original scholarship. It must be a significant contribution to knowledge that reflects the student's creativity and competence in independent research. A final oral examination in defense of the dissertation, conducted by the dissertation committee, advertised and open to the public, is required.

COURSES

For courses, see "Speech and Hearing Science (SHS)," page 259.

Statistics

Interdisciplinary Master's and Certificate Programs

See "Statistics," page 83.

Teaching English as a Second Language

Master's Program

www.asu.edu/clas/english/linguistics

480/965-2563

LL 226C

Elly van Gelderen, Director

Professors: Adams, Major, Nilsen, van Gelderen

Associate Professors: Bates, Gerson

The faculty in the Department of English offer a professional program leading to the Master of Teaching English as a Second Language (MTESL) degree. This specialized degree program provides students with the knowledge and the skills necessary to teach English as a second language.

Admission Requirements. Applicants for the MTESL degree may have undergraduate majors in fields such as, but not limited to, anthropology, applied linguistics, cognitive science, communication, comparative languages and literatures, education, English literature, history, law, linguistics, modern languages, philosophy, political science, psychol-

ogy, religion, rhetoric/composition, sociology, and speech and hearing science. Students should consult with an advisor to determine whether their preparation is deficient in any area. Applicants must submit three letters of recommendation and a personal statement of aims and purposes. All applicants must meet the general requirements for admission to the Division of Graduate Studies (see "Admission to the Division of Graduate Studies," page 58). International students must submit a TOEFL score of at least 600.

Program of Study. The program requires a minimum of 30 hours of approved graduate course work and must include LIN 500 Research Methods, LIN 510 Linguistics, LIN 520 Second Language Acquisition Theories, LIN 521 Methods of Teaching English as a Second Language, and a three-hour applied project (LIN 593) overseen by the supervisory committee.

Foreign Language Requirements. A foreign language is required. International students whose native language is not English may fulfill the foreign language requirement by (1) providing evidence that English is not the medium of instruction at their native-language universities and (2) satisfactory completion of the TSE.

Applied Project. A three-hour applied project (LIN 593) that is overseen by the director, chosen from the English department linguistics/TESL faculty, is required. Two additional faculty members serve with the director to form a committee for the final oral examination on the project.

Final Examination. An oral examination on the applied project is required.

COURSES

For courses, see "Linguistics (LIN)," page 269.

Translation

See "Undergraduate Certificate in Translation," page 292.

Women and Gender Studies

Although the Women and Gender Studies Program does not offer a graduate degree, 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, call an academic advisor at 480/965-2358.

WOMEN'S STUDIES (WST)

WST 598 Special Topics. (1-4)

selected semesters

May be concurrently listed with 400-level courses.

Omnibus Courses. For an explanation of courses offered but not specifically listed in this catalog, see "Omnibus Courses," page 56.