

312 Theory of Knowledge. (3) A

The nature, sources, and limits of human knowledge; theories of truth; a priori concepts and knowledge; empirical concepts and knowledge, perception, and induction; knowledge of the external world. Prerequisite: 1 course from among PHI 101, 103, 301, 302, 333, 350. *General studies:* HU.

314 Philosophy of Science. (3) A

The structure and justification of scientific theories, explanation, and theory change. The roles of observation and laws, theoretical concepts and entities, reduction, probability, confirmation, space and time, and causation. *General studies:* HU.

315 Philosophy of Language. (3) A

Problems pertaining to the nature of language, including meaning, reference, truth, definition, analyticity, translatability, synonymy, and contributions of contemporary linguistics. Prerequisite: PHI 103 or 333 or 350. *General studies:* HU.

316 Metaphysics. (3) A

Problems pertaining to the nature of reality. Topics may include nature of person, minds, substance, universals, space, time, causation, and modality. Prerequisite: 1 course from among PHI 101, 103, 301, 333, 350. *General studies:* HU.

317 Philosophy of Mind. (3) A

Nature of consciousness. The common sense view of mind and perception, behaviorism, materialism, dualism, phenomenalism, self-knowledge, and knowledge of other minds. Prerequisite: 1 course from among PHI 101, 103, 301, 302, 333, 350. *General studies:* HU.

318 Philosophy of Religion. (3) A

Nature and justification of religious belief. Arguments for the existence of God, mysticism, theistic, and pantheistic conceptions of God and creation. *General studies:* HU.

325 Philosophy of Social Science. (3) N

Philosophical problems surrounding the aims, structure, and methods of theories in the social sciences. *General studies:* HU, SB.

332 19th-Century Philosophy. (3) N

The history of 19th-century philosophical thought, emphasizing either the German or the British traditions. Prerequisite: PHI 302. *General studies:* HU.

333 Introduction to Symbolic Logic. (3) A

Symbolic techniques, emphasizing deductions and proofs in the propositional, first, and second order predicate calculi. Either axiomatic or natural deduction systems may be used.

335 History of Ethics. (3) A

Major works of moral philosophy, both ancient and modern, such as those by Plato, Aristotle, Hobbes, Hume, Kant, and Mill. Prerequisite: PHI 101 or 306 or 307 or instructor approval.

350 Philosophical Argument and Exposition. (3) S

The development of techniques of philosophical argument and exposition. Frequent written exercises. Course content may vary with instructor. Prerequisites: major; instructor approval. *General studies:* L2.

401 Rationalism. (3) N

Examination of either classical or contemporary philosophical rationalism, as in Descartes, Spinoza, Malebranche, Leibniz, Broad, Blanchard, or Chisholm. Prerequisites: PHI 302; 1 course from among PHI 305, 309, 312, 316, 317.

402 Empiricism. (3) N

Examination of representative(s) of either classical or contemporary philosophical empiricism, e.g., Bacon, Hobbes, Locke, Butler, Berkeley, Reid, Hume, Mill, Carnap, and Ayer. Prerequisites: PHI 302; 1 course from among PHI 305, 309, 312, 316, 317. *General studies:* HU.

403 Contemporary Analytic Philosophy. (3) A

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; 1 course from among PHI 312, 314, 315, 316, 317, 401, 402. *General studies:* HU.

413 Advanced Symbolic Logic. (3) N

Properties of formal systems axiomatizing propositional and first-order predicate logic. May also include modal logic, number theory, and limits of logicism. Prerequisite: PHI 333.

420 Topics in Philosophy. (3) A

Course descriptions and prerequisites on file in department. Topics may be selected from the following:

- Metaphysics/Epistemology
 - Philosophy of Language/Logic
 - Value Theory
 - History of Philosophy
 - Philosophy of Science
- Courses may be repeated for credit.

591 Seminar. (1–3) A

Topics may be selected from the following:

- Aesthetics
- Epistemology
- Ethics
- History of Philosophy
- Logic
- Metaphysics
- Philosophy of Language
- Philosophy of Law
- Philosophy of Science
- Social and Political Philosophy

Omnibus Courses: See page 44 for omnibus courses that may be offered.

HISTORY AND PHILOSOPHY OF SCIENCE

HPS 321 Man and Machine. (2) A

Relation of man to machine examined in historical, political, and social terms. Comparisons with a look at artificial intelligence studies.

322 History of Science. (3) F

Development and application of scientific thinking from ancient times through the 17th century. *General studies:* HU, H.

323 History of Science. (3) S

Development and application of scientific thinking from the 18th century to the present. *General studies:* HU, H.

330 History of Biology: Conflicts and Controversies. (3) A

Focuses on the 19th and 20th centuries, considering biology as a discipline, evolution, and problems of heredity, development, and cell theory. Cross-listed as ZOL 316. *General studies:* H.

331 History of Medicine. (3) A

Scientific study of the human body, changing theories of disease, evolution of practical opinions on treatment, and the emerging institutionalization of medical practice. Students may receive credit for this course and BIO 218. Cross-listed as ZOL 318. *General studies:* H.

402 Technology, Society, and Human Values. (3) A

Values which motivate mankind to create technology. Areas of conflict and resolution of conflict between values and technology. Readings and discussions with visiting lecturers. Prerequisite: junior standing.

410 Professional Values in Science. (2–3) A
Considers issues related to values in science such as collaboration, finances, legal issues, media, mentoring, ownership of ideas, scientific integrity. Discussion, student projects. Cross-listed as BIO 410.

Omnibus Courses: See page 44 for omnibus courses that may be offered.

Physics and Astronomy

Susan Wyckoff
Chair

(PS F470) 602/965–3561

REGENTS' PROFESSORS

J. COWLEY, STEARNS

PROFESSORS

COMFORT, A. COWLEY, DOAK, DOW,
HANSON, HESTENES, JACOB,
KAUFMANN, LINDSAY, NIGAM, PAGE,
SANKEY, SMITH, SPENCE,
STARRFIELD, TILLERY, TSONG,
VENABLES, VOSS, WYCKOFF

ASSOCIATE PROFESSORS

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BENNETT, BURSTEIN, CHAMBERLIN,
MARZKE, MENENDEZ, REZ,
RITCHIE, SCHEINFELD, SCHMIDT,
TSEN, WINDHORST

ASSISTANT PROFESSORS

ALARCON, CULBERTSON,
HERBOTS, HESTER

PROFESSORS EMERITI

KEVANE, KYRALA, LU, MEISTER,
RAWLS, ROY, SNYDER,
STROJNIK, YALE

PHYSICS—B.S.

Students majoring in Physics may pursue one of two options.

Option I. Designed for students who wish to pursue physics at the bachelor or graduate degree levels, this option consists of 45 semester hours. Required courses are PHY 121 and 122 *or* 150; PHY 131 and 132 *or* 151; PHY 201, 252, 302, 310, 311, 314, 315, 333, 334, 412, 416, 441, and 465. Additional courses in physics and other related fields are selected with the approval of the advisor. Supporting mathematics courses MAT 270, 271 and 272 are required in addition to the

45-semester-hour major requirement. MAT 290 and 291 may be substituted for MAT 270, 271, and 272. French, German, or Russian is strongly recommended to fulfill the foreign language requirement.

Option II. An interdisciplinary program designed for students who wish to obtain an undergraduate physics preparation for entry into other professions or graduate programs. A total of 53 hours are required, including PHY 121 and 122 *or* 150; PHY 131 and 132 *or* 151; PHY 201, 252, 302, 310, 311, 314, 315, 333, 334, 412, and 441. The remaining courses are selected from physics and an area of concentration as approved by the student's advisor. Examples of possible areas of concentration are astronomy, astrophysics, materials science, physical chemistry, applied mathematics, geophysics, biological physics, philosophy of science, scientific journalism, and pre-medical and pre-law programs. Related non-major courses necessarily include MAT 290 and 291. MAT 270, 271, and 272 may be substituted for MAT 290 and 291. French, German, or Russian is strongly recommended to fulfill the foreign language requirement.

Course Changes. The department has established new degree requirements and is in the process of making changes to the course offerings over the next few years. Full details are available from the department.

Emphasis in Astronomy

The astronomy faculty offer courses in astronomy both for nonscience majors and for science and Physics majors. For an emphasis in astronomy, the following courses (or their equivalents) should be taken: AST 321, 322, 421, 422, 499.

MINOR IN ASTRONOMY

This minor consists of a minimum of 24 semester hours. Required courses are as follows: AST 125, 126, 321, 322; PHY 121 and 122 *or* 150; PHY 131 and 132 *or* 151; PHY 252. Electives are chosen with the approval of an astronomy advisor from upper-division courses in physics and astronomy.

MINOR IN PHYSICS

This minor consists of a minimum of 27 semester hours. Required courses are as follows: PHY 121 and 122 *or* 150; PHY 131 and 132 *or* 151; PHY 201, 252, 310, 311, 314. Electives are chosen with the approval of the physics advisor from upper-division courses in physics and astronomy.

SECONDARY EDUCATION— B.A.E.

Physics. Two options are available for physics as the major teaching field.

Option One. The major teaching field consists of 42 semester hours. Required courses are as follows: PHY 121 and 122 *or* 150; PHY 131 and 132 *or* 151; PHY 201, 252, 310, 311, 314, 333; two or more hours in 480 or 484. (PHY 111, 112, 113, and 114 may be substituted for PHY 150, 151, and 252, or equivalents, on approval of the advisor.) Electives are chosen in physics or other closely related fields, subject to the approval of the advisor.

Option Two. An interdisciplinary 60-hour program that consists of 30 semester hours in physics and an additional 30 semester hours in either chemistry (see page 101) or mathematics (see page 132). The physics portion of this program requires the following courses: PHY 121 and 122 *or* 150; PHY 131 and 132 *or* 151; PHY 252. (PHY 111, 112, 113, and 114 may be substituted for PHY 150, 151, and 252, or equivalents, on approval of the advisor.) Also required are the following: PHY 310, 311, 333, and 361 or 314; two or more hours in 480 or 484. Electives to complete the 30-hour physics portion are chosen from physics or closely related fields, subject to the approval of the physics advisor.

Minor Teaching Field. The minor teaching field consists of 24 semester hours. Required courses are as follows: PHY 121 and 122 *or* 150; PHY 131 and 132 *or* 151; PHY 252. Also required are the following: PHY 314 or 361; two hours in 480 or 484. (PHY 111, 112, 113, and 114 may be substituted for PHY 150, 151, and 252, or equivalents, on approval of advisor.) The remaining hours are selected from upper-division courses in physics or astronomy (including AST 125 and 126), subject to approval of the advisor.

GRADUATE PROGRAMS

The Department of Physics and Astronomy offers programs leading to the degrees of Master of Science, Master of Natural Sciences, and Doctor of Philosophy. Consult the *Graduate Catalog* for requirements.

PHYSICS

Changes are planned for some PHY courses. Note statements about the timing of these changes.

PHY 101 Introduction to Physics. (4) F, S Emphasizes applications of physics to life in the modern world. Understanding of elementary algebra is presumed. 3 hours lecture, 1 recitation, 2 hours lab. *General studies:* S1, S2.

105 Basic Physics. (3) F One-semester survey of the principles of physics. Primarily for students who intend to take PHY 121, 131 but have not taken high school physics. 3 hours lecture, 1 recitation. Prerequisites: algebra and trigonometry.

111 General Physics. (3) F, S, SS Noncalculus treatment of the principles of physics for nonphysics majors. Students whose curricula require a laboratory course must also register for PHY 113. 3 hours lecture, 1 recitation. Prerequisite: trigonometry. *General studies:* S1, S2 (if credit also earned in PHY 113).

112 General Physics. (3) F, S, SS Continuation of PHY 111. Students whose curricula require a laboratory course must also register for PHY 114. Prerequisite: PHY 111. *General studies:* S1, S2 (if credit also earned in PHY 114).

113 General Physics Laboratory. (1) F, S, SS Elementary experiments in physics. 2 hours lab. Outside preparation for experiments and report writing are required. May be taken concurrently with, or subsequent to, PHY 111. *General studies:* S1, S2 (if credit also earned in PHY 111).

114 General Physics Laboratory. (1) F, S, SS See PHY 113. May be taken concurrently with, or subsequent to, PHY 112. *General studies:* S1, S2 (if credit also earned in PHY 112).

121 University Physics I: Mechanics. (3) F, S, SS Kinematics, Newton's laws, work, energy, momentum, conservation laws, dynamics of particles, solids, and fluids. 3 hours lecture, 1 hour recitation. Prerequisite: MAT 270 or 290 or instructor approval. *General studies:* S1, S2 (if credit also earned in PHY 122).

122 University Physics Laboratory I. (1) F, S, SS Lab accompanying PHY 121. Pre- or corequisite: PHY 121. *General studies:* S1, S2 (if credit also earned in PHY 121).

131 University Physics II: Electricity and Magnetism. (3) F, S, SS

Electric charge and current, electric and magnetic fields in vacuum and in materials, and induction. AC circuits, displacement current, and electromagnetic waves. 3 hours lecture, 1 hour recitation. Prerequisites: MAT 271 or 291 or instructor approval; PHY 121. Corequisite: MAT 272 or instructor approval. *General studies: S1, S2 (if credit also earned in PHY 132).*

132 University Physics Laboratory II. (1) S, SS

Lab accompanying PHY 131. Pre- or corequisite: PHY 131. *General studies: S1, S2 (if credit also earned in PHY 131).*

150 Physics I. (4) S

Effective spring 1995.

Introductory physics for majors. Kinematics, Newton's Laws, gravitational, electromagnetic and elastic forces, energy, momentum, conservation laws, rotations, special relativity. 3 hours lecture, 2 hours lab. Prerequisite: MAT 270 or 290 or equivalent.

151 Physics II. (4) F

Effective fall 1995.

Continuation of PHY 150. Electrical fields, potentials, DC circuits, magnetic fields and materials, Ampere's and Faraday's Laws, AC circuit elements, Maxwell's equations, electromagnetic radiation. 3 hours lecture, 2 hours lab. Prerequisites: MAT 271 (or 291 or equivalent); PHY 121 and 122 or PHY 150.

190 Seminar: Physics as a Curriculum and a Profession. (1) F, S

Seminar for new Physics majors. Instruction and information on curriculum, departmental functions, and professional preparation. Weekly meetings and excursions. Pass/fail grading.

201 Introduction to Mathematical Physics I. (3) S '96

Effective spring 1996; replaces PHY 401.

Mathematical methods for upper-division physics. Includes complex analysis, linear equations, matrices, determinants, differential equations, Fourier series, vectors, generalized coordinates. Prerequisite: MAT 272 or equivalent.

241 University Physics III: Thermodynamics, Optics, and Wave Phenomena. (3) F, S

Heat, entropy, and the laws of thermodynamics; wave propagation; geometrical and physical optics; introduction to special relativity. 3 hours lecture, 1 recitation. Prerequisite: PHY 131. Concurrent enrollment in lab (PHY 242) is recommended. *General studies: S1, S2 (if credit also earned in PHY 242).*

242 University Physics Laboratory III. (1) F, S

Lab accompanying PHY 241. Pre- or corequisite: PHY 241. *General studies: S1, S2 (if credit also earned in PHY 241).*

252 Physics III. (4) S '96

Effective spring 1996; replaces PHY 241 and 242.

Continuation of PHY 151. Hydrostatics, wave phenomena, harmonic resonance, physical optics, thermodynamics, kinetic theory, black body radiation. 3 hours lecture, 2 hours lab. Prerequisites: MAT 272 or equivalent; PHY 131 and 132 or PHY 151 or equivalent.

302 Mathematical Methods in Physics II. (2) F '96

Effective fall 1996; replaces PHY 402.

310 Classical Particles, Fields and Matter I. (3) F '96

Effective fall 1996; replaces PHY 321.

311 Classical Particles, Fields and Matter II. (3) S '97

Effective spring 1997; replaces PHY 331.

314 Quantum Physics I. (3) F '96

Effective fall 1996; replaces PHY 362.

315 Quantum Physics II. (3) S '97

Effective spring 1997; replaces PHY 471.

321 Newtonian Mechanics. (3) F

Vector calculus. Kinematics and dynamics of particles. Conservative, resistive, and central forces. Dynamics of a charged particle. Many particle systems. The two body problem and collisions. Rigid body dynamics. Motion in noninertial reference frames. Prerequisites: MAT 274 and 291 and PHY 131 or equivalents. Corequisite: MAT 242 or equivalent.

322 Analytical Mechanics. (3) S

Lagrange's and Hamilton's equations; constraints; coupled oscillators; elements of continuum mechanics; elasticity and hydrodynamics. Prerequisite: PHY 321.

331 Electricity and Magnetism. (3) F

Static and quasistatic electric and magnetic fields, electric current, electromagnetic induction, fields in matter, and introduction to Maxwell's equations. Prerequisites: MAT 242, 274. Corequisite: PHY 321 or 401.

332 Electromagnetic Fields. (3) S

Maxwell's equations and applications, radiation, and propagation of electromagnetic waves. Prerequisite: PHY 331.

333 Intermediate Physics Laboratory I. (3) F, S

Basic physical measurements techniques with emphasis on modern electrical and electronic instrumentation. 1 hour lecture, 3 hours lab. Equivalent effort outside of the lab is required. Prerequisites: MAT 274 (or equivalent) and PHY 122 and 132 and 242 and 321 or instructor approval.

333 Electronic Circuits and Measurements. (3) F, S

Effective fall 1996; replaces PHY 333.

334 Intermediate Physics Laboratory II. (3) F, S

Experiments selected in consultation with instructors to suit the student's needs and interests. 3 hours lab. Equivalent effort outside of the lab is required. Prerequisites: PHY 310, 314, 333. *General studies: L2.*

334 Advanced Laboratory I. (2) F, S

Effective spring 1997; replaces PHY 334.

351 Optics. (3) F

Matrix methods in geometrical optics; interferometry, partial coherence, and selective absorbers; Fresnel and Fraunhofer diffraction; Fourier transform spectroscopy. Prerequisites: MAT 272 or 291; PHY 241.

361 Introductory Modern Physics. (3) F, S

Special relativity and introductory quantum theory with applications drawn from atomic, nuclear, and solid state physics. 3 hours lecture, 1 recitation. Prerequisite: PHY 131.

362 Modern Physics. (3) F, S

Special relativity, foundations, and theoretical concepts of quantum theory; introduction to atomic, molecular, solid state, and subatomic physics. Prerequisite: PHY 241. Corequisite: MAT 274 or equivalent.

401 Mathematical Methods in Physics. (3) F
Elements of vector calculus, complex variables, ordinary and partial differential equations, integral transforms, special functions, determinants, matrices, probability, and statistics. Prerequisite: PHY 321.

402 Mathematical Methods in Physics. (3) S
Continuation of PHY 401. Prerequisite: PHY 401.

412 Classical Particles, Fields and Matter III. (3) F
Effective fall 1997; replaces PHY 332.

416 Quantum Physics III. (3) F
Effective fall 1997; replaces PHY 472.

420 Research Paper. (1) F, S
Effective spring 1997.

441 Statistical and Thermal Physics I. (3) F
Statistical and experimental basis of heat, temperature, and entropy. Mechanical and statistical basis of the laws of thermodynamics. Applications of macroscopic thermodynamics. Phase equilibrium. Prerequisite: PHY 362.

442 Statistical and Thermal Physics II. (3) S
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.

452 Advanced Optics. (3) S
Linear systems theory, coherent and incoherent imaging, spatial filtering, elements of radio astronomy, antenna theory, and heat flow problems; holography; coded apertures; reciprocity and symmetry in X-ray, electron, and optical diffraction. PHY 401, 402 recommended. Prerequisites: PHY 331, 351.

452 Physical Optics. (3) F
Effective fall 1997; replaces PHY 452.

462 Nuclear Physics. (3) F
Static properties of nuclei, natural and induced radioactivity, nuclear reactions, nuclear models and energy levels, mesons and hyperons, and interaction of photons and electrons with matter. Prerequisite: PHY 362.

462 Nuclear and Particle Physics. (3) S
Effective spring 1998; replaces PHY 462.

463 Physical Measurements. (1) F
Experiments in mechanics and heat, electricity and magnetism, optics, and modern physics. Designed for teachers and students not majoring in physics. 3 hours lab. May be repeated for a maximum of 3 hours credit. Prerequisite: PHY 112.

465 Advanced Physics Laboratory I. (3) F, S

Continuation of PHY 334 at a more advanced level. 3 hours lab. Equivalent effort outside of the lab is required. Upon approval, student may substitute research lab project. Lab. Prerequisite: PHY 334. Corequisite: PHY 362 or instructor approval.

465 Advanced Laboratory II. (2) F, S
Effective fall 1997; replaces PHY 465.

466 Advanced Physics Laboratory II. (1-3) F, S

Continuation of PHY 465. May be repeated for credit. Prerequisite: PHY 465.

466 Advanced Laboratory III. (1-3) F, S
Effective spring 1998; replaces PHY 466.

471 Quantum Mechanics. (3) F

Wave mechanics, Schrödinger's equation, barrier problems, operators and eigenfunctions, harmonic oscillator, and one-electron atoms. Prerequisites: MAT 242 and 274 and PHY 362 *or* instructor approval.

472 Quantum Mechanics. (3) S

Matrix mechanics, angular momentum, perturbation theory, and the scattering theory. Prerequisite: PHY 471 or instructor approval.

480 Methods of Teaching Physics. (3) S

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.

481 Solid State Physics. (3) S

Structure, elastic properties, and dynamics of crystals; electron motions in crystals under applied fields. Prerequisite: PHY 362.

484 Internship: Physics Teaching. (1–4) F, S, SS

Preparation for high school physics teaching. Student will work closely with a faculty member in the elementary physics program. May be repeated for a total of 6 semester hours. Prerequisite: instructor approval.

495 Project Research. (1–3) F, S

Supervised project in physics or astrophysics. May be repeated for credit. *Note:* Approval of faculty member under whose direction the work is to be done must be obtained before registration. Prerequisite: instructor approval.

501 Methods of Theoretical Physics. (3) F, S

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. Prerequisites: PHY 401 and 402 *or* instructor approval.

502 Methods of Theoretical Physics. (3) F, S

Continuation of PHY 501. Prerequisite: PHY 501.

503 Physical Applications of Group Theory. (3) N

Fundamentals and applications of the theory of finite and continuous groups as they occur in physics. Atomic, molecular, solid state, and elementary particle physics. Prerequisite: instructor approval.

521 Classical Mechanics. (3) F

Variational principles, Lagrange's and Hamilton's equations, rigid body motion, canonical transformations, Hamilton-Jacobi theory. Prerequisite: PHY 321.

522 Advanced Topics in Classical Mechanics. (3) S

Continuum mechanics, elements of hydrodynamics, elasticity theory, and special relativity. Prerequisites: PHY 322, 521.

523 Relativity. (3) N

Special and general theories of relativity. Prerequisites: PHY 522 and 532 *or* instructor approval.

531 Advanced Electricity and Magnetism. (3) F

Electrostatics and magnetostatics; potential theory and theory of constitutive relations; Maxwell's equations; the wave equation, plane electromagnetic waves, cavities, and wave guides. Prerequisite: PHY 331 or instructor approval.

532 Electrodynamics. (3) S

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: PHY 332 and 531 *or* instructor approval.

541 Statistical Physics. (3) F

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 442 recommended. Prerequisites: PHY 441, 471.

542 Advanced Topics in Statistical and Thermal Physics. (3) S

Theory of irreversible processes, Onsager-reciprocity laws, and the fluctuation-dissipation theorem; relaxation and transport processes in fluids and plasmas; Liouville equation; the BBGKY hierarchy of distribution functions; kinetic theory; hydrodynamics from many-body theory; phase changes and equilibrium; ferromagnetism. Prerequisite: PHY 541.

551 X-Ray and Electron Diffraction. (3) S

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.

561 Nuclear Physics. (3) F, S

Two nucleon interaction, Clebsch-Gordon coefficients, internucleon forces, meson theory and high energy scattering, nuclear binding energy, nuclear models, transition probability estimates, nuclear reactions, and beta decay. Prerequisites: PHY 462 and 576 *or* instructor approval.

562 Nuclear Physics. (3) F, S

Continuation of PHY 561. Prerequisite: PHY 561 or instructor approval.

568 Elementary Particle Physics. (3) N

Classification of particles; phenomenology of strong, electromagnetic and weak interactions, cross sections, and decay rates; isotopic spin and higher symmetries; structure of reaction amplitudes. Prerequisite: PHY 577.

569 Elementary Particle Theory. (3) N

Continuation of PHY 568. Prerequisite: PHY 568.

576 Quantum Theory. (3) F, S

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. Prerequisites: PHY 471, 521.

577 Quantum Theory. (3) F, S

Continuation of PHY 576. Prerequisite: PHY 576.

578 Relativistic Quantum Theory. (3) F, S

Relativistic one-particle equations, Klein-Gordon equation, Dirac equation, second quantization, theory of scattering, S-matrix, Feynman diagrams, quantum electrodynamics, and renormalization procedures. Prerequisite: PHY 577.

579 Relativistic Quantum Theory. (3) F, S

Continuation of PHY 578. Prerequisite: PHY 578.

581 Solid State Physics. (3) F

Quantum theory of solids, including phonons, lattice specific heats, band structure models, Fermi surfaces, thermal expansion, plasmons, electron-phonon interactions, and scattering by lattice defects. Pre- or corequisites: PHY 472, 481, 576.

582 Solid State Physics. (3) S

Elements of transport theory, thermal conduction, electronic conduction in metals, mobility in semiconductors, Hall effect, magnetoresistance, and selected topics of current research. Prerequisite: PHY 581.

587 Quantum Optics. (3) F, S

Quantization of the electromagnetic field. Quantum theory of coherence, photon counting, photon states, lasers, density operators, and atomic Raman scattering. Prerequisite: PHY 471.

588 Quantum Optics. (3) F, S

Continuation of PHY 587. Prerequisite: PHY 587.

Omnibus Courses: See page 44 for omnibus courses that may be offered.

ASTRONOMY**AST 111 Introduction to Astronomy I.** (3) F, SS

History; properties of light; instruments; study of solar system and nearby stars. For non-Science majors. Optional lab (AST 125). *General studies:* S1, S2 (if taken with AST 125).

112 Introduction to Astronomy II. (3) S, SS

Structure and evolution of stars; star clusters; galaxies; cosmology. For non-science majors. Optional lab (AST 126). *General studies:* S1, S2 (if taken with AST 126).

125 Astronomy Laboratory I. (1) F

Astronomical observations and experiments designed to help the student become familiar with the sky, telescopes, and astronomical measurements. 2.5 hours lab. Pre- or corequisites: AST 111 or 321; a working knowledge of high school algebra and geometry. *General studies:* S1, S2 (if taken with AST 111 or 321).

126 Astronomy Laboratory II. (1) S

Similar to AST 125, but material chosen to supplement AST 112 and 322. 2.5 hours lab. Pre- or corequisites: AST 112 or 322; a working knowledge of high school algebra and geometry. *General studies:* S1, S2 (if taken with AST 112 or 322).

301 Discovering the Sun and its Planets.

(3) F

Comprehensive first course in astronomy for non-Science majors. Course will include lectures, written assignments, and laboratory work. Not open to students with credit in AST 111 or equivalent. Prerequisites: algebra and geometry *or* instructor approval.

302 Modern Astronomy. (3) S

Second course in astronomy for non-Science majors. Covers achievements and controversies of 20th-century astronomy through lectures, written assignments, and laboratory work. Not open to students with credit in AST 112 or equivalent. Prerequisite: AST 301 or instructor approval.

321 Introduction to Planetary and Stellar Astrophysics. (3) F

Physical laws; celestial mechanics; properties of planets, the sun, and other stars; formation and evolution of stars and planetary systems. Prerequisites: MAT 270 or 290; PHY 121 or 150. *General studies: S1, S2 (if taken with AST 125).*

322 Introduction to Galactic and Extragalactic Astrophysics. (3) S

Evolved stars; introduction to relativity; galaxies and interstellar matter; structure and dynamics of galaxies; cosmology. Prerequisite: AST 321 or instructor approval. *General studies: S1, S2 (if taken with AST 126).*

421 Astrophysics I. (3) F

Aspects of observational astronomy; atomic properties of matter; stellar atmospheres; stellar structure, evolution; nucleosynthesis; compact objects; close binary systems. Prerequisites: AST 312, 322; PHY 311, 314.

422 Astrophysics II. (3) S

Interstellar medium; gaseous nebulae; shock waves; stellar dynamics; star clusters and stellar populations; galaxies and their evolution; cosmology. Prerequisites: AST 321, 322; PHY 412.

Omnibus Courses: See page 44 for omnibus courses that may be offered.

PHYSICAL SCIENCES**PHS 110 Fundamentals of Physical Science.** (4) F, S

One-semester survey of the principles of physics and chemistry. Understanding of elementary algebra is presumed. 3 hours lecture, 2 hours lab. *General studies: S1, S2.*

361 Science and Society. (2) F, S

Fundamental principles of physical science as a creative human enterprise, and its relationship to technology and the environment.

362 Science and Society. (2) F, S

See PHS 361.

375 The Energy Crisis. (2–3) F, S

Current problems in energy resources, production, consumption, and conservation. No physics or mathematics prerequisites. Students registered for 3 hours participate in lecture and discussion.

410 Origins of the Physical Sciences. (3) N

Origins of astronomy, chemistry, physics, and mathematics in the cultures of Mesopotamia, Egypt, China, and India.

411 Development of the Physical Sciences. (3) N

Hellenistic mathematics, physics, chemistry, and astronomy; Arabs and the physical sciences and their role in spreading the physical sciences to Europe; the development of the physical sciences in Europe until the time of Newton.

Omnibus Courses: See page 44 for omnibus courses that may be offered.

Political Science

Stephen G. Walker

Chair

(SS 410) 602/965–6551

REGENTS' PROFESSOR

MILLER

PROFESSORS

BERMAN, CHAUDHURI, JONES,
McDONOUGH, McGOWAN, SIMON,
WALKER, YOUNGBLOOD

ASSOCIATE PROFESSORS

ASHLEY, DAGGER, DANTICO,
GEER, KENNEY, McGAW,
MITCHELL, OLSON, READER,
STOOKEY, WATSON

ASSISTANT PROFESSORS

BOWER, CRITTENDEN, DOTY,
HERRERA, KAHN, KEATING

PROFESSORS EMERITI

ALISKY, HINK, JO, KAMINSKY,
MASON, PEEK, RICE, SWAGERT,
WHITE, WOLF

POLITICAL SCIENCE—B.A.

This program consists of 42 semester hours, of which 30 must be in political science and 12 in related fields consisting of courses selected from the Departments of Anthropology, Economics, Geography, History, Psychology, and Sociology and the Women's Studies Program. At least 15 hours in political science must be in upper-division courses. The following courses are required: POS 101, 110 (or 310), 150 (or 160), 301.

Students who major in Political Science must have a minimum GPA of 2.00 for all courses that count toward the major. Upper-division courses that count toward the major must have "C" grades or better; no more than one "D" grade in a lower-division course may be counted in the major. See "Degree Requirements," page 87.

No more than six hours of POS 484 Internship may be applied to the major.

POLITICAL SCIENCE—B.S.

The program consists of 48 semester hours, of which 36 must be in political science and 12 in related fields consisting of courses selected from the Departments of Anthropology, Economics, Geography, History, Psychology, and Sociology and the Women's Stud-

ies Program. At least 21 hours in political science must be in upper-division courses. The following courses are required: POS 101, 110 (or 310), 150 (or 160), 301, 401.

Students who major in Political Science must have a minimum GPA of 2.00 for all courses that count toward the major. Upper-division courses that count toward the major must have "C" grades or better; no more than one "D" grade in a lower-division course may be counted in the major. See "Degree Requirements," page 87.

No more than six hours of POS 484 Internship may be applied to the major.

Asian Studies Emphasis. Students majoring in political science may elect to pursue an Asian Studies emphasis combining courses from the major with selected outside courses of wholly Asian content. See "Asian Studies," page 90 for more information.

Latin American Studies Emphasis.

Students majoring in political science may elect to pursue a Latin American Studies emphasis combining courses from the major with selected outside courses of wholly Latin American content. See "Latin American Studies," page 91, for more information.

MINOR IN POLITICAL SCIENCE

The minor consists of 18 semester hours in political science courses, 12 hours of which must be in upper-division courses. Required courses are POS 110 (or 310) and 150 (or 160). No more than three hours of POS 484 Internship and three hours of POS 499 Independent Study may be applied to the minor.

Students who minor in Political Science must have a minimum GPA or 2.00 for all courses that count toward the minor. Upper-division courses that count toward the minor must have "C" grades or better; no more than one "D" in a lower-division course may be counted toward the minor.

SECONDARY EDUCATION—B.A.E.

Political Science. The major teaching field consists of 45 semester hours, 30 of which must be in political science and 15 in closely related fields. The following six courses are required: POS 101, 110 (or 310), 150 (or 160), 301, 417, and 480. Courses may be substituted for POS 417 and 480 with departmental approval. Students who pursue

this academic specialization in political science must have a minimum GPA of 2.00 for all courses that count toward the major. Upper-division courses that count toward the major must have “C” grades or better; no more than one “D” grade in a lower-division course may be counted in the academic specialization. No more than six hours of POS 484 Internship may be applied to the major.

The minor teaching field consists of 24 semester hours in political science courses. The following six courses are required: POS 101, 110 (or 310), 150 (or 160), 301, 417, and 480. Students who pursue this academic specialization in political science must have a minimum GPA of 2.00 for all courses that count toward the academic specialization. Upper-division courses that count toward the academic specialization must have “C” grades or better; no more than one “D” grade in a lower-division course may be counted in the minor.

Social Studies. See page 153.

GRADUATE PROGRAMS

The Department of Political Science offers programs leading to the M.A. and Ph.D. degrees. Consult the *Graduate Catalog* for requirements.

POLITICAL SCIENCE

POS 101 Political Ideologies. (3) F, S
Leading political ideas and belief systems, e.g., Marxism, liberalism, conservatism, theories of democracy, and alternative futures. *General studies: SB.*

110 Government and Politics. (3) F, S
Major institutions of modern government and processes of individual and group political activity, with emphasis on the American experience. Meets the federal government requirement for teacher certification. Not open to students with credit for POS 310. *General studies: SB.*

120 Political Issues and Public Policy. (3) A
Contemporary social problems and political issues, particularly development of public policy. *General studies: SB.*

150 Comparative Government. (3) F, S
Political institutions and processes in selected foreign countries, including origins, strengths, and weaknesses of contemporary political systems and political development. *General studies: SB, G.*

160 Global Politics. (3) F, S
The nature of contemporary world politics through the study of both general theoretical topics and specific geographical areas. *General studies: SB, G.*

170 American Legal System. (3) F, S
Concepts, institutions, classifications, and functions of law. The role of the courts and the impact of judicial decision-making on social change. *General studies: SB.*

240 Introduction to Southeast Asia. (3) F
An interdisciplinary introduction to the cultures, religions, political systems, geography, and history of Southeast Asia. Cross-listed as ASB 240/GCU 240/HIS 240/REL 240. *General studies: G.*

301 Empirical Political Inquiry. (3) F, S
Logic of political inquiry, including research problems, concepts, hypotheses, theories, measurement, data collection, and analysis. *General studies: SB.*

310 American National Government. (3) F, S
Powers, functions, and agents of American political institutions. Meets the federal government requirement for teacher certification. Not open to students with credit for POS 110. *General studies: SB.*

311 Arizona Constitution and Government. (2) F, S
Constitution and government of the State of Arizona. Not open to students having credit for POS 316 or 417. Meets the Arizona constitution requirement for teacher certification. May not be counted for the major or a teaching major or minor in Political Science. *General studies: SB.*

313 The Congress. (3) A
Lawmaking process in the U.S. Congress. *General studies: SB.*

314 The American Presidency. (3) A
Office, role, and power of the American presidency in the American political system. *General studies: SB.*

315 The Supreme Court. (3) A
Role of the Supreme Court in American society and politics; examination of decision-making process and impact of decisions; restraint versus activism. *General studies: SB.*

316 State and Local Government. (3) A
Survey of the operations, problems, and policies of state and local governments in the United States. *General studies: SB.*

320 Public Administration. (3) A
Role of the administrator in the political process with an examination of the basic concepts of bureaucracy. *General studies: SB.*

325 Public Policy Development. (3) A
Relationships between policy development and administrative processes as affected by the various roles of legislative bodies, executive, and administrative agencies. *General studies: SB.*

330 Current Issues in National Politics. (3) F, S
Major issues facing national governments in the domestic field. *General studies: SB.*

331 Public Opinion. (3) A
Formation, expression, and influence of individual and organized opinion on political institutions. *General studies: SB.*

332 American Political Parties. (3) A
Development of the American party system. Party organization and functions. *General studies: SB.*

333 Interest Groups. (3) A
Examines how minority, corporate, labor, farm, consumer, environmental, health, education and public interest groups, and single issue movements influence government. *General studies: SB.*

336 Electoral Behavior. (3) A
Voting behavior and the attitudes, perceptions, and activities of the citizenry in the political process. *General studies: SB.*

350 Comparative Politics. (3) A
Theoretical approaches and political institutions, such as parties, pressure groups, legislatures, and executives, from a cross-national perspective. *General studies: SB, G.*

351 The British Nations. (3) A
Examines such parliamentary systems as Great Britain, Ireland, Canada, Australia, and New Zealand. *General studies: SB, G.*

352 Revolution and the Social System. (3) A
Causes and consequences of revolution. Identification of systemic structures and institutions conducive to radical and moderate patterns of conflict resolution. *General studies: SB.*

356 Western Europe. (3) A
Structures and behavior of governmental institutions and political processes in selected countries of Western Europe. *General studies: SB, G.*

360 Current Issues in International Politics. (3) F, S
An analysis of major current problems in world politics. *General studies: SB, G.*

361 American Foreign Policy. (3) A
United States in world affairs; foreign policy since World War I. Techniques in formulating American foreign policies. *General studies: SB, G.*

401 Political Statistics. (3) F, S
Basic concepts in statistics as they facilitate the description, explanation, and prediction of social and political phenomena. *General studies: N2.*

410 Urban Government and Politics. (3) A
Governmental organizations, decision-making structures, and problems of urban political systems. *General studies: SB.*

417 The Arizona Political System. (3) N
Contemporary political problems within the context of Arizona's political, social, and constitutional frameworks. Meets the Arizona Constitution requirement for teacher certification.

422 Politics of Bureaucracy. (3) N
Bureaucracy as a political entity; internal dynamics of public agencies; the relationship between public agencies and other political entities. *General studies: SB.*

423 Politics of Budgeting. (3) N
The policy process in budgeting; strategies used to influence this process and recent reforms in public budgeting. *General studies: SB.*

424 Regulatory Politics. (3) N
Development and implementation of governmental policies regulating business activity, e.g., antitrust, consumer, and environmental protection and labor relations. *General studies: SB.*

- 426 Elements of Public Policy.** (3) A
Each section may cover one of the following topics: consumer protection, natural resources, criminal justice, environmental protection, science and technology, or theories of public policy. May be repeated for credit when topics vary. *General studies: SB.*
- 435 Women, Power, and Politics.** (3) N
The roles and treatment of women within various political contexts. Specific focus may vary with instructor. *General studies: SB.*
- 439 Minority Group Politics in America.** (3) N
Role of minority groups in American politics. *General studies: SB, C.*
- 440 History of Political Philosophy I.** (3) A
Western political philosophers and their theories to the 17th century. *General studies: HU, H.*
- 441 History of Political Philosophy II.** (3) A
Western political philosophers and their theories from the 17th to the 20th century. *General studies: HU, H.*
- 442 American Political Thought.** (3) A
Political theories and movements from the colonial period to the present. *General studies: HU.*
- 443 Topics in Contemporary Political Theory.** (3) A
Major problems and theories in contemporary political thought. *General studies: HU.*
- 445 Asian Political Thought.** (3) A
Contemporary political ideas and theories in selected Asian countries, including the impact of Marxist and non-Marxist theories on revolutionary processes. *General studies: SB, G.*
- 446 Problems of Democracy.** (3) A
Issues and problems in democratic theory, e.g., the nature of democracy, majority rule, representation, equality, and the value of political participation. *General studies: HU.*
- 450 Soviet Union and Eastern Europe.** (3) A
Description and analysis of political institutions and practices in the Soviet Union and the nations of Eastern Europe. *General studies: SB, G.*
- 451 China, Japan, and the Koreans.** (3) A
A comparative analysis of the political modernization experiences of China, Japan, and the two Koreas, focusing on their differing reactions to the West. *General studies: SB, G.*
- 452 China.** (3) A
Background of the Communist revolution, political processes, and developmental problems in China from a comparative perspective. *General studies: SB, G.*
- 453 South America.** (3) A
Governmental institutions, political processes, and developmental problems of the South American states. *General studies: SB, G.*
- 454 Mexico.** (3) A
Mexican federal, state, and local governmental institutions. *General studies: SB, G.*
- 455 Central America and the Caribbean.** (3) A
Governmental institutions, political processes, and developmental problems of the nation-states and dependent areas of Central America and the Caribbean. *General studies: SB, G.*
- 456 Comparative Legislative Processes.** (3) A
Lawmaking process followed in selected legislative bodies; composition of membership, organization, and powers; impact of internal and external forces on legislation.
- 458 Southeast Asia.** (3) A
Political background, governmental institutions, political dynamics, and developmental problems of Southeast Asian nations. *General studies: SB, G.*
- 459 Sub-Saharan Africa.** (3) N
Governmental institutions and processes of politics south of the Sahara. *General studies: SB, G.*
- 460 World Politics.** (3) A
Theoretical examination of one or more aspects of international politics, e.g., foreign policy, negotiations, alliances, crises, wars, and international systems. *General studies: SB, G.*
- 462 Soviet Foreign and Defense Policies.** (3) A
Examination and analysis of foreign and defense policies of the Soviet Union. *General studies: SB, G.*
- 463 Inter-American Relations.** (3) A
Diplomatic relations among the Latin American states. Development of U.S. foreign policy toward Latin America. *General studies: SB, G.*
- 464 American Defense Policy.** (3) A
Problems and issues of the organization and control of the defense establishment of the United States. *General studies: SB.*
- 465 International Organization and Law.** (3) A
History, practical political significance, and future of international institutions, transnational regimes, and international law. *General studies: SB, G.*
- 467 Comparative Defense Policy.** (3) A
Problems and issues of the organization and control of effective defense establishments within the context of various political systems. *General studies: SB, G.*
- 468 Comparative Asian Foreign Policies.** (3) A
Foreign policies of the Asian states, emphasizing their security relations and movements toward regionalism. *General studies: SB, G.*
- 470 Law and Society.** (3) A
Nature, purposes, and sanctions of law; sources of law; private and public law; common and civil law; courts and administration of justice. *General studies: SB.*
- 471 Constitutional Law I.** (3) A
Development of the U.S. Constitution as reflected in decisions of the Supreme Court; jurisdiction and organization of the federal courts; judicial review; separation of powers; federalism; the commerce clause; national taxing and spending power; state police power. *General studies: SB.*
- 472 Constitutional Law II.** (3) A
Development of the United States Constitution as reflected in decisions of the Supreme Court: due process; equal protection of laws; individual rights; civil liberties. *General studies: SB.*
- 480 Methods of Teaching Government.** (3) N
Methods of instruction, organization, and presentation of subject matter in political science. Prerequisite: 15 hours in Political Science or instructor approval.
- 484 Internship.** (1–12) A
- 485 Political Economy.** (3) A
Problems, policies, and possibilities of various political-economic systems and the interrelationship of capitalism, socialism, and democracy. *General studies: SB.*
- 486 International Political Economy.** (3) A
Contending approaches to historical and contemporary issues of international political economy, including global welfare, equality, ecology, and peace. *General studies: SB, G.*
- 494 Special Topics in Political Science.** (3) A
Chosen from the various fields of political science.
- 498 Pro-Seminar.** (3) A
Small group study and research for advanced students within their major area. Prerequisite: major in the department or instructor approval. *General studies: L2.*
- 501 Methods of Political Science.** (3) A
Problems of method and knowledge in political science, strategies of political inquiry, and issues in philosophy of social science.
- 502 Philosophy of Political Inquiry.** (3) A
Problems of knowledge and method in political science, with attention to both empirical and evaluative analysis.
- 503 Empirical Political Inquiry.** (3) A
Research methods and techniques of the discipline, emphasizing empirical foundations and analytic methods employed in subfields. Prerequisites: POS 401 or equivalent; instructor approval.
- 530 American Politics.** (3) A
Examines major debates in the study of American political processes. Covers parties, media, elections, public opinion, nominations, and social choice theory. Seminar.
- 532 American Political Institutions.** (3) N
Examines major debates in the study of American governmental institutions. Covers legislative branch, executive branch, judicial branch, and interest groups. Seminar.
- 545 Themes in Political Thought.** (3) N
Examination of a particular theme or problem in political thought from both a historical and contemporary perspective. Seminar. Prerequisite: instructor approval. Course may be repeated with approval of the director of graduate studies.
- 550 Comparative Politics.** (3) A
Surveys major approaches across topical areas such as revolutions, authoritarianism, policy processes, interest groups, and electoral politics. Focus varies with instructor. Seminar.
- 560 International Relations.** (3) A
Surveys major theoretical approaches and debates in international relations. Seminar.
- 563 Comparative Asian Security Policies.** (3) N
Analyzes domestic and international constraints, belief systems, and economic components in security decisions by major powers and Asian nations. Seminar. Prerequisite: instructor approval.
- 591 Seminar.** (3) A
(a) Global Politics
(b) Comparative Politics
(c) Political Theory
(d) American Politics

598 Special Topics. (3) A

- (a) Global Politics
- (b) Comparative Politics
- (c) Political Theory
- (d) American Politics

601 Advanced Experimental Research. (3) N

Introduces experimental and quasi-experimental research designs in political research, including laboratory techniques and topics in the analysis of variance. Prerequisite: POS 503 or equivalent.

602 Advanced Survey Research. (3) N

Presents design and conduct of political surveys, including sampling, instrument design, scaling, and statistical and graphical analysis of survey data. Prerequisite: POS 503 or equivalent.

603 Polimetrics I. (3) A

Introduces theory and practice of linear regression analysis. Provides skills to read, understand, and evaluate professional literature using regression analysis. Prerequisite: POS 401, 503 or instructor approval.

604 Polimetrics II. (3) A

Apply quantitative techniques to research topics producing publishable papers through exposure to time-series, logit and probit, and simultaneous equations. Prerequisite: POS 401, 503, 603, or instructor approval.

635 State Politics and Public Policy. (3) N

Introduction to comparative state policy emphasizing policy or performance differences among the states and the reasons for these differences. Seminar. Prerequisites: POS 530 and 603 or instructor approval.

636 Electoral Behavior. (3) N

Introduces fundamental concepts of electoral behavior. Emphasizes presidential elections and examines why people vote and how their votes are determined. Seminar. Prerequisites: POS 530 and 603 or instructor approval.

638 Law and Politics. (3) N

Emphasizes research into such topics as constitutional law, women and the law, American legal system, judicial process, and judicial selection. Seminar. Prerequisite: instructor approval.

651 Politics of Change and Development. (3) N

Examines contending approaches to national, social, and political change. Seminar. Prerequisite: instructor approval.

660 The Modern World System. (3) N

Theoretically driven, historical analysis of the organization and operation of the international political economy since the 16th century. Seminar. Prerequisite: instructor approval.

661 The State. (3) N

Examines theories of state, state-society relations, and interstate politics emphasizing questions of sovereignty, territoriality, violence, representation, democracy, and change. Seminar. Prerequisite: instructor approval.

662 International Organization. (3) N

History, practical political significance, and future of international institutions, transnational regimes, and other approaches to international organization. Seminar. Prerequisite: instructor approval.

664 War, Peace, and Conflict Processes.

(3) N

The systematic analysis of the causes of war, the preconditions for peace, and approaches to the resolution of conflict. Seminar. Prerequisite: instructor approval.

665 Foreign Policy Theory. (3) N

Examines foreign policy theory and methods. Development and critique of research designs analyzing foreign policy processes within and among nations. Seminar. Prerequisite: instructor approval.

792 Research. (3) F, S

Projects in various areas of political science. Prerequisite: doctoral student.

Omnibus Courses: See page 44 for omnibus courses that may be offered.

Psychology

J. Jay Braun

Chair

(PSY 237) 602/965-3326

REGENTS' PROFESSORS

CIALDINI, EISENBERG

PROFESSORS

AIKEN, BARRERA, BERNAL,
BRAUN, BRAVER, CHASSIN,
HAYGOOD, HOMA, JONES, KAROLY,
KENRICK, KILLEEN, KNIGHT,
LANYON, LINDER, OKUN,
PARKINSON, PRESSON, REICH,
RUSSO, SANDLER, SOMERVILLE,
WEST, WOLCHIK, ZAUTRA

ASSOCIATE PROFESSORS

CASTRO, CHARTIER, FEHR,
LESHOWITZ, ROSSI, SADALLA,
STONE, VANORDEN

ASSISTANT PROFESSORS

CASTENEDA, FABRICIUS,
GOLDINGER, GONZALES,
MackINNON, MADDOX, NAGOSHI,
NEISEWANDER, NEMEROFF,
NEUBERG, SAENZ

INSTRUCTOR

WEIGAND

PROFESSORS EMERITI

BARDRICK, LEVINE,
MEYERSON, VESTRE

The Department of Psychology maintains an Undergraduate Advisement Office staffed by trained personnel. All Psychology majors are encouraged to meet with an undergraduate advisor once each semester to ask questions regarding the student's choice of courses. Failure to do so may prevent graduation at the expected time. It is the responsibility of the student to consult with an undergraduate advisor.

PSYCHOLOGY—B.A.

The program consists of 31 semester hours in psychology, including at least 15 upper-division hours. Required courses, which must be passed with a minimum grade of "C," are as follows: PGS 101, 315 (or 341 or 350); PSY 230, 290, 323 (or 320 or 324 or 325); one additional upper-division PSY course (excluding PSY 490 and 499); two additional upper-division courses (PGS or PSY); two additional psychology courses, excluding PGS 270. No more than a total of three hours in PGS 399 and 499 and PSY 499 combined may be used to complete the 15 hours of upper-division requirements. Students may take a maximum of six hours of PGS 399 and six hours of PGS 499 and PSY 499 combined. Eighteen hours in courses related to psychology must be passed with a minimum grade of "C." They must be approved by an undergraduate advisor and include MAT 119 (or higher), in addition to one course from among CSE 100, 181, and 183. See "Degree Requirements," pages 87.

PSYCHOLOGY—B.S.

The program consists of 31 semester hours in psychology, including at least 15 upper-division hours. Required courses, which must be passed with a minimum grade of "C," are as follows: PGS 101, 315 (or 341 or 350); PSY 230, 290, 323 (or 320 or 324 or 325); one additional upper-division PSY course (excluding PSY 490 and 499); two additional upper-division courses (PGS or PSY); two additional psychology courses excluding PGS 270. No more than a total of three hours in PGS 399 and 499 and PSY 499 combined may be used to complete the 15 hours of upper-division requirements. Students may take a maximum of six hours of PGS 399 and six hours of PGS 499 and PSY 499 combined. Eighteen hours in courses related to psychology must be passed with a minimum grade of "C." They must be approved by an undergraduate advisor and include MAT 210; one life science lab course (BIO, MIC, or ZOL); one physical science lab course (AST, CHM, GLG, or PHY); and one course from among CSE 100, 181, and 183. Further, the science courses taken to satisfy the Bachelor of Science requirements cannot be used to meet the College of Lib-

eral Arts and Sciences natural science distribution requirements. See "Degree Requirements," pages 87.

MINOR IN PSYCHOLOGY

The minor consists of 22 hours in psychology, including the following: PGS 101, 315 (or 341 or 350); PSY 230, 290, 323 (or 320 or 324 or 325), and two additional upper-division psychology courses (PGS or PSY) excluding PGS 270. A maximum of three hours of research (PGS 399, 499; PSY 499) may be used to meet the minor requirements. Students with an appropriate equivalent course may exclude PSY 230 from the requirements. All courses must be passed with a minimum grade of "C."

SECONDARY EDUCATION— B.A.E.

Psychology. The minor teaching field consists of 24 semester hours. See a departmental advisor.

Social Studies. See page 153.

GRADUATE PROGRAMS

The Department of Psychology offers programs leading to the Ph.D. degree. Consult the *Graduate Catalog* for requirements.

PSYCHOLOGY (PGS)

PGS 101 Introduction to Psychology. (3) F, S, SS

Major areas of theory and research in psychology. Participation in department-sponsored research or an educationally equivalent alternative activity is required. *General studies: SB.*

222 Human Sexual Behavior. (3) F, S
Patterns of sexual behavior, including variations and deviations; theories of sexual attraction, sex differences, and sexual dysfunction and treatment. Prerequisite: PGS 101. *General studies: SB.*

270 Psychology of Adjustment. (3) F, S, SS
Principles of mental health, adjustment, conflict, stress, and coping processes derived from clinical and experimental research. Intended for nonmajors; cannot be used for major credit. Prerequisite: PGS 101 *General studies: SB.*

304 Effective Thinking. (3) A
Understanding and improving your intellectual and behavioral skills; information analysis, inference, logic, problem solving, and decision making. Prerequisite: MAT 119 or PSY 230 or equivalent. *General studies: L1.*

306 Environmental Psychology. (3) F, S, SS
Concepts and research strategies in the study of behavior in interaction with physical environment. Prerequisite: PGS 101. *General studies: SB.*

315 Personality Theory and Research. (3) F, S, SS
Definition and description of personality in terms of theoretical and methodological approaches. Prerequisites: PGS 101; PSY 290. *General studies: SB.*

341 Developmental Psychology. (3) F, S
Behavior development analyzed in terms of psychological principles. Current research in human development. Prerequisites: PGS 101; PSY 290. *General studies: SB.*

344 Directed Child Study. (3–4) F, S, SS
Theories and methods of intervention with preschool children and supervised practicum in the Child Study Laboratory. 1 hour lecture, 6–8 hours practicum. Prerequisite: CDE 232 or PGS 341; instructor approval. *General studies: L2.*

350 Social Psychology. (3) F, S, SS
Human social behavior, including such concepts as aggression, attraction, attribution, conformity, groups, helping, person perception, and persuasion. Prerequisite: PGS 101. *General studies: SB.*

351 Honors Social Psychology. (3) N
A critical analysis of human social behavior for honors students; topics include stereotyping, social influence, attraction, aggression, helping, groups, and attitudes. Lecture, discussion. Open only to students without previous credit for PGS 350. Prerequisites: PGS 101; honors standing; instructor approval. *General studies: L2, SB.*

365 Community Psychology. (3) F, S
Mental health and psychological well-being in the community, emphasizing current issues and related research. Prerequisite: PGS 315 or 350. *General studies: SB.*

399 Supervised Research. (1–3) F, S, SS
Experience within the context of current faculty research projects. Student is assigned responsibility depending on qualifications. "Y" grade only. May be repeated for a total of 6 hours. Prerequisites: approval of faculty member prior to registration; "B" average in major. Pre- or corequisite: PSY 230 or equivalent.

414 History of Psychology. (3) F, S
Historical development of psychology from its philosophical beginnings to the present. Prerequisites: PGS 101; PSY 230, 290. *General studies: L2, SB.*

427 Psychology of Aging. (3) N
Analysis of loss, maintenance, and gain associated with cognitive and affective aging. Individual differences in coping with normative life transitions. Prerequisites: PGS 101, 341. *General studies: L2, SB.*

430 Industrial Psychology. (3) F, S, SS
Organizations and management systems; motivation and work performance; human factors in systems design and evaluation; personnel selection and testing. Prerequisite: MGT 301 or PGS 101.

431 Gender Role Development. (3) N
Theories and research in the development of sexual identification; concepts of femininity and masculinity; social roles and attitudes. Prerequisite: PGS 341. *General studies: L2, SB.*

441 Cognitive Development. (3) F, S
Experimental and theoretical literature in child development and behavior. Prerequisite: PGS 341 or instructor approval. *General studies: L2, SB.*

442 Life Span Development. (3) N
Methods and findings of recent studies of the development, growth, and problems of adolescents and adults, with implications for education. Prerequisite: PGS 341. *General studies: SB.*

443 Abnormal Child Psychology. (3) F, S
The major disorders of childhood and adolescence (e.g., autism, hyperactivity, phobias, and delinquency) are covered, including cause, diagnosis, treatment, and prevention. Prerequisites: PGS 101 and 1 course from among PGS 315, 341, 350 or instructor approval. *General studies: L2, SB.*

444 Adolescent Psychology and Psychopathology. (3) N
An advanced level survey of normal adolescent psychological development and psychological disorders of this age period. Lecture, discussion. Prerequisites: PGS 101, 341; PSY 290. *General studies: L2.*

445 Child Language and Drawing. (3) F
Language acquisition and developmental changes in drawing, considered in the context of cognitive developmental stages. Children's representation and communication of knowledge through language and drawing. Prerequisite: PGS 341. *General studies: SB.*

446 Social Development. (3) N
Theory, research, and issues regarding social development are discussed. Example topics: formation of attachments, prosocial development, and gender-role development. Lecture, seminar. Prerequisite: PGS 341. *General studies: L2.*

450 Social Perception and Cognition. (3) N
A critical analysis of human social perception and social cognition. Topics include attribution, inference, memory, attention, impression formation, stereotype change. Lecture, discussion. Prerequisites: PGS 101, 350. *General studies: L2.*

451 Stereotyping, Prejudice, and Discrimination. (3) N
A critical investigation of the processes underlying, and the factors contributing to, stereotyping, prejudice, and discrimination. Lecture, discussion. Prerequisites: PGS 101, 350. *General studies: L2.*

452 Applied Social Psychology. (3) F
The study of applications of social psychological theory and concepts in natural settings; research design and data analysis. Lecture, lab-type activities. Prerequisites: PGS 101, 350; PSY 230. *General studies: L2.*

453 Organizational Behavior. (3) N
A survey of psychological theory and research as applied to the behavior of individuals in organizational settings. Lecture, discussion. Prerequisites: PGS 101, 350.

458 Group Dynamics. (3) F
Theories and methods of group leadership, group effectiveness, communication within groups, and relations between groups and individual members. Prerequisite: PGS 350.

461 Interpersonal Influence. (3) N
Principles and procedures that affect the process of social influence, consideration of attitudinal, compliance inducing, and perceptual influences. Prerequisite: PGS 350. *General studies: SB.*

462 Health Psychology. (3) F, S

Contributions of psychology to health promotion and illness prevention, adaptation to acute and chronic illness, and to the health care system. Prerequisites: PSY 230, 290.

463 Advanced Psychology of Adjustment. (3) F

Critical analysis and effective expression of psychological theory and research of the topic of adjustment. Lecture, discussion, writing. Prerequisites: PSY 230, 290; completion of first-year English requirements; L1 course. *General studies:* L2.

464 Minority Issues in Psychology. (3) S

Psychological issues relating to the diversity of human cultural experiences and among ethnic minorities in the U.S. Prerequisite: PSY 290.

465 Psychology of Stress and Coping. (3) F Readings in theory and research in the area of stress and coping. Lecture, discussion, class presentations. Prerequisites: PGS 315 or 350; PSY 290. *General studies:* L2.

466 Abnormal Psychology. (3) F, S, SS Historical and current definitions, theory, and research concerning abnormal behavior. Major categories of psychopathology, including related treatment approaches. Prerequisites: PGS 101; PSY 290. *General studies:* SB.

467 Psychology of Magical Beliefs. (3) N The psychological nature and bases of magical beliefs and their impact on health behaviors, eating practices, and interpersonal relations. Lecture, seminar. Prerequisites: PGS 315, 466; PSY 434 or instructor approval. *General studies:* L2.

468 Psychology and Law. (3) F, S

Theories, research, and practice in psychology as related to law, including criminal, civil, domestic relations, and professional issues. Lecture, discussion. Prerequisite: PGS 101.

471 Personnel Testing. (3) S

Methods and theory of psychological testing; various types of psychological tests; consideration of ethical, social, and legal aspects of testing. Prerequisites: MGT 311 or PGS 430; PGS 101; 1 course in statistics.

472 Clinical Psychology. (3) F, S

Clinical psychology as a science and profession. Historical development, methods of interviewing, assessment, and therapeutic intervention. Prerequisite: PGS 466.

Omnibus Courses: See page 44 for omnibus courses that may be offered.

PSYCHOLOGY (PSY)**PSY 230 Introduction to Statistics.** (3) F, S, SS

Basic concepts in descriptive and inferential statistics, emphasizing applications to psychology. The course has both self-paced (PSI) and lecture sections. Prerequisites: MAT 117; PGS 101. *General studies:* N2.

290 Research Methods. (4) F, S

Planning, execution, analysis, and reporting of experiments. Literature, procedures, and instruments in representative areas of psychological research. 3 hours lecture, 3 hours lab. Prerequisite: PSY 230. *General studies:* L1, S2.

320 Learning and Motivation. (3) F, S, SS

Principles of conditioning and motivation; approaches to learning, including acquisition of verbal materials, concepts, and motor skills; memory and transfer. Prerequisite: PSY 290.

323 Sensation and Perception. (3) F, S

Underlying processes of vision, audition, and the other senses. Application of current research and theory in a laboratory environment. Prerequisite: PSY 290 or instructor approval.

324 Memory and Cognition. (3) F, S, SS

Processes underlying information storage and retrieval, including different kinds of memory, forgetting, depth of processing, and control processes. Prerequisite: PSY 290.

325 Physiological Psychology. (3) F, S, SS

Relationships of physiological processes to behavior. Emphasis is on nervous system functioning. Prerequisites: PSY 290 or two courses in biological science; instructor approval.

330 Statistical Methods. (3) S

Advanced application of statistics to psychology. Highly recommended for students interested in attending graduate school. 3 hours lecture, 1 hour lab. Prerequisite: PSY 230. *General studies:* N2.

390 Experimental Psychology. (3) S

Continuation of concepts in PSY 290, with emphasis on multifactor designs and programmatic sequence of experiments. Lecture, lab. Prerequisite: PSY 290. *General studies:* L2.

420 Analysis of Behavior. (3) N

Research, applications, and philosophy of the analysis and control of human behavior. Prerequisite: PSY 290. *General studies:* L2.

424 Genetic Psychology. (3) S

Introduction to the concepts, methodologies, and findings of behavioral genetics for psychology majors. Prerequisites: PGS 100; PSY 230, 290.

425 Biological Bases of Behavior. (3) N

Critical study of physiological psychology; brain mechanisms underlying motivation, and learning. Prerequisite: PSY 325. *General studies:* L2.

426 Neuroanatomy. (4) N

Structure and function of mammalian brain, including sheep brain dissection. 3 hours lecture, 3 hours lab. Prerequisite: PSY 325 or equivalent. *General studies:* L2.

433 Human Psychophysiology. (3) S

Emphasis on human physiological-behavioral relationships. Topics include physiological change associated with imagery, stress, attention, skill learning, lying, and biofeedback. Prerequisite: PSY 325.

434 Cognitive Psychology. (3) S

The human organism as a processor of information, from perception to cognition. Abstract concepts, semantic memory, attention, and mental imagery. Prerequisite: PSY 323 or 324 or instructor approval. *General studies:* L2.

437 Human Factors. (3) F

Emphasis on human factors in high technology systems. Specific topics include systems development, systems analysis techniques, displays, and controls. Prerequisites: PSY 290 and upper division standing or instructor approval. *General studies:* L2.

470 Psychopharmacology. (3) F, S

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.

490 Course Programming. (2) F, S

Supervised experience in the development and administration of programmed instruction. Designed for students who proctor self-paced or personalized courses. May be repeated for a total of 4 credits. Prerequisites: PSY 230; instructor approval.

501 Supervised Teaching. (4) F

Experience in and examination of perspectives on teaching undergraduate psychology. Prerequisites: graduate standing in psychology; instructor approval.

506 Survey of Research in Environmental Psychology. (3) F

Major topics and paradigms in the study of man-environment relationships. Prerequisite: instructor approval.

512 Advanced Learning. (3) N

Principles and theories of learning, emphasizing research literature. Prerequisite: instructor approval.

524 Advanced Physiological Psychology. (3) N

Contributions of physiological processes and brain function to fundamental behavioral processes. Prerequisite: instructor approval.

528 Sensation and Perception. (3) N

Principles of sensory and perceptual processes, emphasizing research literature. Prerequisite: instructor approval.

529 Correlation and Psychometric Theory. (3) S

Principles of correlational techniques, including regression and multiple correlation. Psychometric theory, including reliability and validity. Prerequisite: instructor approval.

530 Intermediate Statistics. (3) F

Continuation of PSY 529. Psychological statistics, emphasizing the analysis of variance and the design of experiments. Prerequisite: PSY 529 or instructor approval.

535 Cognitive Processes. (3) N

Theoretical/empirical treatment of the human organism as a processor of information, including abstraction, memory structure, problem solving, and thinking. Prerequisite: instructor approval.

541 Research in Cognitive Development. (3) N

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 Ph.D. program or instructor approval.

542 Social Development. (3) N

Major issues in the area of social development are topics for review and critique. Theory, research, and content are covered. Prerequisite: instructor approval.

543 Moral Development. (3) N

A variety of issues in moral development, including positive and negative behaviors, are considered. Theory and research are major foci. Prerequisite: instructor approval.

550 Advanced Social Psychology. (3) F, S

Theory and research concerning interpersonal perception, decision-making, attitude formation and change, group processes, social motivation, and interaction processes. Prerequisite: instructor approval.

551 Advanced Social Psychology. (3) F, S

Continuation of PSY 550. Prerequisite: PSY 550 or instructor approval.

553 Social Influence. (3) N

Research literature relevant, for example, to attitude formation and change, conformity, obedience, power, compliance, and altruism. Prerequisite: PSY 551 or instructor approval.

555 Experimental and Quasi-Experimental Designs for Research. (3) N

Review of research techniques. Laboratory and field research analyzed; applications to specific topics. Prerequisite: instructor approval.

556 Social Perception. (3) N

Theoretical and empirical implications of topics in social perception and cognition, e.g., attribution, attraction, and impression formation. Prerequisite: PSY 551 or instructor approval.

558 Interpersonal Processes. (3) N

One or more topics chosen from the following: empathy, modeling, vicarious processes, contagion, group phenomena, social communication, and behavior exchange. Prerequisites: PSY 550 and 551 or instructor approval.

564 Somatopsychology. (3) N

Theory and research in the psychological aspects of chronic illness, physical disability, and mental retardation. Prerequisite: instructor approval.

565 Somatopsychology. (3) N

Continuation of PSY 564. Prerequisite: PSY 564 or instructor approval.

569 Advanced Study of Personality. (3) N

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.

572 Psychological Assessment. (3) F

Theory and research on assessment of personality, psychopathology, and intelligence, and construction of psychological assessment instruments. Prerequisite: admission to clinical Ph.D. program or instructor approval.

573 Psychopathology. (3) F

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 Ph.D. program or instructor approval.

574 Psychotherapy. (3) S

A detailed survey of the theoretical and empirical literature relating to verbal psychotherapy and interviewing methods. Structured role-playing practice in the major procedures. Prerequisite: admission to the clinical Ph.D. program or instructor approval.

575 Behavior Therapy. (3) F

Theory and research relating to the use of behavior therapy in modifying abnormal behavior. Structured practice. Prerequisite: admission to the clinical Ph.D. program or instructor approval.

578 Child Psychopathology. (3) N

Major theories and research related to the development of deviant behaviors in children, including some supervised experience in child assessment. Prerequisite: PSY 572 or instructor approval.

582 Community Psychology. (3) SS

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 Ph.D. program or instructor approval.

588 Consultation Methods. (3) N

Several theories and strategies of organizational consultation. The development of consultational skills through simulation and practical experience. Prerequisite: advanced standing in Psychology Ph.D. program or instructor approval.

589 Social-Learning Theory. (3) N

Social-learning approach to the study of adaptive and maladaptive behavior patterns, including theoretical and empirical research foundations of behavior therapy strategies. Prerequisite: admission to Psychology Ph.D. program or instructor approval.

624 Clinical Neuroscience. (3) S

An examination of 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: See page 44 for omnibus courses that may be offered.

Religious Studies

Linell E. Cady
Chair

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PROFESSORS

FELDHaus, WENTZ

ASSOCIATE PROFESSORS

CADY, FOARD, GEREBOFF, MARTIN,
MORRISON, WOODWARD

ASSISTANT PROFESSORS

CLAY, MOORE,
SCHOBER, SWANSON

RELIGIOUS STUDIES—B.A.

The program consists of 45 semester hours, 30 of which must be in religious studies (including 21 upper-division hours) and 15 of which must be in related fields. In order for the student to become acquainted with a variety of religious phenomena, as well as with major issues and methods in the study of religions, the 30 semester hours in religious studies must include the following: REL 305; at least one course in religions from each of three distinct geographic regions or cultural traditions; two research seminars, including REL 405, which may be repeated for credit.

All majors must plan their programs in consultation with a departmental advisor. A minimum GPA of 2.50 is required in the 30 hours of religious studies courses. See "Foreign Language Requirement," page 87.

MINOR IN RELIGIOUS STUDIES

The minor in Religious Studies consists of 18 semester hours, at least 12 of which must be upper division. Both REL 305 and 405 are required.

GRADUATE PROGRAM

The Department of Religious Studies offers a graduate program leading to the degree of Master of Arts for those who wish to seek the Ph.D. in the study of religions, for those who wish to teach at the community college level, and for those in nonacademic careers who desire general competence in the academic study of religions. Consult the *Graduate Catalog* for requirements.

RELIGIOUS STUDIES

REL 100 Religions of the World. (3) F, S

An introduction to the history of religious traditions of the world, including Buddhism, Christianity, Hinduism, Islam, Judaism, and others. Not open to students who have completed REL 200. *General studies:* HU, G.

200 The Study of Religious Traditions. (3) A

A writing intensive course introducing analytical skills necessary for understanding religious traditions. Beliefs, practices, and communities of several religious traditions of the world. Not open to students who have completed REL 100. *General studies:* L1, HU, G.

201 Religion and the Modern World. (3) A

An introduction to the nature and role of religious beliefs and practices in shaping the lives of individuals and societies, with particular attention to the modern world. *General studies:* L1, HU.

210 Introduction to Judaism. (3) A

The beliefs, ceremonies, festivals, and institutions of Judaism emphasizing the contemporary era. The course presupposes no previous knowledge about Judaism. *General studies:* L1, HU, H.

225 African-American Religion. (3) A

Introduction to the history and development of the African-American religious tradition. Lecture, discussion.

240 Introduction to Southeast Asia. (3) F

An interdisciplinary introduction to the cultures, religions, political systems, geography, and history of Southeast Asia. Cross-listed as ASB 240/GCU 240/HIS 240/POS 240. *General studies:* G.

270 Introduction to Christianity. (3) A

The beliefs, ceremonies, festivals, and institutions of Christianity, emphasizing the contemporary era. The course presupposes no previous knowledge about Christianity. *General studies:* HU.

305 Ritual, Symbol, and Myth. (3) A

Ritual, symbol, and myth as types of religious expression, with examples selected from the nonliterate religions of the world. *General studies:* L2, HU, G.

- 310 Western Religious Traditions.** (3) F
Religious traditions of Judaism, Christianity, and Islam, comparing their doctrinal, institutional, and ritual systems, and social histories. Lecture, discussion. *General studies: H.*
- 315 Hebrew Bible (Old Testament).** (3) A
The nature, content, background, historical situation, and message of the books of the Hebrew Bible in English translation. *General studies: L2, HU, H.*
- 316 Types of Early Judaism.** (3) A
Developments in Judaism during the intertestamental period. *General studies: HU, H.*
- 317 Introduction to Rabbinic Judaism.** (3) A
A historical analysis of the thought, literature, and institutions of rabbinic Judaism. *General studies: HU, H.*
- 320 Religion in America.** (3) F, S
The emergence of religious ideas and institutions up to the Civil War. *General studies: HU.*
- 321 Religion in America.** (3) F, S
The emergence of religious ideas and institutions from the Civil War to the present. *General studies: HU.*
- 330 Native American Religious Traditions.** (3) A
World views and religious thought presented through the art, architecture, literature, music, mythology, ritual, and folklore of representative tribes in North America. *General studies: HU.*
- 331 History of Native American Religious Traditions.** (3) N
The role of religion in Native American history, including missionization, and religious adaptation; prophetic, messianic, and religious revitalization movements. *General studies: L2, HU, H.*
- 340 Confucianism and Taoism.** (3) A
Issues in classical Chinese religious thought. Readings include Confucius, the Tao Te Ching, Mencius, Chuang Tzu, and the I Ching. *General studies: L2, HU.*
- 345 Asian Religious Traditions.** (3) F
Introduction to the major concepts of religious beliefs, rituals, and practices in Hinduism and Buddhism. Lecture, discussion. *General studies: HU, G.*
- 350 Hinduism.** (3) A
The study of diverse forms of Hinduism through its institutions, literature, folklore, art, and architecture. *General studies: L2, HU, G, H.*
- 351 Buddhism.** (3) A
Doctrines, practices, and institutions of the Buddhist religion, emphasizing its role in the history and culture of Asian societies. *General studies: L2, HU, G.*
- 365 Islamic Civilization, 700–1300.** (3) F
An introduction to Islamic religion, culture, and societies from 700 to 1300. *General studies: HU, G, H.*
- 366 Islamic Civilization, 1300 to Present.** (3) F
Introduction to Islamic religion, culture, and societies from 1300 to present. Lecture, discussion.
- 371 New Testament.** (3) A
Origins and literature of early Christian communities; historical investigations of the types of oral and written tradition in the New Testament. *General studies: HU.*
- 372 Formation of the Christian Tradition.** (3) A
Origins, development, and expansion of Christianity; major themes and tensions from the New Testament world to the beginning of the Middle Ages. *General studies: HU.*
- 373 Women in Judaism.** (3) S
A study of the legal, social, and cultural status of Jewish women in various historical and contemporary societies. Cross-listed as WST 372.
- 381 Religion and Moral Issues.** (3) A
The manner in which human religiousness relates to social concerns, e.g., sexuality, the environment, bio-ethical issues, and violence. *General studies: L2, HU.*
- 385 Contemporary Western Religious Thought.** (3) A
Introduction to contemporary Jewish and Christian thought. Topics include religion and politics, problem of evil, interpretations of God, and feminist theology. *General studies: L2, HU.*
- 390 Women and Religion.** (3) A
The role of women in several organized religions and/or religious sects, including a study of myth and symbols as they are used to establish, maintain, and enforce sex-roles within specific religions. *General studies: HU, G.*
- 405 Problems in Religious Studies.** (3) A
Selected topics and methodological problems in religious studies, involving students in the research interests of the instructor. May be repeated for credit when topics vary.
- 410 Judaism in Modern Times.** (3) N
Variety of expressions of Judaism and Jewishness in the modern period. Topics may include American Judaism or religious responses to the Holocaust. *General studies: HU, H.*
- 415 The Jewish Mystical Tradition.** (3) A
Examination of some of the esoteric lore of Judaism. Movements and literature such as Hasidism and Kabbalah will be studied. *General studies: HU.*
- 420 Religion in American Life and Thought.** (3) A
The influence of religion on American society, culture, and ideas; the distinctive character of religion in America. Prerequisite: REL 320 or 321 or equivalent. *General studies: L2, HU.*
- 426 American Preachers and Preaching: The Sermon in America.** (3) N
The life and work of notable American preachers. The emergence of the preacher as representative of American religion. Prerequisite: REL 320 or 321 or equivalent. *General studies: L2, HU.*
- 427 American Religious Thought.** (3) N
The thought of representative American religious thinkers, i.e., Jonathon Edwards, William Ellery Channing, Horace Bushnell, and Reinhold Niebuhr. Prerequisite: REL 320 or 321 or equivalent. *General studies: HU, H.*
- 435 Problems in Native American Religions.** (3) A
An in-depth consideration of selected problems in Native American religions. *General studies: HU.*
- 444 Religion in Japan.** (3) A
Role of religion in Japanese history and culture. Emphasis on the impact of Buddhism and its transformation in Japan, the vitality of folk religion, the intimacy of religion and the arts, the ideals of the samurai, and religion in modern Japan. *General studies: HU, G, H.*
- 454 Hindu Religious Thought.** (3) A
Readings in classical systems, such as Samkhya and Vedanta, and in the works of modern Hindus, such as Aurobindo and Gandhi. REL 351 recommended.
- 460 Studies in Islamic Religion.** (3) A
Issues in the interpretation and understanding of Islamic texts, history, society, culture, and rituals. Prerequisites: REL 365 and Religious Studies major or instructor approval. *General studies: HU, G.*
- 464 The Islamic Mystical Tradition.** (3) N
Asceticism, mysticism, and the cult of the saint in Islamic society; implications for Islamic religious and social history. Prerequisites: REL 365 and Religious Studies major or instructor approval. *General studies: HU, G.*
- 470 Religion in the Middle Ages.** (3) A
Religious aspects of medieval life and thought; variety of forms of dissent, heresy, and reform movements from the 4th to 13th centuries. *General studies: HU, H.*
- 471 Reformation and Modern Christianity.** (3) A
Protestant Reformation to contemporary Christian movements; includes factors in the dissolution of the Medieval Christian synthesis, variety of reform movements and reformation patterns, Catholic counter-reform measures, formation of liberal theology, ecumenical movement, and the World Council of Churches. *General studies: HU, H.*
- 486 Modern Critics of Religion.** (3) A
Major theories and critiques of religion among modern social, philosophical, and religious thinkers. *General studies: HU.*
- 494 Special Topics in Religious Studies.** (3) N
Open to all students, freshmen by instructor approval only. Topics may be selected from various areas.
- 498 Pro-Seminar in Religious Studies.** (3) A
For students with a major or minor emphasis in Religious Studies.
- 501 Research Methods in Religious Studies.** (3) F
An exploration of the major themes and methods in the study of religion, with primary focus on classical texts. Lecture, discussion.
- 502 Research Methods in Religious Studies.** (3) F, S
An exploration of the major themes and methods in the study of religion, with primary focus on contemporary texts. Lecture, discussion.
- 591 Seminar.** (3) N
Topics on methodological issues in the study of religion. Prerequisite: Religious Studies graduate student or instructor approval.
- 598 Special Topics.** (3) F, S
Topics are selected from the following areas:
(a) Study of Religion, Comparative Religion
(b) Comparative Western, Ancient Near East, Judaism
(c) Religion in America
(d) Native American Religion
(e) Religion in East Asia
(f) Religion in South Asia
(g) Islam
(h) Christianity, Greco-Roman Religion
(i) Western Religious Thought, Ethics
(j) Problems in Religious Studies
May be repeated for credit.
- Omnibus Courses:** See page 44 for omnibus courses that may be offered.

Sociology

A. Wade Smith
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PROFESSORS

GORDON, LANER, NAGASAWA,
 SMITH, SNOW, THOMAS,
 WEITZ, WHITAM

ASSOCIATE PROFESSORS

BENIN, COBAS, HARDERT, KULIS,
 MILLER-LOESSE, SULLIVAN,
 VAUGHAN (ASU WEST)

ASSISTANT PROFESSORS

ESPINOSA, JACOBSON, KEITH,
 MUELLER (ASU WEST),
 RIDDLE, ROLISON

LECTURER

MAYO

PROFESSORS EMERITI

AXELROD, FARBER, GUILLOT,
 HENZE, HOULT, LINDSTROM,
 PFUHL, SEBALD

SOCIOLOGY—B.A.

See the opening portion of “College of Liberal Arts and Sciences” section for the departmental requirements for the B.A. degree, described on page 87.

The departmental requirement for either degree consists of 45 semester hours, of which 30 must be in sociology and 15 in closely related fields to be approved by the advisor in consultation with the student. The 30 hours must include SOC 101 (or 301), 391, 395, 483 (or 485 or 486) and one course from at least four of the following seven areas: family, intergroup relations and social psychology, political/comparative-historical, racial/ethnic relations, social problems and processes, stratification/occupations/organization, and urban sociology/demography. Details are available in the department office. One sociology course in racial/ethnic relations is required. At least 18 semester hours must be in upper-division courses, and at least 12 upper-division semester hours in the major are required for residency. See “Degree Requirements,” page 87.

MINOR IN SOCIOLOGY

The minor in Sociology consists of 18 hours in sociology, including the following: SOC 101 (or 301); 391 or 483 or 485 or 486; four remaining courses to be chosen by the student in consultation with a sociology advisor. Twelve hours must be in upper-division courses, and at least six semester hours in upper-division courses in the minor are required for residency.

SECONDARY EDUCATION—B.A.E.

Social Studies. The major teaching field of social studies education consists of 63 semester hours, of which 30 hours may be in criminal justice, economics, geography, history, political science, psychology, and sociology and are exactly those courses required for the B.A. or B.S. degree in Sociology. Of the remaining hours, two groups of 12 hours each and one of six hours are generally taken in related social sciences plus SED 480.

The minor teaching field consists of 24 semester hours, at least six of which are upper division. SOC 101 or 301 is required. The remaining 21 hours must be approved by the sociology advisor in consultation with the student and must include at least one course from at least four of the following seven areas: family, intergroup relations and social psychology, political/comparative-historical, racial/ethnic relations, social problems and processes, stratification/occupations/organization, and urban sociology/demography, (details are available in the department office). One sociology course in racial/ethnic relations is required.

GRADUATE PROGRAMS

The Department of Sociology offers programs leading to the M.A. and Ph.D. degrees. Consult the *Graduate Catalog* for requirements.

SOCIOLOGY

SOC 101 Introductory Sociology. (3) F, S, SS
 Fundamentals of sociology, organization of human groups and society, processes of interaction, and social change. Not open to students who have credit for SOC 301. 2 hours lecture, 1 hour discussion. *General studies: SB.*

294 Special Topics: Introduction to Southeast Asia. (3) N

301 Principles of Sociology. (3) F, S, SS
 Intensive and critical analysis of the concepts of sociology. Not open to students who have credit for SOC 101. *General studies: SB.*

312 Sociology of Adolescence. (3) F, S
 Cultural values and the social processes that help explain the development of the phenomenon of modern adolescence, including investigation of adolescent subcultures and cross-cultural references. *General studies: SB.*

315 Courtship and Marriage. (3) F, S, SS
 An overview of courtship, marriage, and related processes, focusing on problematic aspects of these institutions from the sociological perspective. Prerequisite: SOC 101 or 301 or instructor approval. *General studies: SB.*

318 Overview of Aging. (3) F
 Multidisciplinary introduction to gerontology. Explores the characteristics, experiences, problems, and needs of older persons. *General studies: SB.*

321 Sociology of Work. (3) S
 Social and cultural analysis of industry. Occupational roles, status, and social participation of workers. Prerequisite: SOC 101 or 301. *General studies: SB.*

332 The Modern City. (3) F, S
 Growth, characteristics, and problems of the modern city. Prerequisite: SOC 101 or 301. *General studies: SB.*

333 Population. (3) F, S, SS
 Theories of population change; births, deaths, and migration; population policies. Prerequisite: SOC 101 or 301. *General studies: SB, G.*

340 Sociology of Deviant Behavior. (3) F, S, SS
 A sociological analysis of stigmatized behaviors and conditions, including the causes, effects, and management of stigma. Prerequisite: SOC 101 or 301 or instructor approval. *General studies: SB.*

341 Modern Social Problems. (3) F, S, SS
 Race relations, poverty, unemployment, and other current issues. *General studies: SB.*

352 Social Change. (3) F, S
 Patterns of social change, resistance to change, and change-producing agencies and processes. Prerequisite: SOC 101 or 301. *General studies: SB, G, H.*

360 Sociological Psychology. (3) F, S
 Interaction patterns between the sociocultural order and individuals; socialization process; norms, roles, and statuses; collective behavior. Prerequisite: SOC 101 or 301. *General studies: SB.*

361 Variant Sexuality. (3) F
 Sociological research and theories dealing with homosexuality, transvestism, transsexualism, and other variations in sexual orientation and gender identity. Prerequisite: SOC 101 or 301. *General studies: SB.*

365 The Sociology of Mass Communication. (3) F, S
 A sociological exploration of the major mass media as a communicative process in American society. *General studies: SB.*

368 Sociology of Everyday Life. (3) F, S
 Examination of routine everyday behavior as it relates to problems of social order, control, change, identity, and relationships. Prerequisite: SOC 101 or 301 or instructor approval.

- 391 Sociological Research.** (3) F, S, SS
Methods of sociological research, including the fundamental assumptions underlying research and some practical experience in research design, data collection techniques, and data analysis. Prerequisites: SOC 101 or 301 or instructor approval. *General studies:* SB.
- 395 Social Statistics I.** (3) F, S, SS
Application of descriptive and inferential statistical methods to research problems in sociology. Prerequisites: SOC 101 (or 301), 391; N1 course. *General studies:* N2.
- 415 The Family.** (3) F, S, SS
The family considered from the institutional viewpoint; its historical development and its adaptation to a changing culture; the family system in many cultures. Prerequisite: 6 hours in sociology, including SOC 101 or 301 or instructor approval. *General studies:* SB.
- 416 Marriage Problems in Contemporary Society.** (3) S
Marital and family problems in today's society from the viewpoint of personal and cultural adjustment. Prerequisites: SOC 101 or 301 and an additional 3 hours in sociology or instructor approval. *General studies:* L2, SB.
- 417 Family Violence.** (3) F, S
Study of current research and theory on several aspects of domestic violence, including child maltreatment, spousal aggression, and courtship violence. Prerequisite: instructor approval. *General studies:* SB.
- 418 Aging and the Life Course.** (3) F, S
Social aspects of aging. Theoretical and methodological perspectives and problems of aging such as life satisfaction, retirement, and adjustment to role loss. Prerequisite: SOC 101 or 301 or instructor approval. *General studies:* SB.
- 420 Sociology of Religion.** (3) S
Interrelationship of culture, society, and religion; religion and social stratification; religious, economic, and political institutions; social change and religion. Emphasis on American society and institutions. Prerequisite: 6 hours in sociology, including ASB 102 or SOC 101 or 301 or instructor approval. *General studies:* L2, SB.
- 421 Sociology of Education.** (3) S
Contemporary sociological perspectives are used to examine effects of schools and schooling on individuals and society. Prerequisite: SOC 101 or 301 or instructor approval.
- 422 Sociology of Complex Organizations.** (3) F
Sociological studies of government agencies, industrial firms, labor unions, military establishments, and other large-scale organizations. Prerequisite: 6 hours in sociology, including SOC 101 or 301 or instructor approval. *General studies:* L2, SB.
- 423 Social Class and Stratification.** (3) S
Social classes and the function of these groupings in a society. Prerequisite: 6 hours in sociology, including SOC 101 or 301 or instructor approval. *General studies:* L2, SB.
- 427 Sociology of Health and Illness.** (3) F
Social aspects of physical and mental illness and sociological analysis of the health care system and its practitioners. Prerequisite: SOC 101 or 301 or instructor approval. *General studies:* L2, SB.
- 428 AIDS and Society.** (3) F
This course provides a socio-historical perspective on stigma and illness in general and on AIDS in specific. Prerequisite: SOC 101 or 301 or instructor approval. *General studies:* L2.
- 429 Sociology of Law.** (3) S
Examination of law as an institution; its origins, operations, and consequences. Emphasis on contemporary legal issues and problems. Prerequisite: SOC 446 or instructor approval. *General studies:* SB.
- 432 Human Ecology.** (3) F, S
Patterns and laws of societies' adjustments to the physical environment; distribution of communities and institutions. Prerequisites: SOC 101 (or 301) and 3 additional hours in sociology and college-level algebra or instructor approval. *General studies:* SB.
- 433 Demographic Methods.** (3) S
Science of population analysis; problems in measurements of size, composition, and changes in population. Prerequisites: SOC 101 (or 301), 333; college-level algebra. *General studies:* SB.
- 446 Sociology of Crime.** (3) F
The process of criminalization, exploring the behavior of the definers of crime, and the behavior of those defined as criminals. Prerequisites: SOC 101 (or 301) and 340 or instructor approval. *General studies:* SB.
- 451 Comparative Sociology.** (3) F
Cross-cultural study of basic social institutions; the methodology of cross-cultural research. Prerequisite: ASB 102 or SOC 101 or 301 or instructor approval. *General studies:* SB, G.
- 455 Collective Behavior.** (3) S
Social causes and consequences of such non-institutionalized forms of behavior as crowds, cults, publics, social movements, and revolutions. Prerequisite: 6 hours in sociology, including SOC 101 or 301 or instructor approval. *General studies:* SB.
- 456 Political Sociology.** (3) S
Social factors associated with voting; nature and structure of the electorate and political parties and the nature of national and international power structure. Prerequisite: SOC 101 or 301 or instructor approval. *General studies:* SB, G.
- 462 Social Control.** (3) F
Significance of social control in society and the various methods used by individuals and groups to control others. Prerequisite: SOC 360 or instructor approval. *General studies:* SB.
- 464 Women's Roles.** (3) S
Sociological analysis of the development, nature, and consequences of traditional and alternative roles of women in contemporary society. Prerequisite: SOC 101 or 301 or instructor approval. *General studies:* L2, SB, C.
- 470 Racial and Ethnic Minorities.** (3) F, S, SS
Problems of minorities in the United States and in other racially and ethnically heterogeneous societies. Evaluation of theories of prejudice and of research dealing with discrimination, desegregation, and assimilation. Prerequisites: SOC 101 (or 301) and 3 additional hours in sociology and college-level algebra or instructor approval. *General studies:* SB.
- 474 Afro-American in Modern Society.** (3) F, S, SS
Social and cultural heritage of Black Americans; achievements and current trends. Lecture, discussion. Prerequisite: SOC 101 or 301 or instructor approval. *General studies:* L2, SB, C.
- 483 History of Social Thought.** (3) S, SS
Social thought in human culture. Background of modern sociology. Prerequisite: SOC 101 (or 301) and 3 additional hours in sociology or instructor approval. *General studies:* L2, SB.
- 485 Sociology of Knowledge.** (3) F
Relationship between social conditions and the development of knowledge in modern society. Prerequisite: SOC 101 or 301 or instructor approval. *General studies:* L2, SB.
- 486 Contemporary Theory.** (3) S
Contemporary issues and crises in social theory with major focus on particular theorists. Ideological factors in theory, philosophical issues, the nature of theory and its relationship with methodology. Prerequisite: SOC 101 or 301 or instructor approval. *General studies:* SB.
- 501 Practicum in Survey Research.** (3) F, S
A research practicum in survey field work, analysis, and reporting in the Phoenix Area Study. Prerequisite: SOC 391 or equivalent.
- 502 Practicum in Survey Research.** (3) F, S
Continuation of SOC 501. Prerequisite: SOC 501.
- 505 Social Statistics II: Multivariate Analysis.** (3) F, SS
Analysis of variance, multiple regression, dummy variable regression, path analysis, and related topics. Computer application to problem solving. Prerequisites: SOC 395 or equivalent; a proficiency examination.
- 507 Social Statistics IIIA: Categorical Data Analysis.** (3) F
Logistic and log-linear models through computer applications. Social mobility, dynamic analysis, and discriminate analysis may also be included. Prerequisite: SOC 505 or instructor approval.
- 508 Social Statistics IIIB: Structural Equation Analysis.** (3) S
Structural equation models are taught using LISREL and other computer packages. Topics include multiple group analyses and ordinal endogenous variable models. Prerequisite: SOC 505 or instructor approval.
- 515 Studies of the Family.** (3) S
Current developments in the study of marriage and the family. Prerequisite: instructor approval.
- 585 Development of Sociology.** (3) F
Major sociological theorists, including Durkheim, Weber, Marx, Parsons, Merton, Dahrendorf, Homans, and Mead. Prerequisite: instructor approval.
- 586 Contemporary Sociological Theory.** (3) S
Analysis of major theories, including structural-functional, conflict, social exchange, symbolic interaction, and role theory. Prerequisite: instructor approval.
- 587 Metasociology.** (3) S
Nature of sociological assumptions. Nature and form of sociological theories. Context of discovery-grounded theory. Context of justification. Prerequisite: instructor approval.

588 Methodological Issues in Sociology.

(3) S
Basic methodological issues in the application of scientific methods to the study of human social life. Emphasis on limited number of major works, with contrasting approaches to issues. Prerequisite: SOC 391 or instructor approval.

Omnibus Courses: See page 44 for omnibus courses that may be offered.

Speech and Hearing Science

M. Jeanne Wilcox
Chair

(LL A145) 602/965-2374

PROFESSORS

BACON, CASE, CLUFF, DORMAN,
LaPOINTE, MOWRER, WILCOX

ASSOCIATE PROFESSORS

CHUBRICH, SAMMETH

FACULTY ASSOCIATES

BROWN, BUDRZYNSKY, HUEFFNER,
MINTZ, WEXLER, WILSON

CLINIC DIRECTOR

CASE

PROFESSOR EMERITUS

PRATHER

SPEECH AND HEARING SCIENCE—B.S.

The program consists of 45 semester hours of speech and hearing science courses emphasizing the developmental and scientific aspects of language, speech, and hearing. The following courses, or their approved equivalents, are required: SHS 250, 310, 311, 375, 376, 384, 400, 402, 450, and 465, plus one three-hour course in disorders of speech and one three-hour course in disorders of language. The remaining speech and hearing science courses to complete the major are determined by the students in consultation with an advisor. A list of approved electives is available through the department. Supporting courses from related fields must include the following or their equivalents: MAT 118; PGS 101; PHY 111, 113; PSY 230; ZOL 201.

GRADUATE PROGRAMS

The Department of Speech and Hearing Science offers programs leading to the Master of Natural Science degree with a concentration in communication

disorders, Master of Science degree in Communication Disorders, and Doctor of Philosophy degree in Speech and Hearing Science. Consult the *Graduate Catalog* for requirements.

SPEECH AND HEARING SCIENCE**SHS 174 American Sign Language I.** (3) F, S

Basic receptive/expressive conversational skills; basic grammar and syntax rules. Orientation to deafness and deaf culture. Lecture, drill, practice, dialogue, and discussion.

250 Introduction to Phonetics. (3) F

An introduction to English phonetics with emphasis on phonetic transcription, articulation, phonology, and disorders of speech.

274 American Sign Language II. (3) F, S

Further development of receptive/expressive conversation skills in ASL; finger spelling. Continued exploration of deaf culture. Lecture, discussion, drill, practice. Prerequisite: SHS 174.

305 Survey of Communication Disorders.

(3) F, S
An overview of normative and disordered processes of human communication. Designed for majors as well as nonmajors.

310 Anatomical and Physiological Bases of Speech. (3) F

A noncadaveric study of anatomical systems that underlie human speech and language, including respiration, phonation, articulation, and related nervous system processes.

311 Physical and Physiological Bases of Hearing. (3) F, S

Study of the physical characteristics of sound and of the structure and function of the human auditory system. Prerequisites: MAT 117; PHY 111, 113.

367 Speech and Language Development.

(3) F
Process of speech and language development from birth through adulthood.

374 American Sign Language III. (3) F, S

Develop greater fluency and speed. Emphasis on deaf culture and folklore including storytelling and idioms. Beginning technical and interpreting signs. Lecture, discussion, drill, practice. Prerequisite: SHS 274.

375 Speech Science. (3) F

Normative aspects of speech, hearing, and language. Prerequisites: SHS 310, 311.

376 Psychoacoustics. (3) S

Introduction to acoustics, cochlear anatomy and physiology, and the perception of sound. Prerequisite: SHS 311 or instructor approval.

384 Hearing Disorders. (3) S

Pathologies of the ear and associated peripheral and central hearing disorders: characteristics, management, and effects on communication. Prerequisites: SHS 311, 376.

400 Introduction to Audiologic Evaluation.

(4) F
Measurement of the basic audiologic test battery, including audiograms, masking, speech recognition, and immittance. 3 hours lecture, 3 hours lab. Cross-listed as SHS 500. Prerequisites: SHS 311, 376, 384.

402 Modifying Communicative Behavior.

(3) S
Principles and techniques of modifying speech and language behavior. Prerequisite: SHS 250 or equivalent.

431 Nature of Fluency Disorders. (2) S

History and nature of fluency disorders.

435 Hearing Conservation. (3) S

The causes and prevention of noise-induced hearing loss, and approaches to industrial audiology programs. Cross-listed as SHS 535. Prerequisite: SHS 400.

450 Observation. (1) F, S

Opportunity to obtain observation experience at the ASU Speech and Hearing Center or at external sites. Prerequisite: instructor approval.

465 Language Acquisition. (3) F, SS

Language development in the normal child. Cross-listed as SHS 565.

470 Childhood Language Disorders. (3) S

Introduction to the nature and treatment of language disorders in children. Cross-listed as SHS 570. Prerequisite: SHS 465 or instructor approval.

483 Professional Issues in Communication Disorders. (3) F

Topics related to professional certification, accreditation, code of ethics, graduate education and other issues in speech-language pathology and audiology.

494 Special Topics. (3) F, S

Topics may be selected from the following:

- (a) Hearing Disorders
- (b) Speech and Language Disorders
- (c) Research

May be repeated for credit. Prerequisite: instructor approval.

495 Disorders of Articulation. (3) F

Detailed analysis of disorders of articulation. Cross-listed as SHS 585. Prerequisites: SHS 250, 310.

496 Aural Rehabilitation. (3) S

Approaches to aural rehabilitation of children and adults. Introduction to educational audiology and assistive listening devices. Cross-listed as SHS 596. Prerequisites: SHS 375, 400.

501 Introduction to Audiologic Evaluation.

(4) F
Measurement of the basic audiologic test battery, including audiograms, masking, speech recognition, and immittance. 3 hours lecture, 3 hours lab. Cross-listed as SHS 400. Prerequisite: SHS 311 and 376 and 384 or equivalents.

502 Advanced Audiologic Evaluation I. (4) F

Differential diagnosis of cochlear and retro-cochlear disorders, including measurement of auditory evoked responses. 3 hours lecture, 2 hours lab. Prerequisite: SHS 400 or 500 or equivalent.

504 Hearing Aids. (4) S

Operation, application and fitting of amplification devices for the hearing impaired. 3 hours lecture, 2 hours lab. Prerequisite: SHS 400 or 500 or equivalent.

505 Computers and Current Technology in Audiology and Speech-Language Pathology. (3) F

Computer applications and current technology as applied to service administration and delivery in the fields of audiology and speech-language pathology. Lecture, lab.

508 Pediatric Audiology. (3) F

Audiologic assessment, screening, and development considerations for infants and young children. Prerequisite: SHS 400 or 500 or equivalent.

510 Advanced Hearing Science. (3) N Anatomical, physiological, and psychophysical aspects of audition. Prerequisite: SHS 376 or instructor approval.

511 Auditory Perception by the Hearing Impaired. (3) F '94
A study of how and why sensorineural hearing loss alters the perception of sound. Prerequisite: SHS 376 or instructor approval.

512 Medical Aspects of Speech and Hearing. (3) F, S
Correlation of history and physical findings with pathologic physiology and test results in speech and hearing abnormalities.

515 Audiologic Instrumentation and Calibration. (3) S
Electronic instruments used to produce, modify, and measure characteristics of sound. Measurement standards and methods for calibration of audiologic equipment. Lecture, lab. Prerequisite: SHS 400 or 500 or equivalent.

516 Advanced Audiologic Evaluation II. (3) S
Continuation of SHS 502, including behavioral and physiological measures of the central auditory nervous system, and vestibular assessment. Lecture, lab. Prerequisite: SHS 502.

535 Hearing Conservation. (3) S
The causes and prevention of noise-induced hearing loss and approaches to industrial audiology programs. Cross-listed as SHS 435. Prerequisite: SHS 400 or 500 or equivalent.

545 Speech Perception and Production. (3) F
Current knowledge regarding the production and perception of speech. Introduces speech perceptual problems of the hearing impaired, and cochlear implants. Prerequisite: SHS 375 or instructor approval.

552 Otoacoustic Emissions as a Diagnostic Tool. (3) F '94
Study of the types of otoacoustic emissions, their theoretical implications and application to clinical diagnostics. Lecture, discussion, lab. Prerequisite: SHS 376 or instructor approval.

555 Cochlear Implants. (3) S
Current status of cochlear implant research and development. Prerequisite: SHS 504 and 545 or instructor approval.

565 Language Acquisition. (3) F
Language development in the normal child. Cross-listed as SHS 465.

566 Psychology of Language. (3) S
Language and thought in interaction.

570 Childhood Language Disorders. (3) F
Introduction to the nature and treatment of language disorders in children. Cross-listed as SHS 470. Prerequisites: SHS 465 or 565 or equivalent.

571 Augmentative Communication and Language Programming. (3) S
Focus on individuals across the age span who are or who are at risk for being unable to communicate with spoken language. Lecture, lab.

572 Language Assessment and Intervention in Early Childhood. (3) F
Focus on the birth to 5-year-old population who are at risk for or have communication and language disabilities. Prerequisite: SHS 470 or 570 or equivalent.

574 Fluency Disorders and Treatment. (3) F
Phenomena, etiology, assessment, and theories of stuttering are presented, followed by various treatment procedures for children and adults who stutter. Prerequisite: SHS 431 or equivalent.

575 Aphasia and Related Neurogenic Language Disorders. (3) F
Assessment and treatment of acquired neuro-linguistic impairment. Prerequisite: SHS 310 or equivalent.

576 Neuromotor Speech Disorders. (3) S
Evaluation and treatment of the dysarthrias and apraxia of speech. Emphasis on acquired adult disorders.

577 Craniofacial Disorders of Communication. (3) S, SS
Communication disorders related to anomalies of the craniofacial structures, including orofacial clefting of the lip and palate. Prerequisite: SHS 310 or equivalent.

578 Disorders of Voice. (3) S
Communication disorders related to dysfunction of the phonatory and resonance systems of voice production, assessment, and treatment. Prerequisite: SHS 310 or instructor approval.

580 Clinical Practicum. (1–6) F, S, SS
Supervised practicum in audiology or speech-language pathology. 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.

582 Differential Diagnosis of Communication Disorders. (3) F
Procedures for assessing speech/language disorders in children and adults. 3 hours lecture, 2 hours lab. Prerequisite: instructor approval.

584 Internship. (1–6) F, S, SS
Off-campus directed experiences in audiology or speech-language pathology. May be repeated for credit. Prerequisites: SHS 580; student must consult with coordinator before registration.

585 Disorders of Articulation. (3) F
Detailed analysis of disorders of articulation. Cross-listed as 4995. Prerequisites: SHS 250 and 310 or equivalents.

591 Seminar. (3) F, S, SS
Selected topics regularly offered:
(a) Autism and Pervasive Language Disorders
(b) Multiply Handicapped Child

596 Aural Rehabilitation. (3) S
Approaches to aural rehabilitation in children and adults. Introduction to educational audiology and assistive listening devices. Cross-listed as SHS 496. Prerequisite: SHS 375 or 400 or 500 or equivalent.

Omnibus Courses: See page 44 for omnibus courses that may be offered.

Women's Studies Program

Mary Logan Rothschild
Director
(SS 103) 602/965–2358

PROFESSORS

KOSS-CHIONO (Anthropology);
CODELL, MAGENTA (Art);
K. VALENTINE (Communication);
EDELSKY (Curriculum and Instruction);
BATAILLE, LIGHTFOOT, NILSEN,
SHINN (English); WELLS (Exercise
Science and Physical Education);
KRONENFELD (Health Administration
and Policy); FUCHS, GIFFIN,
ROTHSCHILD, WARNICKE (History);
JOHNSON, KELLY (Justice Studies);
AHERN, LOSSE (Languages and
Literatures); BERNSTEIN, CHASSIN,
EISENBURG, RUSSO (Psychology);
HACKETT, KERR (Psychology in
Education); COUDROGLOU (Social
Work); GORDON, LANER,
SMITH, WEITZ (Sociology)

ASSOCIATE PROFESSORS

BRANDT (Anthropology); FAHLRAN,
SCHLEIF (Art); CARLSON,
C. VALENTINE (Communication);
WILSON (Curriculum and Instruction);
ADAMS, GUTIERREZ, MINER,
MORGAN, SENSIBAR (English);
BAKER, MARTIN (Family Resources
and Human Development); STONER
(History); FERRARO, JURIK, ZATZ
(Justice Studies); RODD (Languages
and Literatures); COOK (Management);
WILLIAMSON (Music); KENNEY
(Nursing); DANTICO (Political Science);
METHA, MOORE (Psychology in
Education); WOODMAN (Social Work);
BENIN, MILLER-LOESSE (Sociology)

ASSISTANT PROFESSORS

HULICK (Art); HORAN (English);
DOUTHWAITE, GRUZINSKA
(Languages and Literatures);
WASSERMAN (Planning); BOWER
(Political Science); SAENZ (Psychology)

LECTURERS

HOPKINS, SCHEINER (Women's
Studies Program)

PROFESSOR EMERITUS

SHAFER (Educational Leadership
and Policy Studies)

The Women's Studies Program is an interdisciplinary university program, housed in the College of Liberal Arts and Sciences. Core and affiliated faculty hold tenure or tenure-track positions in traditional academic departments. Information on faculty affiliation is provided in parentheses for reference.

**WOMEN'S STUDIES—
B.A. OR B.S.**

The program consists of 45 semester hours of which 36 must be in Women's Studies and nine of which must be in a closely related field. At least 36 of the 45 semester hours required for the major must be completed in upper-division courses. In addition, for the B.S. degree, students must complete six hours in statistics, computer science, or quantitative research methods. This sequence must be approved by a women's studies advisor.

Required Courses. Five courses are required. Students must complete the following:

1. WST 100 or 300;
2. WST 376;
3. WST 484 Internship (3);
4. WST 498;
5. an upper-division course that provides a historical perspective on the lives and contributions of women;
6. an upper-division course that provides a humanities or fine arts perspective on the lives and contributions of women; and
7. an upper-division course on women in non-Western societies or a course on minority or ethnic women in American society.

A list of approved courses is available each term in the program office.

The historical perspective requirement may be fulfilled by completing HIS 333, 370, 371, or 422. The humanities perspective requirement may be fulfilled by completing ARA 485, ENG 461 or 462, or REL 390 (or an approved special topics course). No course may be used to satisfy more than one requirement.

Electives in a Closely Related Field.

Majors must complete nine hours of courses in a field closely related to Women's Studies, thereby completing the minimum core requirements in a single field. These courses may be

used to satisfy the general education requirements in the College of Liberal Arts and Sciences.

Minor in Women's Studies

The Women's Studies minor consists of 18 semester hours. Required courses are WST 100 (or 300) and 498 and 12 additional hours of approved women's studies courses taken after consultation with a women's studies advisor. Students pursuing a minor must register at least one semester before graduation.

**CERTIFICATE PROGRAM IN
WOMEN'S STUDIES**

The certificate program is equivalent to an interdisciplinary minor, consists of 21 hours, and is recommended for students outside the College of Liberal Arts and Sciences, graduate students, and nondegree students. Students pursuing a certificate must consult with a Women's Studies advisor. See page 91 for a description of the certificate program.

GRADUATE STUDIES

Although the Women's 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. Information on such programs can be obtained from the Women's Studies Program office.

COURSES IN WOMEN'S STUDIES

The following courses available through departments also count toward the 36 hours of courses in women's studies *when taught by women's studies faculty (or approved by petition)*:

			<i>Semester Hours</i>
ARA	485	Women's View of Art	3
ARS	498	Women and Art in the Middle Ages and the Renaissance	3
ARS	591	Women and Art in the Middle Ages and the Renaissance	3
ASB	211	Women in Other Cultures	3
CED	591	Women: Sense of Identity	3
COM	316	Gender and Communication ..	3
CPY	674	Counseling Women	3
ENG	461	Women and Literature	3
ENG	462	20th-Century Women Authors	3
EPE	441	Physiology of Women in Sport	3
FRE	471	The Literature of Francophone Africa and the Caribbean	3

HIS	370	Women in U.S. History: 1600–1880	3
HIS	371	Women in U.S. History: 1880–1980	3
HIS	422	Rebellious Women	3
JUS	329	Domestic Violence	3
JUS	422	Women, Law, and Social Control	3
JUS	560	Women and Crime	3
PGS	431	Gender Role Development	3
REL	390	Women and Religion	3
SOC	417	Family Violence	3
SOC	464	Women's Roles	3
SPF	515	Education of Women	3

Additional courses appear as Special Topics. These vary by semester. Check with the program office or the department for a current listing.

WOMEN'S STUDIES

WST 100 Women and Society. (3) F, S
Interdisciplinary introduction examining critical issues in women's studies. Not open to students who have credit for WST 300. *General studies: SB, C.*

300 Women in Contemporary Society. (3) F, S, SS
Intensive interdisciplinary examination of such topics as gender roles, work, education, sexuality, politics, health, and law. Not open to students who have credit for WST 100. *General studies: SB, C.*

372 Women in Judaism. (3) S
The impact of feminism on the legal, social, and cultural status of Jewish women in various historical and contemporary societies. Cross-listed as REL 373.

373 La Chicana. (3) F, S
This course examines the important role Mexican-American women, or Chicanas, played in historical, social, and political developments of the Southwest. *General studies: SB, C.*

376 Introduction to Feminist Theory. (3) F, S
Introduction to feminist theories and exploration of the intersection of gender, race, ethnicity, and class through critical analyses. Prerequisite: WST 100 or 300. *General studies: L1, C.*

457 Third-World Women. (3) F
Economic, sociopolitical, and demographic context for understanding the roles of third-world women in health, family, work, education, and community. Cross-listed as NUR 457/SPF 457. Prerequisite: 6 hours of social science credit or instructor approval. *General studies: SB, G.*

484 Internship. (1–3) A
Practical experience to enhance the academic perspectives that emerge from women's studies instruction. Prerequisite: preapproval by internship coordinator required.

498 Pro-Seminar: Theoretical Issues in Women's Studies. (3) A
Reading and research on important theoretical issues in women's studies. *General studies: L2.*

Omnibus Courses: See page 44 for omnibus courses that may be offered. Check with the program office for a current listing.

Zoology

James P. Collins
Chair
 (LS C226) 602/965-3571

REGENTS' PROFESSOR ALCOCK

PROFESSORS
 ALVARADO, CHANDLER, CHURCH,
 COLLINS, DOANE, FAETH, FISHER,
 HADLEY, HAZEL, HEDRICK,
 LAWSON, MAIENSCHIN, MARKOW,
 MCGAUGHEY, MINCKLEY, OHMART,
 RISSING, RUTOWSKI, SATTERLIE,
 A. SMITH, WALSBURG

ASSOCIATE PROFESSORS
 CAPCO, FOUQUETTE, GOLDSTEIN,
 MOORE, G. SMITH

ASSISTANT PROFESSORS
 COOPER, DOWLING,
 ELSER, HARRISON

PROFESSORS EMERITI
 BENDER, CAZIER, CLOTHIER, COLE,
 GERKING, HANSON, JUSTUS,
 LANDERS, PATTERSON,
 RASMUSSEN, WOOLF

BIOLOGY—B.S.

The major in Biology is offered jointly by the Department of Zoology and the Department of Botany. Students are advised by a member of either department. This major serves students desiring a broader program in the biological sciences than provided by the more specialized majors of the individual departments.

The major consists of 43 hours and 20 hours in supplementary areas, plus a mathematics proficiency. The required major courses totaling 31 hours are as follows: BIO 181, 182, 320, 340; BOT 300, 360 (or ZOL 360); MIC 206, 220; ZOL 350. The remaining 12 upper-division hours are selected so that the total major hours reflect a balance between the two departments. Required supplementary courses are as follows: CHM 113, 115; CHM 231 or the sequence CHM 331 and 332 and 335 and 336; CSE 181 or 183; MAT 210 or any calculus; PHY 101 or the sequence PHY 111 and 112 and 113 and 114.

WILDLIFE CONSERVATION BIOLOGY—B.S.

Two options are available: the terrestrial and the aquatic option. Both op-

tions consist of 62 hours in the major and supplementary courses, plus mathematics proficiency. Courses required for both options are as follows: BIO 181, 182, 217, 320, 340, 415; CHM 113, 115; CHM 231 or the sequence CHM 331 and 332 and 335 and 336; ENG 301; MAT 210 or any calculus; ZOL 360, 410, 411, 413.

Terrestrial Option. Additional required courses for this option are as follows: BOT 370; ERA 370 or 360; ZOL 471 or 472.

Aquatic Option. Additional required courses for this option are as follows: BIO 426; ZOL 370 (or 350), 473.

These requirements meet the minimum for eligibility for the Federal Register. Students planning to enter graduate school from either option should take CHM 331, 332, 335, and 336 instead of CHM 231 and should take PHY 111, 112, 113, and 114.

ZOOLOGY—B.S.

The major in Zoology consists of 40 hours in major courses and 17 hours in required supplementary courses, plus math proficiency. Required courses are as follows: BIO 181, 182, 320, 340, 445; CHM 113, 115; CHM 231 or the sequence CHM 331 and 332 and 335 and 336; MAT 210 or any calculus; PHY 101 or the sequence PHY 111 and 112 and 113 and 114; ZOL 280, 330, 331, 360, 370 (or 350 or 354). The remaining six hours may be selected from upper-division BIO or ZOL courses.

Undergraduate Thesis Option. To fulfill the six semester hours of zoology electives, a student may arrange to conduct a laboratory or field research project under the supervision of a member of the Zoology faculty. At least three semester hours are taken as BIO 310 or ZOL 499 and three semester hours as ZOL 495 Undergraduate Thesis. This option culminates in the production of a thesis by the student that describes the research project and a thesis defense. See the Department of Zoology office for a complete description of this option.

MINOR IN ZOOLOGY

The Zoology minor consists of 24 semester hours in BIO and ZOL courses, including BIO 181 and 182, and 16 hours selected with approval of an advisor in the Department of Zoology; at least 12 hours must be in the upper di-

vision. Courses not available for credit in the Zoology major cannot be used for the minor (e.g., BIO 100, ZOL 201). This minor is not available to students majoring in the life sciences.

SECONDARY EDUCATION— B.A.E.

See pages 96–97 for information on the academic specialization in biological sciences.

GRADUATE PROGRAM

The Department of Zoology offers programs leading to the degrees of Master of Natural Science, Master of Science, and Doctor of Philosophy (with a concentration in ecology for the Master of Science and the Doctor of Philosophy). Consult the *Graduate Catalog* for requirements.

The department participates in the new interdisciplinary program for the Master of Science and Doctor of Philosophy degrees in Molecular and Cellular Biology. See pages 139–140 for courses. For more information, contact Dr. Douglas Chandler, LS C592, 602/965-5662.

BIOLOGY

For courses in biology, see "Biological Sciences," pages 96–97.

ZOOLOGY

ZOL 113 Contemporary Zoology. (4) F, S Topics emphasizing socially relevant problems. Cannot be used for major credit in the biological sciences. 3 hours lecture, 3 hours lab. *General studies:* S2.

120 Human Physiology. (4) F, S Basic concepts of general science will be discussed using current issues and basic concepts of human physiology as a focus. Cannot be used for major credit in biological sciences. 3 hours lecture, 3 hours lab. *General studies:* S2.

201 Human Anatomy and Physiology I. (4) F, S, SS Structure and dynamics of the human mechanism. Cannot be used for major credit in the Department of Zoology. 3 hours lecture, 3 hours lab. *General studies:* S2.

202 Human Anatomy and Physiology II. (4) F, S, SS Continuation of ZOL 201. Cannot be used for major credit in the Department of Zoology. 3 hours lecture, 3 hours lab. Prerequisite: ZOL 201 or instructor approval.

241 Human Genetics. (3) F, S Introduction to human heredity and variation. Cannot be used for major credit in the Department of Zoology. Prerequisite: a course in the life sciences.

280 Animal Behavior. (3) F Evolutionary, genetic, physiological, and ecological bases of animal behavior. Prerequisite: 4 hours of BIO or ZOL or instructor approval.

- 300 Biogenetics of Man.** (4) S
Concepts of ecology, heredity, evolution, and their relation to human affairs. Cannot be used for major credit in life sciences.
- 311 Animal Microtechnique.** (2) N
Zoological microtechnique, including the preparation for microscopic examination of animal structures, tissues, cells, and whole mounts. 6 hours lab. Prerequisite: BIO 182.
- 316 History of Biology: Conflicts and Controversies.** (3) N
Focuses on 19th and 20th centuries, considering biology as a discipline, evolution, and problems of heredity, development, and cell theory. Cross-listed as HPS 330. *General studies: H.*
- 318 History of Medicine.** (3) N
Scientific study of the human body, changing theories of disease, evolution of practical opinions on treatment, and the emerging institutionalization of medical practice. Cross-listed as HPS 331. *General studies: H.*
- 330 Developmental Anatomy.** (3) F
General developmental biology (embryology) and comparative structure of organ systems, illustrated mainly by vertebrate examples. Prerequisite: BIO 182.
- 331 Laboratory in Vertebrate Developmental Anatomy.** (2) F, S
Morphology of representative embryonic and adult vertebrates. Two 3-hour labs. ZOL 330 recommended. Prerequisite: BIO 182.
- 350 Comparative Invertebrate Zoology.** (4) F
Characteristics, life cycles, adaptations, and evolution of invertebrate animals. 3 hours lecture, 3 hours lab. Prerequisite: BIO 182 or instructor approval.
- 354 General Entomology.** (4) S '96
Form, activities, and classification of insects. 3 hours lecture, 3 hours lab. Prerequisite: BIO 182.
- 360 Basic Physiology.** (4) F, S
Physiological mechanisms of the higher vertebrates. 3 hours lecture, 3 hours lab. Prerequisites: BIO 182; CHM 115; MAT 117.
- 370 Vertebrate Zoology.** (4) S
Characteristics, classification, evolution, and natural history of the major groups of vertebrate animals. 3 hours lecture, 3 hours lab. Prerequisite: BIO 182.
- 380 Sociobiology.** (3) S
Survey of animal and human social behavior examined from an evolutionary perspective. Suitable for nonmajors. ZOL 280 is recommended.
- 394 Special Topics (Nonmajors).** (2–3) N
Topics of current or special interest in one or more aspects of animal biology. Topics vary. Cannot be used for major credit in life sciences. Prerequisite: junior standing.
- 410 Techniques in Wildlife Conservation Biology.** (3) F
Field and analytical techniques used in evaluating population structure, viability and environmental impacts. Lecture, lab. Prerequisites: BIO 217 and 320 or instructor approval. *General studies: L2.*
- 411 Biology and Management of Terrestrial Wildlife.** (3) S
Principles, theories, and practices of managing terrestrial wildlife from habitat and population perspectives. Prerequisites: BIO 217 and 320 and ZOL 471 and 472 or instructor approval.
- 413 Biology and Management of Aquatic Resources.** (3) F
Principles, theories, and practices of managing aquatic resources. Prerequisites: BIO 217 and 320 and ZOL 473 or instructor approval.
- 420 Field Zoology.** (3) N
Experience in zoological field techniques. Requires weekend or longer field trips. Prerequisite: instructor approval.
- 423 Population and Community Ecology.** (3) N
Organization and dynamics of population and communities, emphasizing animals. Theoretical and empirical approaches. Prerequisite: BIO 320 or instructor approval.
- 425 Animal Ecology.** (3) N
Physiological and behavioral adaptations of individual animals to both abiotic and biotic environments. Prerequisite: BIO 320.
- 433 Animal Histology.** (4) S
Microscopic study of animal tissues. 3 hours lecture, 3 hours lab. Prerequisite: BIO 182 or instructor approval.
- 440 The Nucleus.** (3) N
Experimental studies in chromatin and chromosome structure. Molecular mechanisms of chromosome movement and mechanics, cell population kinetics, the nucleolus, and the nuclear envelope. Prerequisites: BIO 340; CHM 261, 335 (or 361).
- 441 Principles of Human Genetics.** (3) N
Genetics in human populations, including medical aspects. Prerequisite: BIO 340.
- 454 Aquatic Insects.** (3) N
Systematics and ecology of aquatic insects. Prerequisite: ZOL 354.
- 465 Neurophysiology.** (3) S '96
Detailed treatment of cellular and organismal neurophysiology and nervous system function. Prerequisite: ZOL 360.
- 466 Neurophysiology Laboratory.** (2) S '96
Intracellular and extracellular electrophysiological recording techniques, histological preparations, and dye-filling techniques. 6 hours lab. Pre- or corequisite: ZOL 465.
- 470 Systematic Zoology.** (3) S '95
Philosophy, theory, and practice in interpreting patterns of animal diversity, including species concepts and speciation, nomenclature and taxonomy, and evolutionary and phylogenetic classification. Prerequisites: junior standing; 18 hours in life science. *General studies: L2.*
- 471 Ornithology.** (3) S
The biology of birds. 2 hours lecture, 3 hours lab, weekend field trips. Prerequisite: ZOL 370 or instructor approval.
- 472 Mammalogy.** (4) F '94
Classification, structure, habits, ecology, and distribution of mammals, emphasizing North American forms. 3 hours lecture, 3 hours lab or field trip, weekend field trips. Prerequisite: ZOL 370 or instructor approval.
- 473 Ichthyology.** (3) S '95
Systematics and biology of recent and extinct fishes. 2 hours lecture, 3 hours lab or field trip, weekend field trips required. Prerequisites: ZOL 370 and 425 or instructor approval. *General studies: L2.*
- 474 Herpetology.** (3) S '96
Systematics and biology of recent and extinct reptiles and amphibians. 2 hours lecture, 3 hours lab or field trip. Prerequisite: ZOL 370.
- 481 Research Techniques in Animal Behavior.** (3) S '96
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: ZOL 280. *General studies: L2.*
- 495 Undergraduate Thesis.** (3) F, S, SS
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 or ZOL 499; formal conference with instructor; instructor and department chair approval.
- 508 Scientific Data Presentation.** (2) F
Techniques necessary for presentation of scientific data used in journal publications, grant proposals, and visual presentations. Lecture, lab. Prerequisite: instructor approval.
- 515 Populations: Evolutionary Genetics.** (3) F
Mathematical models in the description and analysis of the genetics of populations. Prerequisites: BIO 320 and 415 and 445 or instructor approval.
- 516 Populations: Evolutionary Ecology.** (3) S
Principles of population biology and community ecology within an evolutionary framework. 2 hours lecture, 2 hours recitation. Prerequisites: BIO 320, 415 (or MAT 210); ZOL 515.
- 517 Techniques in Evolutionary Genetics.** (4) S
Practical experience in modern techniques for the study of evolution. Lecture, lab. Prerequisites: BIO 340, 445; instructor approval.
- 532 Developmental Genetics.** (3) S '96
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 443.
- 560 Comparative Physiology.** (3) S '95
The analysis of function in invertebrates and vertebrates, emphasizing evolutionary trends in physiological systems. Prerequisite: ZOL 360 or equivalent.
- 566 Environmental Physiology.** (3) S '96
Physiological responses and adaptations of animals to various aspects of the physical environment. Prerequisites: BIO 320; ZOL 360.
- 568 Mammalian Physiology.** (3) F '95
Detailed treatment of mammalian organ system functions emphasizing integrative mechanisms. Prerequisite: ZOL 360 or equivalent.
- 569 Cellular Physiology.** (3) F '94
Emphasizing the molecular basis for cell structure and function. Prerequisites: ZOL 360 and organic chemistry.
- 591 Seminar.** (1–3) F, S
Topics such as the following will be offered:
(a) Behavior
(b) Cell Biology
(c) Ecology
(d) Genetics
(e) Physiology
(f) Evolution
(g) Adaptations
(h) Genetic Engineering
May be repeated for credit.
- Omnibus Courses:** See page 44 for omnibus courses that may be offered.