

**5980-5990. Special Problems.** 1–3 hours each. Special problems in advanced physics for graduate students. Problem chosen by the student with the approval of the supervising professor.

**6000. Mathematical Methods of Physics I.** 3 hours. Complex variables, Laurent series, contour integration, integral transformations, dispersion relations, approximations methods, ordinary differential equations. Legendre, Bessel functions. Sturm-Liouville theory, eigenvalue problem. Green's functions. Prerequisite(s): PHYS 3310.

**6001. Mathematical Methods of Physics II.** 3 hours. Floquet theory, Mathieu and Hill equations, elliptic functions, vector spaces and Hilbert spaces, linear operators and elements of spectral theory. Green's functions, integral equations, non-linear wave equations and approximation techniques. Prerequisite(s): PHYS 6000.

**6010. Advanced Classical Mechanics II.** 3 hours. Non-linear dynamics; chaos; fractals; classical field theory; hydrodynamics and non-linear waves. Prerequisite(s): PHYS 5710.

**6030. Electromagnetic Theory II.** 3 hours. Waves in plasma; waves in inhomogeneous, anisotropic and non-linear media. Radiation and diffraction; particle radiation and energy loss in matter. Scattering. Multipole fields. Covariant formulation and classical field theory. Prerequisite(s): PHYS 5720.

**6110. Statistical Mechanics I.** 3 hours. Equilibrium classical and quantum statistical mechanics and thermodynamics with applications to real gases, liquids, solids, spin systems and phase transitions. Prerequisite(s): PHYS 4110 and 5510.

**6120. Statistical Physics.** 3 hours. Non-equilibrium classical and quantum statistical mechanics, including Boltzmann equations, BBGKY hierarchy, transport theory and dielectric properties of systems; fluctuations and irreversible processes. Prerequisite(s): PHYS 6110 or consent of department.

**6155. Communication in Scientific Teaching and Research.** 3 hours. Basics of technical writing; techniques for seeking and obtaining research funding; research proposal writing; research presentations; research publications; job applications and interviewing; the workings and organization of academic institutions, government agencies and private industry.

**6160. Introduction to Scattering Theory I.** 3 hours. Partial waves; effective range theory; integral equation approach; resonances; bound states; Variational and R-Matrix methods. Emphasis on applications. Prerequisite(s): PHYS 5510.

**6161. Introduction to Scattering Theory II.** 3 hours. Time-dependent potential scattering, the general theory of collisions, electron-ion collisions, resonances, ion-ion collisions, ion-atom collisions, density matrix formulation and atoms in intense fields. Emphasis on applications.

**6330. Atomic and Molecular Physics I.** 3 hours. Atomic, molecular structure; construction of periodic table. Experimental basis. One-, few- and many-electron systems; Hartree-Fock, Thomas Fermi methods; inner and outer shell phenomena. Prerequisite(s): PHYS 5510.

**6340. Atomic and Molecular Physics II.** 3 hours. Applications of scattering theory. Born approximation, phase shifts, effective range theory; density operator; scattering and transition matrices. Interaction of large and weak EM fields with matter. Laser spectroscopy. Prerequisite(s): PHYS 6330.

**6450-6460. Advanced Solid State Physics.** 3 hours each. A two-course sequence designed to prepare graduate students for research in several areas of current interest in solid state physics. Topics include lattice vibration and

phonon spectra; band theory, including calculational schemes, symmetry considerations and application to metals and semiconductors; optical and magnetic properties of solids. Prerequisite(s): PHYS 5510 and 5450, or consent of department.

**6500-6510. Advanced Quantum Theory.** 3 hours each.

**6500.** Dirac and Heisenberg formalisms, second quantization and quantum theory of radiation. Dirac equation and its applications. Prerequisite(s): consent of department.

**6510.** Quantization of Dirac, Klein-Gordon fields, interactions, S-matrix theory, perturbation theory and applications. Prerequisite(s): PHYS 6500 or consent of department.

**6750. Selected Topics in Theoretical Physics.** 3 hours. Advanced topics selected from areas of theoretical and mathematical physics, including relativity, field theory, elementary particles and the many-body problem. Prerequisite(s): consent of department. May be repeated for credit as topics vary.

**6800. Selected Topics in Solid State Physics.** 3 hours. Advanced topics selected from specialized areas of solid state physics. Prerequisite(s): consent of department. May be repeated for credit as topics vary.

**6900-6910. Special Problems.** 1–3 hours each. Special problems in experimental or theoretical physics for advanced graduate students. Problem chosen by the student with the approval of the supervising professor.

**6940. Individual Research.** 1–12 hours. To be scheduled by the doctoral candidate engaged in research. May be repeated for credit.

**6950. Doctoral Dissertation.** 3, 6 or 9 hours. To be scheduled only with consent of department. 12 hours credit required. No credit assigned until dissertation has been completed and filed with the graduate dean. Doctoral students must maintain continuous enrollment in this course subsequent to passing qualifying examination for admission to candidacy. May be repeated for credit.

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## Political Science

*International Studies* – see *Undergraduate Catalog*

### *Political Science, PSCI*

**5020. Proseminar in American Government and Politics.** 3 hours. Concepts, research, analytical methods and literature drawn from the leading scholars in the various areas of the field.

**5050. Seminar in American Government and Politics.** 3 hours. Analysis of pertinent government and political problems confronting the American people on the national, state and local levels. May be repeated for credit as topics vary.

**5220. Proseminar in Public Law.** 3 hours. Concepts, research, analytical methods and literature drawn from leading scholars in various areas of the field.

**5230. Seminar in American Public Law.** 3 hours. The legal framework within which American governmental processes operate; analysis of substantive legal rules and basic processes by which law is made and applied. May be repeated for credit as topics vary.

**5310. Proseminar in Political Theory.** 3 hours. Explores the variety of concepts, research, analytical methods and literature drawn from leading scholars in various areas of the field.

**5340. Seminar in Political Science Scope and Methods.** 3 hours. Concepts, trends and research design in political science.

**5350. Topics in Political Theory.** 3 hours. Study of selected theorists or themes in political philosophy. Seminar may include works of ancient, medieval or modern theorists, focusing on issues of power and justice, human nature and politics, and the nature of the best political system. Themes might include liberalism and conservatism, ethics and international politics, or American political thought. May be repeated for credit as topics vary.

**5420. Proseminar in Public Administration.** 3 hours. Concepts, research, analytical methods and literature drawn from leading scholars in various areas of the field.

**5610. Proseminar in Comparative Government.** 3 hours. Concepts, research, analytical methods and literature drawn from leading scholars in various areas of the field.

**5650. Seminar in Area Studies.** 3 hours. The institutions and processes of the major regional areas of the world: Africa, Asia, Europe, the former Soviet Union, Western Europe, Latin America and the Commonwealth. May be repeated for credit as topics vary.

**5810. Proseminar in International Relations.** 3 hours. Concepts, research, analytical methods and literature drawn from leading scholars in various areas of the field.

**5820. Seminar in International Relations.** 3 hours. Selected problems and concepts related to the theory and practice of international politics, international law, and organization and foreign policy. May be repeated for credit as topics vary.

**5900-5910. Special Problems.** 1–3 hours each. Conference courses open to advanced students capable of doing independent research under the direction of the instructor. Prerequisite(s): consent of department chair.

**5950. Master's Thesis.** 3 or 6 hours. To be scheduled only with consent of department. 6 hours credit required. No credit assigned until thesis has been completed and filed with the graduate dean. Continuous enrollment required once work on thesis has begun. May be repeated for credit.

**6000. Research Seminar.** 3 hours. Specialized study and research in the field of political science. May be repeated for credit.

**6100. Political Science Teaching and Research.** 3 hours. Classroom methods for political science instruction, as well as basic research and job-hunting skills. Pass/no pass. May be repeated for credit as topics vary. Hours may not count toward graduate degree plans.

**6320. Quantitative Political Research Methods.** 3 hours. Empirical research design and contemporary statistical applications in political science, including an introduction to the use of computers. An undergraduate introductory statistics course would be useful prior to registering for this course.

**6340. Time Series Methods for Political Data.** 3 hours. Focuses on methods for analyzing dynamic relationships among political variables. Topics include pooled cross-sectional time series designs, ARCH, ECM, State-Space, VAR and Box-Jenkins-Tiao intervention-transfer function models. Emphasis is placed on the application of these methodologies using mainframe and microcomputer

programs such as BMDP, MICROCRUNCH, RATS and SPSS PC + TRENDS. Prerequisite(s): PSCI 6320 or consent of instructor.

**6900-6910. Special Problems.** 1–3 hours each. Conference courses for doctoral students. Directed reading and research in fields of special interest. Prerequisite(s): consent of department.

**6930. Individual Research.** 1–12 hours. Independent doctoral research prior to comprehensive examinations. May be repeated for credit. Pass/no pass only. Prerequisite(s): approval of graduate adviser.

**6940. Practicum.** 3–6 hours. Pre-dissertation independent research, under faculty supervision. May be repeated for credit up to 6 hours. Partially fulfills the tool requirement. Prerequisite(s): must be near completion of course work.

**6950. Doctoral Dissertation.** 3, 6 or 9 hours. To be scheduled only with consent of department. 12 hours credit required. No credit assigned until dissertation has been completed and filed with the graduate dean. Doctoral students must maintain continuous enrollment in this course subsequent to passing qualifying examination for admission to candidacy. May be repeated for credit.

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## Portuguese

see *Undergraduate Catalog*

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## Psychology

### *Psychology, PSYC*

**5010. Human Development.** 3 hours. An integrated rather than specialized view of the biophysical, sociocultural, psychoemotional and intellectual development of human beings in Western culture. Development is viewed as a product of the interaction of genetic endowment with the environment.

**5021. Interviewing I.** 3 hours. Interviewing theory and strategies for psychotherapeutic purposes. Prerequisite(s): open only to graduate students in psychology.

**5022. Interviewing II.** 3 hours. Application of different interview theories to counseling and psychotherapy in mental health settings. Prerequisite(s): open only to graduate students in psychology.

**5040. Cultural Aspects of Health.** 3 hours. Conceptual frameworks to understand factors influencing patterns of health (psychological, biological and social) across cultures and subcultures. Behavioral medicine perspective of health and disease; illustration of their unique and common elements in sociopolitical and environmental contexts.

**5050. Seminar in Psychology: Current Issues.** 1–4 hours. Issues and topics of current interest to students in the various graduate programs but not covered by course offerings. May be repeated for credit.

**5060. History and Systems.** 3 hours. Philosophical and physiological roots of psychology; traditional historical systems, including structuralism, functionalism, behaviorism, Gestalt and psychoanalysis; relevance to major contemporary systems.