877. Equilibrium Statistical Mechanics
Fall. 3(3-0) Approval of department. Ensembles, partition functions, thermodynamic potentials with applications to simple thermodynamics; topics from many-body theory.

878. Nonequilibrium Statistical Mechanics
Winter. 3(3-0) 877. Time-dependent Liouville equation, Boltzmann equation, and master equation, with application to relaxation processes and atomic, molecular, and nuclear systems.

879. Quantum Statistical Mechanics
Spring. 3(3-0) 878. Green's function techniques with application to transport theory, superconductivity, magnetism.

919. Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

927. Elementary Particle Physics
Fall. 3(3-0) 889. Properties of elementary particles; invariance principles and conservation laws; strong, electromagnetic, and weak interactions; pion physics.

928. Elementary Particle Physics
Winter. 3(3-0) 927. Rayon models, meson resonances, unitary symmetry, dispersion relations.

929. Elementary Particle Physics
Spring. 3(3-0) 928. Selected current topics, partial wave amplitudes and Regge poles; current algebra and weak interactions.

937. Molecular Structure and Spectra I
Fall of odd-numbered years. 3(3-0) 937 or concurrently. Structure and spectra of diatomic molecules.

938. Molecular Structure and Spectra II
Winter of even-numbered years. 3(3-0) 937. Structure and spectra of polyatomic molecules.

939. Molecular Structure and Spectra III
Spring of even-numbered years. 3(3-0) 938. Advanced topics in vibration-rotation theory of polyatomic molecules.

947. Solid State Physics I
Fall. 3(3-0) 830 and 840. Crystal symmetry, crystal binding, lattice vibrations and specific heat, one-electron theory; Harte-Fock equation, Brillouin zones.

948. Solid State Physics II
Winter. 3(3-0) 947. Effective mass approximation. Exchange and correlation corrections. Theory of conductivity and related effects, metals and semiconductors.

949. Solid State Physics III
Spring. 3(3-0) 948. Ionic crystals. Impurities in crystals, plastic deformations, color centers. Optical properties. Rectification, transistors, selected topics.

957. Nuclear Physics I
Fall. 3(3-0) 867. Nucleon-nucleon scattering, nuclear sizes and shapes, multiple moments; shell model; collective states.

958. Nuclear Physics II
Winter. 3(3-0) 957. Experimental methods and instrumentation; nuclear reactions; inelastic scattering and particle transfer.

959. Nuclear Physics III
Spring. 3(3-0) 958. Many-body methods in nuclear physics; Bethe-Goldstone equation; effective interaction; nuclear models.

960. Techniques in Nuclear and Particle Physics
Fall. 3(3-0) Approval of department. Properties of accelerators and particle beams; passage of radiation through matter, particle detection, pulse electronics, statistics, on-line computation.

961. Accelerator Physics

964. Advanced Readings in Physics
Fall, Winter, Spring, Summer. Variable credit.

967. Advanced Topics in Physics
Fall, Winter, Spring. 3(3-0) or 4(4-0). In any one term this course will be devoted to a single topic, such as advanced quantum theory, quantum electrodynamics, specialised topics in solid state physics, statistical mechanics, relativity theory and cosmology.

989. Waves and Radiations in Plasmas
Fall of even-numbered years. 3(3-0) 859. Interdepartmental with the Astronomy Department and Electrical Engineering and administered by Electrical Engineering. Plasma oscillation; interaction, electromagnetic fields with plasmas, wave propagation in magnetohydrodynamic plasma sheath; radiation of electric source in incompressive and compressive plasmas; electrouesistive waves; magnetohydrodynamic research topics in plasmas.

999. Research
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

PHYSIOLOGY PSL

College of Human Medicine
College of Natural Science
College of Osteopathic Medicine
College of Veterinary Medicine

240. Introductory Physiology
Fall, Spring, Summer. 4(3-2) Sophomores or approval of department. Survey of the physiology of circulatory system, excretion, nervous system and special senses, digestion, metabolism and endocrinology.

241. Introductory Physiology
Winter. 4(3-2) 240. Continuation of 240. Physiology of muscle function and neuro-muscular relationships; exercise; respiration; changes in organ systems in relation to muscular exercise.

323. Physiology, Anatomy, and Histology of the Eye
Fall. Summer of even-numbered years. 3(2-2) 240; Elementary Education or Special Education major, or approval of department.

Human Physiology
Winter. 4(3-2) 331. Basic course in anatomy, physiology, and hygiene of the visual system; includes discussion of normal visual functioning and abnormal visual functioning, with methods of correction and education implications.

331. Human Physiology
Winter. 4(3-2) 331.

401. Comparative Physiology I
Fall. 4(3-4) 340 or B 5 219 and CEM 132. Interdepartmental with Department of Zoology. A comparison of osmoregulation, digestion, respiration, and other physiological processes in a wide range of organisms.

402. Comparative Physiology II
Winter. 4(4-0) 401 or approval of department. Interdepartmental with and administered by the Department of Zoology. A comparison of sensory, motor, endocrine and other integrative mechanisms in animals.

416. Physiology of the Cell
Fall. 3(3-0) CEM 242 or 353. Physiologic mechanisms common to all living cells with emphasis on those of the vertebrates. The functions of the cell membrane and cytoplasm are studied as the basis for the physiologic behavior of vertebrate organs and systems.

417. Physiology of the Cell
Summer. 4(3-3) 4(6-6) 5 weeks. This is equivalent to 3 hours of lecture and 3 hours of laboratory on a ten-week basis. Approval of department. Physiologic mechanisms common to all living cells with emphasis on those of the vertebrates. The functions of the cell membrane and cytoplasm are studied as the basis for the physiologic behavior of vertebrate organs and systems.

440. Avian Physiology
Spring of odd-numbered years. 4(3-2) Approval of department. Interdepartmental and administered jointly with the Poultry Science Department. A survey of the systemic physiology of birds emphasizing digestion, metabolism, the endocrine and reproductive systems.

444. Milk Secretion

445. Endocrinology and Reproduction of Farm Animals
Fall. 4(3-2) 340 Interdepartmental and administered jointly with the Dairy Science Department. Endocrine and reproductive systems are presented with emphasis upon characteristics which can be altered for economic benefit and upon causes, prevention, and treatment of endocrine abnormalities.
480. Special Problems  
Fall, Winter, Spring, Summer. 1 to 5 credits. Approval of department.

497. Principles of Endocrinology  
500A. Introductory Physiology for Medicine  
Fall, Winter, 3(3-0) or 5(3-0)  
Admission to the professional program in a college of medicine.  
Concepts and problems in physiology to be followed by supplemental physiology instruction during subsequent phases of medical training.

500B. Introductory Physiology for Medicine  
Summer, 3(3-0) or 4(3-1)  
Admission to the professional program in a college of medicine.  
Classical concepts and problems in physiology which form a base for clinical physiology training in subsequent terms.

500C. Introductory Physiology for Medicine  
Fall, 3(3-0) or 4(3-1)  
Admission to the professional program in a college of medicine.  
Continuation of 500B.

501. Advanced Mammalian Physiology  
Winter, 5(5-0)  
Approval of department.

502. Advanced Mammalian Physiology  
Spring, 6(5-4)  
Continuation of 501; reproduction; blood and cardiovascular system; respiration and kidney.

808. Advanced Endocrinology  
Winter, 3(3-0)  
Approval of department.

180. Advanced Comparative Physiology  
Fall, 4(3-4)  
B S 213 or approval of department.

815. Sensory Physiology  
Winter of even-numbered years. 3(2-2)  
Not open to students with credit in 333.  
Approval of department.

819. Kidney Physiology and Electrolyte Metabolism  
Spring, 3(3-0)  
502.  
Critical study of the literature on classical and contemporary principles of renal physiology and related aspects of body fluid and electrolyte metabolism.

835. Neurophysiology  
Winter of odd-numbered years. 4(2-4)  
Approval of department.

836. Physical Principles of Biological Systems  
Winter, 3(3-0)  
Application of laws and methods of physics to measurement and description of physiological phenomena.

837. Radiobiology  
Fall, 3(3-0)  
Approval of department.

885. Analysis of Hormone Action  
Spring, 4(4-6)  
ZOL 317, or approval of department and administered by the Zoology Department.

915. Respiratory Physiology  
Fall, 4(3-2)  
502, approval of department.

919. Cardiovascular System  
Fall, 4(3-2)  
Outstanding literature on physiology of heart, blood vessels and lymph vessels, hemodynamics, cardiac output and circulation in special regions. Appropriate methodology discussed. Laboratory work illustrates principles of special procedures.

950. Topics in Physiology  
Fall, Winter, Spring, Summer. 1 to 3 credits. May re-enroll for a maximum of 9 credits. Approval of department.

980. Problems  
Fall, Winter, Spring, Summer. 1 to 3 credits. May re-enroll for a maximum of 9 credits. Approval of department.

999. Research.  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

POLITICAL SCIENCE

College of Social Science

100. American National Government  
(300.) Fall, Winter, Spring, Summer. 4(3-6)  
Not open to majors.

140. Comparative Politics  
Fall, Winter, Spring, 4(3-0)  
Comparison of political systems in western and non-western nations.

160. International Relations  
(260.) Fall, Winter, Spring. 4(2-0)  
Contemporary world affairs surveyed. The struggle for power, the nation-state system; factors creating harmony and hostility among nations. War and peace in our time.

170. The Iams  
Fall, Winter, Spring, 4(3-0)  
Introduction to basic contemporary political ideologies; theoretical foundations of democracy, socialism, communism, political elitism, and nationalism. Special attention to ideology underlying contemporary political problems.

200. Introduction to Political Science  
Fall, Winter, Spring, Summer. 4(3-0)  
Acquaints the student with the theories, methods and concepts of political science. Emphasis is on ideology and interest groups in the political process.

290. Methods of Political Research  
Fall, Winter, 4(3-0)  
200.  
Design and execution of research in political behavior and institutions. Major emphasis on logic underlying various types of political research, on identification of appropriate data sources and field methods.