989. ElectrodynamicsofPlasmas II
Winter of odd-numbered years. 3(3-0)
One fluid plasma model, magnetohydrodynamics. Maxwell's stress tensor, low frequency waves, transport phenomena, Landau damping, collision and rate coefficients. Diffusions in a magnetic field; investigation of dc, rf and microwave discharges.

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

Astronomy and Astrophysics

AST

119. General Astronomy (N)
Fall, Winter, Spring, Summer. 4(4-0)
Intended primarily for non-science majors. Not open to engineering or physical science majors. Students may not receive credit in more than one of the following: AST 119, AST 217, AST 229; N S 135, S N 155.
A qualitative presentation of the current view of the universe including birth and death of stars, cosmology, comparisons of planets, and life in the universe.

217. General Astronomy (N)
Fall, Winter, Spring, 4(4-0) MTH 100 or MTH 111. High school physics recommended. Students may not receive credit in more than one of the following: AST 119, AST 217, AST 229; N S 135, S N 155.
A semi-quantitative presentation of current views of the universe including birth and death of stars, cosmology, comparisons of planets, and life in the universe, and their interpretation through physical laws.

229. General Astronomy
Fall, 4(4-0) PHY 287 or PHY 291H or concurrently: MTH 113. Intended for physics and astronomy majors and recommended for astrophysics majors. Students may not receive credit in more than one of the following: AST 119, AST 217, AST 229; N S 135, S N 155.
Fundamental observations in astronomy, and their interpretation through physical laws. Quantitative discussion of orbital motion, time, telescopes, solar system, stars, galaxies, and cosmology.

230. General Astronomy
Winter. 3(3-0) AST 229.
Fundamental observations in astronomy and their interpretation through physical laws. Continuation of AST 229.

327. Practical Astronomy
Spring. 3(3-0) AST 230.

442. Radiation Astrophysics
Winter of even-numbered years. 2(3-0)
PHY 395.
Emission, absorption and transfer of radiation in an astrophysical context. Stellar atmospheres, line formation, plasma diagnostics. Synchrotron radiation.
431. Human Physiology

Winter. 4(4-0) One year of biological science or ANT 316, CEM 121 or CEM 141.

Physiology of the digestive, endocrine, nervous, and reproductive systems.

432. Human Physiology

Spring. 4(4-0) PSL 431 or approval of department.

Physiology of the autonomic nervous, cardiovascular, renal, and respiratory systems.

433. Human Physiology Laboratory

Spring. 1(0-3) PSL 431, PSL 432 or concurrently or approval of department.

Human and vertebrate animal experiments demonstrate fundamental physiological processes. Responses to sensory inputs are systematically studied; numerical data are tabulated and analyzed.

435. Mammary Physiology

(Fall) 4(4-0) PSL 431, BCH 200 or BCH 401. Interdepartmental with and administered by the Department of Animal Science.


436. Principles of Animal Reproduction

(Fall) 4(4-0) PSL 431, BCH 200 or BCH 401. Interdepartmental with and administered by the Department of Animal Science.

Processes of reproduction and endocrinology with special emphasis on anatomy of reproductive systems, folliculogenesis, gametogenesis, reproductive cycle, fertilization, sex determination, gestation and artificial regulation of these reproductive events for economic benefit.

455. Asian Physiology

(Fall) 4(4-0) Approval of department and administered by the Department of Animal Science.

Systemic physiology of birds emphasizing respiration, circulation, temperature regulation, the endocrine, and reproduction.

470. Biological Membranes

(IOC 470) Spring, 3(3-0) BCH 401. Interdepartmental with the departments of Biochemistry, and Microbiology and Public Health.

The chemistry, physics and mathematics of the permeability, energy transductions and surface functions of differentiated cell membranes and membranous organelles are compared. A brief discussion of theoretical and experimental models is included.

460. Special Problems

Fall, Winter, Spring, Summer. 1 to 5 credits. Approval of department.

481. Honors Research Paper

Fall, Winter, Spring, Summer. 2 credits. PSL 480 and approval of department.

Oral and written presentation of undergraduate research project initiated and carried forward under PSL 480.

497. Principles of Endocrinology

Winter. 4(4-0) One year organic chemistry; ZOL 317. Interdepartmental with and administered by the Department of Zoology.

Hormonal principles, illustrated by experimental observations, in vertebrates and invertebrates. Emphasis on control mechanism. Group discussion, background in organic chemistry and cell biology strongly recommended. Term paper required.

500A. Introductory Physiology for Medicine

Spring. 5(5-0) 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

Fall. 4(4-0) Admission to the professional program in a college of medicine. Principles of systemic physiology germane to the practice of medicine with introduction to clinical pharmacology.

500C. Introductory Physiology for Medicine

Winter. 5(5-0) Admission to the professional program in a college of medicine. Continuation of PSL 500B.

500D. Introductory Physiology for Medicine

Winter. 5(5-0) Admission to a college of medicine or approval of department. Concepts and problems in physiology germane to the practice of medicine.

500E. Introductory Physiology for Medicine

Spring. 5(5-0) Admission to a college of medicine or approval of department. Continuation of PSL 500D.

504A. Neuroscience Laboratory I

Winter. 4(4-0) PSL 827 and approval of instructor. Interdepartmental with the departments of Psychology and Zoology. Administered by the Department of Psychology.

Development of skills in the methods, techniques and instrumentation necessary for research in a variety of areas concerned with neuroscience.

504B. Neuroscience Laboratory II

Spring. 4(4-0) PSL 804A. Interdepartmental with the departments of Psychology and Zoology. Administered by the Department of Psychology.

Continuation of PSL 804A.

805. Advanced Mammalian Physiology I

Winter. 1(2-0) PSL 500D, PSL 801 or concurrently or approval of department. Readings and discussions to supplement PSL 500D on basic research principles of neural, cardiovascular and respiratory physiology.

806. Advanced Mammalian Physiology II

Spring. 1(2-0) PSL 500F, PSL 801 or concurrently or approval of department. Readings and discussions to supplement PSL 500E on basic research principles of renal, gastrointestinal and endocrine physiology.

811. Advanced Cell Physiology

(PSL 801.) Fall. 6(7-0) PSL 431, PSL 432 or PSL 401, PSL 402, BCH 453 or concurrently, or approval of department; calculus recommended.

Concepts in advanced cellular physiology, including bioenergetics, transport, regulation of metabolic reactions, and specialized cell functions including nerve, muscle, secretory, epithelial and lymphocyte.

812. Advanced Systems Physiology I

Winter. 6(7-0) PSL 801 or approval of the course coordinator.

Basic and advanced physiologic concepts of the cardiovascular, renal, central nervous systems.

813. Advanced Systems Physiology II

Spring. 6(7-0) PSL 802 or approval of the course coordinator.

Basic and advanced physiologic concepts of the endocrine, gastrointestinal and respiratory systems.

825. Cell Structure and Function

Winter. 4(4-0) BCH 401 or BCH 404 or approval of instructor. Interdepartmental with the departments of Biochemistry, and Microbiology and Public Health. Administered by the Department of Biochemistry.

Molecular basis of structure and function of cells. Fundamental properties of cells: reproduction, dynamic organization, integration, programmed and interactive information transfer considered through original investigations in all five kingdoms.

836. Physical Principles of Biological Systems

Winter of even-numbered years. 3(3-0) Application of laws and methods of physics to measurement and description of physiological phenomena. Approved through Fall 1987.

839. Systems Neuroscience

Winter of odd-numbered years. 5(4-2) Approval of department. Interdepartmental with the departments of Anatomy, and Pharmacology and Toxicology. Administered by the Department of Anatomy.

Physiology, anatomy and pharmacology of sensory, somatomotor and autonomic nervous systems.

840. Advanced Cardiovascular Physiology

Spring of odd-numbered years. 4(5-0) PSL 500D or approval of course coordinator. Physiology of peripheral cardiovascular system including arteries, veins, capillaries, and their functions, control mechanisms and integration.

841. Advanced Endocrine Physiology and Pharmacology

Fall of odd-numbered years. 5(6-0) PSL 500E or approval of course coordinator. Interdepartmental with the Department of Pharmacology and Toxicology.

Basic and advanced physiologic and pharmacologic concepts of general endocrinology including reproductive endocrinology.
Descriptions — Physiology of Courses

843. Advanced GI/Metabolism Physiology
Spring of odd-numbered years. 3(0-0)
PSL 506E or approval of course coordinator.
Physiology of gastrointestinal motility, secretion, absorption, and their function; control mechanisms and integration. Physiology of energy balance, overall metabolism and control of food intake.

844. Advanced Renal Physiology
Fall of even-numbered years. 3(0-0)
PSL 509D. PSL 506E or approval of course coordinator.
Current concepts of renal physiology.

859. Analysis of Hormone Action
Spring. 4(0-0) ZOL 317, or approval of department. Interdepartmental with and administered by the Department of Zoology.
Discussion of recent work on the molecular and developmental aspects of hormone action in vertebrates and invertebrates. Selected topics vary from year to year.

865. Advanced Neurobiology
Spring. 4(0-0) ZOL 827. Interdepartmental with the departments of Anatomy, Psychology and Zoology. Administered by the Department of Anatomy.
Basic organization, structure and function of neural networks comprising sensory, motor and autonomic systems including examples from invertebrates and vertebrates. Attendance at neuroscience seminar is required.

875. Advanced Physiology Laboratory
Summer. 4(0-0) PSL 511, PSL 512, PSL 813; approval of department.
Experiments in animal and human physiology; data collection, analysis and interpretation.

885. Vertebrate Neural Systems I (PSY 885.) Winter of odd-numbered years. 5(0-0) ANT 815, ANT 885. recommended.
Interdepartmental with the departments of Anatomy, Psychology, and Zoology. Administered by the Department of Anatomy.
Structure and function of major component systems of vertebrate brains, their evolution, ontogeny and comparative analysis in mammals, birds, reptiles, amphibians and fish. Interrelation of behavioral, anatomical and physiological studies.

886. Vertebrate Neural Systems II (ZOL 886.) Spring of odd-numbered years. 5(0-0) ANT 885. Interdepartmental with the departments of Anatomy, Psychology, and Zoology. Administered by the Department of Anatomy.
Continuation of ANT 885. Major component systems of vertebrate brains, their evolution, ontogeny, and comparative analysis in mammals, birds, reptiles, amphibians and fish. Interrelation of behavioral, anatomical, and physiological studies.

890. Readings in Biophysics
(BFY 890.) Fall, Winter, Spring, Summer. 3 to 6 credits. Approval of department. Reading course in special topics adapted to the individual preparation and needs of the student.

899. Master's Thesis Research
Fall, Winter, Spring. Summer. Variable credit. Approval of department.

919. Cardiovascular System
Fall. 4(3-3) May reenroll for a maximum of 12 credits if different subjects are taken. Interdepartmental with and administered by James Madison College.
Classical and current literature on physiology of heart, circulation, and microcirculation. Each fall a different one of these three topics will be discussed. Laboratory work illustrates methodology and special procedures.

950. Topics in Physiology
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 8 credits. Approval of department.
Classical and modern concepts in selected areas of physiology.

980. Problems
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 9 credits. Approval of department.
Limited amounts of individual work on selected research problems.

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

POLITICAL SCIENCE

PLS College of Social Science

100. American National Government
Fall, Winter, Spring, Summer. 3(0-0)
Major aspects of national government with emphasis on the making process.

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

160. International Relations
Fall, Winter, Spring, Summer. 3(0-0)
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 Isms
Fall, Winter, Spring, Summer. 3(0-0)
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. 3(0-0)
Acquaints the student with the theories, methods and concepts of political science. Emphasis on an ideology and interests in the political process.

225. Politics of the Western Hemisphere (MTG)
Fall, Winter, Spring. 3(0-0) May reenroll for a maximum of 12 credits if different subjects are taken. Interdepartmental with and administered by James Madison College.
Developing areas of the western hemisphere: historical development of the societies; contemporary political and economic states; international relationships with other area countries, the United States, the wider world community.

251. Human Values and Politics: On Liberty
Fall. 4(0-0)
Liberty as a basic value underlying public issues of life or death: right to live; rights of women and children; slavery; justification of war and terrorism; capital punishment; biological planning.

253. Human Values and Politics: Authority and the Individual
Spring. 4(0-0)
Individualism and authority as basic values underlying public issues; free speech; rights of minorities; right of privacy; community norms and individual preferences.

IDC. Introduction to Contemporary Courses
For course description, see Interdisciplinary Courses.

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

291. Methods of Political Research
Fall, Winter, Spring. 4(0-0) PLS 290.
Analysis of political data, with major emphasis on quantitative techniques.

301. American State Government
Fall, Winter, Spring, Summer. 3(0-0)
Major aspects of policy-making process at the state government level. Comparison of state political systems.

302. American Urban Government
Fall, Winter, Spring, Summer. 3(0-0)
Urban political process in America. Policies of policymaking for urban functions; politics of intergovernmental relations.

310. Public Bureaucracy in the Policy Process
Fall, Winter, Spring, Summer. 3(0-0)
Introduces student to following major areas of public administration: development of administration in the U.S.; theories of administrative organization; principles and methods of administrative management; executive leadership; interpersonal and group relationships; levels of decision making, ethics and responsibility.

313. Public Policy Analysis
Fall, Winter, Spring. 3(0-0)
Problems and methods in perception of public problems, determination of goals, generation and evaluation of alternatives, policy choice. Planning and program budgeting, political and analytical methods of policymaking compared.

320. The American Judicial Process
Fall, Winter, Spring, Summer. 3(0-0)
Analysis of the structure and functions of judicial systems. Organization, administration, and policies of judicial bureaucracies. Roles of judges, juries, counsel, litigants, and interest groups in adjudication processes.

321. Judicial Policymaking
Fall, Winter, Spring. 3(0-0)
Consideration of political behavior of judges (especially Justices of Supreme Court) and their policymaking. Focus on policy questions currently important, including civil liberties, national economic policy and interrelationships among governmental units.