Descriptions — Physics and Astronomy

Courses

Astronomy and Astrophysics  AST

119. General Astronomy (N)
Fall, Winter, Spring. 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 155, N S 155, N S 1834.
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 109 or MTH 111. High school physics recommended. Students without the necessary science or math background are directed to AST 119. Intended primarily for physical science majors. Students may not receive credit in more than one of the following: AST 119, AST 217, AST 229, N S 155, N S 155, N S 1834.
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 physical science 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 155, N S 155, N S 1834.
Fundamental observations in astronomy and their interpretation through physical laws. Quantitative discussions 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.
Celestial coordinate systems, time conversion and sidereal time. Atmospheric refraction, parallax, proper motion, aberration, and precession. Star catalogs and ephemerides. Finding charts and setting of equatorial telescopes.

442. Radiation Astrophysics
Winter of even-numbered years. 3(3-0)
PHY 394.
Emission, absorption and transfer of radiation in an astrophysical context. Stellar atmospheres, line formation, plasma diagnostics. Synchrotron radiation.

443. Astrophysical Fluid Dynamics
Spring of even-numbered years. 3(3-0)
PHY 396.
Dynamics of fluids in an astrophysical context. Fundamental equations. Applications to stellar structure, interstellar medium, and compact objects.

462. Galactic Astronomy
Winter of odd-numbered years. 3(3-0)
PHY 427.

463. Extragalactic Astronomy
Spring of odd-numbered years. 3(3-0)
AST 462.

490. Special Problems
Fall, Winter, Spring, Summer. 1 to 5 credits. May enroll for a maximum of 10 credits. Approval of department.
Individual study or project under the direction of a faculty member. An oral report on the work may be required in department seminar.

500. Research Methods
Fall, Winter, Spring, Summer. 2(0-4) May enroll for a maximum of 6 credits. Beginning graduate students. Interdepartmental with and administered by Physics.
Problems and techniques of current research by taking part in the design and setup of experiments, data taking and reduction; study and practice of theoretical methods. Areas of study: solid state and molecular structure, nuclear, elementary particles, astronomy, astrophysics.

850. Electrodynamics of Plasmas I
Fall. 3(3-0) E E 448 or PHY 448; E E 474.
Interdepartmental with Electrical Engineering and Physics. Administered by Electrical Engineering.
Boltzmann equation; moment equations; two-fluid theory of plasma, waves in cold, warm and anisotropic infinite plasmas, waves in bounded plasma structures, energy flow in anisotropic plasmas.

860. General Relativity and Cosmology I
Fall of even-numbered years. 3(3-0)
PHY 850 or approval of department. Interdepartmental with and administered by Physics.
Relativistic cosmology: the model universes; conceptual foundations of general relativity theory; elements of tensor calculus; Riemann-Christoffel curvature tensor; the field equations; experimental tests; special solutions; the extension to cosmology.

861. General Relativity and Cosmology II
Winter of odd-numbered years. 3(3-0)
PHY 860.
Interdepartmental with and administered by Physics.
Relativistic cosmology: the model universes; steady-state theory; observational evidence and possibilities for decision among models; current problems.

954. Advanced Readings in Physics or Astronomy
Fall, Winter, Spring, Summer. 1 to 3 credits. May enroll for a maximum of 6 credits. Interdepartmental with and administered by Physics.

989. Electrodynamics of Plasmas II
Winter of odd-numbered years. 3(3-0)
E E 850.
Interdepartmental with Electrical Engineering and Physics. Administered by Electrical Engineering.
One fluid plasma model, magnetohydrodynamics, Maxwell's stress tensor, low frequency waves, transport phenomena, Landau damping, collision and rate coefficients. Distributions in a magnetic field, investigation of dc, rf and microwave discharges.

PHYSIOLOGY PSL

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

240. Introductory Physiology
Fall, Spring. 4(4-0) Sophomores or approval of department.
Physiology of the cell, nerve and reflex activity, skeletal muscle, brain, and cardiovascular system emphasizing environmental influences such as disease and exercise.

241. Introductory Physiology
Winter. Summer of even-numbered years. 4(4-0) PSL 240 or approval of department.
Continuation of PSL 240. Physiology of respiration, digestion, metabolism, kidney, endocrinology, and reproduction.

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

401. Comparative Physiology I
Fall. 4(4-3) PSL 240 or B S 212; CEM 131 or CEM 141. Interdepartmental with the 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) PSL 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.

410. Computational Problem Solving in Physiology
Fall, Spring, Summer. 3(3-0) PSL 240 or PSL 431 or PSL 811, approval of instructor.
Utilization of existing computer software and designing custom programs for statistical functions to solve complex sets of equations in physiology.

416. Physiology of the Cell
Fall. Summer of odd-numbered years. 3(3-0) BCH 401 or BCH 451.
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.

431. Human Physiology
Winter. 4(4-0) One year of biological science or ANT 316; CEM 131 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.

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

435. Mammalian Physiology
Fall. 4(3-2) PSL 241, BCH 200 or BCH 401. Interdepartmental with and administered by the Department of Animal Science.


453. Principles of Animal Reproduction
Winter. 4(5-0) PSL 241, 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. Avian Physiology
Spring. 4(3-3) Approval of department. Interdepartmental with and administered by the Department of Animal Science.

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

460. Hormones Research Paper
Fall. Winter, Spring, Summer. 1 to 5 credits. Approval of department.

461. 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.

470. Biological Membranes
(2DC 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.

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

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 physiopathology.

500C. Introductory Physiology for Medicine
Winter. 5(5-0) Admission to a 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.

804A. Neuroanatomy Laboratory I
Winter. 1(2-4) or 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 neuroanatomy.

804B. Neuroanatomy Laboratory II
Spring. 4(2-4) PSL 504A. Interdepartmental with the departments of Psychology and Zoology. Administered by the Department of Psychology.

Continuation of PSL 504A.

811. Advanced Cell Physiology
(PSL 801.) Fall. 6(6-0) PSL 431, PSL 432 or PSL 801, PSL 802, BCH 453 or concurrently; or approval of department; calculus recommended. Interdepartmental with the departments of Psychology and Zoology.

Concepts in advanced cell 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(6-0) PSL 511 or approval of the course coordinator. Basic and advanced physiological concepts of the cardiovascular, renal, central nervous systems.

813. Advanced Systems Physiology II
Spring. 6(6-0) PSL 812 or approval of the course coordinator. Basic and advanced physiological concepts of the endocrine, gastrointestinal and respiratory systems.

825. Cell Structure and Function
Spring. 4(4-0) BCH 451 or BCH 401 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.
Descriptions — Physiology of Courses

901. Investigating the Lung
Fall of even-numbered years. 3(3-0)
Approval of department. Interdepartmental with the departments of Large Animal Clinical Sciences, and Pathology. Administered by the Department of Large Animal Clinical Sciences.

919. Cardiovascular System
Fall. 4(3-3) May reenroll for a maximum of 12 credits if different topics are taken. Approval of the course coordinator.

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

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

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(3-0)
Major aspects of national government with emphasis on the policy-making process.

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

160. International Relations
Fall, Winter, Spring, Summer. 3(3-0)
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 Irons
Fall, Winter, Spring, Summer. 3(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.

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

228. Politics of the Western Hemisphere (MTC)
Fall, Winter, Spring, Summer. 3(3-0) May reenroll for a maximum of 12 credits if different topics are taken. Interdepartmental with and administered by James Madison College.

251. Human Values and Politics: On Liberty
Fall. 4(4-0)
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 (S)
Spring. 4(4-0)
Individuality and authority as basic values underlying public issues; free speech; rights of minorities; right of privacy; community norms and individual preferences.

290. Methods of Political Research
Fall, Winter, Spring, Summer. 3(3-0)
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.

291. Methods of Political Research
Fall, Winter, Spring, Summer. 3(3-0) PLS 390.
Analysis of public data, with major emphasis on quantitative techniques.

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

310. Public Bureaucracy in the Policy Process
Fall, Winter, Spring, Summer. 3(3-0)
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 intergroup relationships; levels of decision making; ethics and responsibility.

313. Public Policy Analysis
Fall, Winter, Spring, Summer. 3(3-0)
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(3-0)
Analysis of the structure and functions of judicial systems. Organization, administration, and politics of judicial bureaucracies. Roles of judges, juries, counsel, litigants, and interest groups in adjudication processes.

321. American Constitutional Law
Fall, Winter, Spring, Summer. 3(3-0)
U.S. Supreme Court decision making and its effect on issues of current importance, including civil liberties, national economic policy and interrelationships among governmental units.

324. The American Legislative Process
Fall, Winter, Spring, Summer. 3(3-0)
Nature of legislative process in the United States; organization and procedure of legislative bodies; direct legislation; relationship of legislative branch to other branches of government.

325. The American Executive Process
Spring. 3(3-0)
Role of the president, state governors, and municipal executives in the American system of government. Analysis and discussion of constitutional status and powers, selection, administrative responsibilities, legislative and political leadership, accountability and responsibility of chief executives.

330. Government and the Mass Media
Spring. 3(3-0) Juniors.
How press, radio, television and journals shape public opinion and government policy; examines questions of influence and linkage, regulation vs. free comment, and the media as an interest group.

331. American Political Parties
Fall, Winter, Spring. 3(3-0)
Origins, structure, and functions of political parties. Dynamics of the two-party system. Role of third parties.

332. Interest Groups and Political Movements
Fall, Winter. 3(3-0)
Group theory and politics. Growth of organizations and associations to represent the interests of business, labor, agricultural, professional, veterans, and other groups. Internal politics of private associations and their impact on public policy.

333. Political Opinion and Voting Behavior
Fall, Winter. 3(3-0)
Development of political attitudes, ideology, and partisanship and their relation to voting behavior; political participation; comparisons of mass and elite attitudes and behavior; representation of public opinion in the political system.

334. Campaigns and Elections
Fall, Winter, Spring. 3(3-0)
Methods of campaigning. Nominating process and recruitment of candidates. Formation of electoral coalitions and analysis of election results. Examination of trends and changes in electoral support.

335. Comparative Parties and Pressure Groups
Spring. 3(3-0)
Dynamics of political party and pressure group behavior in selected political systems. Comparative study of organization, ideologies, membership, leadership, tactics, power and influence of parties.