

Descriptions - Physics and Astronomy

of

Courses

119. General Astronomy (N)

Fall, Winter, Spring, Summer. 4(4-0)
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.

A qualitative presentation of man's current view of the universe including birth and death of stars, cosmology, comparisons of planets, and life in the universe.

120. Topics in Astronomy

Winter, Spring. 4(4-0) AST 119.

Detailed qualitative discussion of currently interesting topics in astronomy. May include such topics as quasars, pulsars, black holes, planetary exploration, cosmology, concepts of relativity.

217. General Astronomy (N)

Fall, Winter, Spring. 4(4-0) MTH 109 or MTH 111. Students may not receive credit in more than one of the following: AST 119, AST 217, AST 229.

Intended primarily for physical science majors. A semiquantitative presentation of current views of the universe including birth and death of stars, cosmology, comparisons of planets, and life in the universe.

229. General Astronomy

Fall. 4(4-0) PHY 287 or PHY 291H or concurrently; MTH 113. Students may not receive credit in more than one of the following: AST 119, AST 217, AST 229.

Fundamental observations in astronomy and their interpretation through physical laws. Intended for physical science majors and recommended for astrophysics majors. Quantitative discussion of orbital motion, time, telescopes, solar system, stars, galaxies, and cosmology. Limited opportunity for astronomical observations.

237. Introductory Observatory Laboratory

Fall. 1(0-3) AST 217 or AST 229 or concurrently.

Photographic and spectroscopic telescopic observations. Darkroom processing.

327. Practical Astronomy

Winter. 3(3-0) AST 217 or AST 229, MTH 113.

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.

378. Contemporary Astronomy

Winter. 3(3-0) AST 217 or AST 229.

A continuation of General Astronomy with particular emphasis on modern developments. May include such topics as planetary exploration, interstellar matter, star formation, stellar evolution through final stages, supernovae, pulsars, neutron stars, black holes, galaxies, and cosmology.

437. Observatory Practice

Spring. 3(1-4) AST 327 and approval of department.

Stellar photography. Photographic photometry. Photoelectric photometry and corrections for atmospheric extinction. Multicolor photometric systems. Astronomical spectroscopy and radial velocity determinations.

451. Solar System Astrophysics

Fall. 3(3-0) PHY 427 or concurrently or approval of department.

Application of physical principles to the study of the planets, satellites, asteroids, comets, and interplanetary dust and gas. Mechanics of solar system objects.

452. Stellar and Interstellar Astrophysics

Winter. 3(3-0) PHY 364 or PHY 294 and PHY 395 or approval of department.

Emission, absorption and transfer of radiation in stars and the interstellar medium. Application of physical principles to the study of the interstellar medium and stellar interiors. Evolution of stars.

453. High-Energy Astrophysics

Spring. 3(3-0) PHY 364 or PHY 294 and PHY 395 or approval of department.

Application of fundamental physical laws of mechanics, gravitation, and electromagnetism to the dynamics of star systems, X-ray and radio sources such as galaxies and close binary stars, and to cosmology.

490. Special Problems

Fall, Winter, Spring, Summer. 1 to 5 credits. May reenroll 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.

800. Research Methods

Fall, Winter, Spring, Summer. 2(0-6) May reenroll 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.

801. Seminar

Winter. 1(1-0) May reenroll for a maximum of 2 credits. Graduate students or approval of department.

Seminars to be presented by both faculty and students to review papers in the current astronomical research literature.

820. Advanced Topics in Astrophysics

Winter. 3(3-0) May reenroll for a maximum of 15 credits. AST 452 or PHY 395 or PHY 429 or approval of department.

Possible topics include dynamics of stars in galaxies, astrophysical fluid dynamics, quasar theory, stellar atmospheres, stellar interiors, stellar spectroscopy, and stellar photometry.

850. Electrodynamics of Plasmas I

Fall. 3(3-0) E E 835 or PHY 448; E E 874. 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 plasma; 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 858 or approval of department. Interdepartmental with and administered by Physics.

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.

984. Advanced Readings in Physics or Astronomy

Fall, Winter, Spring, Summer. Variable credit. 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. Diffusions 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 PLS 240. Physiology of respiration, digestion, metabolism, kidney, endocrinology, and reproduction.

323. Physiology, Anatomy, and Hygiene of the Eye

Fall. Summer of even-numbered years. 3(2-2) 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(3-4) 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.

- 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) One year of biological science or ANT 316; CEM 131 or CEM 141.
Physiology of the autonomic nervous, cardiovascular, renal, and respiratory systems.
- 435. Mammary Physiology**
(444.) Fall. 4(3-2) PSL 241, BCH 200 or BCH 401. Interdepartmental with and administered by the Department of Animal Science.
Anatomy of mammary gland. Hormonal and nervous control of mammary growth, initiation and maintenance of lactation. Biochemistry of milk secretion. Physiology of milking; physiological, pathological and management factors affecting lactation.
- 455. Principles of Animal Reproduction**
(445.) 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.
- 465. Avian Physiology**
(440.) Spring. 4(3-3) Approval of department. Interdepartmental with and administered by the Department of Animal Science.
Systemic physiology of birds emphasizing respiration, circulation, temperature regulation, the endocrines, and reproduction.
- 480. 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 cellular endocrinology. Group discussion, background in organic chemistry and cell biology strongly recommended. Term paper required.
- 500A. Introductory Physiology for Medicine**
Fall, Winter. 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 physiopathology.
- 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. 4(4-0) Admission to the professional program in a college of medicine.
Concepts and problems in physiology germane to the practice of medicine.
- 500E. Introductory Physiology for Medicine**
Spring. 4(4-0) Admission to the professional program in a college of medicine.
Continuation of PSL 500D.
- 503. Cell Biology**
Fall. 5(5-0) Admission to the College of Human Medicine. Interdepartmental with the departments of Biochemistry, Microbiology and Public Health, and Pharmacology and Toxicology. Administered by the Department of Microbiology and Public Health.
Principles of cell biology for medical students.
- 801. Advanced Cell Physiology**
Fall. 5(6-0) PSL 431, PSL 432 or PSL 401, PSL 402; BCH 451, BCH 452, 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.
- 802. Advanced Systemic Physiology I**
Winter. 5(6-0) PSL 801 or approval of department.
Physiology of the respiratory, nervous, and cardiovascular systems. Principles of physiological control systems.
- 803. Advanced Systemic Physiology II**
Spring. 5(6-0) PSL 802 or approval of department.
Physiology of the renal, gastrointestinal, endocrine, and reproductive systems.
- 804A. Neuroscience Laboratory I**
Winter. 4(2-4) Approval of instructor. Interdepartmental with Biophysics and 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.
- 804B. Neuroscience Laboratory II**
Spring. 4(2-4) PSY 804A. Interdepartmental with Biophysics and the departments of Psychology, and Zoology. Administered by the Department of Psychology.
Continuation of PSL 804A.
- 808. Neuroendocrinology**
Winter of even-numbered years. 3(3-0) Approval of department.
Anatomical, biochemical and physiological aspects of neuroendocrinology. Control systems and interaction among endocrine glands will be emphasized.
- 809. Physiology of Aging**
Winter of odd-numbered years. 3(3-0) Basic course on elements of physiology.
Theories of aging; vital statistics; changes in cellular, tissue and organ functions; pathology; integrative mechanisms; longevity and life prolongation; neuroendocrines; immunology; brain function; chronological versus individual aging.
- 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.
- 837. Radiobiology**
Fall of even-numbered years. 3(3-0) Approval of department.
Application of radioactive tracer techniques to study of biological functions. Determination of turnover rates and tissue constituents by isotope dilution. Control of radiation hazards.
- 859. Analysis of Hormone Action**
Spring. 4(4-0) 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 to vary from year to year.
- 865. Advanced Neurobiology**
(BIM 865.) Spring. 4(4-0) BPY 827. Interdepartmental with Biophysics and 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 of odd-numbered years. 4(2-5) PSL 801, PSL 802, PSL 803 and approval of department.
Experiments in animal and human physiology; data collection, analysis and interpretation.
- 885. Vertebrate Neural Systems I**
Fall of odd-numbered years. 5(3-4) Approval of department; ANT 815 and BPY 827 recommended. Interdepartmental with Biophysics and the departments of Zoology, and Psychology. Administered by the Department of Psychology.
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**
Winter of even-numbered years. 5(3-4) PSY 885. Interdepartmental with Biophysics and the departments of Psychology, and Zoology. Administered by the Department of Zoology.
Continuation of PSL 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.
- 899. Master's Thesis Research**
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**Descriptions – Physiology
of
Courses**

910. Seminar
Fall, Winter, Spring. 1(1-0) May reenroll for a maximum of 2 credits for the Master's program and a maximum of 4 additional credits for either the Ph.D. or the diploma program.

915. Respiratory Physiology
Fall of even-numbered years. 4(3-2)
PSL 801, approval of department.
Development of ideas leading to our present state of knowledge in respiration.

919. Cardiovascular System
Fall. 4(3-3) May reenroll for a maximum of 12 credits if different topics are taken. PSL 802.

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.

945. Physiology of Mammalian Reproduction
Winter of odd-numbered years. 4(5-0)
DRY 445 or PSL 445 or approval of department. Interdepartmental with and administered by Dairy Science.

Chemistry and biosynthesis of reproductive hormones. Gonadal, hypothalamic and pituitary development of reproductive potential. Ovulation, fertilization, implantation and placentation will be studied. Relationships of conceptus, uterus and corpus luteum. Parturition.

950. Topics in Physiology
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 9 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(3-0)
Major aspects of national government with emphasis on the policy-making process.

140. Comparative Politics
Fall, Winter, Spring. 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 Isms
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.

200. 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.

251. Human Values and Politics: On Liberty (S)
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.

252. Human Values and Politics: Equality and Justice (S)
Winter. 4(4-0)

Equality and justice as basic values underlying major public issues in areas such as crime and punishment, education, family and employment. Effect of public policy on equal opportunity.

253. Human Values and Politics: Authority and the Individual (S)
Spring. 4(4-0)

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 China
For course description, see Interdisciplinary Courses.

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. 4(3-1) PLS 290.
Analysis of political 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.

303. Michigan Government
Spring. 3(3-0)
How Michigan government is organized and conducted and how policies are made; sources of executive-legislative conflict; politics of taxation; role of the state in local affairs; balance of political forces in the state.

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. 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. Judicial Policymaking
Fall, Winter, Spring. 3(3-0)

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.

324. The American Legislative Process
Fall, Winter. 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.