869. *Quantized Fields*

Spring. 3(3-0) PHY 868.

Heisenberg representation, S-matrix reduction formulae, Feynman rules, quantum electrodynamics; topics from many-body theory.

877. *Statistical Mechanics I*

Fall. 3(3-0) Approval of department.

Necessity of statistical considerations, ensembles, probability distributions and density matrices, Liouville's equation, equilibrium distributions, microscopic basis of thermodynamics; applications to thermodynamics of spin systems.

878. *Statistical Mechanics II*

Winter. 3(3-0) PHY 877.

Applications to thermodynamic properties of ideal classical and quantum gases, and to imperfect gases and interacting spin systems. Nonequilibrium dstributions and transport theory, the Boltzmann equation, Kubo's linear response theory, Onsager's relations.

879. *Statistical Mechanics III*

Spring. 3(3-0) PHY 878.

Special topics chosen at discretion of instructor. Topics may include phase transitions, critical phenomena and renormalization group techniques; Green's function and diagrammatic techniques for interacting systems.

899. *Research*

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

927. *Elementary Particle Physics*

Fall of even-numbered years. 3(3-0) PHY 869.

Properties of elementary particles; invariance principles and conservation laws; strong, electromagnetic, and weak interactions; pion physics.

928. *Elementary Particle Physics*

Winter of odd-numbered years. 3(3-0) PHY 927.

Baryon and meson resonances, unitary symmetry, dispersion relations.

929. *Elementary Particle Physics*

Spring of odd-numbered years. 3(3-0) PHY 928.

Selected current topics, partial wave amplitudes and Regge poles; current algebra and weak interactions.

937. *Molecular Structure and Spectra I*

Fall of even-numbered years. 3(3-0) PHY 837 or concurrently.

Structure and spectra of diatomic molecules.

938. *Molecular Structure and Spectra II*

Winter of odd-numbered years. 3(3-0) PHY 937.

Structure and spectra of polyatomic molecules.

939. *Molecular Structure and Spectra III*

Spring of odd-numbered years. 3(3-0) PHY 938.

Advanced topics in vibration-rotation theory of polyatomic molecules.

947. *Solid State Physics I*

Fall of odd-numbered years. 3(3-0) PHY 839 and PHY 840.

Crystal symmetry, crystal binding, lattice vibrations and specific heat, one-electon theory; Hartee-Fock equation, Brillouin zones.

948. *Solid State Physics II*

Winter of even-numbered years. 3(3-0) PHY 947.

Effective mass appoximation. Exchange and correlation corrections. Theory of conductivity and related effect, metals and semiconductors.

949. *Solid State Physics III*

Spring of even-numbered years. 3(3-0) PHY 948.

Ionic crystals. Imperfections in crystals, plastic deformations, color centers. Optical properties. Rectification, transistors, selected topics.

957. *Nuclear Physics I*

Fall of odd-numbered years. 3(3-0) PHY 867.

Nucleon-nucleon scattering, nuclear sizes and shapes, multipole moments; shell model; collective states.

958. *Nuclear Physics II*

Winter of even-numberes years. 3(3-0) PHY 957.

Experimental methods and instrumentation; nuclear reactions; inelastic scattering and particle transfer.

959. *Nuclear Physics III*

Spring of even-numbered years. 3(3-0) PHY 958.

Many-body methods in nuclear physics; Bethe-Goldstone equation; effective interaction; nuclear models.

984. *Advanced Readings in Physics or Astronomy*

Fall, Winter, Spring, Summer. Variable credit. Interdepartmental with the Department of Astromony and Astrophysics.

987. *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, specialized topics in solid state physics, statistical mechanics, relativity theory and cosmology.

989. *Waves and Radiations in Plasmas*

Winter of even-numbered years. 3(3-0) E E 850. Interdepartmental with the Department of Astronomy and Astrophysics and Electrical Engineering. Administered by Electrical Engineering.

Plasma oscillation; interaction, electromagnetic fields with plasmas, wave propagation in magnetionic media; plasma sheath; radiation of electric source in incompressive and compressive plasmas; electroacoustic waves; magnetohydrodynamics; 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. 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. 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 and CEM 132. 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. 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 vetebrate 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 commmon 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*

(331.) Winter. 4(4-0) ANT 316 or one year of biological science, CEM 132 or approval of department.

432. *Human Physiology*

(332.) Spring. 4(4-0) PSL 431.

440. Avian Physiology

Spring. 4(3-3) Approval of department. Interdepartmental and administered jointly with the Department of Poultry Science.

A survey of the systemic physiology of birds emphasizing digestion, metabolism, the endocrines, and reproduction.

444. Mammary Physiology

Winter. 4(3-2) PSL 240, BCH 200. Interdepartmental and administered jointly with the Department of Dairy 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.

445. Endocrinology and Reproductive Physiology

Fall. 4(5-0) PSL 240. Interdepartmental and administered jointly with the Department of Dairy 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.

IDC. Biological Membranes

For course description, see Interdisciplinary Courses.

480. Special Problems

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

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

(500.) 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

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 PSL 500B.

801. Advanced Physiology

(501.) Winter. 4(3-2) PSL 432 or PSL 402 or approval of department; courses in anatomy, histoloy, biochemistry and calculus recommended.

Principles of physiological control systems. Physiology of the nervous system including, neuromuscular, reflex, sensory and autonomic nervous function. Physiology of respiration; acid-base, regulation of body fluids.

802. Advanced Physiology

(502.) Spring. 4(3-2) PSL 432 or PSL 402 or approval of department; courses in anatomy, histology, biochemistry and calculus recommended.

Physiology of kidney and micturition, blood and cardiovascular system.

803. Advanced Physiology

Fall. 4(3-2) PSL 432 or PSL 402 or approval of department; courses in anatomy, histology, biochemistry and calculus recommended.

Physiology of the digestive system, regulation of metabolism; endocrinology and reproduction.

804A. Neuroscience Laboratory I

Winter. 5(2-4) Approval of instructor. Interdepartmental with the departments of Biophysics, Psychology and Zoology and 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. 5(2-4) PSY 804A. Interdepartmental with the departments of Biophysics, Psychology and Zoology and administered by the Department of Psychology.

Continuation of PLS 804A.

808. Neuroendocrinology

Winter. 3(3-0) Approval of department.

Anatomical, biochemical and physiological aspects of neuroendocrinology. Control systems and interaction among endocrine glands will be emphasized.

819. Kidney Physiology and Electrolyte Metabolism

Summer. 4(4-0) PSL 802, approval of department.

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.

Functions and properties of the peripheral and central nervous systems.

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.

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

Spring. 3(3-0) BPY 827. Interdepartmental with the departments of Biophysics, Biomechanics, Psychology and Zoology and administered by the Department of Biomechanics.

Basic organization, structure and function of neural networks comprising sensory, motor and autonomic systems including examples from invertebrates and vertebrates.

870. Research Problems and Techniques in Pathologic Physiology

Spring of odd-numbered years. 3(3-0) PSL 801, PSL 802, PSL 803.

Description of mechanisms of human disease states. Stimulation of research where especially needed. Development of animal models to study these disease states. Lecture demonstrations illustrate methods of producing disease models.

875. Advanced Physiology Laboratory

Spring. 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 the departments of Zoology, Biophysics and Psychology and 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 the departments of Psychology, Biophysics and Zoology and administered by the Department of Zoology.

Continuation or 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. Research

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

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

Winter of odd-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. 4(5-0) DRY 445 or PSL 445 or approval of deparment. Interdepartmental with and administered by the Department of 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 lutem. 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. *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. 4(3-0)

Major aspects of national government with emphasis on the policy-making process.

140. *Comparative Politics*

Fall, Winter, Spring. 4(3-0)

Comparison of political systems in western and non-western nations.

160. *International Relations*

Fall, Winter, Spring, Summer. 4(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. 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 interests in the political process.

IDC. *Introduction to Latin America III*

For course description, see Interdisciplinary Courses.

IDC. *The Politics of Ecology*

For course description, see Interdisciplinary Courses.

251. *Human Values and Politics I: On Liberty*

Fall. 4(4-0)

How conflicts over basic human values of liberty, equality, justice, and individualism lie at the root of major issues of American public policy such as capital punishment, abortion, censorship, women's rights, school prayers. Centers on questions of citizenship, slavery, life and death. *Approved through Summer term 1979.*

252. *Human Values and Politics II: Equality and Justice*

Winter. 4(4-0)

Continuation of PLS 251. Focuses on policies dealing with crime and punishment, equality of opportunity, role of courts in assuring rights of women, blacks, and the poor. *Approved through Fall term 1979.*

253. *Human Values and Politics III: Individual and Community*

Spring. 4(4-0)

Continuation of PLS 252. Focuses especially on conflicts between individual and community in such issues as tolerance of political and ethnic minorities, the right of privacy, free speech, censorship, abortion. *Approved through Winter term 1980.*

IDC. *Continuing Revolution in China: Problems and Approaches*

For course description, see Interdisciplinary Courses.

290. *Methods of Political Research*

Fall, Winter. 4(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*

Winter, Spring. 4(3-0) PLS 290.

Analysis of political data, with major emphasis on quantitative techniques.

301. *American State Government*

Fall, Winter, Spring, Summer. 4(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. 4(3-0)

Urban political process in America. Politics of policymaking for urban functions; politics of intergovernmental relations.

303. *Michigan Government*

Spring. 4(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 politcal forces in the state.

310. *Public Bureaucracy in the Policy Process*

Fall, Spring. 4(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*

Winter. 4(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. 4(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, Spring. 4(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*

Winter. 4(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. 4(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.

329. *Socialist Politics in the U.S.*

Spring. 4(3-0)

The politics of Marxist and non-Marxist socialism from the post-Civil War to the present. Political parties, social movements, ideas, and individuals.

330. *Government and the Mass Media*

Spring. 4(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. 4(3-0)

Origins, structure, and functions of political parties. Dynamics of the two-party system. Role of third parties.