

and circulation applied to the use of park and recreation areas and facilities. Field trip required.

446. Park Area Operations
(R D 446.) Spring. 3(3-0) Approval of department.

Problems in operations and maintenance of park and recreation areas and facilities. Personnel practices, budgeting, and maintenance schedules. Selection and adaptability of maintenance equipment. Field trip required.

448. Field Studies in Park Administration
(R D 448.) Fall. 3 credits. Approval of department.

Investigation and analysis of outstanding park and recreation programs. Visits to areas under local, state, and federal jurisdiction. Evaluation of administrative practices, area management, and operation policies. Conducted as a traveling class with agency assistance.

449. Recreation Land Management
(R D 440., 350.) Fall, Spring. 3(2-0) Not open to majors.

Fundamentals of outdoor recreation resource management. Planning, development, and administration of programs and facilities. Two weekend field trips required.

450. Natural Resource Administration
Fall, Winter. 4(4-0) Interdepartmental with the Fisheries and Wildlife, Forestry, and Resource Development Departments and administered by the Forestry Department.

Concepts and methods of economics and administration and application of techniques to management of wildlands.

480. Supervised Study
Fall, Winter, Spring, Summer. 1 to 4 credits. May re-enroll for a maximum of 10 credits. Approval of department.

Seminars on current problems. Supervised readings. Individual undergraduate research on selected topics.

484. Senior Proseminar
Winter. 1(1-0) Senior majors.
Seminars on current professional problems and literature.

842. Park and Recreation Policy
Winter. 3(3-0) Interdepartmental with the Resource Development Department.

Recreation, leisure and work concepts. Determination of needs for recreation facilities. Factors affecting public and private allocation of resources for provision of needed facilities.

846. Urban Recreation Area and Program Analysis
Spring. 4(4-0) Approval of department.

Analysis of urban public, private and commercial recreation areas, facilities, and programs. Construction of a typology of urban communities. Course is conducted in selected urban communities in Michigan.

848. Recreation Resource Law
Spring. 3(3-0)

Legal basis for public recreation. Methods of acquiring recreational resources, including contracts and condemnation procedures. Administrative problems, including zoning, liability, civil rights and law enforcement. Study of cases and statutes.

880. Special Problems
Fall, Winter, Spring, Summer. 1 to 6

credits. May re-enroll for a maximum of 10 credits. Approval of department.

Seminars on current problems. Supervised readings. Independent study of selected topics.

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

PATHOLOGY PTH

**College of Human Medicine
College of Osteopathic Medicine
College of Veterinary Medicine**

404. General Pathology
Fall. 5(3-6) ANT 420, Junior Medical Technology majors, or approval of department.

407. Clinical Pathology
Winter. 5(3-4) 404 or approval of department.

Theory and technics in hematology, coagulation, blood banking, clinical microscopy and chemical pathology, including urinalysis, blood chemistry and continuous flow analysis.

408. Clinical Pathology
Spring. 5(3-4) 404 or approval of department.
Continuation of 407.

501. Pathology of Infancy and Childhood
Winter. 5(5-0) Year V Human Medicine Students.

An analysis of disease processes in the immature human between birth and puberty.

550. Pathology I
Fall, Spring. 7(4-8) Fifth-term Veterinary Medicine students or approval of department.

Principles of pathology, including causes of disease, disturbances of growth and metabolism, necrosis, circulatory changes, inflammation, and neoplasms; pathology of the skeletal, muscular, integumentary, nervous, and endocrine systems.

560. Pathology II
Winter, Summer. 7(4-8) 550.

Continuation of 550, with coverage of the hematopoietic, cardiovascular, urinary, digestive, respiratory and reproductive systems; integration of principles of clinical pathology.

610. Veterinary Clinical Pathology
Fall, Spring. 3(2-3) 560.

Laboratory procedures in the diagnosis and prognosis of animal disease; examination of body tissues, fluids and excreta.

615. Diseases of Poultry
Winter, Summer. 4(4-0) Eighth-term Veterinary Medicine students.

Etiology, signs, lesions, differential diagnosis and control of infectious and noninfectious diseases of birds, with emphasis on domestic poultry.

800. Problems in Pathology
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

Elective work for students in veterinary medicine interested in pathology as a speciality, or in the special pathology of diseases of a par-

ticular class or species, and for graduate minors and majors interested in pathological techniques or in non-thesis research.

801. Pathology Seminar
Fall, Winter, Spring, Summer. 1(1-0) May re-enroll for a maximum of 3 credits for M.S. candidates and 6 credits for Ph.D. candidates. Approval of department.
Seminar required of all majors in Pathology.

802. Advanced Histopathology
Fall. 5(6-0) Approval of department.

A relatively advanced and comprehensive study in the histopathologic aspects of systemic and special pathology; independent study in the field of pathogenesis and microscopic pathology.

803. Advanced Histopathology
Winter. 5(6-0) 802 and approval of department.
Continuation of 802.

804. Histopathologic Techniques
Fall. 3(1-6) Approval of department.

Theory and practice in preparation of tissues for examination with the light microscope; special stains and histochemical procedures included.

805. Pathology Proseminar
Fall. 2(2-0) Approval of department.

Philosophy and methods of research; theses and other research reports; literature review; illustration of research data; practical assignments.

810. Post-Mortem Diagnosis
Winter, Summer. 3(0-9) May re-enroll for a maximum of 6 credits. Approval of department. Required of majors.

Instruction and practice in diagnosis of animal diseases by means of necropsy and other laboratory techniques. Emphasis will be placed upon correlation and interpretation of gross and microscopic lesions and the results of other tests.

811. Advanced Clinical Pathology
Winter. 3(1-6) Approval of department.

Application of standard and newer techniques and instrumentations in hematology, biochemistry, parasitology, etc., to the diagnosis of disease.

812. Hematology
Winter. 5(3-4) 408 or 610 or approval of department.

Pathology of diseases of blood and an analysis of diagnostic laboratory procedures.

820. Oncology
Spring. 3(6-0) Approval of department.

A study of benign and malignant neoplasms with emphasis on gross and microscopic characteristics and diagnosis.

821. Pathology of Nutritional and Metabolic Diseases
Spring of odd-numbered years. 3(1-6) Approval of department.

The pathogenesis and macroscopic and microscopic lesions of nutritional deficiencies and imbalance and of other disturbances of metabolism.

826. Laboratory Animal Pathology
Spring. 4(3-3) Graduate status and approval of department. Interdepartmental with and administered by Laboratory Animal Resources.

Macro and microscopic studies on the diseases of laboratory animals with special emphasis on naturally-occurring diseases which might interfere with the interpretation of experimental results.

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

910. Biology of Disease
Fall. 3(2-3) Approval of department. Primarily for students in the biological sciences.
Basic morphologic changes in disease with emphasis on the related physiologic pathology. Laboratory includes relevant problems in post-mortem diagnosis.

980. Histopathologic Diagnosis
Fall, Winter, Spring, Summer. 3(0-9)
May re-enroll for a maximum of 6 credits. 803, 820.
Trimming, histopathologic examination, description, diagnosis and reporting of specimens from biopsy and necropsy.

990. Advanced Correlative Pathology
Fall, Winter, Spring, Summer. 5(0-15)
May re-enroll for a maximum of 15 credits. Approval of department.
Experience in morphologic and clinical pathology and correlation of these with the clinical aspects of disease.

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

PHARMACOLOGY PHM

College of Human Medicine College of Osteopathic Medicine College of Veterinary Medicine

350. Introductory Human Pharmacology
Spring. 3(3-0) PSL 332 or concurrently; or approval of department.

Survey of pharmacology including general principles, central nervous system drugs, autonomic nervous system drugs, cardiovascular and renal drugs, endocrine drugs, anti-infectives, poisoning therapy, and other basic related topics.

430. Drug Abuse
Fall. 3(3-0) Juniors and approval of department. Biology and Chemistry recommended.

Actions, mechanism of action, toxicity and uses of drugs of abuse. Sociological and psychological aspects of drug abuse and the legal aspects of the sale and distribution of drugs are considered.

480. Special Problems
Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 5 credits. Approval of department.

520. Principles of Pharmacology
Fall, Spring. 4(4-0) PSL 502.

Pharmacology principles, including absorption, distribution, biotransformation, drug antagonism, receptor theory and pharmacogenetics; literature data analysis; adverse drug reactions. Chemotherapy including anti-neoplastic, antiviral and anti-microbial agents; endocrine and emergency therapies.

521. Pharmacodynamics
Winter, Summer. 5(4-0) 520.

Pharmacology of the nervous systems (central, peripheral and autonomic); cardiovascular, renal, gastrointestinal drugs.

522. Toxicology
Spring. 3(3-0) 521.
Toxicology of economic and household poisons, noxious gases and vapors, minerals solvents, pesticides and pollutants.

610. Clinical Pharmacology
Spring. 4(4-0) 521.
Therapeutic efficacy, toxicity and optimal clinical usage of important drugs used in the treatment of disease.

810. Synaptic Transmission
Winter of odd-numbered years. 4(4-0)
Approval of department.
Chemical and electrical aspects of the transmission of nervous impulses at synaptic and neuroeffector junctions and the influences of drugs upon these processes.

811. Organ System Pharmacology
Winter of even-numbered years. 4(3-3)
510 and approval of department.
Current concepts and recent advances in the areas of cardiovascular, renal and syncytial smooth muscle pharmacology.

812. Advanced Principles of Pharmacology and Toxicology
Spring of odd-numbered years. 4(4-0)
522 and approval of department.
Kinetics of drug absorption, elimination and metabolism; drug-receptor interaction. Principles of drug toxicity in evaluation and treatment; includes problems of modern toxicology, i.e., teratogenesis, mutagenesis, carcinogenesis.

870. Problems
Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 5 credits. Approval of the department.
Limited amounts of individual work on selected research problems.

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

910. Seminar
Fall, Winter, Spring. 1(1-0) May re-enroll for a maximum of 3 credits.

911. Literature Critique
Fall. 1(1-0) Approval of department.
Seminar and discussion of current pharmacological literature.

980. Problems
(880.) Fall, Winter, Spring, Summer. Variable credit. May re-enroll for a maximum of 5 credits. Approval of department.
Limited amounts of individual work on selected research problems.

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

101. Introduction to Philosophy: Ethics and Value
Fall, Winter, Spring, Summer. 3(3-0)

Moral responsibility, praise and blame, good and evil, justice, law and morality, individual liberty and collective authority and contemporary moral issues are typical problems.

102. Introduction to Philosophy: Epistemology and Metaphysics
Fall, Winter, Spring, Summer. 3(3-0)

Skepticism and certainty, existence, matter and mind, God, space and time, knowledge and belief, perception, personal identity, causality, and free-will are typical problems.

103. Introduction to Philosophy: Logic
Fall, Winter, Spring, Summer. 3(3-0)

Deductive and inductive reasoning and such topics as rational argumentation, fallacies, definition, meaning, truth and evidence.

200H. Honors Work
Fall, Winter, Spring. 1 to 16 credits. Approval of department.

211. Introduction to the History of Philosophy, Part I
Fall, Winter, Spring. 3(3-0)
Greek and Roman philosophy.

212. Introduction to the History of Philosophy, Part II
Fall, Winter, Spring. 3(3-0)
Middle Ages and Renaissance.

213. Introduction to the History of Philosophy, Part III
Fall, Winter, Spring. 3(3-0)
Eighteenth century (Berkeley and Hume) to twentieth century.

294. Special Topics
Fall, Winter, Spring, Summer. 2 to 6 credits. Approval of department.
Intensive study of some particular problem or author in philosophy.

311. Indian Philosophy
Fall, Winter. 3(3-0)
Metaphysical, ethical and social theories developed within major Indian philosophical systems; e.g., philosophical Buddhism, Vedantist transcendentalism, Samkya dualism, and the Realist schools.

312. Chinese Philosophy
Spring. 3(3-0)
Major cosmological and ethical doctrines of such Chinese authors and movements as Confucius, Mo Tzu, Lao Tzu, Taoism, Yin-Yang dualism, Buddhism, responses to Western influences, the new China.

315. American Philosophy
Spring, Summer. 3(3-0) Three credits in philosophy or approval of department.

Examination of such thinkers as Royce, Pierce, James, Dewey, Whitehead and Santayana, illustrating classic American contributions to philosophy.

323. Existentialism
Fall, Winter, Spring. 3(3-0) Three credits in philosophy or approval of department.

An examination of a major existentialist author (or authors), so designed as to place existentialist views in significant relation to the tradition of European thought.

PHILOSOPHY PHL

College of Arts and Letters

Each of the courses 101, 102, 103 is an independent gateway to an area of philosophy. Together they provide a comprehensive introduction to philosophical inquiry through contact with philosophical issues.