

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.