

- 445. Comprehensive Recreation Planning**  
Fall, Winter. 4(4-0) EC 200, PRR 344 or approval of department.  
Comprehensive planning techniques for recreation resources at national, state, and local levels. Supply-demand analysis, forecasting, impact assessment, survey methods and citizen input for recreation system planning.
- 446. Park Area Operations**  
Winter, 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.
- 447. Recreation Planning Projects**  
Fall, Spring. 4(1-6) PKG 444, PKG 445, PKG 446 or approval of department.  
Accumulative research, planning and evaluation of recreation resources. Supervised project requiring synthesization of recreation planning and design criteria as selected by student and approved by instructor. Field trip required.
- 448. Field Studies in Park Administration**  
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**  
Winter. 3(3-0) Not open to majors.  
Fundamentals of outdoor recreation resource management. Planning, development, and administration of programs and facilities.
- 450. Natural Resource Administration**  
Fall, Spring. 4(4-0) Seniors. Interdepartmental with the departments of Fisheries and Wildlife, Forestry, and Resource Development and Agriculture and Natural Resources. Administered by the Department of Forestry.  
Concepts and methods of administering wild-land properties. The legal, economic and social environment. Benefit-cost analysis of management changes. Unit organization, personnel management and accounting. Presents a systems view of administration.
- 451. Environmental Interpretation II: Methods and Devices**  
Spring. 4(3-1) PRR 351.  
Methodology and equipment used in information transmission in natural, historic, and scenic areas. Site selection and development criteria for natural resource interpretation.
- 452. Sky Interpretation**  
Spring 3(2-2) PRR 351 or approval of department.  
Observations of celestial objects and phenomena; past and present concepts of the sky; and procedures and materials for interpreting the sky.
- 455. Natural Resource Economics**  
Winter. 4(4-0) FOR 450 or approval of department. Interdepartmental with the departments of Fisheries and Wildlife, Forestry, Resource Development and Agriculture and Natural Resources. Administered by the Department of Forestry.  
Basic economic and political principles and techniques that govern the production and consumption of forest land products, including basic forest valuation procedures.
- 470. Commercial Recreation Enterprises**  
Fall. 4(4-0) EC 201; AFA 202 or approval of department.  
The planning, design, impact, and natural resource base of privately-owned outdoor recreation businesses.
- 471. Recreation Products Consumption**  
Winter. 4(4-0) PKG 470 recommended; EC 201, AFA 202, or approval of department.  
Recreation, economic and personality theories of consumption. Specific recreation product industry case studies.
- 480. Supervised Study**  
Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll 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.
- 801. Dimensions of Recreation and Leisure**  
Fall. 3(3-0) PRR 344 or approval of department.  
Concepts of recreation and leisure in the United States and their implications for professional development. Extensive reading into concepts, definitions, values, educational components and historic roots of recreation and leisure.
- 840. Recreation Economics**  
Spring. 4(4-0) FOR 809 or approval of instructor. Interdepartmental with the departments of Forestry and Resource Development.  
Application of economic analysis to recreation resource problems including measurement of demand and supply, valuation of recreation resources, determination of economic impact, economic decision making and policy considerations.
- 842. Park and Recreation Policy**  
Winter. 3(3-0) Interdepartmental with the Department of Resource Development.  
Recreation, leisure and work concepts. Determination of needs for recreation facilities. Factors affecting public and private allocation of resources for provision of needed facilities.
- 844. Recreation Research Methods**  
Winter. 4(4-0) Approval of department.  
Relate recreation research to broader context of social scientific investigation and to the nature and philosophy of social scientific research. Examine the theoretical and methodological approaches in recreation research.
- 846. Urban and Regional Recreation Resource Planning**  
Fall. 4(4-0) Approval of department.  
Evaluation and application of recreation planning techniques at urban and regional levels. Analysis of programs, policies, land areas, facilities, and populations as they pertain to leisure service delivery systems.
- 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.
- 850. Development of Water Recreation Resources**  
Winter. 3(3-0) Approval of department.  
Administration, research, design, and construction of water recreation facilities. Policy issues, use conflict, and fiscal planning reviewed in light of interagency relationship and legislative mandate.
- 880. Special Problems**  
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 10 credits. Approval of department.  
Advanced work for non-thesis projects or advanced individual study in recreation: policy, land use, planning, systems administration and management, economics, recreation forestry, commercial recreation enterprises, recreation and social problems, environmental interpretation, travel and touring, spatial analysis, leisure concepts, research.
- 882. Recreation Research Seminar**  
Fall. 2(2-0) May reenroll for a maximum of 4 credits. Approval of department.  
Evaluation of a variety of studies presented by the scientists to illustrate how principles are applied to recreation research project management.
- 899. Master's Thesis Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.
- 999. Doctoral Dissertation Research**  
Fall, Winter, Spring, Summer. Variable credit. May reenroll for a maximum of 36 credits. Approval of department.

**PATHOLOGY PTH**

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

- 404. General Pathology**  
Fall, Spring. 5(3-6) ANT 420, Junior Medical Technology majors, or approval of department.
- 407. Clinical Pathology**  
Winter, Summer. 3(3-0) or 5(3-4) Approval of department.  
Theory and technics in hematology and coagulation.

## Descriptions – Pathology

### of

### Courses

- 408. Clinical Pathology**  
Fall, Spring. 3(3-0) or 5(3-4) Approval of department.  
Immunohematology, urinalysis, and topics in blood chemistry.
- 502. Human Pathology I**  
Winter. 2 to 5 credits. Admission to a college of medicine or approval of department.  
Pathologic processes and specific disease syndromes with emphasis on clinical applications. Concepts of disease and pathologic process in selected common diseases or conditions for the beginning medical student with a limited knowledge of anatomy, physiology and biochemistry.
- 503. Human Pathology II**  
Spring. 2(2-1) PTH 502.  
An introductory study of neuropathology in which vocabulary and concepts of neuromuscular diseases are systematically reviewed. Self-instructional option available.
- 504. Human Pathology III**  
Fall. 3(2-2) PTH 503 or approval of department.  
A continuation of PTH 503. Diseases of the cardiovascular system, including stress effects, arteriosclerosis and disorders of autonomic and endocrine regulation. Laboratory sessions include the study of histologic sections.
- 505. Human Pathology IV**  
Winter. 3(2-2) PTH 504 or approval of department.  
A continuation of PTH 504. The systems include: lung, kidney, male genitourinary and bone and joints. In the laboratory sections, gross and microscopic changes in diseased tissues are studied and correlated with lecture material. Separate lab sessions covering pulmonary function tests, acid-base balance and urinalysis are included.
- 506. Human Pathology V**  
Spring. 3(2-2) PTH 505 or approval of department.  
A continuation of PTH 505. The systems include gastrointestinal tract (including liver and pancreas), female reproductive tract and breast.
- 520. Biology of Blood Diseases Laboratory**  
Spring. 1(0-3) Enrollment in a college of medicine or a graduate program in a biological science; MED 520 concurrently.  
Laboratory experience correlating basic science and clinical concepts of hematology.
- 550. Veterinary Pathology**  
Spring. 5(2-6) Third-term Veterinary Medicine students or approval of department.  
Principles of pathology, including causes of disease, disturbances of cell growth and metabolism, necrosis, circulatory changes, inflammation and neoplasia.
- 552. Veterinary Clinical Pathology**  
Winter. 4(3-3) Fifth-term Veterinary Medicine students or approval of department.  
Technical aspects, principles and interpretation of selected laboratory procedures in hematology, chemistry, cytology and related areas.
- 608. Pathology Clerkship**  
Fall, Winter, Spring, Summer. 3 to 17 credits. May reenroll for a maximum of 17 credits. H M 602 or approval of department.  
Anatomic and clinical pathology, with emphasis on clinical-pathological correlations. Conducted in the pathology departments of affiliated hospitals.
- 651. Veterinary Clinical Pathology Clerkship**  
Fall, Winter, Spring, Summer. 4 credits. Satisfactory completion of term 8 of the professional veterinary curriculum, approval of department.  
Concepts in laboratory interpretation and diagnosis.
- 652. Veterinary Necropsy Clerkship**  
Fall, Winter, Spring, Summer. 4 credits. Satisfactory completion of term 8 of the professional veterinary curriculum, approval of department.  
Supervised necropsy and interpretation of findings.
- 655. Problems in Veterinary Clinical Pathology**  
Fall, Winter, Spring, Summer. 4 credits. PTH 651, approval of department.  
Problems related to subspecialties such as hematology, clinical chemistry, cytology and applied immunology.
- 656. Problems in Veterinary Necropsy**  
Fall, Winter, Spring, Summer. 4 credits. PTH 652, approval of department.  
Problems related to necropsy and interpretation of findings.
- 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 particular 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 reenroll 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) PTH 802 and approval of department.  
Continuation of PTH 802.
- 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. Postmortem Diagnosis**  
Fall, Spring. 3(0-9) May reenroll 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 results of other tests.
- 811. Advanced Clinical Pathology**  
Fall. 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) PTH 408 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.
- 826. Laboratory Animal Pathology**  
Spring. 4(3-3) Graduate status and approval of department.  
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. Master's Thesis 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.
- 921. Pathology of Nutritional and Metabolic Diseases**  
Summer of even-numbered years. 4(3-2) Approval of department. PTH 404 or ANT 420. ANS 525, BCH 452, HNF 462 recommended. Interdepartmental with the departments of Large Animal Surgery and Medicine and Animal Husbandry and Human Nutrition and Foods. Administered by Human Nutrition and Foods.  
Development, physiopathology and morphologic pathology of nutritional and metabolic diseases including carbohydrate, protein, fatty acid, vitamin and mineral deficiencies, their experimental induction and their medical or economic significance.
- 980. Histopathologic Diagnosis**  
Fall, Winter, Spring, Summer. 3(0-9) May reenroll for a maximum of 6 credits. PTH 803, PTH 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 reenroll 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. Doctoral Dissertation Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

**PEDIATRICS PED**

(Established effective January 1, 1979.)

**College of Osteopathic Medicine**

**590. Special Problems in Pediatrics**  
Fall, Winter, Spring, Summer. 1 to 8 credits. Approval of department.

Each student will work under direction of a faculty member on an experimental, theoretical or applied problem.

**600. Pediatrics Clerkship**  
(O M 652.) Fall, Winter, Spring, Summer. 8 credits. Grade P in all courses offered in terms 1 through 8 or approval of department.

Practical clinical exposure in the area of pediatrics. Program developed to achieve proficiency in motor skills and aptitudes; comprehension of concepts and principles; patient evaluation, diagnosis, management and therapy.

**620. Directed Studies**  
Fall, Winter, Spring, Summer. 2 to 24 credits. PED 600 or approval of department.  
Study in general or specialty pediatrics.

**PEDIATRICS AND HUMAN DEVELOPMENT PHD**

(Name changed July 1, 1979. Formerly Department of Human Development.)

**College of Human Medicine**

**520. Genetics Clinic**  
Fall, Winter, Spring, Summer. 1 to 3 credits. My reenroll for a maximum of 9 credits.  
Students will interview and examine patients with inheritable disorders, perform related laboratory diagnostic procedures, and participate in genetic counseling conferences and discussions.

**531. Medical Genetics**  
Spring. 1(1-0) ANT 544 or approval of department.

Basic genetic principles and their application to clinical medicine, prenatal genetic diagnosis, exercises in genetic counseling and the importance of relevant laboratory tests.

**532. Phenomena of Development**  
Fall. 5(5-0) PHD 531 or approval of department.

Normal psychological and physical development of the human including intellectual, social, emotional and endocrinological growth from infancy through adolescence. Clinical examples highlight deviations from the normal course of development.

**590. Special Problems in Human Development**  
Fall, Winter, Spring, Summer. 1 to 6 credits. May reenroll for a maximum of 12 credits. Human Medicine students or approval of department.

Each student will work under direction of a staff member on an experimental, theoretical or applied problem.

**608. Pediatric Specialty Clerkship**  
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll for a maximum of 43 credits. H M 602; primary clerkship.

Clinical experience with pediatric patients under the direction of members of the faculty of the Department of Human Development and community pediatricians. Fall, Saginaw. Winter, Lansing. Spring, Grand Rapids. Summer, Flint.

**609. Human Development and Pediatric Sub-Specialties**  
Fall, Winter, Spring, Summer. 1 to 17 credits. May reenroll for a maximum of 34 credits. H M 602.

Elected experiences in selected clinical and basic sciences related to pediatrics and human development.

**PHARMACOLOGY AND TOXICOLOGY PHM**

(Effective July 1, 1978. Formerly Department of Pharmacology)

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

**350. Introductory Human Pharmacology**  
Spring. 3(3-0) PSL 432 or PSL 241 or concurrently; or approval of department.

General principles; central nervous system, autonomic nervous system, cardiovascular and renal drugs; chemotherapy; and other selected basic topics.

**430. Drug Abuse**  
Fall of odd-numbered years. 4(4-0) Juniors or 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. 1 to 3 credits. May reenroll for a maximum of 9 credits. Approval of department.

Limited amounts of individual work on selected research problems for undergraduate students.

**520A. Principles of Pharmacology**  
Fall. 4(4-0) PSL 500B, PSL 500C.

Drug absorption, distribution, biotransformation, elimination, receptor theory and pharmacogenetics; chemical toxicity; autonomic nervous system, cardiovascular and renal pharmacology.

**520B. Principles of Pharmacology**  
Winter. 4(4-0) PSL 500A; BCH 501.

Drug absorption, distribution, biotransformation, elimination, antagonism; receptor theory and pharmacogenetics. Chemotherapy: antineoplastic, antiviral and antimicrobial agents. Toxicology and emergency therapies. Pharmacology related to the autonomic nervous system.

**521A. Pharmacodynamics**  
Winter. 5(4-2) PHM 520A. Primarily for students of Veterinary Medicine.

Endocrine, autocoid and central nervous system pharmacology; chemotherapy: antimicrobials, antihelminthics, antineoplastics.

**521B. Pharmacodynamics**  
Spring. 4(4-0) PHM 520B or PHM 520A.

Pharmacology of the central and peripheral nervous systems. Cardiovascular, renal and gastrointestinal drugs. Endocrine and autocoid pharmacology.

**810. Synaptic Transmission**  
Winter of odd-numbered years. 4(4-0) Approval of department.

Chemical and electrical aspects of nervous impulse transmission at synaptic and neuroeffector junctions and influences of drugs upon these processes. Intrinsic neuronal circuitry; reticular formation; thalamus; neocortex; cerebellum.

**811. Advanced Renal and Autocoid Pharmacology**  
Spring of even-numbered years. 4(4-0) PHM 521A or PHM 521B and approval of department.

Advanced concepts and current topics in renal and autocoid pharmacology.

**812. Advanced Principles of Pharmacology**  
Fall. 2(2-0) PHM 521A or PHM 521B, approval of department.

Pharmacodynamics, drug-receptor interactions, computer modeling, drug metabolism.

**813. Cardiac Pharmacology**  
Winter of even-numbered years. 4(4-0) PHM 520A, PHM 521A or PHM 520B, PHM 521B; PSL 801, PSL 802, PSL 803; and approval of department.

Effects of drugs on normal physiological and biochemical processes in cardiac cells are studied. Emphasis is placed on mechanisms of drug action.

**814. Advanced Principles of Toxicology**  
Spring of even-numbered years. 4(4-0) PHM 812.

Current biochemical and physiological mechanisms of toxicity on major organ systems. Mechanisms of mutagenicity, carcinogenicity and teratology.

**870. Problems**  
Fall, Winter, Spring, Summer. 2 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.

Limited amounts of individual work on selected research problems for first year graduate students in the Department of Pharmacology and Toxicology.

**899. Master's Thesis Research**  
Fall, Winter, Spring, Summer. Variable credit. Approval of department.

Individual work on research problems for the master's degree in pharmacology.

**910. Seminar**  
Fall, Winter, Spring. 1(1-0) May reenroll for a maximum of 3 credits. Approval of department.

Discussion of recent topics on pharmacology by departmental or outside speakers, or reporting of research efforts by graduate students of the Department of Pharmacology and Toxicology.