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(4-0) PKG 444, PKG 445, PKG 446 or approval of department.
Accumulative research, planning and evaluation of recreation resources. Supervised project requiring substantive 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 wildland 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.

453. 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.

454. Commercial Recreation Enterprises
Fall, Spring. 4(4-0) EC 201, AFA 502 or approval of department.
The planning, design, impact, and natural resource base of privately-owned outdoor recreation businesses.

455. Recreation Products Consumption
Winter. 4(4-0) FOR 470 recommended.
EC 201, AFA 202, or approval of department. Recreation, economic and personality theories of consumption. Specific recreation product industry case studies.

456. Supervised Study
Fall, Winter, Spring, Summer. 1 to 4 credits. May enroll for a maximum of 10 credits. Approval of department.
Seminars on current problems. Supervised readings. Individual undergraduate research on selected topics.

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

458. 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.

459. Recreation Economics
Spring. 4(4-0) FOR 506 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.

460. 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.

461. Recreation Research Methods
Winter. 4(4-0) Approval of department.
Relate research recreation 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.

462. 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.

463. 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.

464. 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 local planning reviewed in light of interagency relationship and legislative mandate.

465. Special Problems
Fall, Winter, Spring, Summer. 1 to 6 credits. May enroll for a maximum of 10 credits. Approval of department.
Advanced work for non-thesis projects or advanced individual study in recreation resource planning, land use, planning, systems administration and management, economics, recreation forestry, commercial recreation enterprises, recreation and social problems, environmental interpretation, travel and tourism, spatial analysis, leisure concepts, research.

466. Recreation Research Seminar
Fall. 2(2-0) May enroll 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.

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

468. 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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Fall, Winter, Spring, Summer</th>
<th>Approval</th>
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<tbody>
<tr>
<td>PTH 502</td>
<td>Human Pathology I</td>
<td>2-5</td>
<td>Winter</td>
<td>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.</td>
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<tr>
<td>PTH 503</td>
<td>Human Pathology II</td>
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<td>Spring</td>
<td>2(2-1) PTH 502. An introductory study of neuropathology in which vocabulary and concepts of neuromuscular disease are systematically reviewed. Self-instructional option available.</td>
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<td>PTH 504</td>
<td>Human Pathology III</td>
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<td>Fall</td>
<td>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.</td>
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<tr>
<td>PTH 505</td>
<td>Human Pathology IV</td>
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<td>Winter</td>
<td>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.</td>
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<td>PTH 506</td>
<td>Human Pathology V</td>
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<td>Spring</td>
<td>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.</td>
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<td>PTH 507</td>
<td>Veterinary Pathology</td>
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<td>PTH 508</td>
<td>Veterinary Clinical Pathology Clerkship</td>
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<td>PTH 651</td>
<td>Veterinary Necropsy Clerkship</td>
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<td>PTH 652</td>
<td>Problems in Veterinary Clinical Pathology</td>
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<td>PTH 653</td>
<td>Problems in Pathology</td>
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<td>PTH 654</td>
<td>Pathology Seminar</td>
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<td>PTH 655</td>
<td>Advanced Histopathology</td>
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<td>PTH 656</td>
<td>Advanced Histopathology</td>
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<tr>
<td>PTH 657</td>
<td>Pathology Proseminar</td>
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<td>PTH 658</td>
<td>Postmortem Diagnosis</td>
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<td>PTH 659</td>
<td>Histopathologic Diagnosis</td>
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<td>PTH 660</td>
<td>Advanced Correlative Pathology</td>
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<tr>
<td>PTH 661</td>
<td>Doctoral Dissertation Research</td>
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**PEDIATRICS**

*Established effective January 1, 1979. Formerly Department of Human Development.*

**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**

*Established effective January 1, 1979. Formerly Department of Human Development.*

**College of Human Medicine**

520. Genetics Clinic
Fall, Winter, Spring, Summer. 1 to 3 credits. May reenroll for a maximum of 9 credits.
Students will interview and examine patients with hereditary 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 54 credits. H M 602.
Elected experiences in selected clinical and basic sciences related to pediatrics and human development.

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**Pharmacology and Toxicology – Descriptions of Courses**

521A. Pharmacodynamics
Winter. 5(4-2) PHM 520A. Primarily for students of Veterinary Medicine.
Endocrine, autonomic and central nervous system pharmacology, chemotherapy: antimicrobials, anthelminthics, 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 autonomic 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; tetanic formation; thalamus, neocortex; cerebellum.

811. Advanced Renal and Autocid 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 autonomic pharmacology.

812. Advanced Principles of Pharmacology
Fall. 3(3-0) PHM 521A or PHM 521B.
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 501, PSL 502, PSL 503, 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 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: antimicrobial, antiviral and antimicrobial agents. Toxicology and emergency therapies. Pharmacology related to the autonomic nervous system.

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.