616. The Osteopathic Examination III
Fall, Summer. 1(0-4) OST 615 or approval of instructor.
Introductory clinical course in the application of
neuromusculoskeletal assessment, palpatory
diagnosis, and osteopathic manipulative treat-
ment in the hospital setting.

PACKAGING PKG

College of Agriculture and Natural Resources

210. Principles of Packaging
Fall, Winter, Spring, Summer. 3(3-0)
A general course in packaging principles cover-
ing the growth and development of the field, and
the technological and motivational problems involved in present day packaging. Consider-
ation will be given to the basic functions of the
package, and their relation to the needs and
wants of our society.

321. Technical Principles for Packaging
Fall, Winter, Spring. 4(3-2) PKG 210,
PHY 337, PHY 258 or approval of school.
Relationships between package systems and dis-
tribution environments. Testing, evaluating and
predicting package performance under various
environmental influences.

330. Package Printing
Winter. 3(3-0) PKG 321 or approval of
school
Basic printing processes used for packaging
materials. Advantages, disadvantages and iden-
tification of these printing methods.

331. Plastic and Glass Packaging
Fall, Winter, Spring. 4(3-2) PKG 321,
CEM 143, CEM 161 or approval of school.
Physical and chemical properties of plastics and
glass and their relationship to selection, design,
manufacture, performance and evaluation of con-
tainer systems.

332. Paper and Metal Packaging
Fall, Winter, Spring. 4(3-2) PKG 321,
CEM 143, CEM 161 or approval of school.
Physical and chemical properties, manufacture,
conversion and use of wood, paper, paperboard,
mets, metal foils and related components.
Design, use and evaluation of packages made
from these materials.

340. Packaging and the Environment
Winter. 3(3-0)
Broad study of the effects of packaging on envi-
ronmental quality including solid waste man-
agement, air and water quality, laws,
economics, energy considerations, resource con-
servation and environmental ethics.

425. Packaging Process Analysis
Fall, Winter, Spring. 4(3-2) PKG 331,
PKG 332.
The integrated study of the operation, structure and
control of packaging and package-making
processes. A one-day field trip is required.

428. Packaging Development
Fall, Winter, Spring. 4(3-2) PKG 423,
PKG 425, Seniors.
Development of packages to meet present-day
requirements of protection and merchandising.

429. Packaging Economics
Winter. 3(3-0) PKG 331, PKG 332, EC
202, ACC 201 or approval of school.
Examination of economic issues in packaging as
they relate to policies of the firm and of govern-
ment. Relationships between economic policy and
social issues.

430. Elements of Packaging Machinery
Spring. 4(4-0) PKG 331, PKG 332 or
approval of school.
Design, selection, specification and operation of
components of packaging machinery. Industrial
parts and processes. Basic machine mechanisms.
Application of pneumatics, hydraulics and elec-
tricity. Field trip required.

433. Packaging Performance Testing
Fall, Winter. 3(3-0) PKG 423.
Performance testing of package systems for fra-
gility, impact, vibration, compression, and
material performance in accordance with indus-
try practices. Package container design. Mea-
surement and simulation of distribution environ-
ment for handling, shipping, and storage of
package systems.

435. Distribution Packaging
Fall, Winter, Spring. 3(3-0) EC 202,
PKG 331, PKG 332, Juniors or approval of
school.
Interrelationships between packaging and other
segments of the distribution system. Market
related issues in packaging: materials handling,
transportation, and inventory control.

438. Pharmaceutical Packaging
Winter. 4(3-2) PKG 331, PKG 332.
Special requirements for packaging pharma-
cuticals and medical devices. Evaluations of pack-
age systems and packaging procedures that meet
these requirements.

440. Special Topics (MTC)
Fall, Winter, Summer. 1 to 4
May reenroll for a maximum of 12 credits. May
re-enroll for a maximum of 12 credits if differ-
te topics are taken. Juniors or approval of school.

450. Packaging Laws and Regulations
Spring. 3(3-0) PKG 331, PKG 332 or
approval of school.
History and development of packaging laws and
regulations. Relationships among law, govern-
ment regulation and commercial regulation.
Effect of current laws and regulations on pack-
aging. Personal liability of the packaging profes-
sional.

455. Food Packaging
Fall. 4(0-2) PKG 331, PKG 332 or
approval of school.
Food packaging systems and their relationship to
specific products, processes, regulations and
equipment.

616. Automation in Packaging
Fall. 4(2-2) PKG 331, PKG 332.
Automated material handling systems: config-
urations, components, sensors, vision systems.
Robotic safety. Material handling, line inspec-
tion, automated guided vehicle systems,
automated storage retrieval systems. Economic
justification. Field trips required.

647. Permeability and Shelf Life
Winter. 4(3-2) PKG 331, PKG 332,
EC 111, PKG 332.
Comprehensive study of the relationship of the
storage life of packaged food and agricultural
products and the gas, moisture, and vapor per-
meability of package in various environments.
Computer aided package design.

822. Seminar
Fall. 1(1-0) Approval of department.
Discussions of recent advances in packaging and
reports by graduate students and faculty on
research problems. Field trips required.

823. Advanced Packaging Dynamics
Spring. 3(2-2) PKG 423 or approval of
school.
Shock simulation, random vibration, power
spectral density, modeling of non-linear systems.
Fourier decomposition. Modal analysis. Multi-
ple degree of freedom systems. Damping and
cushioning properties. Instrumentation in
dynamic testing.

834. Special Investigations in Packaging
Fall, Winter, Spring, Summer. 1 to 4
May reenroll for a maximum of 6 credits.
Approval of school.

840. Selected Topics
Fall, Winter, Summer, 1 to 4
May reenroll for a maximum of 12 credits.
Approval of department.

599. Master's Thesis Research
Fall, Winter, Spring, Summer. Variable
credit. Approval of school.

PARK AND RECREATION
RESOURCES PRR

College of Agriculture and Natural Resources

200. Leisure and Society
Fall, Winter, Spring. 3(0-2)
Leisure and recreation as part of daily life. Leis-
ure as a social, psychological and economic
force in American culture.
Descriptions — Park and Recreation Resources of Courses

210. Our National Parks
Fall, Winter, Spring, 3(3-0)

213. Introduction to Park and Recreation Services
Fall, Winter, Spring, 3(3-0)
Leisure in relation to park and recreation resources. History and philosophy, significance in modern society, and impact on urban and natural resource developments.

215. Recreation Programming and Leadership
(PRR 201) Fall, Winter, 4(3-2)
Recreation leadership and programming. Recreation program service settings, design and conduct of programs to serve different clientele groups.

302. Environmental Attitudes and Concepts
Fall, 3(3-0)
History of development of attitudes and values about the environment in western civilization. Wilderness, environmentalism, environmental quality, economic development, conservation. Environmental perception and environment-behavior relationships.

304. Recreation Planning and Design
Fall, Spring, 3(3-0) Approval of department.
Basic planning and design concepts applied to recreation areas, facilities, and programs. Planning process, public involvement, population and resource analysis, aesthetic and functional considerations in park design.

310. Camp Counseling and Administration
Spring, 3(3-0)
Camp counseling techniques, leadership roles and responsibilities, campcraft skills, programming camp activities, organization and administration of youth camps.

315. Recreation Program Management
(PRR 313) Winter, Spring, 4(3-2) PRR 215
Application of recreation programming and leadership principles to program planning, management and evaluation. Development of recreation programs utilizing leisure education format and small group process.

320. Park and Recreation Behavior
Spring, 3(3-0) PRR 213, PRR 215 or approval of department.
Behaviors of persons involved in park and recreation settings including antisocial behavior, intervening conditions, and outcomes. Application of concepts to recreation behavior situations.

351. Park Interpretation and Visitor Information Services I: Principles
Fall, Winter, 3(3-0) PRR 213, PRR 215 or approval of department.
Communication principles applied to park and recreation resource interpretation and other information services. Principles of audience analysis, brochure and exhibit design, public relations, natural/cultural interpretation, visitor information centers.

362. Recreation for Special Populations
Fall, Spring, 3(3-0) PRR 215.
Therapeutic recreation, recreation services for special populations. Physical, social, and psychological disabilities as they relate to leisure services. Field trip required.

354. Junior Proseminar
Fall, Spring, 1(1-0) Juniors, PRR 304, PRR 320, PRR 351.
Seminar on current professional problems and literature.

403. Fieldwork in Park and Recreation
Fall, Winter, Spring, 1 to 8 credits. 
May reenroll for a maximum of 8 credits. Approval of department.
Fieldwork course in which student acts as a leader under supervision in community park and recreation programs.

422. Leisure Theory and Philosophy
Fall, Spring, 3(3-0) PRR 213 or approval of department.

430. Evaluation Concepts and Methods in Parks and Recreation
Fall, 3(3-0) STT 201, PRR 354 or approval of department.
Research methods with applications to evaluation of recreation programs and facilities. Survey, experimental, and qualitative designs for evaluation based on goals, standards, and impacts.

440. Park and Recreation Administration
Winter, Spring, 4(4-0) PRR 304, PRR 351 or concurrently or approval of department.
Park and recreation organization, administration and policy at municipal, county, and regional level. Field trip required.

442. Park and Recreation Resources Policy
Spring, 3(3-0) PRR 394 or approval of department.
History and significance of recreation policy affecting leisure services. Recreation policy process and development in natural resource and human service agencies.

442A. Park and Recreation Resource Policy
Spring, 3(3-0) PRR 213 or approval of department. May not receive credit for both PRR 442A and PRR 442B.

442B. Leisure Services Policy
(442) Spring, 3(3-0) PRR 315 or PRR 362. May not receive credit for both PRR 442A and PRR 442B.
History and significance of recreation policy affecting leisure services and special populations in the U.S. Studies of recreation policy development. Professional certification. Approved through Fall 1989.

444. Park and Recreation Area Design
Winter, 4(3-4) PRR 304 or approval of department.
Planning and design principles of space, scale, and circulation applied to the use of park and recreation areas and facilities. Field trip required.

445. Comprehensive Recreation Planning
Fall, 4(4-0) PRR 364 or approval of department.
Comprehensive planning techniques for recreation resources at national, state, and local levels. Supply-demand analysis, forecasting, impact assessment, survey methodology, and citizen input for recreation system planning.

446. Park and Recreation Area Operations
Winter, Spring, 3(3-0) Approval of department.
Operations and maintenance of park and recreation areas and facilities. Preparation and implementation of maintenance plans, standards, scheduling, budget estimating, selection and operation of maintenance equipment, supplies, and materials.

449. Recreation Land Management
Winter, 3(3-0) Seniors in Landscape Architecture, Forestry, Fisheries and Wildlife, Park and Recreation Resources, Resource Development or approval of department.
Fundamentals of outdoor recreation resource management. Planning, development and administration of programs and facilities.

450. Natural Resource Administration
Spring, 4(4-0) Seniors. Interdepartmental with Agriculture and Natural Resources and the departments of Fisheries and Wildlife, Forestry, and Resource Development. Administered by the Department of Forestry.

451. Park Interpretation and Visitor Information Services II: Methods
Spring, 4(4-0) PRR 351.
Methods used in information services for park and recreation areas. Audiodvisual programs, exhibit technology, interpretation issues, interpretive planning and program development. Field trip required.

455. Natural Resource Economics
Fall, 4(3-2) EC 200 or EC 201. Interdepartmental with Agriculture and Natural Resources and the departments of Fisheries and Wildlife, Forestry, and Resource Development. Administered by the Department of Forestry.
Basic economic and institutional principles and techniques that govern the production and consumption of renewable natural resources. Natural resource evaluation, project analysis, and distributional considerations.

466. Natural Resource Planning
Winter, 3(3-2) FOR 455 or R D 417 or approval of department. Interdepartmental with the departments of Forestry and Resource Development. Administered by the Department of Forestry.
Natural resource planning concepts and techniques applicable to area-level and subarea-level planning. Case studies in comprehensive, multiple resource public planning and single resource private planning.

467. Therapeutic Recreation Principles
Fall, 3(3-0) PRR 362.
Planning, implementation, and evaluation of therapeutic recreation services. Individual disabilities, review of health care models and related therapies. Field trip required.
465. **Therapeutic Recreation Techniques**
   Winter. 3(2-2) PRR 467.
   Instructional, intervention, and interaction techniques in therapeutic recreation. Treatment planning, terminology, documentation, and leisure counseling. Field trip required.

470. **Commercial Recreation Enterprises**
   Fall. 4(4-0) Juniors; EC 201; ACC 202 or ACC 230; PRR 384 or concurrently.
   Management methods and problems in commercial recreation enterprises with an emphasis on small business.

471. **Recreation Products Consumption**
   Winter. 4(4-0) PRR 470 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 12 credits. Approval of department.
   Seminars on current problems. Individual undergraduate research on selected topics.

801. **Dimensions of Recreation and Leisure**
   Fall. 3(3-0) 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.
   Applications 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.

871. **Selected Topics**
   Fall, Winter, Spring, Summer. 1 to 4 credits. May reenroll for a maximum of 12 credits. Approval of department.
   Selected topics in recreation resource planning, administration, management, policy, and research.

501. **Introduction to Human Pathology**
   Spring. 2(1-2) Admission to the College of Human Medicine and ANT 543; or approval of department.
   Pathologic processes and specific disease syndromes with emphasis on clinical applications. Concepts of disease. Pathologic processes in selected common diseases or conditions.

502. **Human Pathology I**
   Winter. 2 to 5 credits. Admission to a college of medicine or approval of department. ANT 560 for College of Osteopathic Medicine students.
   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.

507. **Human Pathology II**
   Fall. 5(4-2) PTH 501.
   Disease of the cardiovascular and endocrine systems. Laboratory sessions will emphasize gross and microscopic morphology and clinical pathologic techniques.

509. **Human Pathology III**
   Spring. 3(3-0) PTH 501.
   Diseases of the respiratory, gastrointestinal, urinary and male reproductive systems. Laboratories will emphasize gross and microscopic study of lesions and a problem solving approach to disorders.

510. **Human Pathology IV**
   Spring. 2(2-0) PTH 501.
   Diseases of nervous system and muscle. Problem solving exercises will be utilized.

525. **Neuropathology Problem Solving Exercises**
   Fall, Winter, Spring, Summer. 2(0-4) Medical student or approval of instructor.
   Independent study of 24 neuropathology problems including clinical history and brain specimens.

540. **Introduction to Laboratory Medicine**
   (OST 551.) Winter. 2 credits. ANT 560, BCH 501, PTH 502.
   Introduction to laboratory medicine leading to proficiency in patient evaluation and diagnosis through understanding of common pathologies and basic laboratory procedures in blood, urine and feces analysis.

550. **Veterinary Pathology**
   Fall. 5(3-4) Second year 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.

590. **Special Problems in Pathology**
   Fall, Winter, Spring, Summer. 1 to 12 credits. May reenroll for a maximum of 12 credits if different topics are taken. Admission to a professional program in the College of Osteopathic Medicine or Human Medicine: approval of department.
   Each student will work under direction of a faculty member on an experimental, theoretical or applied problem in pathology.