

**Descriptions—Osteopathic Medicine
of
Courses**

590. Special Problems
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 60 credits in all enrollments for this course.
R: Open only to graduate-professional students in College of Osteopathic Medicine. Approval of college. Individual study directed by a faculty member on an experimental, theoretical, or applied problem.
QA: OST 590

PACKAGING PKG

**School of Packaging
College of Agriculture and Natural
Resources**

210. Principles of Packaging
Fall, Spring, Summer. 3(3-0)
Packaging systems, materials and forms and their relationship to the needs and wants of society.
QA: PKG 210

310. Technical Principles and Dynamics for Packaging
Fall, Spring. 4(3-2)
P: MTH 124 or MTH 132; PHY 232. R: Open only to Packaging students.
Testing, evaluating, and predicting package performance under various environmental conditions. Methods of protection against shock, vibration, and other environmental hazards.
QP: PHY 239, MTH 112 or MTH 122 QA: PKG 321, PKG 423

320. Plastic and Glass Packaging
Fall, Spring. 4(3-2)
P: CEM 143, PKG 310. R: Open only to Packaging students.
Physical and chemical properties of plastic and glass and their relationship to selection, design, manufacture, performance and evaluation of packages.
QP: PKG 321, CEM 143 QA: PKG 331

325. Paper and Metal Packaging
Fall, Spring. 4(3-2)
P: CEM 143, PKG 310. R: Open only to Packaging students.
Physical and chemical properties, manufacture, conversion and use of wood, paper, paperboard, metal foils and related components. Design, use and evaluation of packages.
QP: PKG 321, CEM 143 QA: PKG 332

330. Package Printing
Fall. 3(3-0)
P: PKG 310. R: Open only to Packaging students.
Methods of printing packages including copy preparation, design, electronic imaging, aesthetics, camera use, and effects of package materials. Production of printed packages including quality control, economics, and environmental considerations.
QP: PKG 321 QA: PKG 330

370. Packaging and the Environment
Spring. 3(3-0)
P: CEM 141; completion of Tier I writing requirement. R: Not open to freshmen and sophomores.
Effects of packaging on environmental quality. Solid waste. Air and water quality. Laws, economics and energy. Resource use and conservation.
QP: CEM 141 QA: PKG 340

415. Packaging Decision Systems
Fall, Spring. 3(2-2)
P: MTH 110 or MTH 116; CPS 100 or CPS 130 or CPS 131. R: Open only to majors in Packaging.
Application of computers to analyze and solve problems in the management, specification, production, and testing of packaging systems.
QA: PKG 467

432. Packaging Processes
Fall, Spring. 4(3-2)
P: PKG 320, PKG 325. R: Open only to Packaging students.
Integrated study of machines, organization and control of packaging processes. Application of pneumatics, hydraulics and electricity. Interrelationship of product, packaging and machinery.
QP: PKG 331, PKG 332 QA: PKG 430, PKG 425

440. Automation in Packaging
Fall. 3(2-2)
P: MTH 124. R: Not open to freshmen and sophomores.
Automated systems: configurations, components, sensors, drive mechanisms, and control systems. Robotic safety. Material handling, line inspection, vision systems, automated storage and retrieval systems. Economics. Field trips required.
QP: MTH 112 QA: PKG 465

452. Pharmaceutical Packaging
Fall. 4(3-2)
P: PKG 320 or PKG 325.
Special requirements for packaging pharmaceuticals and medical devices. Evaluation of package systems and packaging procedures.
QP: PKG 331 or PKG 332 QA: PKG 438

455. Food Packaging
Spring. 3(3-1)
P: PKG 320, PKG 325. R: Open only to Packaging majors.
Food package systems related to specific products and processes. Product composition: problems and packaging solutions, shelf life considerations, and packaging lines.
QP: PKG 331, PKG 332 QA: PKG 455

460. Distribution Packaging and Performance Testing
Spring. 3(2-2)
P: PKG 310. R: Open only to Packaging majors.
Interrelationships between packaging and distribution systems. Transportation, material handling, warehousing. Logistics and management systems. Performance testing and industry practices. Package container design and testing.
QP: PKG 321, PKG 423 QA: PKG 435, PKG 433

475. Packaging Economics
Fall. 3(3-0)
P: EC 201 or EC 202.
Economic issues in packaging as they relate to policies of the firm and of government. Relationships between economic policy and societal issues.
QP: EC 201 or EC 202 QA: PKG 429

480. Packaging Laws and Regulations
Spring. 3(3-0)
P: PKG 320 or PKG 325. R: Open only to Packaging majors.
History and development of packaging laws and regulations. Relationships among law, government regulation and commercial regulation. Effect of current laws and regulations on packaging.
QP: PKG 331 or PKG 332 QA: PKG 450

485. Packaging Systems Development
Fall, Spring. 3(3-1)
P: PKG 432. R: Open only to seniors or graduate students in Packaging.
Package development including selection, design and implementation of package systems for protection, distribution, merchandising, use and disposal.
QP: PKG 423, PKG 425 QA: PKG 428

490. Directed Studies in Packaging
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
P: PKG 320, PKG 325. R: Open only to Packaging majors. Approval of department; application required.
Development of solutions to specific packaging problems. Supervised individual study.
QP: PKG 331, PKG 332 QA: PKG 424

491. Special Topics
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course.
Selected topics of current interest.
QA: PKG 440

492. Senior Seminar
Fall, Spring. 1(2-0)
R: Open only to seniors in Packaging.
Seminar on current packaging issues, business organization and operations, and accepted practices in a corporate environment.
QA: PKG 463

805. Advanced Packaging Dynamics
Spring. 3(2-2)
P: PKG 310.
Shock and vibration. Distribution hazards and product fragility. Cushion performance and package design. Environmental measurement and simulation.
QP: PKG 423 QA: PKG 823

815. Permeability and Shelf Life
Spring. 3(2-2)
P: MTH 124 or MTH 132; PKG 320; PKG 325.
Relationship between the storage life of packaged food and pharmaceutical products and the gas, moisture, and organic vapor permeability of packages in various environments.
QP: PKG 331, PKG 332, MTH 112 QA: PKG 820

817. Instruments for Analysis of Packaging Materials
Fall of even-numbered years. 4(3-2)
P: PKG 320, PKG 325.
Analytical methods for packaging including spectrophotometry and chromatography. Material identification and characterization. Migration and permeation measurements.
QP: PKG 331, PKG 332 QA: PKG 830

825. Polymeric Packaging Materials
Fall. 4(3-2)
P: PKG 320.
Physical and chemical properties of polymeric materials and structures used in packaging. Relationship of properties to performance.
QP: PKG 331 QA: PKG 810

875. Stability and Recyclability of Packaging Materials
Fall of odd-numbered years. 3(3-0)
P: PKG 320, PKG 325.
Interactions between packaging materials and environments: corrosion, degradation, stabilization, and recycling. Impacts of packaging disposal.
QP: PKG 331, PKG 332

890. Independent Study in Packaging
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 4 credits in all enrollments for this course.
R: Open only to graduate students in Packaging. Approval of department; application required.
Special investigations of unique packaging problems.
QA: PKG 834

891. Selected Topics
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course.
R: Open only to graduate students in Packaging.
Selected topics of interest to graduate packaging students.
QA: PKG 840

899. Master's Thesis Research
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 99 credits in all enrollments for this course.
R: Open only to Master's students in Packaging.
QA: PKG 899

PARK AND RECREATION RESOURCES PRR

College of Agriculture and Natural Resources

200. Leisure and Society
Fall, Spring, Summer. 3(3-0)
Leisure and recreation as part of daily life. Leisure as a social, psychological, political, economic and cultural force in the United States.
QA: PRR 200

210. Our National Parks and Recreation Lands
Fall, Spring, Summer. 3(3-0)
Scope and history of federal recreation lands. Comparisons of national parks to other federal lands. Recreation land management in other nations. Future federal land management options.
QA: PRR 210

- 213. Introduction to Parks, Recreation, and Leisure**
Fall, Spring, Summer. 3(3-0)
The scope and management of recreation services and resources. Historical and philosophical foundations. Influence of recreation behavior on state, national, international, economic, political and social institutions.
QA: PRR 213
- 215. Recreation Program Management**
Fall, Spring. 4(3-2)
Programming and leadership principles for planning, management, and evaluation. Program design and conduct to service different clientele, using leisure education, program development, and small group processes. Field trips required.
QA: PRR 215
- 293. Field Work in Park and Recreation Resources**
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course.
P: PRR 213, PRR 215. R: Open only to students in Park and Recreation Resources. Approval of department.
Professional field experience in a park or recreation setting.
QA: PRR 403
- 302. Environmental Attitudes and Concepts**
Fall. 3(3-0)
P: One ISS course or one PSY course or one SOC course. R: Not open to freshmen.
History of attitudes and values associated with the environment, wilderness, environmentalism, environmental quality, conservation, and preservation. Perceptions and assessment of modern environmental problems.
QA: PRR 302
- 320. Human Behavior in Park and Recreation Settings**
Spring. 3(3-0)
P: One PSY course or one SOC course.
Antecedents, intervening conditions, and outcomes of human behavior in park, recreation, and leisure settings. Interactions between recreation behavior and the natural environment. Problem solving in recreation.
QP: PRR 213, PRR 215 QA: PRR 320
- 351. Recreation and Natural Resources Communication**
Fall. 3(2-2)
P: PRR 213. R: Not open to freshmen.
Principles of communication for recreation and natural resource audiences. Application to various forms of interpretive media including verbal, graphic, and written. Field trips required.
QP: PRR 213, PRR 215 QA: PRR 351
- 362. Recreation for Special Populations**
Spring. 3(3-0)
P: PRR 213. R: Not open to freshmen.
Therapeutic recreation services emphasizing handicapper and geriatric characteristics. Chemical dependency issues. Leisure lifestyle issues. Philosophical foundations and service models. Integration, normalization, inclusion, and empowerment concepts
QP: PRR 213, PRR 215 QA: PRR 362
- 370. Administration and Operation of Parks and Recreation Systems**
Fall. 4(4-0)
P: PRR 215, PRR 351. R: Not open to freshmen and sophomores.
Policy, administration, and operations at municipal, county, and regional levels. Policy and administrative development of systems. Preparation and implementation of operation and maintenance plans and schedules.
QP: PRR 213, PRR 304, PRR 351 QA: PRR 442, PRR 440, PRR 446
- 371. Management of Park and Recreation Agencies and Organizations**
Spring. 4(4-0)
P: ACC 230, PRR 213, PRR 215. R: Not open to freshmen and sophomores.
Management and operating concepts and methods. Revenues and cost management, service marketing, staffing and supervision.
QP: ACC 230, PRR 213, PRR 215 QA: PRR 440, PRR 470, PRR 471
- 393. Professional Seminar**
Fall, Spring. 1(1-0)
P: PRR 293. R: Open only to majors in Park and Recreation Resources.
Linkage of field work and internship. Integration of course work with professional practice.
QP: PRR 303 QA: PRR 384
- 443. Parks and Recreation Planning and Design Concepts**
Spring. 4(2-4)
P: PRR 351. R: Not open to freshmen and sophomores.
Planning models and design analysis, synthesis, and communication and recreation and tourism subsystem and supply analysis.
QP: PRR 351 QA: PRR 444, PRR 445, PRR 304
- 449. Management of Natural Resource Based Recreation**
Fall. 3(3-0)
R: Not open to freshmen and sophomores.
The history of natural resource recreation management in the U.S. Techniques for dispersed and developed recreation management. Security of facilities, visitors, and personnel.
QP: PRR 213 QA: PRR 449
- 451. Park Interpretive Services and Visitor Information Systems**
Spring of even-numbered years. 3(2-2)
P: PRR 351. R: Not open to freshmen and sophomores.
Orientation, management, and education information systems. Influencing visitor behaviors. Goals and functions of interpretation. Types of services. Nature/visitor center programming and facility design and layout. Historical-cultural interpretation.
QP: PRR 351 QA: PRR 451
- 467. Programming in Therapeutic Recreation**
Fall. 3(3-0)
P: PRR 362.
Comprehensive and individual program planning methods. Standards of practice, quality assurance, interview techniques, professional ethics, and terminology. Field trips required.
QP: PRR 362 QA: PRR 467
- 468. Therapeutic Recreation Techniques**
Spring. 3(3-0)
P: PRR 467.
Health care documentation. Leisure education. Facilitation techniques. Assistive recreation devices. Principles of pharmacology related to therapeutic recreation. Professional and certification issues.
QP: PRR 467 QA: PRR 468
- 473. Commercial Recreation and Tourism Enterprises**
Fall. 3(3-0)
P: EC 201, PRR 371. R: Not open to freshmen and sophomores.
Management and operation of resort, recreation, and tourism enterprises. Emphasis on small business. Strategic planning, feasibility studies, market assessment, and quality assurance.
QP: EC 201, ACC 202, PRR 384 QA: PRR 470, PRR 471
- 474. Community and Natural Resource Based Tourism**
Spring of odd-numbered years. 3(3-0)
R: Not open to freshmen and sophomores.
Developing and sustaining tourism. Environmental, social, and economic considerations. Roles and responsibilities of agencies and organizations. Impact management. Tourism-based community and rural development.
- 475. Evaluation in Parks and Recreation**
Fall. 3(2-2)
P: STT 200 or STT 201 or PSY 295 or GEO 427. R: Open only to seniors or graduate students.
Evaluation concepts, approaches, and methods. Evaluation in management and administrative functions.
QP: PRR 215 or PSY 215 or GEO 427 QA: PRR 430
- 485. Legal Aspects of Parks, Recreation, and Sport**
Fall. 3(3-0)
R: Open only to seniors or graduate students.
Legal concepts in management and operation of public and private programs, areas and facilities. Tort liability and risk management planning. Rights and behavior constraints of clientele. Legal foundations of authority.
QP: PRR 440
- 490. Independent Study**
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
P: PRR 215, PRR 320. R: Approval of department; application required.
Individualized readings and research compatible with students' interests and abilities under the guidance of a faculty member.
QP: PRR 215, PRR 320 QA: PRR 480
- 491. Special Topics in Park and Recreation Resources**
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
P: PRR 215; PRR 320. R: Approval of department; application required.
Group studies for advanced undergraduate students having special interests in Park and Recreation Resources.
QP: PRR 215, PRR 320
- 815. Park and Recreation Program Services**
Fall. 3(3-0)
Concepts, theories, and philosophies of leisure and recreation. Role and function of delivery systems in communities. Management of the program-planning process and provision of recreation services to diverse groups.
- 840. Recreation and Tourism Economics**
Fall. 3(3-0)
Economic concepts in public and private sector recreation and tourism decisions. Non-market valuation techniques. Regional economic impact. Demand and supply. Forecasting consumption trends. Financial and benefit cost analysis.
QA: PRR 840
- 841. Park and Recreation Administration and Policy**
Fall. 3(3-0)
Administration and management of park and recreation services in urban and rural environments. Policy development and evaluation. Planning, financing, staffing, operating and evaluating organizational structures.
QA: PRR 871
- 844. Research Methods in Recreation, Parks, and Tourism**
Spring. 3(3-0)
Recreation research needs, techniques, assessment and application. Management problems and decision making.
QA: PRR 844
- 848. The Law and Leisure Services**
Spring. 3(3-0)
Risk control. Legal audits. Human rights mandates. Legal information systems. Contracts and participant forms. Intentional tort and negligence concepts. Personnel legal processes.
QA: PRR 848

Descriptions—Park and Recreation Resources of Courses

870. Park, Recreation and Natural Resources Marketing
Fall of odd-numbered years. 3(3-0)
R: Open only to graduate students in Park and Recreation Resources, Resource Development, Forestry, and Fisheries and Wildlife.
 Integration of marketing concepts and methods into agency planning and decision making.
 QA: PRR 871

874. Leisure, Travel and Tourism
Spring. 3(3-0)
 Modern concepts of leisure, travel, and tourism. Historical antecedents and current concepts of leisure, travel, and tourism.
 QA: PRR 871

879. Case Studies in Park and Recreation Resources
Spring. 3(3-0)
P: PRR 840, PRR 841.
 Integrated approach to policy, planning, and management problems.

890. Independent Study
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 7 credits in all enrollments for this course.
 Supervised individual study in an area of parks, recreation, leisure, or tourism.

891. Selected Topics
Fall, Spring, Summer. 3 to 6 credits. A student may earn a maximum of 8 credits in all enrollments for this course.
 Selected topics in park and recreation resources of current interest and importance.

892. Park and Recreation Resources Seminar
Fall, Spring. 1 to 2 credits. A student may earn a maximum of 2 credits in all enrollments for this course.
 Current policy issues, problems and research in parks, recreation and tourism.

899. Master's Thesis Research
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 99 credits in all enrollments for this course.
R: Open only to graduate students in Park and Recreation Resources. Approval of department.

944. Advanced Research Methods
Summer. 3(3-0)
P: PRR 844.
 Applications of advanced and specialized research methods to problems in recreation and tourism. Measurement, sampling, and research design.

999. Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course.
R: Open only to Ph.D. students in Park and Recreational Resources.

542. Basic Principles of Pathology
Spring. 2 credits.
R: Graduate-professional students in colleges of Human and Osteopathic Medicine.
 Fundamental pathologic processes; clinical applications.

550. Veterinary Pathology
Fall. 4(3-2)
R: Completion of the first year of the graduate-professional program in College of Veterinary Medicine. Not open to students with credit in PTH 551.
 Etiology of disease. Disturbances of cell growth and metabolism, necrosis, circulatory changes, inflammation, and neoplasia.
Temporary approval effective from Fall Semester 1992 through Spring Semester 1993.
 QA: PTH 550

551. General Pathology
Spring. 3(2-2)
R: Completion of 1 semester of the graduate-professional program in the College of Veterinary Medicine. Not open to students with credit in PTH 550. Not open to students with credit in PTH 550.
 Host responses to injury, including cell degeneration, necrosis, disturbances of growth and development, neoplasia, circulatory disturbances and inflammation.

552. Veterinary Clinical Pathology
Fall. 3(2-2)
R: Completion of the first year of the graduate-professional program in the College of Veterinary Medicine. Not open to students with credit in PTH 553.
 Technical aspects, principles, and interpretation of laboratory procedures in hematology, chemistry, cytology, and related areas.
Temporary approval effective from Fall Semester 1992 through Spring Semester 1993.
 QA: PTH 552

553. Clinical and Systemic Pathology
Fall. 5(4-2)
R: Completion of 2 semesters of the graduate-professional program in the College of Veterinary Medicine. Not open to students with credit in PTH 552. Not open to students with credit in PTH 552.
 Hematology. Pathology of hematopoietic, lymphatic, digestive, urinary, respiratory, integumentary, cardiovascular, nervous, reproductive, musculoskeletal, endocrine, ocular, and otic systems.

590. Special Problems in Pathology
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 8 credits in all enrollments for this course.
R: Open only to graduate-professional students in College of Human Medicine or Osteopathic Medicine.
 Individual directed work on an experimental, theoretical, or applied problem in pathology.
 QA: PTH 590

592. Special Problems in Veterinary Pathology
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
R: Open only to graduate-professional students in the College of Veterinary Medicine. Not open to students with credit in PTH 632.
 Student works under faculty direction on an experimental, theoretical or applied problem.
Temporary approval effective from Fall Semester 1992 through Spring Semester 1996.
 QA: PTH 592

608. Pathology Clerkship
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 12 credits in all enrollments for this course.
R: Open only to graduate-professional students in College of Human Medicine or Osteopathic Medicine.
 Anatomic and clinical pathology with emphasis on clinical-pathological correlation. Conducted in pathology departments of affiliated hospitals.
 QA: PTH 608

609. Laboratory Medicine Clerkship
Fall, Spring, Summer. 1 to 4 credits. A student may earn a maximum of 8 credits in all enrollments for this course.
R: Open only to graduate-professional students in College of Human Medicine or Osteopathic Medicine.
 Laboratory procedures. Correlation of laboratory data with morphologic abnormalities in patients with altered pathophysiology.
 QA: PTH 609

621. Histopathology Clerkship
Fall, Spring. 2 credits.
R: Completion of the third year of the graduate-professional program in the College of Veterinary Medicine.
 Supervised instruction in the examination and interpretation of histologic lesions caused by animal diseases.
Temporary approval effective from Fall Semester 1992 through Spring Semester 1996.
 QA: PTH 621

630. Diagnostic Pathology Clerkship
Fall, Spring. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
P: Completion of semester 5 of the graduate-professional program in the College of Veterinary Medicine. R: Not open to students with credit in PTH 651 or PTH 652.
 Necropsy and surgical and clinical pathology. Interpretation of gross findings and laboratory data.
 QA: PTH 651, PTH 652

631. Necropsy Clerkship
Fall, Spring. 3 credits
P: PTH 630. R: Completion of 5 semesters of the graduate-professional program in the College of Veterinary Medicine.
 Supervised necropsy. Interpretation and presentation of findings.

632. Problems in Veterinary Pathology
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
R: Completion of 5 semesters in the graduate-professional program in the College of Veterinary Medicine. Approval of department.
 Supervised projects involving gross pathology, histopathology, clinical pathology, or molecular pathology.

633. Transfusion Medicine
Fall, Spring. 3 credits.
R: Completion of 5 semesters of the graduate-professional program in the College of Veterinary Medicine.
 Management of blood donors, blood banking, and cross match technologies. Administration of blood components. Blood typing in large and small animals.

651. Veterinary Clinical Pathology Clerkship
Fall, Summer. 3 credits.
R: Completion of the third year of the graduate-professional program in the College of Veterinary Medicine. Not open to students with credit in PTH 630.
 Concepts in laboratory interpretation and diagnosis.
Temporary approval effective from Fall Semester 1992 through Spring Semester 1996.
 QA: PTH 651

652. Veterinary Necropsy Clerkship
Fall, Spring, Summer. 3 credits.
R: Completion of the third year of the graduate-professional program in the College of Veterinary Medicine. Not open to students with credit in PTH 630.
 Supervised necropsy and interpretation of findings.
Temporary approval effective from Fall Semester 1992 through Spring Semester 1996.
 QA: PTH 652

656. Problems in Veterinary Necropsy Clerkship
Spring. 2 credits.
P: PTH 652. R: Completion of the third year of the graduate-professional program in the College of Veterinary Medicine. Not open to students with credit in PTH 631.
 Problems in necropsy and interpretation of findings.
Temporary approval effective from Fall Semester 1992 through Spring Semester 1996.
 QA: PTH 656

PATHOLOGY PTH

**Department of Pathology
 College of Human Medicine
 College of Osteopathic Medicine
 College of Veterinary Medicine**

525. Neuropathology Problem Solving Exercises
Fall, Spring, Summer. 2(0-4)
R: Open only to graduate-professional students in College of Human Medicine or Osteopathic Medicine.
 Independent study of 24 neuropathology problem solving exercises.
 QA: PTH 525