

**542. Integrative Clinical Correlations II**  
Spring, 1(9-2)  
P: OST 541.  
Application of basic science information, problem-solving, and clinical skills in an integrated clinical case format. Case presentations by students and faculty.

**543. Integrative Clinical Correlations III**  
Summer, 1 credit.  
P: OST 542.  
Application of basic science information, problem-solving, and clinical skills in an integrated clinical case format. Case presentations by students and faculty.

**544. Integrative Clinical Correlations IV**  
Fall, 1 credit.  
P: OST 543. R: Approval of college.  
Application of systems biology information, problem-solving, and clinical skills in an integrated clinical case format. Case presentations by students and faculty.

**545. Integrative Clinical Correlations V**  
Spring, 1 credit.  
P: OST 544. R: Approval of college.  
Application of systems biology information, problem-solving, and clinical skills in an integrated clinical case format. Case presentations by students and faculty.

**546. Integrative Clinical Correlations VI**  
Summer, 1 credit.  
P: OST 545. R: Approval of college.  
Application of systems biology information, problem-solving, and clinical skills in an integrated clinical case format. Case presentations by students and faculty.

**551. Issues in Minority Health**  
Fall, Spring, Summer, 3(3-0)  
R: Open only to graduate and graduate-professional students in the Colleges of Osteopathic Medicine, Human Medicine, and Nursing or approval of college.  
Patterns of health and illness in minority populations.  
SA: CMS 515

**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 the College of Osteopathic Medicine. Approval of college.  
Individual study directed by a faculty member on an experimental, theoretical, or applied problem.

## OSTEOPATHIC SURGICAL SPECIALTIES OSS

### Department of Osteopathic Surgical Specialties College of Osteopathic Medicine

**512. Biostatistics and Epidemiology**  
Summer, 2(2-0)  
R: Open only to graduate and graduate-professional students in the Colleges of Osteopathic Medicine, Human Medicine, and Nursing or approval of department.  
Medical literature to illustrate statistical reasoning and research design. Emphasis on analysis rather than computation. Prospective or retrospective studies. Sensitivity, specificity, and predictive values. Epidemiologic terminology.  
SA: CMS 512

**590. Special Problems**  
Fall, Spring, Summer, 1 to 24 credits. A student may earn a maximum of 48 credits in all enrollments for this course.  
R: Open only to graduate-professional students in the College of Osteopathic Medicine. Approval of department.  
Each student works under faculty direction on an experimental, theoretical, or applied problem.

**620. Directed Studies**  
Fall, Spring, Summer, 1 to 30 credits. A student may earn a maximum of 48 credits in all enrollments for this course.  
R: Open only to graduate-professional students in the College of Osteopathic Medicine upon completion of Units I and II.  
Individual or group work on special problems in medicine.

**651. Obstetrics and Gynecology Clerkship**  
Fall, Spring, Summer, 1 to 9 credits. A student may earn a maximum of 9 credits in all enrollments for this course.  
R: Open only to graduate-professional students in the College of Osteopathic Medicine upon completion of Units I and II.  
Obstetric patient evaluation and management: motor skills, aptitudes, evaluation of postpartum patient and management of gynecologic problems.

**653. Surgery Clerkship**  
Fall, Spring, Summer, 1 to 12 credits. A student may earn a maximum of 12 credits in all enrollments for this course.  
R: Open only to graduate-professional students in the College of Osteopathic Medicine upon completion of Units I and II.  
Surgical diagnosis, management, and treatment. Structure developed to achieve proficiency in motor skills, aptitudes, comprehension of concepts and principles, patient evaluation, diagnosis, management, therapy.

**654. Anesthesiology Clerkship**  
Fall, Spring, Summer, 1 to 4 credits. A student may earn a maximum of 4 credits in all enrollments for this course.  
R: Open only to graduate-professional students in the College of Osteopathic Medicine upon completion of Units I and II.  
Motor skills, concepts and principles, patient evaluation, management and therapy.

**656. Orthopedic Clerkship**  
Fall, Spring, Summer, 1 to 20 credits. A student may earn a maximum of 30 credits in all enrollments for this course.  
R: Open only to graduate-professional students in the College of Osteopathic Medicine upon completion of Units I and II.  
Program developed to achieve proficiency in motor skills, aptitudes, comprehension of concepts and principles, patient evaluation, diagnosis, management, and therapy.

**658. Otorhinolaryngology Clerkship**  
Fall, Spring, Summer, 1 to 20 credits. A student may earn a maximum of 30 credits in all enrollments for this course.  
R: Open only to graduate-professional students in the College of Osteopathic Medicine upon completion of Units I and II.  
Develop proficiency in motor skills, aptitudes, comprehension of concepts and principles, patient evaluation, diagnosis, management, and therapy.

## PACKAGING PKG

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

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

**221. Packaging with Glass and Metal**  
Fall, Spring, 3(3-0)  
P: PKG 101 or concurrently, CEM 141, PHY 231.  
Physical and chemical properties of glass and metals and their applications to packaging.  
SA: PKG 320, PKG 325

**322. Packaging with Paper and Paperboard**  
Fall, Spring, 4(3-2)  
P: PKG 101, CEM 143, PKG 221 or concurrently. STT 200 or STT 201 or STT 315. R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging.  
Physical and chemical properties, manufacture, conversion, and use of wood, paper, paperboard, and related components in packaging. Design, use, and evaluation of packages.  
SA: PKG 325

**323. Packaging with Plastics**  
Fall, Spring, 4(3-2)  
P: PKG 101, CEM 143, PHY 232, MTH 124, PKG 221 or concurrently. STT 200 or STT 201 or STT 315. R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging.  
Physical and chemical properties of plastics and their relationship to selection, design, manufacture, performance, and evaluation of packages.  
SA: PKG 320

**330. Package Printing**  
Fall, 3(3-0)  
P: PKG 221. R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging.  
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.

**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.

**410. Distribution Packaging Dynamics**  
Fall, Spring, 3(3-0)  
P: PKG 322, PKG 323. R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging.  
Identification and measurement of hazards in physical distribution. Methods of protection against climate, shock, vibration, and compression.  
SA: PKG 310

**415. Packaging Decision Systems**  
Fall, Spring, 3(2-2)  
P: MTH 116; CPS 101 or CPS 131. R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging.  
Application of computers to analyze and solve problems in the management, specification, production, and testing of packaging systems.

**432. Packaging Processes**  
Fall, Spring, 4(3-2)  
P: PKG 322, PKG 323. R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging.  
Integrated study of machines, organization and control of packaging processes. Application of pneumatics, hydraulics and electricity. Interrelationship of product, packaging and machinery.

## Descriptions — Packaging of Courses

### 440. Automation in Packaging

Fall, 3(2-2)

P: MTH 124.

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 requi red.

### 452. Medical Packaging

Fall, 4(3-2)

P: PKG 322 or PKG 323.

Special requirements for packaging pharmaceuticals and medical devices. Evaluation of package systems and packaging procedures.

### 455. Food Packaging

Spring, 3(3-1)

P: PKG 322, PKG 323. R: Open only to juniors or seniors or graduate students in the Packaging major.

Food package systems related to specific products and processes. Product composition: problems and packaging solutions, shelf life considerations, and packaging lines.

### 460. Distribution Packaging and Performance Testing

Spring, 3(2-2)

P: PKG 410. R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging. Interrelationships between packaging and distribution systems. Transportation, material handling, warehousing. Logistics and management systems. Performance testing and industry practices. Package container design and testing.

### 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.

### 480. Packaging Laws and Regulations

Spring, 3(3-0)

P: PKG 322 or PKG 323. R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging.

History and development of packaging laws and regulations. Relationships among law, government regulation and commercial regulation. Effect of current laws and regulations on packaging.

### 485. Packaging Development (W)

Fall, Spring, 4(4-0)

P: PKG 410, PKG 415, PKG 432. R: Open only to seniors or graduate students in a Packaging major. Completion of Tier I writing requirement.

Package development including selection, design and implementation of package systems for protection, distribution, merchandising, use and disposal.

### 490. Directed Studies in Packaging Problems

Fall, Spring, Summer, 1 to 3 credits. A student

may earn a maximum of 6 credits in all enrollments for this course.

P: PKG 322, PKG 323. R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging. Approval of department; application required.

Development of solutions to specific packaging problems. Supervised individual study.

### 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.

### 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.

### 805. Advanced Packaging Dynamics

Spring, 3(2-2)

P: PKG 410.

Shock and vibration. Distribution hazards and product fragility. Cushion performance and package design. Environmental measurement and simulation.

### 815. Permeability and Shelf Life

Spring, 3(2-2)

P: MTH 124 or MTH 132; PKG 322, PKG 323.

Relationship between the storage life of packaged food and pharmaceutical products and the gas, moisture, and organic vapor permeability of packages in various environments.

### 817. Instruments for Analysis of Packaging Materials

Fall of even-numbered years, 4(3-2)

P: PKG 322, PKG 323.

Analytical methods for packaging including spectrophotometry and chromatography. Material identification and characterization. Migration and permeation measurements.

### 825. Polymeric Packaging Materials

Fall, 4(3-2)

P: PKG 323.

Physical and chemical properties of polymeric materials and structures used in packaging. Relationship of properties to performance.

### 875. Stability and Recyclability of Packaging Materials

Fall of odd-numbered years, 3(3-0)

P: PKG 322, PKG 323.

Interactions between packaging materials and environments: corrosion, degradation, stabilization, and recycling. Impacts of packaging disposal.

### 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.

### 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.

### 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.

### 985. Analytical Solutions to Packaging Design

Spring of odd-numbered years, 3(3-0)

P: PKG 825 R: Open only to graduate students in the College of Agriculture and Natural Resources, College of Engineering, and College of Natural Science. Approval of department; application required.

Analytical and quantitative techniques for packaging design and evaluation.

### 992. Packaging Seminar

Fall, 1(2-0) A student may earn a maximum of

3 credits in all enrollments for this course.

R: Open only to graduate students in packaging.

Presentations of detailed studies on specialized aspects of packaging.

### 999. Doctoral Dissertation Research

Fall, Spring, Summer, 1 to 24 credits. A student

may earn a maximum of 50 credits in all enrollments for this course.

R: Open only to Doctoral students in packaging.

## PARK, RECREATION AND TOURISM RESOURCES PRR

### Department of Park, Recreation and Tourism Resources College of Agriculture and Natural Resources

### 100. Recreation in Michigan Natural Resources

Spring, 3(3-0)

The scope and status of Michigan natural resources used for recreation. Historical and philosophical foundations of management and policy. Analysis of contemporary environmental and recreational policy issues.

### 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.

### 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.

### 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.

### 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 clienteles, using leisure education, program development, and small group processes. Field trips required.

### 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.

### 300B. Coaching Sports for Athletes with Disabilities

Spring of even-numbered years, 2(2-0) Interdepartmental with Physical Education and Exercise Science. Administered by Physical Education and Exercise Science.

Rules, strategies, and training. Developing and evaluating player skills. Planning, conducting, and evaluating sport practices. Health and safety concerns.