

## PACKAGING

## PKG

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

#### 101 Principles of Packaging

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

#### 221 Packaging with Glass and Metal

Fall, Spring. 3(3-0) P: (CEM 141 or CEM 151 or LB 171) and (PHY 231 or PHY 231C or PHY 183 or PHY 183B or LB 273) and (PKG 101 or concurrently) SA: PKG 320, PKG 325

Physical and chemical properties of glass and metals and their applications to packaging.

#### 315 Packaging Decision Systems (W)

Fall, Spring. 3(2-2) P: (MTH 116 or MTH 114 or MTH 124 or MTH 132 or MTH 152H or LB 118) and completion of Tier I writing requirement R: Open to sophomores or juniors or seniors in the School of Packaging. SA: PKG 415

Application of computers to communicate, analyze and solve problems in the management, specification, production, and testing of packaging systems.

#### 322 Packaging with Paper and Paperboard

Fall, Spring. 4(3-2) P: ((PKG 221 or concurrently) and PKG 101) and (MTH 124 or MTH 132 or MTH 152H or LB 118) and (CEM 143 or CEM 251 or CEM 351) and (STT 200 or STT 201 or STT 315 or STT 351) R: Open to sophomores or juniors or seniors or graduate students in the School of Packaging. SA: PKG 325

Physical and chemical properties, manufacture, conversion, and use of wood, paper, paperboard, and related components in packaging. Design, use, and evaluation of packages.

#### 323 Packaging with Plastics

Fall, Spring. 4(3-2) P: ((PKG 221 or concurrently) and PKG 101) and (CEM 143 or CEM 251 or CEM 351) and (STT 200 or STT 201 or STT 315 or STT 351) and (MTH 124 or MTH 132 or MTH 152H or LB 118) R: Open to sophomores or juniors or seniors or graduate students in the School of Packaging. SA: PKG 320

Physical and chemical properties of plastics and their relationship to selection, design, manufacture, performance, and evaluation of packages.

#### 330 Package Graphics

Fall. 3(3-0) P: PKG 221 R: Open to sophomores or juniors or seniors in the School of Packaging.

Position and importance of package graphics and structure in consumer packaging and marketing. Printing and decoration methods and technologies for paper, plastic and other materials. Preparation, production, application and economics of package graphics operations.

#### 370 Packaging and the Environment

Spring. 3(3-0) P: Completion of Tier I writing requirement. RB: CEM 141 or CEM 151 or LBS 164 R: Not open to freshmen or 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 and PKG 323 R: Open only to sophomores or juniors or seniors or graduate students in the School of Packaging. SA: PKG 310

Identification and measurement of hazards in physical distribution. Methods of protection against climate, shock, vibration, and compression.

#### 411 Package Development Technology

Fall, Spring. 3(2-2) P: PKG 322 and PKG 323 and (PKG 315 or concurrently)

Development of consumer packaging utilizing current technology tools. Integration of package structure, graphics and performance. Examination and application of current practices in packaging development.

#### 432 Packaging Processes

Fall, Spring. 4(3-2) P: (PKG 322 and PKG 323) and (PHY 232 or PHY 232C or PHY 184 or PHY 184B or PHY 294H or LB 274) R: Open to sophomores or juniors or seniors or graduate students in the School of Packaging.

Integrated study of packaging and production operations, quality control, and organization and control of machines. Interrelationship of products, packaging, machinery layout and efficiency, and quality issues.

#### 444 Radio Frequency Identification (RFID) for Packaging

Fall, Spring. 3(2-2) P: PKG 322 and PKG 323 or approval of school

Automatic identification tags, codes, and hardware and software for radio frequency identification (RFID). Business applications. Effect of products, materials, packaging, warehousing, supply chain, and quality on radio frequency equipment and readability.

#### 445 Robotics in Packaging

Spring. 2(2-0) P: MTH 124 or MTH 132 or LB 118 or MTH 152H SA: PKG 440

Robotic systems. Configurations, components, drive mechanisms, control and feedback, and safety. Line inspection, vision systems, guided vehicle, and storage retrieval systems.

#### 450 Automotive and Industrial Packaging

Fall. 2(2-0) P: MTH 124 or MTH 132 or LB 118 or MTH 152H SA: PKG 440

Returnable and expendable packaging for part shipments to assembly plants, cost justification, service parts packaging, logistical systems, and material handling.

#### 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 and PKG 323 R: Open only to sophomores or 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) RB: 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.

#### 477 Hazardous Materials Packaging

Summer. 3(3-0) RB: PKG 322 and PKG 323 R: Open to juniors or seniors or graduate students.

Packaging hazardous materials. Title 49 of the U.S. Code of Federal Regulations. Product classes, use of regulations, exceptions, authorized packaging, and the performance testing program.

#### 480 Packaging Laws and Regulations

Spring. 3(3-0) RB: 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 and PKG 315 and PKG 432) and completion of Tier I writing requirement R: Open to seniors or graduate students in the School of Packaging.

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. RB: PKG 322 and 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

Spring. 1(2-0) R: Open to seniors in the Packaging major.

Seminar on current packaging issues, business organization and operations, and accepted practices in a corporate environment.

## Packaging—PKG

- 493 Professional Internship in Packaging**  
Fall, Spring, Summer. 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CMP 493, CSS 493, EEP 493, ESA 493, FIM 493, FSC 493, FW 493, HRT 493, PKG 493, PLP 493, and PRR 493. P: PKG 322 and PKG 323 and PKG 315 R: Approval of department; application required.  
Supervised professional experience in the field of packaging offered through corporations and other businesses throughout the U.S.
- 801 Packaging Materials**  
Fall. 4(4-0) R: Approval of department.  
Physical and chemical properties of packaging materials; design, manufacture, performance and evaluation of packages.
- 803 Packaging Distribution and Dynamics**  
Spring. 2(2-0) R: Approval of department.  
SA: PKG 802  
Transportation environment, distribution packaging design and testing.
- 804 Packaging Processes**  
Spring. 2(2-0) R: Approval of department.  
SA: PKG 802  
Integrated study of packaging and production operations, quality control, organization and control of machines. Interrelationship of products, packaging, machinery layout and efficiency, and quality issues.
- 805 Advanced Packaging Dynamics**  
Spring. 3(2-2) RB: PKG 410  
Shock and vibration. Distribution hazards and product fragility. Cushion performance and package design. Environmental measurement and simulation.
- 814 Packaging for Food Safety**  
Summer. 3 credits. Interdepartmental with Veterinary Medicine. Administered by Veterinary Medicine. RB: Enrollment in graduate program in related field. R: Open to masters students in the Food Safety major and open to graduate students in the Packaging major or approval of college.  
Current issues in packaging and food safety.
- 815 Permeability and Shelf Life**  
Spring. 3(2-2) RB: MTH 124Q and MTH 132 and PKG 322 and 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 years. 4(3-2) RB: PKG 322 and PKG 323  
Analytical methods for packaging including spectrophotometry and chromatography. Material identification and characterization. Migration and permeation measurements.
- 826 Principles of Scholarship: Integrity, Ethics and Research**  
Fall. 2(2-0) Interdepartmental with Agriculture and Natural Resources. Administered by Packaging.  
Principles, considerations, expectations and culture of professional scholarship.
- 827 Polymeric Packaging Materials**  
Fall. 3(3-0) RB: PKG 323 or PKG 801 SA: PKG 825  
Physical and chemical properties of polymeric materials and structures used in packaging. Relationship of properties to performance.
- 828 Processing and Applications of Packaging Plastics**  
Spring. 3(3-0)  
Processing of packaging plastics: extrusion, coating, film, containers. Effects of processing variables on morphology and performance.
- 829 Packaging Plastics Laboratory**  
Fall. 1(0-2) Not open to students with credit in PKG 825.  
Structure versus property relationships and plastics processing.
- 840 Anti-Counterfeit Strategy and Product Protection**  
Summer. 3(3-0) Interdepartmental with Criminal Justice and Veterinary Medicine. Administered by Veterinary Medicine. R: Open to graduate students in the School of Criminal Justice or in the School of Packaging or in the Food Safety major or approval of department.  
Theory and applied techniques for anti-counterfeit strategies and product protection for food and consumer products.
- 850 Packaging Value Chain**  
Fall. 3(3-0)  
Packaging value chain from raw material supplier to retailers in context of meeting current needs. Global exploration of value chain strategies to increase innovation, sustainability, cost savings, quality, organizational agility, responsiveness.
- 875 Stability and Recyclability of Packaging Materials**  
Fall of odd years. 3(3-0) RB: PKG 322 and PKG 323  
Interactions between packaging materials and environments: corrosion, degradation, stabilization, and recycling. Impacts of packaging disposal.
- 888 Master's Project**  
Fall, Spring, Summer. 2 credits. R: Open only to masters students in the School of Packaging. Approval of school, application required.  
Master's degree Plan B project. Completion of a project related to packaging issues.
- 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 the School of 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 the School of 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 masters students in the Packaging major.  
Master's thesis research.
- 985 Analytical Solutions to Packaging Design**  
Spring of even years. 3(3-0) RB: PKG 801 R: Open only to graduate students in the College of Agriculture and Natural Resources or College of Engineering or College of Natural Science. Approval of department; application required.  
Analytical and quantitative techniques for packaging design and evaluation.
- 990 Independent Study in Packaging**  
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to Ph.D. students in the School of Packaging. Approval of department; application required.  
Special investigations of unique packaging problems.
- 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 the School of 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 the School of Packaging.  
Doctoral dissertation research.