

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.

102 Introductory Packaging Seminar
Fall, Spring. 2(2-0) P: PKG 101 or concurrently R: Open to undergraduate students in the Packaging Major.

Packaging career choices in science, management and engineering. Creativity in packaging designs and career decisions.

221 Packaging with Glass and Metal
Fall, Spring. 2(2-0) 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 102 or concurrently) R: Open to sophomores or juniors or seniors in the Packaging Major. SA: PKG 320, PKG 325

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

315 Packaging Decision Systems
Fall, Spring. 3(2-2) P: (MTH 132 or MTH 152H or LB 118) and (PKG 221 or concurrently) R: Open to sophomores or juniors or seniors in the School of Packaging. SA: PKG 415

Communication, analysis, and problem solving in the management, specification, production, sustainability, economics and testing of packaging.

322 Packaging with Paper and Paperboard
Fall, Spring. 4(3-2) P: ((PKG 221 or concurrently) and PKG 101) and (MTH 133 or MTH 153H or LB 119) 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 (MTH 133 or MTH 153H or LB 119) and (STT 200 or STT 201 or STT 315 or STT 351) and (CEM 143 or CEM 251 or CEM 351) 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.

410 Distribution Packaging Dynamics
Fall, Spring. 4(3-2) P: PKG 322 and PKG 323 R: Open to sophomores or juniors or seniors or graduate students in the School of Packaging. SA: PKG 310 Not open to students with credit in PKG 803.

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) or EGR 102)

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

421 Virtual Design and Prototyping
Spring. 3(2-2) P: PKG 411

Using technology resources to design and integrate packaging structure and graphics. Use of design thinking for package development. Virtual and physical prototyping. Emphasis on packaging for specialized markets.

430 Packaging for Fast-Moving Consumer Goods

Fall. 3(3-0) P: PKG 315 and PKG 322 and PKG 323 R: Open to juniors or seniors or graduate students in the School of Packaging. SA: PKG 330

Package graphics and structure in fast-moving consumer goods packaging and marketing. Consumer experience, printing and decoration. Preparation, production, and economics of packaging graphics.

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. 4(3-2) P: PKG 322 and PKG 323 R: Open to sophomores or juniors or seniors or graduate students in the School of Packaging or approval of department.

Food package systems and their relationship to specific products and processes. Product composition, deterioration and packaging-solutions. Shelf life, packaging, and supply chain issues

456 Packaging and Shelf Life of Perishable Food

Fall. 3(3-0) P: PKG 322 and PKG 323 R: Open to sophomores or juniors or seniors or graduate students in the School of Packaging or approval of department.

Chemical, physical and microbiological changes that affect quality of produce, meat, and seafood, and their relationship to packaging and distribution (cold chain). Packaging and preservation technologies to extend shelf life of perishable food.

465 Packaging Value Chain

Fall, Summer. 3(3-0) P: PKG 322 and PKG 323 R: Open to students in the School of Packaging.

Integrated identification and measurement of packaging supply chain components, from material extraction through processing, shipping, warehousing, sales and disposal. Integration of information technologies. Application and interrelationship of costs and financial aspects to the decision-making processes.

470 Packaging Sustainability

Spring. 3(3-0) P: PKG 315 and PKG 322 and PKG 323 R: Open to juniors or seniors or graduate students in the School of Packaging. SA: PKG 370

Effects of packaging on sustainability and environmental quality. Solid waste and recycling. Air and water quality. Laws, economics and energy. Resource use and conservation. Life cycle analysis.

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.

PKG—Packaging

- 480 Packaging Laws and Regulations**
Spring. 3(3-0) RB: PKG 322 or PKG 323 R: Open 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 432) and completion of Tier I writing requirement) and (PKG 315 or EGR 102) and (PKG 411 or concurrently) 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 to sophomores or seniors or graduate students. 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.
- 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, ANR 493, ANS 493, CMP 493, CSS 493, CSUS 493, EEP 493, FIM 493, FSC 493, FW 493, HRT 493, PKG 493, and PLP 493 P: (PKG 322 and PKG 323) and (PKG 315 or EGR 102) R: Open to juniors or seniors or graduate students in the School of Packaging. Approval of department; application required.
Supervised professional experience in the field of packaging offered through corporations and other businesses throughout the U.S.
- 499 Undergraduate Research**
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open to undergraduate students in the Packaging Major. Approval of school.
Undergraduate research project designed to enhance critical thinking, problem-solving, teamwork, and communication skills.
- 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 master's 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.
- 825 Polymeric Packaging Materials**
Fall. 4(3-2) RB: Graduate students with chemistry, physics, and mathematics backgrounds. SA: PKG 827
Physical, mechanical and chemical properties of packaging polymers and multilayer structures; relationship between properties and performance of packaging materials and systems; processing of packaging plastics.
- 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.
- 860 Research Methods**
Fall. 3(3-0) RB: General statistics.
Principles and expectations for responsible conduct of research in packaging. Integrity of the research process, critical thinking, scientific methods, proposal writing, and scientific communications.
- 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.
- 880 Life Cycle Assessment: Background, Principles, Calculations, and Applications**
Spring of even years. 3(2-2) RB: Graduate students with chemistry, physics and mathematics backgrounds.
Determination of the environmental footprint of products, packages and systems during their entire life-cycle using life cycle assessment (LCA) methodology. Introduction to the theory and application of LCA.
- 888 Master's Project**
Fall, Spring, Summer. 2 credits. R: Open only to master's 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 master's 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 36 credits in all enrollments for this course. R: Open to doctoral students in the School of Packaging.

Doctoral dissertation research.