PHYS 4420* Electromagnetics II 3(3) Continuation of PHYS 4410. Study of foundations of electromagnetic theory. Topics include magnetic properties of matter, microscopic theory of magnetization, electromagnetic induction, magnetic energy, AC circuits, Maxwell’s equations, and propagation of electromagnetic waves. Other topics may include waves in bounded media, antennas, electromagnetics, special theory of relativity, and plasma physics.

PHYS 4560* Quantum Physics II 3(3) Continuation of PHYS 4550. Application of principles of quantum mechanics such as Schrödinger equation for free particles, the hydrogen atom, and the harmonic oscillator. IncludesHonors sections. Preq: PHYS 4450.

PHYS 4450* Solid State Physics 3(3) Continuation of PHYS 4450, including selected topics in solid-state physics such as optical properties, superconductivity, non-crystalline solids, dielectrics, ferroelectrics, and nanomaterials. Plasmons, polarons, and excitons are discussed. Brief introduction into methods of solid-state synthesis and characterization tools is presented. IncludesHonors sections. Preq: PHYS 4450.

PHYS 4520* Nuclear and Particle Physics 3(3) Study of our present knowledge concerning subatomic matter. Experimental results are stressed. Topics include particle spectra, detection techniques, Regge pole analysis, quark models, proton structure, nuclear structure, scattering and reactions. IncludesHonors sections.

PHYS 4530* Quantum Physics 3(3) Discussion of the Schroedinger equation for free particles, the hydrogen atom, and the harmonic oscillator. IncludesHonors sections. Preq: PHYS 4450.

PHYS 4450* Solid State Physics 3(3) Continuation of PHYS 4450. Application of principles of quantum mechanics as developed in PHYS 4550 to atomic, molecular, solid state, and nuclear systems. IncludesHonors sections. Preq: PHYS 4450.

PHYS 4550* Thermodynamics and Statistical Mechanics 3(3) Study of temperature development of the laws of thermodynamics and their application to thermodynamic systems. Introduction to low temperature physics is given. IncludesHonors sections. Preq: PHYS 4450.

PHYS 4750* Selected Topics 3(3,1) Comprehensive study of a topic of current interest in the field of physics. May be repeated for a maximum of six credits, but only if different topics are covered. Preq: Consent of instructor.

PHYS 4810 Physics of Surfaces 3(3) Introduction for advanced undergraduates to the physics and chemical physics of solid surfaces and to the interaction of atoms and molecules with those surfaces. Preq: PHYS 3120 and PHYS 3220 and PHYS 3250 and PHYS 3260 and PHYS 4410. Coreq: PHYS 4820.

PHYS 4820 Surface Experiments Laboratory 0(3) Non-credit laboratory to accompany PHYS 4820. Coreq: PHYS 4820.

PHYS 4990 Creative Inquiry-Physics and Astronomy 1(1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. To be taken Pass/No Pass only. May be repeated for a maximum of eight credits. Preq: Consent of faculty member/mentor.

PACKAGING SCIENCE


PKSC 1010 Packaging Orientation 1(1) Overview of the various principles and practices in packaging science, historical development, packaging as a career.

PKSC 1020 Introduction to Packaging Science 2(2) Considers functions of a package, materials, processes, and technology used in package development; and the relationship of packaging to the corporation, consumer, and society as a whole.

PKSC 1000 Packaging Perishable Products 3(3) Covers fundamental characteristics and applications of various materials and systems used to package perishable products such as foods and pharmaceuticals. Discusses packaging issues regarding food, pharmaceutical, and medical packaging. Includes product/package interactions and packaging requirements to address basic theory in food and pharmaceutical protection. Preq or concurrent enrollment: CH 100 and PKSC 1020 and PKSC 2020.


PKSC 2021 Packaging Materials and Manufacturing Laboratory 0(3) Non-credit laboratory to accompany PKSC 2021. Coreq: PKSC 2020.

PKSC 2030 Packaging Research Fundamentals 2(2) Principles, methods, and resources for organizing, researching, and reporting technical work in packaging science. Preq: PKSC 1020 and PKSC 1030 and ENGL 1020 and Packaging Science major.

PKSC 2040 Container Systems (Rigid and Flexible) 3(3) Examination of all the containers and packaging used to develop systems to distribute products. Compatibility of product and package, structural design, costs, and merchandising considerations are stressed. Preq: PKSC 1020 and PKSC 2020. Coreq: PKSC 2060.


PKSC 2201 Product/Package Design and Prototyping Laboratory 0(6) Non-credit laboratory to accompany PKSC 2201. Coreq: PKSC 2200.

PKSC 3200 Packaging Design Theory 3(2) Study of human factors psychology as it relates to product and packaging development. Lecture topics center on advanced color theory, space, shape, texture, pattern, typography, branding, marketing, consumer studies, ergonomics, sustainability and applied packaging. Laboratory focuses on developing retail packaging through applying coursework, group development and peer critique. Preq: PKSC 1020 and PKSC 2200. Coreq: PKSC 3201.

PKSC 3201 Packaging Design Theory Laboratory 0(3) Non-credit laboratory to accompany PKSC 3200. Coreq: PKSC 3200.

PKSC 3680 Packaging and Society 3(3) Study of the role of packaging in society as it specifically relates to the responsibilities of the packaging scientist in protecting people and the environment. Includes study of packaging and environmental regulations and guidelines currently in place to achieve these goals. Ability to make informed decisions and ethical judgments is an encompassing goal. IncludesHonors sections.

PKSC 4010 Packaging Machinery 3(3) Systematic study of types of machinery used to form, fill, seal, and handle various packaging, products, and packaging materials. Emphasizes basic mechanical, electrical, pneumatic, and hydraulic components of packaging machinery along with packaging machinery terminology. Discusses methods for machine line optimization and layout. Preq: Packaging Science major or Food Science and Human Nutrition major or Food Science minor; and FDSC 2140 or PKSC 2040.

PKSC 4030 Packaging Career Preparation 1(1) Preparation for a successful career in Packaging Science by completing the professional eportfolio, and finalizing a resume and career eportfolio. Refines career skills through role playing. Topics include presentations, interviewing, effective collaboration and communication, business and foreign travel etiquette. Preq: Packaging Science major or minor. Coreq: PKSC 4200.

PKSC 4040 Mechanical Properties of Packages and Principles of Protective Packaging 3(3) Study of the mechanical properties of products and packaging and standard methods of determining these properties. Focuses on the functional properties of packages related to shock and vibration isolation and compression. IncludesHonors sections. Preq: Packaging Science major or minor and junior standing; and MATH 1060 and PKSC 1020 and PKSC 2040; and one of PHYS 1220 or PHYS 2070.
PKSC 4201* Package Design and Development 4(3)
Detailed study of polymer science and engineering as applied to packaging science. Includes polymer morphology, rheology, physical properties, processing methods, and polymerization. Emphasizes relationships among processing, structure, and properties. Preq: Packaging Science major or minor; and PKSC 1020 and PKSC 2040 and PKSC 2060; and one of CH 2100 or CH 2230; and one of PHYS 1220 or PHYS 2070. Coreq: PKSC 4161.

PKSC 4161* Application of Polymers in Packaging 4(3)
Provides an overview of the techniques used in packaging science. Includes polymer morphology, rheology, physical properties, processing methods, and polymerization. Emphasizes relationships among processing, structure, and properties. Preq: Packaging Science major or minor; and PKSC 1020 and PKSC 2040 and PKSC 2060; and one of CH 2100 or CH 2230; and one of PHYS 1220 or PHYS 2070. Coreq: PKSC 4161.

PKSC 4301* Converting for Flexible Packaging Laboratory 0(3)
Non-credit laboratory to accompany PKSC 4300. Coreq: PKSC 4300.

PKSC 4400* Packaging for Distribution 3(3)
Provides a comprehensive overview of how to design structural packaging for paperboard and corrugated mediums. This course begins with a basic overview and transitions into covering advanced applications. Access to design software (vector-based 2D CAD software, such as Illustrator or AutoCAD) is required. Recommended for students with design software experience.

PKSC 4401* Creative Inquiry—Packaging Science Laboratory 0(3)
Non-credit laboratory to accompany PKSC 4400. Coreq: PKSC 4400.

PKSC 4950 Senior Honors Research in Packaging Science Laboratory 0(6) Non-credit laboratory to accompany PKSC 4950. Coreq: PKSC 4950.

PKSC 4980 Creative Inquiry Laboratory 1-3(9)
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams based on laboratory experimentation. Projects may be interdisciplinary in nature. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits, but the combined credits earned from PKSC 4980 and 4990 may not exceed eight.

PLPA 2130 Fungi and Civilization 3(3)
Overview of how fungi affect the lives of humans, both currently and historically. Addresses the diversity of fungi and the tremendous roles fungi play on the planet with respect to the biological, social and ethical consequences. The general nature of this course makes it beneficial to all students.

PLPA 3101 Principles of Plant Pathology Laboratory 0(3)
Non-credit laboratory to accompany PLPA 3101. Coreq: PLPA 3101.

PLPA 4060 or ENT 4060 to learn symptomatology, diagnosis, and control of infectious diseases of turfgrasses and life histories, diagnosis, and control of important insect pests of turfgrasses. May also be offered as ENT 4060. Preq: ENT 3010 and PLPA 3100.

PLPA (ENT) 4060* Diseases and Insects of Turfgrasses Laboratory 1(3)
Introduction to plant diseases caused by biotic and abiotic disorders, recognition of symptoms and signs, and the effects of plant diseases on human welfare and the environment. Preq: BIOL 1110; or BIOL 1040 and BIOL 1060. Coreq: PLPA 3101.