Polymer & Fiber Engineering - PFEN

Courses

PFEN 2270 INTRODUCTION TO ENGINEERED FIBROUS MATERIALS (4) LEC. 4. Pr. ENGR 1110 or ENGR 1113. The fundamentals of chemistry and engineering applied to fibrous assemblies illustrated using the properties required by end-use. Topics will include biomedical materials, architectural applications cables, ropes, and tethers, composite materials, filtration fabrics, ballistic protection, and health-care products.

PFEN 3100 FUNDAMENTALS OF POLYMERS (3) LEC. 3. Pr. CHEM 2030 or CHEM 2070 or CHEM 2077. Fundamentals of polymers: terminology, synthesis, structure, molecular weight, transitions of state, structure and uses.

PFEN 3400 FUNDAMENTALS OF COLORATION (4) LEC. 3. LAB. 3. Pr. PFEN 3100. Fundamentals of aqueous chemistry, interfacial processes, interactions of chemicals and fibrous/polymeric materials, color perception and coloration of fiber/polymers.

PFEN 3500 STRUCTURE AND PROPERTIES OF POLYMERS AND FIBERS (3) LEC. 3. Pr. PFEN 3100. Exploration of the relationships between the chemical structure, properties and uses of polymers and fibers. Emphasis on the importance of judicious material selection for particular end use applications. Spring.

PFEN 4100 POLYMER CHARACTERIZATION (4) LEC. 3. LAB. 3. Pr. (PHYS 1610 or PHYS 1617) and (CHEM 2080 or CHEM 2087) and PFEN 3500. Study of the major techniques for the physical characterization of polymers. Topics to be covered include molecular weight determination, spectroscopy (light, vibrational, nuclear magnetic resonance, electron spin resonance), X-ray diffraction, microscopy (light, electron), optical methods, and thermal analysis.

PFEN 4300 ENGINEERED FIBROUS STRUCTURES (4) LEC. 3. LAB. 3. Pr. PFEN 2270. Design and applications of high performance industrial fibrous structures for civil engineering, architecture and construction, filtration, medical, military and defense, pulp and paper industry, safety and protection, sports and recreation, transportation, agriculture and other industries. Fall.

PFEN 4400 MECHANICS OF FLEXIBLE STRUCTURES (3) LEC. 3. Pr. ENGR 2070 and ENGR 2200 and PFEN 2270. Analysis of mechanical behavior and physical properties of flexible structures such as fibers, yarns and fabrics.

PFEN 4500 FIBER REINFORCED MATERIALS (3) LEC. 3. Pr. ENGR 2070 and ENGR 2200 and MATH 2660 and PFEN 2270. Material properties and manufacture of fiber reinforced materials; perform structures such as weaves and braids, analysis, design methodology and applications. Spring.

PFEN 4810 POLYMER AND FIBER ENGINEERING DESIGN I (3) LEC. 3, IND/LEC. 2. Pr. PFEN 3500. Departmental approval. Tools and skills needed to conduct an engineering design project.

PFEN 4820 POLYMER AND FIBER ENGINEERING DESIGN II (3) IND. 3. Undergraduate senior design project, second semester.

PFEN 4970 SPECIAL TOPICS (1-3) AAB. Departmental approval. Reading course with varying emphasis to give opportunity for overview in specific areas of engineering and technology. Course may be repeated for a maximum of 12 credit hours.

PFEN 4997 HONORS THESIS (1-3) IND. Pr. Honors College. Departmental approval. Honors Thesis is a project-based course and may be presented in form of a written report or a conference-style presentation. Course may be repeated for a maximum of 6 credit hours.

PFEN 5200 POLYMER PROCESSING (4) LEC. 3. LAB. 3. Pr. PFEN 2270. Characteristics and flow properties of polymers; film and fiber extrusion, molding technology, polymer material selection and processing. Credit will not be given for both PFEN 5200 and PFEN 6200.

PFEN 5300 RHEOLOGY (3) LEC. 3. Pr. (MATH 2630 or MATH 2637) and ENGR 2200 or MECH 3030. Departmental approval. Covers the most important aspects of elementary modern rheology, including elastic solids, viscoelastic behavior of polymeric systems, composite systems, concentrated solutions and suspension rheology.

PFEN 5510 POLYMER CHEMISTRY (3) LEC. 3. Pr. CHEM 2030 and (ENGR 2050 or ENGR 2053) and (PHYS 1610 or PHYS 1617). Polymer chemistry including polymer synthesis, polymer characterizations, polymer classes, solubility and swelling, and structure/property relationships.

PFEN 6200 POLYMER PROCESSING (4) LEC. 3. LAB. 3. Departmental approval. Characteristics and flow properties of polymers; film and fiber extrusion, molding technology, polymer material selection and processing. Credit will not be given for both PFEN 5200 and FPFEN 6200.

PFEN 6250 ADVANCED ENGINEERING FIBROUS STRUCTURES (3) LEC. 3. Pr. PFEN 4300. Departmental approval. Application of advanced technology to the design, development and analysis of high performance industrial textiles.

PFEN 6510 POLYMER CHEMISTRY (3) LEC. 3. Pr. CHEM 2030 and (ENGR 2050 or ENGR 2053) and (PHYS 1610 or PHYS 1617). Polymer chemistry including polymer synthesis, characterizations, classes, solubility and swelling, and structure/property relationships.

PFEN 7310 STRUCTURE AND PROPERTIES OF POLYMERS (4) LEC. 3. LAB. 3. Pr. CHEM 2080 or CHEM 2087. Departmental approval. The inter-relationships between chemical structure of a polymer, polymer properties and uses. Plastics, elastomers and fibers-synthesis and property requirements.

PFEN 7620 ADVANCED MECHANICS OF FLEXIBLE STRUCTURES (3) LEC. 3. Pr. PFEN 4400. Recent advances in modeling and analysis of mechanical behavior of flexible structures. Spring.

PFEN 7700 ADVANCED METHODS IN POLYMER CHARACTERIZATION (4) LEC. 4. LAB. 3. Pr. PFEN 6510. Departmental approval. Important aspects and methods in polymer characterization.

PFEN 7770 INTRODUCTION TO CONDUCTING POLYMERS (3) LEC. 3. Pr. PFEN 6510. This "Introduction of Conducting Polymers" course covers the most up to date research and applications in the areas of conducting polymers. This course provides extensive background on: mechanism of electrical conductivity of conducting polymers, classification of conducting polymers, potential applications of conducting polymers, and recent advance of the researches in the fields of conducting polymers. For example, organic solar cells, and organic light emitting diodes.

PFEN 7950 GRADUATE SEMINAR (1) SEM. 1. SU. Presentation of departmental research; practicing written and oral communication skills. Course may be repeated with change in topic. Fall.

PFEN 7960 SPECIAL PROBLEMS AND FIBER ENGINEERING (1-3) IND. Specialized project research with varying emphasis in particular areas of polymers and fibers. Course may be repeated for a maximum of 12 credit hours.

PFEN 7970 SPECIAL TOPICS (3) LEC. 3. Analysis of current issues in the area of polymers and fibers. Course may be repeated for a maximum of 12 credit hours.

PFEN 7980 GRADUATE PROJECT (1-3) IND. In-depth work in a particular project in polymers and fibers. Course may be repeated for a maximum of 12 credit hours.

PFEN 7990 RESEARCH AND THESIS (1-10) MST. Departmental approval. Required of all students seeking an advanced degree in the department. Course may be repeated with change in topics.

PFEN 8990 RESEARCH AND DISSERTATION (1-10) DSR. PhD Research and Dissertation. Course may be repeated with change in topics.