Purdue University

School of Chemical Engineering

ChE Electives - Fall 2015

The 500-level courses that have less than ten students may be cancelled. Students affected by the cancellation will be notified. (S-Science type course, D-Design type course)

SPECIAL PROJECTS COURSES

CHE 41100 CHEMICAL ENGINEERING SCIENCE RESEARCH PROBLEMS. (S)

 Prerequisites: Junior or senior standing in ChE and consent of Undergraduate Counselor.

 (May be repeated for credit.)

 Experience in chemical engineering science research or development; either directed or independent work which can be experimental theoretical.

CHE 41200 CHEMICAL ENGINEERING DESIGN RESEARCH PROBLEMS. (D)

 Prerequisites: Junior or senior standing in ChE and consent of Undergraduate Counselor.

 (May be repeated for credit.)

 Experience in chemical engineering design research or development.

CHE 49800 RESEARCH IN CHEMICAL ENGINEERING I. Class, 1 Lab 6, cr. 3.

 Prerequisite: Honors classification

 Individual research projects for students with honors classification. Requires prior approval of, and arrangement with, a faculty research adviser.

CLASSES

CHE33000 PRINCIPLES OF MOLECULAR ENGINEERING

 (Pol) Prerequisites: Passing grades in CHE 20500 (Chemical Engineering Calculations), CHE 211 (Introductory Chemical Engineering Thermodynamics), and MA 261 (Multivariate Calculus).

 Familiarity with mathematics, algebraic manipulations, derivations, calculus, statistics, general chemistry and physics is essential. I recommend that you keep your old textbooks in these subjects handy as a reference.

Develop understanding of how molecular and atomic forces and kinetics determine structure, phase behavior, reaction, catalysis, diffusion, adsorption, and mechanical and electronic properties of materials.

CHE 46100 BIOMEDICAL ENGINEERING Class 1, cr 1.

 (Hannemann) There are no prerequisites

 A thorough introduction to the field of biomedical engineering with an emphasis on the role of the chemical engineer.

CHE 46300 APPLICATIONS OF CHEMICAL ENGINEERING PRINCIPLES Cr. 3

 (Houze) Prerequisites: Senior standing and CHE37800

The objective of this course is to provide students with opportunities to apply chemical engineering principles to practical situations to design, analyze operations, or predict operability of systems. Course Outcomes: Apply principles of chemical engineering to design practical systems. Participate in team-based projects to understand team operation and decision-making. Gain experience in and appreciation of the need for individual learning about new systems, equipment, etc. Understand the role of the engineer in promoting safe operation and consideration of environmental issues in technical decisions.

CHE 53800 PARTICLE DESIGN AND PROCESS

 (Litster) Prerequisite: Graduate student or senior standing

 Particle design is the production of new particles with specific attributes including the size, morphology and surface properties.  To control these attributes, both the particle formation processes and the feed formulation properties need to be controlled.  There are many particle design processes including crystallisation and precipitation; granulation; jet break up and spray drying; aerosol processes; chemical vapour deposition; suspension polymerisation; and comminution. This course will study a series of particulate design processes with special emphasis on quantitative design and operation to control particle attributes.

CHE 59700 Advanced Solar Energy Conversion

(Agrawal) Prerequisite: Graduate student or senior standing

The course will focus on: (1) the fundamentals of solar energy conversion, primarily with photovoltaics, (2) critical analysis of the state-of-the-art, and (3) the methods to develop the next generation of solar energy converters. Specific topics will include: Analysis of the solar spectrum, methods of solar energy utilization, thermodynamic analysis, electronic structure of materials, electronic transport, electron-hole generation, recombination, semiconductor junctions, device structure, minority carrier based devices, excitonic based devices, light management, economic analysis, experimental methods, state-of-the-art of silicon, thin film, and III-V technologies, next generation technologies.

CHE 59700 PRINCIPLES OF PHARMACEUTICAL ENGINEERING cr. 3

 (Reklaitis) Prerequisite: Graduate student or senior standing

 Survey course that provides an overview of the major issues involved in the development, manufacturing and delivery of pharmaceutical products in an integrated manner. The topics include: Introduction, Drug Discovery, Product portfolio optimization, Process synthesis and Route selection, Rational product formulation and design, Batch Process simulation and tools, Pilot plant and scale-up, Process Analytical Technology, Pharmaceutical Informatics, Process safety and control, Scheduling and planning of supply chains, cGMP and Regulatory environment and future directions.

CHE 59700 INDUSTRIAL CATALYTIC PROCESSES FOR HYDROCARBONS cr. 3

 (Miller) Prerequisite: Graduate student or senior standing

The course will focus on: (1) the fundamentals of industrial hydrocarbon conversion for the fuels and petrochemical industry, (2) process design, and (3) the basics of catalyst chemistry. Specific topics will include:  Reactor design and operation, process separations, catalytic chemistry and reaction mechanism, effects of feed quality on operations, product specification and plant integration with other units. The course will also include a discussion of emerging technologies which will impact future energy and chemical industries.