CHEMICAL ENGINEERING (CHEN)

CHEN 2630  Applied Engineering 1  1 s.h.
Physics, chemistry, and calculus applications to problems in general engineering with a focus on EIT/FE exam questions, strength and properties of materials. Topics include: mechanics, dynamics, kinematics, conservation equations. Three-hour computational lab.  
Prereq.: PHYS 2610 or permission of instructor.

CHEN 2631  Applied Engineering 2  1 s.h.
Physics, chemistry, and calculus applications to problems in general engineering with a focus on EIT/FE exam questions, strength and properties of materials. Topics include: wave phenomena (light, sound), electricity (circuits), magnetism, materials, strength of materials. Three-hour computational lab.  
Prereq.: CHEN 2630 or permission of instructor.

CHEN 2650  Computer Methods in Chemical Engineering  2 s.h.
Application of computational software packages and spreadsheets to solve chemical engineering problems. Utilization of process simulation packages. Real-time computing applications in laboratory automation.  
Prereq.: ENGR 1560, ENGR 1560H or consent of instructor.

CHEN 2681  Industrial Stoichiometry  3 s.h.
To aid the non-chemical engineer to organize, analyze, and effectively utilize the information inherent in chemically stoichiometric relationships, as they apply to actual plant situations.  
Prereq.: MATH 1571, CHEM 1516.

CHEN 2683  Chemical Engineering Principles 1  3 s.h.
Prereq.: MATH 1571 or MATH 1585H, CHEM 1515.

CHEN 2684  Chemical Engineering Principles 2  3 s.h.
Prereq.: CHEN 2683.

CHEN 2688  Energy Assessment  3 s.h.
Prereq.: CHEN 2680.

CHEN 3700  Measurement Laboratory  1 s.h.
Computer application in real-time data acquisition and laboratory data processing. Measurements of physical and chemical properties. Oral presentations and preparation of technical reports.  
Prereq.: Acceptance in any engineering program.

CHEN 3718  Women, Science, and Technology  3 s.h.
An overview of the role women have played in scientific and technological advances. Problems unique to women entering scientific professions will be addressed, information about scientific and technical careers and job opportunities and contacts with professionals in the community will be provided.  
Prereq.: ENGL 1550.

CHEN 3721  Engineering Plastics  3 s.h.
Preparation, characterization, manufacture, properties and applications of commercial polymers.  
Prereq.: CHEN 2684 and CHEM 3719; or consent of instructor.
CHEN 4815 Unit Operations 2 3 s.h.
Gas absorption and desorption, interphase mass transfer processes, liquid extraction and leaching. Physical separation processes including filtration, settling, and size reduction. Derivation of the design equations for the above processes, and applications of the design equations to equipment design. 
Prereq.: CHEN 3787.

CHEN 4815L Unit Operations Laboratory 2 1 s.h.
Experiments in absorption, cascade operations, reaction kinetics, mixing and other chemical engineering operations employing industrial and pilot plant size equipment and instrumentation. Treatment of experimental data, correlations and comparison with theory. Oral presentations and preparation of technical reports. Three hour laboratory. 
Prereq.: CHEN 4815.

CHEN 4822 Reinforced Polymer Structures 3 s.h.
Survey of raw materials, manufacturing methods, and design of products utilizing reinforcing materials combined with an elastomer or polymer binder. 
Prereq.: CHEN 2684 or consent of instructor.

CHEN 4840 Biochemical Engineering Fundamentals 3 s.h.
Design of biological reactors, bioremediation schemes for the purification and mass production of chemical species from living organisms or cultures, extraction, and fermentation. Technologies and processing of recombinant DNA, antibiotics, antibodies, vitamins, steroids, and methane are included. Essentials of microbiology, biochemistry, and genetics will precede industrial applications. PreReq.: CHEN 2684 or consent of instructor.

CHEN 4845 Chemical Engineering Analysis 3 s.h.
Modeling of processes from unit operations, transport phenomena, and thermodynamics. Topics include the determination of limiting and generalized operating conditions, estimates of operating variables, and process balance of energy, mass, and momentum transfer. 
Prereq.: CHEN 2684 or consent of instructor.

CHEN 4880 Chemical Reactor Design 1 3 s.h.
Chemical reaction equilibria. Theoretical developments and methods of interpreting experimental data pertaining to chemical kinetics. General design principles and construction features of reactors with application of these principles to the design of specific reactors. 
Prereq.: CHEN 3771.

CHEN 4881 Chemical Reactor Design 2 3 s.h.
Chemical reaction equilibria. Theoretical developments and methods of interpreting experimental data pertaining to chemical kinetics. General design principles and construction features of reactors with application of these principles to the design of specific reactors. 
Prereq.: CHEN 4880.

CHEN 4882 Process Dynamics 3 s.h.
Introduction to automatic control and control loop concepts. Laplace transform techniques. Linear open-loop and closed-loop systems. Root-locus and frequency response methods. Design of control systems. 
Prereq.: CHEN 3786.

CHEN 4882L Process Dynamics Laboratory 1 s.h.
Experimental studies in process dynamics and control. Treatment of experimental data with correlation and comparison with theory. Oral presentations and preparation of technical reports. Three hours of laboratory. 
Prereq.: CHEN 4882.

CHEN 4887 Process and Plant Design 1 3 s.h.
An examination of engineering economic analysis to include: cost estimation, profitability, optimum design, principles of fixed and operating costs, materials and site selection, and general and specialized design techniques. 
Prereq.: CHEN 3787 and unrecalculated GPA of 2.0 or better in major courses.

CHEN 4888 Process and Plant Design 2 3 s.h.
The application of chemical engineering and cost principles to the component design and selection of process equipment. The application of chemical engineering and cost principles to the design of chemical plants and processes including societal aesthetic, environmental, and safety considerations. 
Prereq.: CHEN 4887.

CHEN 5800 Special Topics 1-4 s.h.
Special topics and new developments in chemical engineering. Subject matter, credit hours, and special prerequisites to be announced in advance of each offering. 
Prereq.: Consent of instructor.

CHEN 5805 Principles of Biomedical Engineering 3 s.h.
Application of engineering principles and methods of analysis to processes in the human body. Rheological, physical and chemical properties of body fluids. Dynamics of the circulatory system. The human thermal system. Transport through cell membranes. Analysis and design of artificial organs. 
Prereq.: CHEN 2684 or consent of instructor.

CHEN 5810 The Business of Engineering 3 s.h.
Industrial processing facilities, and the engineers and business people that run them. Decision-making perspectives and the technical and communication skills of each group are compared. Focus is on quality control, R&D, and efficiency.

CHEN 5811 Advanced Transport Phenomena 3 s.h.
Development of basic differential balance equations for mass, momentum and energy. Analytical and approximate solutions to the equation of change with application to the analysis of common engineering problems. 
Prereq.: CHEN 3786.

CHEN 5820 Industrial Pollution Control 3 s.h.
Types, sources and effects of industrial and hazardous waste; principles of industrial and hazardous waste control; discussion and design of biological, physical, and chemical treatment processes. 
Prereq.: CHEN 2684 or consent of instructor.

CHEN 5821 Fundamentals of Polymer Science 3 s.h.
The survey of polymerization mechanisms, polymer structure-property relationships, transport properties, flammability-related plasticizers and solvents as well as design applications. 
Prereq.: CHEN 2684 or consent of instructor.

CHEN 5830 Nuclear Reactors 3 s.h.
Neutron interactions and scattering; moderation ratio, the steady state reactor core and four factor equation, the diffusion equation for various reactor geometries and the reflected reactor core. 
Prereq.: CHEN 3726 or consent of instructor.

CHEN 5835 Introduction to Nuclear Fusion 3 s.h.
Fusion reactors; the kinetics of fusion reactions. Plasma confinement technology. 
Prereq.: CHEN 3726.

CHEN 5845 Corrosion Engineering 3 s.h.
Introduction to causes and forms of corrosion, corrosion rate calculations, electrode potentials, electrochemistry, corrosion testing, and effects of corrosion on mechanical properties. Theory and use of corrosion inhibition methods. 
Prereq.: CHEN 2684.

CHEN 5850 Industrial Processes 3 s.h.
A fundamental approach to the design of industrial chemical processes. Emphasis upon flow-charting, chemical reactions, separations involved, thermodynamics, and economic considerations. Food and pharmaceutical processing is a major focus. 
Prereq.: CHEN 2684 or consent of instructor.
CHEN 5854  Corrosion Engineering  3 s.h.
Introduction to causes and forms of corrosion, corrosion rate calculations, electrode potentials, electro-chemistry, corrosion testing, and effects of corrosion on mechanical properties. Theory and use of corrosion inhibition methods.
Prereq.: Junior or Senior Standing or Approval of the Instructor.

CHEN 5883  Mathematical Methods in Chemical Engineering  3 s.h.
The applications of advanced mathematics to the solution of chemical engineering problems. Topics covered include treatment and interpretation of engineering data, modeling of chemical engineering systems and formulation of ordinary and partial differential equations governing chemical engineering operations and their solutions by use of numerical and analytical techniques.
Prereq.: CHEN 3786.

CHEN 5886  Nuclear Reactor Design  3 s.h.
The steady state reactor core; four-factor equation, resonance escape probability, neutron flux distribution in various geometrics, two-group and multigroup theories. Transient reactor behavior and control; effect of delayed neutrons, fission product poisoning, nuclear fuels, nuclear heat transfer and burnout problems, reactor economy; fuel burnup and power cost. Thermal breeder and fast reactors. Neutron flux distribution measurements. Radiation detection and monitoring.
Prereq.: CHEN 3726 or consent of instructor.

CHEN 6981  Advanced Chemical Reaction Engineering  3 s.h.
Advances topics in chemical reaction engineering including non-elementary reaction kinetics, reactor design for autocatalytic reactions, temperature and energy effects in chemical reactions, heterogeneous catalysis, catalyst preparation, fabrication and activation.
Prereq.: CHEN 4880.

CHEN 6983  Modern Power Sources  3 s.h.
Analytical and descriptive study of modern power plants. Combustion and environmental problems with fossil-fueled power plants. Electromagnetic circuits and devices with emphasis on the principles of electromechanical energy conversions.

CHEN 6984  Nuclear Fission and Fusion Power Sources  3 s.h.
Energy available from fission and fusion nuclear reactions, on setting and maintaining chain reaction. Mechanical and electromagnetic confinement techniques. Reactor design, heat removal, and safety problems.

CHEN 6985  Electromechanical Motion Devices  3 s.h.
Thermodynamics of batteries, and electric and fuel cells. Power from nuclear isotopes. Features common to rotating electromagnetic fields. Analysis and design of electromechanical power components.

CHEN 6990  Thesis  1-9 s.h.
Research selected and supervised by departmental advisor. May be repeated for a maximum of nine semester hours.
Prereq.: Acceptance by departmental committee.