Chemical Engineering (CHEG)

cbe.engr.uconn.edu

5001. Advanced Chemical Engineering Fundamentals

Three credits. Prerequisite: Instructor consent.

This course will provide graduate-level introduction to thermodynamics, transport phenomena, and kinetics within the context of chemical engineering applications. Primary attention will be paid to developing an understanding of the fundamentals of each of these topic areas. As the course progresses, integration and application of thermodynamics, transport phenomena, and reaction kinetics will be discussed.

5013. Principles of Regenerative Engineering and Applications

Three credits. Prerequisite: Instructor consent.

Foundations, principles, and technologies of regenerative engineering.

5301. Chemical Engineering Thermodynamics I

Three credits.

An advanced study of classical thermodynamics with emphasis on phase and chemical equilibria and applications to the chemical process industries. Kinetic theory and statistical thermodynamics with emphasis on the prediction and correlation of physical and chemical properties of gases and liquids, including mixtures. Theory and application of flames, plasmas, and shock waves.

5302. Chemical Engineering Thermodynamics II

Three credits.

An advanced study of classical thermodynamics with emphasis on phase and chemical equilibria and applications to the chemical process industries. Kinetic theory and statistical thermodynamics with emphasis on the prediction and correlation of physical and chemical properties of gases and liquids, including mixtures. Theory and application of flames, plasmas, and shock waves.

5315. Transfer Operations I

Three credits.

An advanced study of momentum, heat and mass transfer with application to complex problems. Cartesian tensors, non-Newtonian flow, statistical theory of turbulence. Mass transfer in multicomponent systems and with chemical reaction. Mass transfer in drops and bubbles; two-phase flow and fluidization.

5321. Reaction Kinetics I

Three credits.

Chemical kinetics and reactor design. An advanced study of chemical reaction engineering with emphasis on catalysis. Applications to stirred-tanks, fixed-bed, and fluidized bed reactors.

5333. Computer Simulation in Chemical Engineering

Three credits. Prerequisite: Instructor consent. Recommended preparation: CHEG 5001 or equivalent.

Learning and applying modern tools for computer simulation of chemical engineering processes. Covers the basic equations required to simulate generic types of processes and interactive Computer Labs where we solve examples from the course textbook. You will integrate theory with modeling, determine other solutions and find bugs, and identify inaccuracies or problems in the proposed solution. Short introductions to the Interface of each Software (Aspen Plus, Matlab, Comsol) will be given. The Computer Labs structure will be based on a step-by-step solution of chemical engineering problems. Students work with PowerPoint slides to perform a step for a simulation, while working with the instructor to ensure understanding before proceeding to the next slide.

5336. Optimization

Three credits. Prerequisite: Department consent.

Advanced topics in optimization such as linear and nonlinear programming, mixed-integer linear and nonlinear programming, deterministic and stochastic global optimization, and interval global optimization. Example applications drawn from engineering.

5351. Polymer Physics

Three credits.

Modern concepts relating to glassy, rubbery and organized states of bulk polymers. Considers rubber elasticity, glass-to-rubber transitions, networks, elements of crystallization, blends and interfacial phenomena.

5352. Polymer Properties

(Also offered as POLY 5352.) Three credits.

Interrelationships between solid state structure, dynamics, and mechanical properties of non-crystalline and semi-crystalline polymers. Considers polymer viscoelasticity, diffusion, failure mechanism, and elementary polymer rheology.

5358. Composite Materials

Three credits.

An introduction to the mechanical properties of fiber reinforced composite materials. Included are discussions of the behavior of unidirectional composites, short fiber composites and laminates. Special topics such as fatigue, fracture and environmental effects are also included.

5363. Electrochemical Engineering

Three credits. Prerequisite: Instructor consent.

Principles underlying electrochemical processes. Transformation of chemical and electrical energy. Applications of fundamental electrochemical laws to industrial processes, energy conversion, and electrometallurgical operations.

5367. Polymer Rheology

(Also offered as POLY 5367.) Three credits.

Analysis of the deformation and flow of polymeric materials. Topics include non-Newtonian flow, viscoelastic behavior and melt fracture with application to polymer processing.

5373. Biochemical Engineering

Three credits.

Principles and design of processes involving biochemical reactions. Nature of biological materials, biochemical kinetics, heat and mass transfer, application to fermentation and other biological processes.

5393. Seminar

Zero credits.

5394. Seminar

Zero credits.

5395. Investigation of Special Topics

Variable (1-3) credits. May be repeated for a total of 12 credits.

Designed for special topics, or for individual students who desire to pursue investigations in a specialized field.

5399. Independent Study

Variable (1-3) credits. Prerequiste: Instructor consent. May be repeated for a total of six credits.

Independent study under the supervision of a Chemical Engineering faculty member.