CHEMICAL ENGINEERING (CENG)

CENG-COMP Senior Comprehensive Exam
(NULL credits) (Both Fall & Spring Semesters)
NULL

CENG-2010 Chemical Engineering Fundamentals
(3 credits) (Fall Semester)
Chemical Engineering Fundamentals (3) (F) This course introduces students to foundational concepts in chemical engineering with the primary focus on material and energy balances. Students must earn a grade of "C-" or better to take subsequent chemical engineering courses.
Prerequisite(s): CHEM-1210.

CENG-3050 Separations
(3 credits) (Spring Semester)
Separations (3) (S) This course covers the theory and application of chemical engineering separations and the equipment design of these unit operations. The unit operations studied include the following: distillation, absorption, stripping, liquid-liquid extraction, and others.
Pre or Corequisite(s): ENGR-3600: Prerequisite: CENG-2010 (with a grade of C- or better).

CENG-3250 Chemical Engineering Thermodynamics
(3 credits) (Fall Semester)
Chemical Engineering Thermodynamics (3) (F) This course explores the applications of thermodynamic principles to the analysis of chemical processes of interest in modern chemical engineering. Energy conservation and efficiency in chemical processes involving multiple unit operations will be analyzed using the first and second laws of thermodynamics. Models for calculating thermodynamic properties of pure compounds and mixtures are studied. Fundamentals and modeling of phase equilibrium, solution thermodynamics and chemical reaction equilibrium are used in this course.
Prerequisite(s): CENG-2010 with minimum grade of C+.

CENG-3300 Unit Operations
(3 credits) (Spring Semester)
Unit Operations (3) (S) This course introduces unit operations, solids handling, humidification, evaporation, drying, and mechanical separations, while emphasizing fluids transport. The fluids topics include fluid properties, non-Newtonian fluids, the mechanical energy balance, the Bernoulli equation, laminar and turbulent flow, compressible flow, flow measurement, pumps, and compressors. Prerequiste CENG-2010 with minimum grade of C+.

CENG-3350 Chemical Engineering Laboratory I
(2 credits) (Fall Semester)
Chemical Engineering Laboratory I (2) (F) Experiments that reinforce chemical engineering principles in both transient and steady-state material and energy balances and introduce students to heat transfer and filtration. Corequisite or Prerequisite: ENGR-3150.
Prerequisite(s): CENG-2010 with minimum grade of C+.

CENG-4080 Chemical Process Dymamics & Control
(3 credits) (Fall Semester)
Chemical Process Dynamics and Control (3) (F) This course explores the dynamic behavior of chemical processes in response to disturbances in operating conditions. Students analyze process dynamics of processes consisting of traditional chemical engineering unit operations and design suitable control systems. Pre or Co-requisites: CENG-3050 and CENG-4210.

CENG-4210 Reactor Design
(3 credits) (Spring Semester)
Reactor Design (3) (F) In this course students apply mass balances, energy balances, chemical kinetics, and thermodynamics to the design of ideal tubular and tank reactors. In addition, it provides an introduction to residence time distributions, bioreactors, catalysis, and polymerization.
Prerequisite(s): CENG-2010 and MATH-3100: Pre or Corequisite: ENGR-3600.

CENG-4350 Chemical Engineering Laboratory II
(3 credits) (Fall Semester)
Chemical Engineering Laboratory II (3) (F) This course experimentally investigates chemical engineering unit operations with a focus on separations, reaction kinetics, and process control. Students learn to identify the information necessary to solve simple design problems, develop experimental designs to obtain the required data, and analyze the data to provide the information necessary to complete the design calculations. Students develop their technical communication skills through the preparation of memos, technical reports, and oral presentations.
Pre or Corequisite(s): CENG-4210 and ENGR-3410.

CENG-4600 Plant Design I
(3 credits) (Fall Semester)
Plant Design I (3) (F) The first half of the full-year capstone course covers the execution of process industry design projects introducing the concept of the project lifecycle. Students will learn to specify process requirements, generate process concepts, develop conceptual designs, and evaluate the designs based on technical feasibility, economic viability, safety, and environmental impact. The course emphasizes the clear presentation of results through technical drawings, memos, briefs, and reports. Pre or Co-requisites: CENG-4080 and ENGR-3170. (WC)
General Education Categories: Written Communication

CENG-4610 Plant Design II
(3 credits) (Spring Semester)
Plant Design II (3) (S) The second half of the full-year capstone course examines the later stages of the project lifecycle, including an introduction to issues in the procurement and implementation phases. Students will learn to prepare preliminary designs by adding detail to conceptual designs, including piping and instrumentation, process automation, and physical layouts of plants and process plots. The course continues to emphasize the clear presentation of results with an emphasis on the oral presentation of results. (OC, VC)
Prerequisite(s): CENG-4600.
General Education Categories: Oral Communication, Visual Communication

CENG-4810 Non-Ideal Reactor Design & Catalysis
(3 credits) (Discretion of Department)
Non-ideal Reactor Design and Catalysis (3) (D) This course explores the design and modeling of non-ideal tubular and tank reactors, fluidized-beds, and other reactors, and bioreactors. It emphasizes principles of heterogeneous catalysis, modeling catalytic reactions, scaleup, and the design of catalytic reactors.
Prerequisite(s): CENG-4210.

CENG-4820 Bioprocess Engineering
(3 credits) (Discretion of Department)
Bioprocess Engineering (3) (D) [Bioprocess Engineering] This course applies chemical engineering principles to the analysis of the production and recovery of products from enzymatic and fermentation reactions. Material covered includes microbial and enzyme kinetics, design and modeling of bioreactors and separation processes for the recovery of sensitive products. Pre or Co-requisites: CHEM-3500 and CENG-4210.

CENG-4830 Food Process Engineering
(3 credits) (Discretion of Department)
Food Process Engineering (3) (D) This course examines food processing unit operations used in the commercial preparation and preservation of food products. The course applies fluid, mass & heat transfer principles along with basic food chemistry to the design of food processes including thermal processing, drying, extrusion, membrane processing and freezing. Prerequisites or Corequesites: ENGR-3600 and CENG-3050.

CENG-4850 Chem Engr Process Simulation
(3 credits) (Discretion of Department)
Chemical Engineering Process Simulation (3) (D) A hands-on course emphasizing the solution of a broad range of realistic chemical engineering problems using process simulators. Focuses first on the selection and solution of appropriate equations of state, and testing of thermodynamic models for phase equilibria, chemical reactions, and heat and mass transfer problems. Process simulation will then be used to address problems of fluid flow, mass and heat transfer unit operations, and chemical reactors.
Prerequisite(s): CSCI-2300 or ENGR-2000, and CENG-3050, CENG-4210.

CENG-4860 Adv Chem Engr Thermodynamics
(3 credits) (Discretion of Department)
Advanced Chemical Engineering Thermodynamics (3) (D) Fundamentals of intermolecular forces and statistical thermodynamics with emphasis on the molecular aspects of designing chemical processes and materials. Solutions to chemical engineering problems in traditional process and manufacturing industries are analyzed based on the governing microscopic phenomena.
Prerequisite(s): CENG-2010, ENGR-3250, and ENGR-3500.

CENG-4870 Moleclr Sim for Chem Engrs
(3 credits) (Discretion of Department)
Molecular Simulation for Chemical Engineers (3) (D) Practical application of statistical thermodynamics concepts for understanding and predicting the behavior of collections of molecules. Introduction 218 to algorithms and software for simulating physicochemical processes at the molecular scale. Interactive lab training will focus on molecular-based prediction of thermodynamic properties, phase-equilibria, solubility, interfacial properties, and transport properties.
Prerequisite(s): CSCI-2300 or ENGR-2000, CHEM-3800, ENGR-3250.