Chemical Engineering (CHEG)

Courses

CHEG 2113. Introduction to Chemical Engineering I (Sp, Fa). 3 Hours.
Introduction to the field of chemical engineering. Industries, careers, and the curriculum are discussed. Basic chemical engineering terms, concepts, and calculations are presented. Mass balance calculations are performed and the application of computers to chemical engineering problems is introduced. Pre- or Corequisite: CHEM 1123 or CHEM 1133 or CHEM 1223.

CHEG 2133. Fluid Mechanics (Sp, Su, Fa). 3 Hours.
Analysis and design of fluids handling equipment and systems. Application of the principles of fluid statics, fluid dynamics, compressible flow, etc. Pre- or Corequisite: MATH 2574 or MATH 2574C and (CHEG 2113 or BENG 2632 or BMEG 2613 or INEG 2103).

CHEG 2133H. Honors Fluid Mechanics (Sp, Su, Fa). 3 Hours.
Analysis and design of fluids handling equipment and systems. Application of the principles of fluid statics, fluid dynamics, compressible flow, etc. Pre- or Corequisite: MATH 2574 or MATH 2574C and (CHEG 2113 or BENG 2632 or BMEG 2613 or INEG 2103).

This course is equivalent to CHEG 2133.

A detailed study of the thermodynamic "state principles," energy and entropy balances, and their application to the solution of problems involving single-component physical systems and processes. Pre- or Corequisite: MATH 2574 or MATH 2574C and (CHEG 2113 or BENG 2632 or BMEG 2613 or INEG 2103).

A detailed study of the thermodynamic "state principles," energy and entropy balances, and their application to the solution of problems involving single-component physical systems and processes. Pre- or Corequisite: MATH 2574 or MATH 2574C and (CHEG 2113 or BENG 2632 or BMEG 2613 or INEG 2103).

This course is equivalent to CHEG 2313.

CHEG 3144. Heat and Mass Transfer (Sp, Fa). 4 Hours.
Applications of the principles of conduction, convection and radiation to the analysis and design of chemical processing heat transfer equipment and systems. Fundamentals of chemical diffusional and convection processes. Corequisite: Drill component. Pre- or Corequisite: CHEG 3323. Prerequisite: CHEG 2133 and MATH 2584.

CHEG 3144H. Honors Heat and Mass Transfer (Sp, Fa). 4 Hours.
Applications of the principles of conduction, convection and radiation to the analysis and design of chemical processing heat transfer equipment and systems. Fundamentals of chemical diffusional and convection processes. Corequisite: Drill component. Pre- or Corequisite: CHEG 3323. Prerequisite: CHEG 2133 and MATH 2584.

This course is equivalent to CHEG 3144.

CHEG 3233L. Chemical Engineering Laboratory I (Sp, Fa). 3 Hours.
Experimental measurements of various physical properties and comparison with published values and theoretical predictions. Experimental investigation of fluid flow and thermodynamics. Interpretation of results using graphical, numerical and statistical tools, and presentation of results in written technical reports and oral briefings. Identification and quantification of sources of experimental error. Identification of relevant experimental parameters to achieve an objective. Pre- or Corequisite: CHEG 3144. Corequisite: Drill component. Prerequisite: CHEG 2133 and CHEG 2313.

CHEG 3253. Chemical Engineering Computer Methods (Sp, Fa). 3 Hours.
Application of computer methods to chemical engineering problems including a review of structured programming principles. Corequisite: Drill component. Pre- or Corequisite: CHEG 3144 and CHEG 3323. Prerequisite: MATH 2584.

CHEG 3323. Thermodynamics of Multi-Component Systems (Sp, Fa). 3 Hours.
The use of the state principle and energy and entropy balance developed in CHEG 2133 is extended to allow processes. Physical and chemical equilibrium processes are considered in detail. Prerequisite: CHEG 2313 and MATH 2574.

CHEG 3323H. Honors Thermodynamics of Multi-Component Systems (Sp, Fa). 3 Hours.
The use of the state principle and energy and entropy balance developed in CHEG 2313 is extended to allow processes. Physical and chemical equilibrium processes are considered in detail. Prerequisite: CHEG 2313 and MATH 2574.

This course is equivalent to CHEG 3323.

CHEG 3333. Chemical Engineering Reactor Design (Sp, Fa). 3 Hours.
Principles of kinetics of homogeneous and heterogeneous reactions, catalysis, and reactor design with applications, drawn from industrial processes. Pre- or Corequisite: CHEG 3253. Prerequisite: CHEG 3323.

CHEG 3333H. Honors Chemical Engineering Reactor Design (Sp, Fa). 3 Hours.
Principles of kinetics of homogeneous and heterogeneous reactions, catalysis, and reactor design with applications, drawn from industrial processes. Pre- or Corequisite: CHEG 3253. Prerequisite: CHEG 3323.

This course is equivalent to CHEG 3333.

CHEG 3713. Chemical Engineering Materials Technology (Sp). 3 Hours.
Selection of metals, polymers and ceramics for service in process conditions (including corrosion). In addition to static strains on materials, specialized materials such as semiconductors,., composites, and nano-materials are studied. The relationship between molecular structure and macroscopic properties is emphasized including processing and manufacture. Prerequisite: CHEM 3603 and PHYS 2054 and CHEG 3323.

CHEG 4163. Separation Processes (Sp, Fa). 3 Hours.
Applications of chemical engineering design to stagewise and continuous separations in systems approaching equilibrium. Prerequisite: CHEG 3144.

CHEG 4163H. Honors Separation Processes (Sp, Fa). 3 Hours.
Applications of chemical engineering design to stagewise and continuous separations in systems approaching equilibrium. Prerequisite: CHEG 3144. This course is equivalent to CHEG 4163.

CHEG 4273. Corrosion Control (Sp). 3 Hours.
Qualitative and quantitative introduction to corrosion and its control. Application of the fundamentals of corrosion control in the process industries is emphasized. Prerequisite: CHEG 2313.

CHEG 4332L. Chemical Engineering Laboratory II (Sp, Fa). 2 Hours.
Experimental investigations of mass transfer and kinetics/reactor design. Special attention to attaining a high order of accuracy and to presenting results in complete written reports, with emphasis on quality rather than quantity work performed. Pre- or Corequisite: CHEG 3333 and CHEG 4163. Corequisite: Drill component. Prerequisite: CHEG 3233L.
CHEG 4413. Chemical Engineering Design I (Sp, Fa). 3 Hours.
Principles of cost estimation, profitability, economic analysis, and economic balances as practiced in the chemical process industries. Special emphasis on the solution of problems involving the combination of engineering principles and economics. Corequisite: Drill component. Pre- or Corequisite: CHEG 4163. Prerequisite: ECON 2013 (or ECON 2143) and CHEG 3144 and CHEG 3333.

CHEG 4413H. Honors Chemical Engineering Design I (Sp, Fa). 3 Hours.
Principles of cost estimation, profitability, economic analysis, and economic balances as practiced in the chemical process industries. Special emphasis on the solution of problems involving the combination of engineering principles and economics. Corequisite: Drill component. Pre- or Corequisite: CHEG 4163. Prerequisite: ECON 2013 (or ECON 2143) and CHEG 3144 and CHEG 3333.
This course is equivalent to CHEG 4413.

CHEG 4423. Automatic Process Control (Sp). 3 Hours.
Application of mathematical modeling methods to the description of transient phenomena of interest to process engineers. Modes of control and principles of feedback control are introduced with applications to process engineering problems. Pre- or Corequisite: CHEG 4163. Prerequisite: CHEG 3253.

CHEG 4423H. Honors Automatic Process Control (Sp). 3 Hours.
Application of mathematical modeling methods to the description of transient phenomena of interest to process engineers. Modes of control and principles of feedback control are introduced with applications to process engineering problems. Pre- or Corequisite: CHEG 4163. Prerequisite: CHEG 3253.
This course is equivalent to CHEG 4423.

CHEG 4443. Chemical Engineering Design II (Sp, Fa). 3 Hours.
Responsibility for decision making is placed on the students in the solution of a comprehensive, open ended problem based on an industrial process. Both formal oral and formal written presentation of results are required. Corequisite: Drill component. Prerequisite: CHEG 4413.

CHEG 4443H. Honors Chemical Engineering Design II (Sp, Fa). 3 Hours.
Responsibility for decision making is placed on the students in the solution of a comprehensive, open ended problem based on an industrial process. Both formal oral and formal written presentation of results are required. Corequisite: Drill component. Prerequisite: CHEG 4413.
This course is equivalent to CHEG 4443.

CHEG 4813. Chemical Process Safety (Fa). 3 Hours.
Application of chemical engineering principles to the study of safety, health, and loss prevention. Fires and explosions, hygiene, toxicology, hazard identification, and risk assessment in the chemical process industries. Corequisite: Drill component. Prerequisite: CHEG 3144 and CHEG 3323.

CHEG 4813H. Honors Chemical Process Safety (Fa). 3 Hours.
Application of chemical engineering principles to the study of safety, health, and loss prevention. Fires and explosions, hygiene, toxicology, hazard identification, and risk assessment in the chemical process industries. Corequisite: Drill component. Prerequisite: CHEG 3323 and CHEG 3144.
This course is equivalent to CHEG 4813.

CHEG 488V. Special Problems (Sp, Su, Fa). 1-6 Hour.
Prerequisite: Senior standing. May be repeated for up to 6 hours of degree credit.

CHEG 5013. Membrane Separation and System Design (Irregular). 3 Hours.
Theory and system design of cross flow membrane process—reverse osmosis, nanofiltration, ultrafiltration, and microfiltration—and applications for pollution control, water treatment, food and pharmaceutical processing.

CHEG 5033. Technical Administration (Irregular). 3 Hours.
Contemporary issues affecting the domestic and global Chemical Process Industries (CPI). Emphasis is on process economics, market and corporate strategy as well as advances in technology to improve corporate earnings while addressing the threats and opportunities in the CPI. Prerequisite: Senior or graduate standing.

CHEG 5043. Colloid and Interface Science (Odd years, Sp). 3 Hours.
This course aims to provide essential knowledge about surface, interface, and molecular self-organization. At the end of this course students should understand (i) basic concepts to describe phenomena at surfaces, (ii) molecular self-organization, and (iii) basic techniques for characterization of surfaces and interfaces.

CHEG 5113. Transport Processes I (Fa). 3 Hours.
Fundamental concepts and laws governing the transfer of momentum, mass, and heat.

CHEG 5133. Advanced Reactor Design (Sp). 3 Hours.
Applied reaction kinetics with emphasis on the design of heterogeneous reacting systems including solid surface catalysis, enzyme catalysis, and transport phenomena effects. Various types of industrial reactors, such as packed bed, fluidized beds, and other non-ideal flow systems are considered.

CHEG 5213. Advanced Chemical Engineering Calculations (Irregular). 3 Hours.
Developments of and solutions of equations and mathematical models of chemical processes and mechanisms.

CHEG 5273. Corrosion Control (Sp). 3 Hours.
Qualitative and quantitative introduction to corrosion and its control. Application of the fundamentals of corrosion control in the process industries is emphasized.

CHEG 5333. Advanced Thermodynamics (Fa). 3 Hours.
Methods of statistical thermodynamics, the correlation of classical and statistical thermodynamics, and the theory of thermodynamics of continuous systems (non-equilibrium thermodynamics).

CHEG 5353. Advanced Separations (Irregular). 3 Hours.
Phase equilibrium in non-ideal and multicomponent systems, digital and other methods of computation are included to cover the fundamentals of distillation, absorption, and extraction.

CHEG 5513. Biochemical Engineering Fundamentals (Even years, Sp). 3 Hours.
An introduction to bioprocessing with an emphasis on modern biochemical engineering techniques and biotechnology. Topics include: basic metabolism (procaryote and eucaryote), biochemical pathways, enzyme kinetics (including immobilized processes), separation processes (e.g. chromatography) and recombinant DNA methods. Material is covered within the context of mathematical descriptions (calculus, linear algebra) of biochemical phenomenon.

CHEG 5733. Polymer Theory and Practice (Odd years, Fa). 3 Hours.
Theories and methods for converting monomers into polymers are presented. Topics include principles of polymer science, commercial processes, rheology, and fabrication.

CHEG 5801. Graduate Seminar (Sp, Fa). 1 Hour.
Oral presentations are given by master's candidates on a variety of chemical engineering subjects with special emphasis on new developments. Prerequisite: Graduate standing.

CHEG 588V. Special Problems (Sp, Su, Fa). 1-6 Hour.
Opportunity for individual study of an advanced chemical engineering problem not sufficiently comprehensive to be a thesis. Prerequisite: Graduate standing. May be repeated for up to 6 hours of degree credit.

CHEG 600V. Master's Thesis (Sp, Su, Fa). 1-6 Hour.
Master's Thesis. Prerequisite: Graduate standing. May be repeated for degree credit.

CHEG 6123. Transport Processes II (Sp). 3 Hours.
Continuation of CHEG 5113. Prerequisite: CHEG 5113.
CHEG 6203. Preparation of Research Proposals (Irregular). 3 Hours.
This course will cover technical communication in both written and oral presentation.
Prerequisite: Instructor consent.

CHEG 6801. Graduate Seminar (Sp, Fa). 1 Hour.
Oral presentations are given by doctoral students on a variety of chemical engineering subjects with special emphasis on new developments. Prerequisite: graduate standing.

CHEG 688V. Special Topics in Chemical Engineering (Sp, Su, Fa). 1-3 Hour.
Advanced study of current Chemical Engineering topics not covered in other courses. Prerequisite: Doctoral students only. May be repeated for up to 3 hours of degree credit.

CHEG 700V. Doctoral Dissertation (Sp, Su, Fa). 1-18 Hour.
Doctoral Dissertation. Prerequisite: Candidacy. May be repeated for degree credit.