CHEMICAL ENGINEERING (CHE)

CHE 2033 Introduction to Chemical Process Engineering
Prerequisites: CHEM 1515 and ENSC 2213
Description: Concurrent enrollment in MATH 2233 or 3263, ENGR 1412. Application of mathematics and scientific principles to solving chemical engineering problems. Simple material and energy balances applied to process design. The nature and application of unit operations and unit processes to the development of chemical processes.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Discussion, Combined lecture & discussion, Lecture
Department/School: Chemical Engineering

CHE 2581 Chemical Engineering Seminar I
Prerequisites: CHE majors.
Description: Through guest lectures and home assignments, preparation and planning for a CHE career and success in the CHE curriculum. Professional growth topics oriented to students in the sophomore-level courses.
Credit hours: 1
Contact hours: Lecture: 1
Levels: Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 3013 Rate Operations I
Prerequisites: Admission to CHE Professional School.
Description: Development and application of phenomenological and empirical models to the design and analysis of fluid processing and heat transfer unit operations.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 3113 Rate Operations II
Prerequisites: CHE 3013, CHE 3333, CHE 3473, admission to CHE Professional School.
Description: Development and application of phenomenological and empirical models to the design and analysis of mass transfer and separations unit operations.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 3123 Chemical Reaction Engineering
Prerequisites: CHE 3333, CHE 3473, and admission to CHE Professional School.
Description: Principles of chemical kinetics rate concepts and data treatment. Elements of reactor design principles for homogeneous systems; introduction to heterogeneous systems. Course previously offered as CHE 4473.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 3333 Introduction to Transport Phenomena
Prerequisites: Admission to CHE Professional School.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 3473 Chemical Engineering Thermodynamics
Prerequisites: Admission to CHE Professional School.
Description: Application of thermodynamics to chemical process calculations. Behavior of fluids, including estimation of properties by generalized methods. Study of chemical thermodynamics, including heats of reaction, chemical reaction, and phase equilibria.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 3581 Chemical Engineering Seminar II
Prerequisites: Junior standing in the department.
Description: Through guest lectures and home assignments, preparation and planning for a CHE career and success in the CHE curriculum. Professional growth topics oriented to students in the junior-level CHE courses.
Credit hours: 1
Contact hours: Lecture: 1
Levels: Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering
CHE 4002 Chemical Engineering Laboratory I
Prerequisites: CHE 3013, CHE 3333, CHE 3473, admission to CHE Professional School.
Description: Application of CHE fundamentals and unit operation principles to the analysis of bench and pilot-scale equipment. Primarily fluid processing and heat exchange. Design of experiments on non-ideal units to generate credible data useful for validation of principles and for engineering decisions. Interpretation of experimental data and presentation of results.
Credit hours: 2
Contact hours: Lab: 4
Levels: Graduate, Undergraduate
Schedule types: Lab
Department/School: Chemical Engineering

CHE 4112 Chemical Engineering Laboratory II
Prerequisites: CHE 3113, CHE 3123, CHE 4002, admission to CHE Professional School.
Description: A continuation of CHE 4002. Primary reaction and mass transfer processes.
Credit hours: 2
Contact hours: Lab: 3
Levels: Graduate, Undergraduate
Schedule types: Lab
Department/School: Chemical Engineering

CHE 4124 Chemical Engineering Design I
Prerequisites: CHE 3113, CHE 3123, CHE 4002, and admission to CHE Professional School.
Description: Economic analysis of process plants and systems of equipment; methods for estimating plant investment requirements and operating costs; economic evaluation and optimal design of chemical process systems; basic equipment and process design calculations.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 2
Levels: Graduate, Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Chemical Engineering

CHE 4224 Chemical Engineering Design II
Prerequisites: CHE 4124 and admission to CHE Professional School.
Description: A continuation of CHE 4124. Economic analysis of process plants and equipment. Design of chemical processing equipment and chemical plants. Application of computer techniques to chemical engineering design.
Credit hours: 4
Contact hours: Lecture: 3 Lab: 2
Levels: Graduate, Undergraduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Chemical Engineering

CHE 4283 Bioprocess Engineering
Prerequisites: Admission to CHE Professional School and CHE 3123. (or instructor consent)
Description: Application of fundamental engineering principles to biochemical and biological processes. Introduction to cellular processes, fermentation technology, biological mass transfer and kinetics, bioreactor design and scale-up and downstream processing. Same course as BAE 4283.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate, Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 4293 Biomedical Engineering
Prerequisites: ENSC 2213, ENSC 3233, MATH 2155
Description: Introduction to engineering principles applied to biomedical applications. Biomaterials, drug delivery, artificial organs, transport in biological systems, tissue engineering and modeling of biological systems.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 4343 Environmental Engineering
Prerequisites: CHE 4123
Description: Application of science and engineering principles to minimize the adverse effects of human activities on the environment. National and state environmental regulations. Predictive movement and fate of chemicals in the geospheres. Multi-media pollution assessment, analysis and control. Consideration of safety, health and environmental issues from a process standpoint.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 4523 Introduction to Colloid Processing
Prerequisites: MATH 2153 and CHEM 1515
Description: The physics and chemistry governing the behavior of microscopic particles in dilute and concentrated suspensions. Interparticle interaction influence on viscosity, viscoelasticity, yield stress, and shear thinning. Practical applications of colloids principles in industrial practice. No credit for students with credit in CHE 5523. Same course as MSE 4523.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 4581 Chemical Engineering Seminar III
Prerequisites: Senior standing in the department
Description: Through guest lectures and home assignments, preparation and planning for a ChE career and success in the ChE curriculum. Professional growth topics oriented to students in the senior-level ChE courses.
Credit hours: 1
Contact hours: Lecture: 1
Levels: Graduate, Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 4843 Chemical Process Instrumentation and Control
Prerequisites: CHE 4124 and admission to CHE Professional School.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate, Undergraduate
Schedule types: Lecture
Department/School: Chemical Engineering
CHE 4990 Special Problems
Prerequisites: Senior standing.
Description: Training in independent work, study of relevant literature, and experimental investigation of an assigned problem. Offered for variable credit, 1-5 credit hours, maximum of 5 credit hours.
Credit hours: 1-5
Contact hours: Other: 1
Levels: Undergraduate
Schedule types: Independent Study
Department/School: Chemical Engineering

CHE 5000 Master's Thesis
Prerequisites: Approval of major professor.
Description: Methods used in research and thesis writing. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.
Credit hours: 1-6
Contact hours: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Chemical Engineering

CHE 5030 Professional Practice
Prerequisites: Senior standing and consent of instructor.
Description: Application of chemical engineering principles to the solution of real-life engineering problems in an actual or simulated industrial environment. Includes application of design and testing procedures, economic evaluation and reporting on one or more assigned projects. Offered for variable credit, 2-6 credit hours, maximum of 8 credit hours.
Credit hours: 2-6
Contact hours: Other: 2
Levels: Graduate
Schedule types: Independent Study
Department/School: Chemical Engineering

CHE 5073 Tissue Engineering
Prerequisites: Graduate standing and permission of instructor.
Description: Tissue engineering (TE) and the material strategy for different tissue constructs in bone TE, liver TE, neural TE, intestine TE, etc. will be discussed in this course. Same as MSE 5073.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5110 Special Topics in Chemical Engineering
Prerequisites: Consent of instructor.
Description: Small group and individual projects in unit operations, unit procedures, chemical kinetics, computer applications, process modeling, or any of a wide range of chemical engineering topics. May be repeated for credit if subject matter varies. Offered for variable credit, 2-3 credit hours, maximum of 6 credit hours.
Credit hours: 2-3
Contact hours: Other: 2
Levels: Graduate
Schedule types: Independent Study
Department/School: Chemical Engineering

CHE 5123 Advanced Chemical Reaction Engineering
Prerequisites: CHE 4473
Description: Advanced principles and applications of chemical kinetics in catalysis, heterogeneous systems, non-ideal reactions, polymerization, and biological reactions.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5213 Selected Diffusional Unit Operations
Description: Mass transfer in fluids. Diffusion in liquids and gases. Equilibrium stage and transfer unit concepts. Mass transfer concepts of diffusional unit operations such as absorption, adsorption, crystallization, drying, humidification and liquid extraction.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5233 Bioseparations
Prerequisites: BAE 3013 or CHE 3013
Description: Study of separations important in food and biochemical engineering such as leaching, extraction, expression, absorption, ion exchange, filtration, centrifugation, membrane separation, and chromatographic separations. Course available online only through AG*IDEA consortium.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5263 Advanced Biomaterials Science and Engineering
Prerequisites: Graduate standing or consent of instructor.
Description: Engineering issue that are implicit in understanding the interactions of living tissue and processed materials will be introduced. Emphasis is on identifying the processes in which cells interact with surfaces and particulate matter and the outcome of these interactions. Highlighted biological responses will include inflammation and coagulation. Also, biomaterial issues related to drug delivery and tissue engineering will be discussed. Same course as MAE 5003.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5265 Advanced Chemical Reaction Engineering
CHE 5273 Basic Physiology and Physiological System Analysis for Engineers
Prerequisites: Graduate standing or consent of instructor.
Description: The goals of this class are: 1) to introduce the basic physiology concepts used widely in biomedical engineering research; 2) to introduce and develop engineering concepts and approaches for quantitative analysis of physiological systems. Engineering principles will be applied to study mechanical properties of various tissue and organ systems under normal and diseased conditions. Knowledge obtained from this class can help engineers to apply engineering principles to the design and development of medical devices for disease treatments. Same course as MAE 5013.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5283 Advanced Bioprocess Engineering
Prerequisites: Consent of instructor.
Description: Application of fundamental engineering principles to biochemical and biological processes. Introduction to cellular processes, fermentation technology, biological mass transfer and kinetics, bioreactor design and scale-up, and downstream processing. Same course as BAE 5283.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5293 Advanced Biomedical Engineering
Prerequisites: Consent of instructor.
Description: Principles and engineering analysis of biomedical processes. Artificial organs, biomaterials, tissue engineering, transport in biological systems, biomedical imaging and drug delivery systems. Same course as MAE 5033.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5343 Advanced Environmental Engineering
Prerequisites: Consent of instructor.
Description: Science and engineering principles to minimize the adverse effects of human activities on the environment. National and state regulations. Predictive movement and fate of chemicals in the geospheres. Multi-media pollution assessment, analysis, and control. Consideration of safety, health, and environment issues from a process standpoint. Special project required. Credit not allowed if CHE 4343 was taken.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5373 Process Simulation
Prerequisites: CHE 5843 or concurrent enrollment or with professor’s consent.
Description: Computer-aided process synthesis, simulation, analysis and optimization. Systematic tools for developing and screening potential chemical process flow sheets. Use of commercial process simulators to aid in evaluating process designs. Practical problems will be used as examples and case studies.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5523 Colloid Processing
Prerequisites: Graduate standing in engineering, physics, or chemistry or consent of instructor.
Description: The physics and chemistry governing the behavior of microscopic particles in dilute and concentrated suspensions. Interparticle interaction influence on viscosity, viscoelasticity, yield stress, and shear thinning. Practical application of colloids principles in industrial practice.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5633 Stagewise Operations
Description: Stagewise separation in binary and multicomponent systems. Development of theoretical techniques with application to typical situations in vapor-liquid, liquid-liquid and solid-liquid systems. Use of digital and analog techniques.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5703 Optimization Applications
Prerequisites: Graduate standing.
Description: A survey of various methods of unconstrained and constrained linear and non-linear optimization. Applications of these methodologies using hand-worked examples and available software packages. Intended for engineering and science students. Same course as ECEN 5703, IEM 5023 & MAE 5703.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5733 Neural Networks
Prerequisites: Graduate standing.
Description: Introduction to mathematical analysis of networks and learning rules and on the application of neural networks to certain engineering problems, image and signal processing and control systems. Same course as ECEN 5733 & MAE 5733.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering
CHE 5743 Chemical Engineering Process Modeling
Description: Chemical engineering systems and process models. Analytical and numerical methods of solution of resulting equations with computer methods in a chemical engineering context.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5843 Principles of Chemical Engineering Thermodynamics
Description: Principles of thermodynamics. Properties of fluids and prediction of thermodynamic properties. Phase and chemical equilibrium. Thermodynamics in unit operations.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5850 Advanced Process Control Laboratory
Prerequisites: Graduate standing and permission of instructor.
Description: Instrumentation systems and control strategies on pilot-scale chemical processes. Calibration, filtering, dynamic modeling, tuning, advanced control, and method evaluation. Students will learn industrial practices and cope with many non-idealities. Offered for variable credit, 2-3 credit hours, maximum of 6 credit hours.
Credit hours: 2-3
Contact hours: Lecture: 1 Lab: 2
Levels: Graduate
Schedule types: Lab, Lecture, Combined lecture and lab
Department/School: Chemical Engineering

CHE 5853 Advanced Chemical Process Control
Prerequisites: CHE 4843 or equivalent
Description: General concepts and approaches of model-based control. Studies in the application of process-model-based control and model-predictive control on multivariable, nonlinear, nonstationary, noisy processes.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5873 Air Pollution Control Engineering
Description: Causes, effects and control of atmosphere pollution. Same course as CIVE 5873.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 5990 Special Problems
Prerequisites: Consent of instructor.
Description: Individual report topics in chemical engineering involving operations, processes, equipment, experiments, literature search, theory, computer use or combinations of these. Offered for variable credit, 2-4 credit hours, maximum of 9 credit hours.
Credit hours: 2-4
Contact hours: Other: 2
Levels: Graduate
Schedule types: Independent Study
Department/School: Chemical Engineering

CHE 6000 Doctoral Thesis
Prerequisites: Consent of major professor.
Description: The doctoral candidate registers for a minimum of 2 semester credit hours to a maximum of 15 semester credit hours in each semester during which laboratory work is in process. Methods used in research and thesis writing. An original investigation of a problem in chemical engineering and its report in a dissertation. Offered for variable credit, 2-15 credit hours, maximum of 54 credit hours.
Credit hours: 2-15
Contact hours: Other: 2
Levels: Graduate
Schedule types: Independent Study
Department/School: Chemical Engineering

CHE 6010 Chemical Engineering Seminar
Description: Advanced research and development topics. Offered for variable credit, 1-3 credit hours, maximum of 3 credit hours.
Credit hours: 1-3
Contact hours: Other: 1
Levels: Graduate
Schedule types: Independent Study
Department/School: Chemical Engineering

CHE 6440 Advanced Topics in Chemical Engineering
Prerequisites: CHE 5843
Description: Phase equilibrium in multicomponent systems. Irreversible processes. Properties of fluids and the prediction of properties by statistical methods. Application of thermodynamics to unit operations.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Lecture
Department/School: Chemical Engineering

CHE 6623 Advanced Chemical Engineering Thermodynamics
Prerequisites: CHE 5843
Description: Phase equilibrium in multicomponent systems. Irreversible processes. Properties of fluids and the prediction of properties by statistical methods. Application of thermodynamics to unit operations.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Independent Study
Department/School: Chemical Engineering

CHE 6703 Research Methods in Chemical Engineering
Prerequisites: MS or PhD candidacy in chemical engineering or consent of instructor.
Description: Methods and skills required to successfully conduct chemical engineering research projects. Maintaining research records, experiment design, data validation, results presentation and research ethics.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Independent Study
Department/School: Chemical Engineering

CHE 6703 Research Methods in Chemical Engineering
Prerequisites: MS or PhD candidacy in chemical engineering or consent of instructor.
Description: Methods and skills required to successfully conduct chemical engineering research projects. Maintaining research records, experiment design, data validation, results presentation and research ethics.
Credit hours: 3
Contact hours: Lecture: 3
Levels: Graduate
Schedule types: Independent Study
Department/School: Chemical Engineering