

Chemical Engineering (CHEN)

CHEN 2371 Conservation Principles I **3 SCH (3-0)**

Applications of the conservation laws of mass to the solution of chemical engineering problems. Prerequisites: CHEM 1312 or PHYS 2325/PHYS 2125.

CHEN 2372 Conservation Principles II **3 SCH (3-0)**

Applications of the conservation laws of energy to the solution of chemical engineering problems. Prerequisite: CHEN 2371.

CHEN 3305 Introduction to Chemical Engineering for Non-Chemical Engineering Majors **3 SCH (3-0)**

A comprehensive introduction to the basic principles and technologies used by chemical engineers in industry today. Includes an introduction to basic quantitative principles in the fundamental chemical engineering topics of mass and energy balances, fluid and heat transport, and thermodynamics. Credit for this course is not allowed if the student has declared chemical engineering as their major. This course is required for non-majors pursuing the Chemical Process Industries certificate. Pre-requisites: CHEM 1312, MATH 2414, and PHYS 2326.

CHEN 3310 Heat Transport Phenomena **3 SCH (3-0)**

Fundamentals of energy transport and system applications involving this operation including computer applications to heat exchanger design. Prerequisites: CHEM 3323, CHEN 3392 or NGEN 3392, CHEN 3347 or MEEN 3347.

CHEN 3315 Chem Process Design Economics **3 SCH (3-0)**

Basic principles and techniques of economic analysis and cost engineering with applications to problems in chemical process and equipment design. Prerequisites: CHEN 2372 and credit for or registration in CHEN 3310.

CHEN 3321 Process Simulation **3 SCH (3-0)**

Basic numerical methods used in chemical process simulation. An introduction to the use of commercial process simulators, with hands-on applications. Prerequisite: MATH 3320, credit or registration in CHEN 3310.

CHEN 3347 Chem Eng Thermodynamics I **3 SCH (3-0)**

Theory and applications of the first and second laws of thermodynamics to mechanical and chemical interactions for both reversible and irreversible processes. Pressure-Volume-Temperature relations and equations of state. Prerequisite: MATH 2414. Corequisites: PHYS 2326/PHYS 2126.

CHEN 3371 Chemical Thermodynamics II **3 SCH (3-0)**

Fundamental thermodynamic relations for property and phase equilibria calculations. Procedures for deciding when and to what extent chemical reactions and phase changes may be expected to occur according to the basic principles of physical chemistry and the laws of thermodynamics. Prerequisites: CHEM 3325/CHEM 3125, CHEM 3331, and CHEN 3347.

CHEN 3392 Fluid Transport Phenomena **3 SCH (3-0)**

Fundamentals of momentum transport, including fluid statics, flow of incompressible and compressible fluids, pumps, turbines, and compressors, with computer applications. Prerequisites: MATH 3320 and credit or registration in MEEN 2302 or MEEN 2355.

CHEN 4120 Seminar in CHEN **1 SCH (1-0)**

Seminar on contemporary issues in Chemical Engineering. Prerequisite: junior standing.

CHEN 4130 Service Learning in CHEN **1 SCH (1-0)**

Service learning experience in a project that engages a community agency and raises awareness of chemical engineering professional issues. Prerequisite: junior standing.

CHEN 4278 Unit Operations Lab I **2 SCH (0-6)**

Selected laboratory experiments on fluid flow and heat transfer. Prerequisite: CHEN 3310.

Fee: \$5.00

CHEN 4279 Unit Operations Lab II **2 SCH (0-6)**

Selected laboratory experiments on heat and mass transfer. Prerequisites: CHEN 4278 and CHEN 4389.

Fee: \$5.00

CHEN 4311 Biochemical Engineering **3 SCH (3-0)**

Principles involved in the processing of biological materials using biological agents such as cells, enzymes or antibodies. Prerequisites: CHEM 3325/CHEM 3125.

CHEN 4316 Chemical Process Design I **3 SCH (3-0)**

The application of chemical engineering principles to a sequence of design problems utilizing computer software, such as SIMSCI. Prerequisites: CHEN 3315, CHEN 3371 and CHEN 3310.

CHEN 4317 Chem Process Design II (WI) **3 SCH (3-0)**

The application of chemical engineering principles, including economic criteria to a comprehensive design problem. Computer software is utilized as a design aid. Prerequisites: CHEN 4316, CHEN 4373, CHEN 4389 and credit for or registration in CHEN 4392.

CHEN 4335 Special Problems **1-3 SCH (1-3)**

Individual solution of selected problems in chemical engineering conducted under direct supervision of a faculty member. May be repeated for up to six hours. Prerequisite: senior standing.

CHEN 4341 Chemical Process Safety 3 SCH (3-0)

A comprehensive overview of safety topics in the design, construction, startup, operation, and shutdown of chemical plants and refineries. Pre-requisite: CHEN 3310.

CHEN 4342 Chemical Process Sustainability 3 SCH (3-0)

A study of sustainability topics applied to the chemical process industry, focusing on energy conservation, process and utility water conservation, hazardous chemical replacement or minimization, and process substitution at chemical process plants and refineries. Pre-requisites: CHEM 3310.

CHEN 4343 Environmental Treatment of Chemical Processes 3 SCH (3-0)

A study of the different processes used to treat air, water, and solid waste streams associated with the chemical process industry and refineries. Pre-requisites: CHEN 3310 and CHEN 4389.

CHEN 4344 Data Analytics for Chem Eng 3 SCH (3-0)

Data analytics for chemical engineers with an emphasis towards trend identification and decision analysis for chemical processes, based upon chemical plant performance data. Prerequisites: CHEN 2371, IEEN 2310, and senior standing.

CHEN 4351 Biofuels/Biochemical Production Processes 3 SCH (3-0)

Basic principles and theory for the engineering design of large-scale biochemical processes for biofuel, food, and pharmaceutical production and waste treatment. Prerequisites: Either CHEN 2372 or CHEN 3305 and CHEN 4311.

CHEN 4352 Bioseparations 3 SCH (3-0)

Basic principles and theory for the engineering design of large-scale equipment used in the purification of biological products. Prerequisite: CHEN 3371.

CHEN 4353 Bioprocesses for Waste Treatment 3 SCH (3-0)

Basic principles and theory for the engineering design and operation of biological processes used for waste treatment (including air, water, and solid waste media) in the refinery, petrochemical, and related industries. Prerequisites: CHEM 4311 and CHEN 4389.

CHEN 4354 Biochemical Reaction Engineering 3 SCH (3-0)

This course provides the necessary knowledge on the fundamentals of reaction kinetics, reaction engineering and reactor process economic analysis as applied to biochemical, biomolecular, and biocatalytic processes. Prerequisites: Either BIOL 2421 or CHEM 4345 and CHEN 4311.

CHEN 4355 Frontiers in Biochemical Processes 3 SCH (3-0)

Select topics in biochemical processes, focusing on advances that have allowed for improved production and recovery of biochemicals over the last couple of decades. Focus will also be on those processes that offer greater sustainability as compared to fossil-fuel based chemicals. Prerequisites: Either BIOL 2421 or CHEM 4345 and CHEN 4311.

CHEN 4373 Chemical Reactor Engineering 3 SCH (3-0)

Chemical reaction rates and design of chemical reactors. Applications of computers to chemical kinetics and the design of chemical reactors. Prerequisites: CHEM 3332, CHEN 3310, CHEN 3321 and CHEN 3371.

CHEN 4386 Air Pollution Control 3 SCH (3-0)

A fundamental approach to air pollution testing, control and design of control systems. Introduction to dispersion modeling via computer. Prerequisite: CHEN 3392 and senior standing.

CHEN 4389 Mass Transport Phenomena 3 SCH (3-0)

Fundamentals of mass transport, including gas/liquid absorption/desorption, extraction, membrane separation, binary and multicomponent distillation. Prerequisites: CHEM 3331, CHEN 3321, CHEN 3371 and credit or registration in CHEN 3310.

CHEN 4399 Internship in CHEN 1-3 SCH (1-3)

Internships in industry, government, or consulting companies in career-based practical activities to broaden the skills obtained through curricular education. Prerequisite: junior standing.

CHEN 4492 Process Dynamics and Control 4 SCH (0-3-0-3)

Basic operating theory of control systems and their application to industrial chemical processes. Applications of computers to process control. Prerequisites: CHEN 4373 and CHEN 4389.