

CH E Course Descriptions

CH E 130 Chemical Engineering Tools 3(2,2)

Tools and methods for analyzing engineering problems with applications in chemical and biochemical processes, including development of process flow diagrams, numerical methods, graphing, and applied statistics. Problem-solving and computer skills are developed in the lecture and laboratory activities. *Preq:* CES 102. *Coreq:* MTHSC 108, PHYS 122.

CH E 199 Creative Inquiry—Chemical and Biomolecular Engineering 1-4(1-4,0)

In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

CH E 211 Introduction to Chemical Engineering 4(3,2)

Introduction to fundamental concepts of chemical engineering, including mass and energy balances, PVT relationships for gases and vapors, and elementary phase equilibria; problem-solving and computer skills are developed in lab. *Preq:* CH 102, MTHSC 108, PHYS 122; and CH E 130 or ENGR 130.

CH E 220 Chemical Engineering Thermodynamics I 3(3,0)

Topics include first and second laws of thermodynamics, ideal gases, PVT properties of real fluids, energy balances with chemical reactions, and thermodynamic properties of real fluids. *Preq:* CH E 211, MTHSC 206.

CH E 230 Fluids/Heat Transfer 4(3,2)

General principles of chemical engineering and study of fluid flow, fluid transportation, and heat transmission. Special emphasis is placed on theory and its practical application to design. *Preq:* CH E 211. *Coreq:* CH E 220, MTHSC 206.

CH E 299 Creative Inquiry—Chemical and Biomolecular Engineering 1-4(1-4,0)

In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

CH E H300 Honors Seminar 1(1,0)

Acquaints students enrolled in the Departmental Honors Program with current research issues in the profession. This assists the student in preparing a research proposal for the Senior Thesis. To be taken Pass/Fail only. *Preq:* Admission to departmental honors program, Junior standing.

CH E 307 Unit Operations Laboratory I 3(2,3)

Laboratory work in the unit operations of fluid flow, heat transfer, and evaporation. Stress is on the relation between theory and experimental results and the statistical interpretation of those results and on report preparation and presentation. *Preq:* CH E 220, 230.

CH E 311 Fluid Flow 3(3,0) NO LONGER OFFERED

Fundamentals of fluid flow and the application of theory to chemical engineering unit operations, such as pumps, compressors, and fluidization. *Preq:* CH E 211, MTHSC 206.

CH E 312 Heat and Mass Transfer 3(3,0) NO LONGER OFFERED

Study of the basics of heat transmission and mass transport. Special emphasis is placed on theory and its application to design. *Preq:* CH E 220, 311.

CH E 319 Engineering Materials 3(3,0)

Introduction to the fundamental properties and behavior of engineering materials emphasizing polymers, metals, ceramics, and composite materials. *Preq:* CH E 211. *Coreq:* CH 223, CH E 220.

CH E 321 Chemical Engineering Thermodynamics II 3(3,0)

Continuation of CH E 220. Topics include thermodynamics of power cycles and refrigeration/liquefaction, thermodynamic properties of homogeneous mixtures, phase equilibria, and chemical reaction equilibria. *Preq:* CH E 220, MTHSC 208.

CH E 330 Mass Transfer and Separation Processes 4(3,2)

Study of mass transport fundamentals and application of these fundamentals to separation technologies, with emphasis on gas absorption, stripping, distillation, and liquid-liquid extraction. *Preq:* CH E 230. *Coreq:* CH E 321.

CH E 344 Chemical Engineering Junior Seminar 1(1,0) NO LONGER OFFERED

Preparation of junior chemical engineering students for entry into the profession. Timely information on job interviewing skills, career placement and guidance, professional registration, professional behavior and ethics, graduate school, and management of personal finances. Outside speakers are used frequently. To be taken Pass/Fail only. *Preq:* CH E 230.

CH E 353 Process Dynamics and Control 3(3,0)

Mathematical analysis of the dynamic response of process systems. Basic automatic control theory and design of control systems for process applications. *Preq:* MTHSC 208, CH E 311 or 230. *Coreq:* CH E 330 or 413.

CH E H395 Honors Research I 3(0,9) Individual research under the direction of a Chemical Engineering faculty member. *Preq:* CH E H300 or consent of department honors coordinator.

CH E 399 Creative Inquiry—Chemical and Biomolecular Engineering 1-4(1-4,0)

In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

CH E 401, 601 Transport Phenomena 3(3,0)

Mathematical analysis of single and multidimensional steady-state and transient problems in momentum, energy, and mass transfer. Both the similarities and differences in these mechanisms

are stressed. *Preq:* CH E 330, MTHSC 208.

CH E 407 Unit Operations Laboratory II 3(1,6)

Continuation of CH E 307 with experiments primarily on the diffusional operations. Additional lecture material on report writing and general techniques for experimental measurements and analysis of data, including statistical design of experiments. *Preq:* CH E 307, 330.

CH E 412, 612 Polymer Engineering 3(3,0)

Design-oriented course in synthetic polymers. Topics include reactor design used in polymer production, effect of step versus addition kinetics on reactor design, epoxy curing reactions, polymer solubility, influence of polymerization and processing conditions on polymer crystallinity. *Preq:* CH 224 and 332 or consent of instructor.

CH E 413 Separation Processes 3(3,0) NO LONGER OFFERED

Study of gas-liquid and liquid-liquid separation techniques emphasizing gas absorption, distillation, and liquid-liquid extraction. *Preq:* CH 332, CH E 312, 321.

CH E (B E) 428, 628 Biochemical Engineering 3(3,0)

See B E 428. Use of microorganisms and enzymes for the production of chemical feedstocks, single-cell protein, antibiotics, and other fermentation products. Topics include kinetics and energetics of microbial metabolism, design and analysis of reactors for microbial growth and enzyme-catalyzed reactions, and considerations of scale-up, mass transfer, and sterilization during reactor design. *Preq:* B E 312, MICRO 305; *Coreq:* (for Biosystems Engineering majors) BIOCH 301 or 305; (for Chemical Engineering majors) CH E 330, 450.

CH E 431 Chemical Process Design I 3(3,0)

Steps in creating a chemical process design from original concept to successful completion and operation. Topics include process layout, equipment selection and sizing, safety and environmental evaluation, engineering economics, simulation, evaluation of alternatives, and optimization. *Preq:* CH E 307, 321, 330. *Coreq:* CH E 450.

CH E 432 Process Development, Design, and Optimization of Chemical Engineering Systems II 5(1,12) NO LONGER OFFERED

Continuation of CH E 431. Principles of process development, design, and optimization are applied in a comprehensive problem carried from a general statement of the problem to detailed design and economic evaluations. *Preq:* CH E 321, 353, 407, 413, and 450 or consent of department chair.

CH E 433 Process Design II 3(1,6)

Continuation of CH E 431. Principles of process development, design, and optimization are applied in a comprehensive problem carried from a general statement of the problem to detailed design and economic evaluations. *Preq:* CH E 330, 407, 431, 450.

CH E 443 Chemical Engineering Senior Seminar I 1(1,0)

Preparation of senior chemical engineering students for entry into the profession. Timely information on job interviewing skills, career placement and guidance, professional registration,

professional behavior and ethics, and management of personal finances. Outside speakers are used frequently. To be taken Pass/Fail only. *Preq:* CH E 330, Senior standing in Chemical Engineering. *Coreq:* CH E 431.

CH E 444 Chemical Engineering Senior Seminar II 1(1,0)

Working in groups, students present and discuss topics related to professional practice, ethics, business, industrial safety, the environment, and selected technical subjects of interest to society. To be taken Pass/Fail only. *Preq:* CH E 344 or 443. *Coreq:* CH E 432.

CH E 445 Selected Topics in Chemical Engineering 3(3,0)

Topics not covered in other courses, emphasizing current literature, research, and practice of chemical engineering. Topics vary from year to year. May be repeated, but only if different topics are covered. *Preq:* Consent of instructor.

CH E 450, 650 Chemical Reaction Engineering 3(3,0)

Review of kinetics of chemical reactions and an introduction to the analysis and design of chemical reactors. Topics include homogeneous and heterogeneous reactions, batch and continuous flow reaction systems, catalysis, and design of industrial reactors. *Preq:* CH E 330, 321, CH 332.

CH E 491, H491 Special Projects in Chemical Engineering 1-3(1-3,0)

Topics requested by students or offered by faculty as the need arises. Topics may include review of current research in an area, technological advances, and national engineering goals. May be repeated for a maximum of six credits, but only if different topics are covered.

CH E H495 Honors Research II 3(0,9)

Individual research under the direction of a chemical engineering faculty member. *Preq:* CH E H395.

CH E H497 Honors Thesis 1(1,0)

Preparation of honors thesis based on research conducted in CH E H395 and H495. *Preq:* CH E H495.

CH E 499 Creative Inquiry—Chemical and Biomolecular Engineering 1-4(1-4,0)

In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.