CHEMICAL AND BIOMOLECULAR ENGINEERING (CHME)

CHME 805 Multiple Contact Separation Processes
Prerequisites: CHME 823 and permission
Description: Application of the principles of physical kinetics and the equilibrium stage to separation processes such as absorption, extraction, and distillation.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 809 Process Intensification and Sustainability
Crosslisted with: CHME 409
Prerequisites: Senior Standing
Description: Process intensification focuses on considerable improvements in tens to hundred percent in manufacturing by modification of existing operations or new designs. Optimization of manufacturing processes is at the core of PI
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Graded
Offered: FALL/SPR

CHME 812 Introduction to Atomistic Simulations
Crosslisted with: CHME 412
Prerequisites: Senior standing
Description: Theory and application of quantum-based computational methods used to model, predict and analyze materials properties.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 815 Advanced Chemical Engineering Analysis
Prerequisites: CHME 833, MATH 820 or MATH 821
Description: Application of advanced mathematics to chemical engineering design, with emphasis upon the derivation of differential equations describing physical situations as well as upon the solution of these equations. Design methods for tubular and stirred tank reactors, ion exchange units, pebble heaters, gas absorbers, mixers, etc.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Prerequisite for: CHME 845

CHME 823 Chemical Engineering Thermodynamics and Kinetics
Crosslisted with: CHME 323
Prerequisites: CHME 223
Description: Application to multi-component systems; thermodynamics, phase equilibria, chemical reaction equilibria, and process analysis.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Prerequisite for: CHME 324; CHME 805; CHME 825; CHME 845; CHME 847, CHME 447; CHME 935; CHME 995

CHME 825 Theoretical and Applied Thermodynamics for Chemical Engineers
Prerequisites: CHME 823 or CHEM 982, MATH 820 or 821 or equivalent
Description: Application of classical engineering and chemical thermodynamics to problems in chemical engineering.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 830 Chemical Engineering Laboratory II
Crosslisted with: CHME 430
Prerequisites: CHME 330; CHME 442 or parallel; CHME 462 or parallel.
Description: Selected experiments in chemical engineering. Emphasis on experimental design, interpretation of results, and formal oral and written presentation.
Credit Hours: 4
Max credits per semester: 4
Max credits per degree: 4
Grading Option: Grade Pass/No Pass Option
Course and Laboratory Fee: $25
Experiential Learning: Case/Project-Based Learning

CHME 835 Transport Phenomena I
Prerequisites: MATH 821; CHME 832 and CHME 833 or equivalent
Description: Advanced consideration of molecular and turbulent momentum, energy and mass transport.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Prerequisite for: CHME 836; CHME 845; CHME 925

CHME 836 Transport Phenomena II
Prerequisites: CHME 835
Description: Continuation of Transport Phenomena I.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 842 Chemical Reactor Engineering and Design
Crosslisted with: CHME 442
Prerequisites: CHME 323.
Description: Basic principles of chemical kinetics are coupled with models descriptive of rates of energy and mass transfer for the analysis and design of reactor systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Prerequisite for: CHME 845

CHME 845 Advanced Chemical Engineering Kinetics
Prerequisites: CHME 815, CHME 823, CHME 835, CHME 842
Description: Kinetics of chemical reactions in several categories of reactors for interpretation of experimental data and design of equipment.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 847 Principles and Applications of Catalysis in Reaction Engineering
Crosslisted with: CHME 447
Prerequisites: CHME 323.
Description: Principles and applications of heterogeneous catalysis, mechanisms, catalytic reactor types and catalyst characterization and performance. Case studies on current catalytic technologies.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 852 Chemical Engineering Process Economics and Optimization
Crosslisted with: CHME 452
Prerequisites: CHME 331, CHME 333, CHME 334. Credit toward the degree may be earned in only one of BSEN 206/CONE 206 or CHME 452
Description: Criteria of chemical process economics: cost and asset accounting, time value of money, profitability, alternative investments, minimum attractive rate of return, sensitivity and risk analysis. Process optimization in: plant operations, unit operations, using successive calculations, linear programming and dynamic programming.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 853 Chemical Engineering Process Design and Safety
Crosslisted with: CHME 453
Prerequisites: CHME 452
Description: Design, evaluation, and safety considerations of chemical engineering process applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Experiential Learning: Case/Project-Based Learning

CHME 854 Chemical Process Engineering
Crosslisted with: CHME 454
Prerequisites: CHME 430, CHME 312
Description: Practical and theoretical aspects of chemical process analysis, simulation, and synthesis. Case studies used to illustrate principles. Use of the digital computer as a tool of the process engineer is stressed.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 860 Automatic Process Control Laboratory
Crosslisted with: CHME 460
Prerequisites: Parallel: CHME 462.
Description: Selected laboratory experiments to demonstrate the theory of the dynamics and control of chemical processes.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 1
Grading Option: Grade Pass/No Pass Option
Course and Laboratory Fee: $25

CHME 862 Automatic Process Control
Crosslisted with: CHME 462
Prerequisites: MATH 221, CHME 333
Description: Analysis and design of automatic control systems. Dynamic responses of measuring instruments, control elements, stability of control systems, and process equipment included in control loops.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Prerequisite for: CHME 965

CHME 871 Stem Cell Engineering and Regenerative Medicine
Crosslisted with: CHME 371
Prerequisites: CHEM 109A and 109L or CHEM 113A and 113L.
Description: Introduction to stem cells and regenerative medicine with emphasis on stem cells and their application in the treatment of diseases and translational lab-to-clinic hurdles in stem cell therapy
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 873 Biochemical Engineering
Crosslisted with: CHME 473
Prerequisites: CHEM 431
Description: Engineering processes for production of biologics and metabolic products, with emphasis on biopharmaceutical production by bacteria, yeast, and mammalian systems.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Prerequisite for: CHME 470; CHME 474, CHME 874

CHME 874 Advanced Biochemical Engineering
Crosslisted with: CHME 474
Prerequisites: CHME 473/873.
Description: Recent theoretical and technical developments in biochemical engineering.
Credit Hours: 2-6
Min credits per semester: 2
Max credits per semester: 6
Max credits per degree: 6
Grading Option: Grade Pass/No Pass Option

CHME 875 Biochemical Separations
Crosslisted with: CHME 475
Prerequisites: CHME 333/833
Description: Separation and purification of compounds of biological origin from an analytical perspective. Application of unit operations for these separations.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 876 Micro/Nano systems for Engineering and Life Sciences
Crosslisted with: CHME 476
Prerequisites: Senior standing.
Description: Introduction to a number of biological problems facing living systems and show how micro/nanotechnology is being used to solve those problems. Emphasis on engineering perspectives of the life sciences.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 877 Molecular Bioengineering
Crosslisted with: CHME 477
Prerequisites: Senior standing.
Description: Introduction to fundamentals and up-to-date developments in the field of bioengineering at the molecular level. Topics to cover include recombinant DNA methods, protein engineering, microbial cell factories, synthetic and systems biology, DNA and protein therapeutics.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option
Offered: FALL/SPR

CHME 882 Polymers
Crosslisted with: CHME 482
Prerequisites: CHEM 262, 264 or 264A, and MATH 221
Description: Introduction to polymer synthesis, structure, polymer physics, thermodynamics, kinetics, polymer characterization techniques, polymer properties and applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 883 Chemical Processes in Semiconductor Manufacturing
Crosslisted with: CHME 483
Prerequisites: A grade of C or better in ECEN 211 and MATH 208
Description: Introduction to the basic chemical processes used in chip manufacturing, with emphasis on: thin-film metal and dielectric deposition, etching, ion implantation, diffusion, lithography, and planarization. Discuss material synthesis and processing and the principle physical/chemical governing phenomena.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 886 Electrochemical Engineering
Crosslisted with: CHME 486
Prerequisites: CHME 223 or MECH 200 or BSEN 244
Description: Thermodynamic and kinetic principles of electrochemistry are applied to the design and analysis of electrochemical processes, including chemical production, batteries, fuel cells, and corrosion prevention.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 889 Air Pollution, Assessment and Control
Crosslisted with: CHME 489
Prerequisites: Senior standing.
Description: Survey of the present status of the air pollution problem and the application of engineering and scientific principles to its practical and effective coordinated control.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 896 Advanced Topics in Chemical Engineering Computation
Crosslisted with: CHME 496
Prerequisites: CHME 312 or CSCE 455/855 or MECH 480/880, and permission.
Description: Intensive treatment of special topics of current research interest in such areas as steady-state and dynamic process simulation, design optimization, chemical process synthesis, computer-aided product research, stochastic optimization, and numerical methods applied to transport problems.
Credit Hours: 1-6
Min credits per semester: 1
Max credits per semester: 6
Max credits per degree: 6
Grading Option: Grade Pass/No Pass Option
Prerequisite for: CHME 915

CHME 899 Masters Thesis
Prerequisites: Admission to masters degree program and permission of major adviser
Credit Hours: 1-10
Min credits per semester: 1
Max credits per semester: 10
Max credits per degree: 99
Grading Option: Grade Pass/No Pass Option

CHME 900 Seminar in Chemical Engineering
Description: Discussion of research projects and review of current literature in chemical engineering.
Credit Hours: 1
Max credits per semester: 1
Max credits per degree: 6
Grading Option: Grade Pass/No Pass Option

CHME 915 Systems Analysis in Chemical Engineering
Prerequisites: CHME 496/896
Description: Computational methods of process optimization. Techniques of process systems analysis and their application in digital simulators. Process simulation in the presence of uncertainty.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 925 Transport Properties
Prerequisites: CHME 835, CHEM 882
Description: Application of the kinetic theories of gases, liquids, and solids to the prediction and correlation of transport properties.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 935 Membrane Principles and Processes
Prerequisites: CHME 823 and CHME 833
Description: Fundamental principles relating to membrane effects, the structure and properties of membranes, and applications in electrodialysis, ultrafiltration, diffusion control, artificial organs, and other processes.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 965 Advanced Process Dynamics and Control
Prerequisites: CHME 862
Description: Transient behavior of typical industrial processes and systems-heat exchangers, dryers, distillation columns, absorbers, chemical reactors, etc.-emphasis on the control of such processes. Introduction to systems engineering.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Grading Option: Grade Pass/No Pass Option

CHME 995 Special Problems in Chemical Engineering
Prerequisites: CHME 823, CHME 833 or equivalent
Credit Hours: 1-9
Min credits per semester: 1
Max credits per semester: 9
Max credits per degree: 9
Grading Option: Grade Pass/No Pass Option

CHME 999 Doctoral Dissertation
Prerequisites: Admission to doctoral degree program and permission of supervisory committee chair
Credit Hours: 1-24
Min credits per semester: 1
Max credits per semester: 24
Max credits per degree: 99
Grading Option: Grade Pass/No Pass Option