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
Format: LEC

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
Format: LEC

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
Format: LEC

CHME 823 Chemical Engineering Thermodynamics and Kinetics
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
Format: LEC
Prerequisite for: CHME 845

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
Format: LEC

CHME 830 Chemical Engineering Laboratory II
Crosslisted with: CHME 430
Prerequisites: CHME 330; CHME 442 or parallel; CHME 462 or parallel.
Parallel: CHME 460.
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
Format: LAB

CHME 832 Transport Operations I
Crosslisted with: CHME 332
Prerequisites: MATH 208; CHME 223
Description: Mass, momentum and energy transport phenomena and their application in chemical engineering.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: AGEN 325, BSEN 325; AGEN 344, BSEN 344; CHME 330; CHME 333, CHME 833; CHME 420; CHME 835

CHME 833 Transport Operations II
Crosslisted with: CHME 333
Prerequisites: CHME 832
Description: Continuation of CHME 332/832.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC
Prerequisite for: CHME 475, CHME 875; CHME 486, CHME 886; CHME 815; CHME 835; CHME 935; CHME 995

CHME 834 Diffusional Operations
Crosslisted with: CHME 434
Prerequisites: CHME 332
Description: Application of diffusional theory to the design of processing equipment required for absorption, adsorption, leaching, drying, and chemical reactions.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

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
Format: LEC
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
Format: LEC
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  
Format: LEC  
Prerequisite for: CHME 486, CHME 886; 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  
Format: LEC  

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  
Format: LEC  

CHME 852 Chemical Engineering Process Economics and Optimization  
Crosslisted with: CHME 452  
Prerequisites: CHME 333, CHME 331, CHME 434  
Notes: Credit toward the degree may be earned only in CHME 452/852  
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  
Format: LEC  
Prerequisite for: CHME 965  

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  
Format: LEC  

CHME 854 Chemical Process Engineering  
Crosslisted with: CHME 454  
Prerequisites: CHME 430 and 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  
Format: LEC  

CHME 860 Automatic Process Control Laboratory  
Crosslisted with: CHME 460  
Prerequisites: CHME 462 or parallel. Parallel: CHME 430.  
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  
Format: LAB  

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  
Format: LEC  

CHME 873 Biochemical Engineering  
Crosslisted with: CHME 473  
Prerequisites: CHEM 262, CHEM 431  
Description: Dynamics of microbial growth and death. Engineering processes for microbiological synthesis of cellular materials and industrial products, with emphasis on food and pharmaceutical production by bacteria and fungi.  
Credit Hours: 3  
Max credits per semester: 3  
Max credits per degree: 3  
Format: LEC  
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  
Format: LEC
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
Format: LEC

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
Format: LEC

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
Format: LEC

CHME 882 Polymers
Crosslisted with: CHME 482
Prerequisites: CHEM 262 and 264.
Description: Introduction to polymer technology stressing polymerization kinetics, methods of resin manufacture and applications.
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

CHME 886 Electrochemical Engineering
Crosslisted with: CHME 486
Prerequisites: CHME 333, and CHME 442, or MECH 310 and MATL 360.
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
Format: LEC

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
Format: LEC

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
Format: LEC

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
Format: IND

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
Format: LEC

CHME 915 Systems Analysis in Chemical Engineering
Prerequisites: CHME 496/896
Credit Hours: 3
Max credits per semester: 3
Max credits per degree: 3
Format: LEC

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
Format: LEC
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
Format: LEC

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
Format: LEC

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
Format: LEC

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
Format: IND