

CHEMICAL ENGINEERING

BME 6221 Biomolecular Cell Mechanics 3 Credits

Grading Scheme: Letter Grade

Biomolecular basis of cell mechanics and cell motility, emphasizing quantitative models and systems-biology approaches.

BME 6322 Dynamics of Cellular Processes 3 Credits

Grading Scheme: Letter Grade

Develops research skills, including generation of questions, hypotheses testing, reporting, interpretation, and discussion of findings.

Prerequisite: a course on kinetics and/or transport, or consent of instructor.

BME 6644 Pharmacokinetics 3 Credits

Grading Scheme: Letter Grade

Basic pharmacokinetic and pharmacodynamic concepts and models. Use of these concepts in the drug discovery process.

CHM 5275 The Organic Chemistry of Polymers 2 Credits

Grading Scheme: Letter Grade

Classification of polymerization types and mechanisms from a mechanistic organic point of view. The structure of synthetic and natural polymers and polyelectrolytes. Reaction of polymers. Practical synthetic methods of polymer preparation.

Prerequisite: CHM 2200, 2210, or equivalent.

CHM 5511 Physical Chemistry of Polymers 2 Credits

Grading Scheme: Letter Grade

Structure, configuration, conformation, and thermodynamics of polymer solutions, gels, and solids. Thermal, mechanical, optical, and rheological properties of plastics and rubbers.

Prerequisite: CHM 4411 or equivalent.

ECH 5938 Topics in Colloid Science 3 Credits

Grading Scheme: Letter Grade

Colloids and interfacial phenomena, colloid interaction forces, electrokinetic phenomena, transport phenomena influenced by colloidal forces, and electrokinetic phenomena. Examples and applications.

Prerequisite: PHY 2049 and 2056L, CHM 2046 and 2046L, MAC 2312 or equivalent.

ECH 6126 Thermodynamics of Reaction and Phase Equilibria 3 Credits

Grading Scheme: Letter Grade

Methods of treating chemical and phase equilibria in multi-component systems through application of thermodynamics and molecular theory.

ECH 6270 Continuum Basis of Chemical Engineering 3 Credits

Grading Scheme: Letter Grade

Integrated introduction to transport processes in continuous media with emphasis on fluid mechanics and heat and mass transfer.

ECH 6272 Molecular Basis of Chemical Engineering 3 Credits

Grading Scheme: Letter Grade

Statistical mechanics and microscopic explanation of macroscopic laws of classical thermodynamics, transport phenomena, and chemical kinetics. Statistical mechanical theories that connect molecular structure to macroscopic properties.

ECH 6285 Transport Phenomena 3 Credits, Max 3 Credits

Grading Scheme: Letter Grade

Integrated introduction to transport processes in continuous media with emphasis on fluid mechanics and heat and mass transfer.

Prerequisite: Admission to the ChE graduate program or by consent of instructor, dependent upon prior background in undergraduate fluid mechanics and heat and mass transfer, at a level required to obtain an undergraduate degree in Chemical Engineering.

ECH 6326 Computer Control of Processes 3 Credits

Grading Scheme: Letter Grade

Introduction to digital computers, sampled data systems and Z-transforms, control of multiple input-multiple output systems, optimal control, state estimation and filtering, and self-tuning regulators.

ECH 6506 Chemical Engineering Kinetics 3 Credits

Grading Scheme: Letter Grade

Fundamental aspects of chemical reactors, including collision theory, transition rate theory, unimolecular rate theory, homogeneous gas and liquid phase kinetics, and heterogeneous kinetics.

ECH 6526 Reactor Design and Optimization 3 Credits

Grading Scheme: Letter Grade

Fundamentals of heterogeneous reactor design including the characterization of catalytic reactions and support, the development of global rate of the intrinsic reaction affected by chemical and physical deactivation of catalyst, intraphase and interphase mass and heat transfer, and the design and optimization of various types of heterogeneous reactors.

ECH 6709 Electrochemical Engineering Fundamentals and Design 3 Credits

Grading Scheme: Letter Grade

Fundamentals of electrochemical and ionics applied to systems of interest in electrochemical engineering.

ECH 6726 Interfacial Phenomena I 3 Credits

Grading Scheme: Letter Grade

Introduction to the forces responsible for unique physical properties at interfaces, including wetting phenomena, the adsorption of polymers and surface-active molecules at interfaces, and the structure of these solutions.

ECH 6727 Interfacial Phenomena II 3 Credits

Grading Scheme: Letter Grade

Discussion on the forces responsible for unique physical properties at solid-liquid interfaces and their application in various engineering problems. Topics include the role and application of colloids, spreading of liquids on surfaces, lubrication, flotation, and nanomaterial synthesis.

ECH 6829 Polymer Processing 3 Credits

Grading Scheme: Letter Grade

Polymer Processing

ECH 6843 Experimental Basis of Chemical Engineering 3 Credits

Grading Scheme: Letter Grade

Statistical design of experiments and treatment of data including regression analysis, interpolation, and integration. Introduction to analytical techniques including electron and photon spectroscopies, chromatography, and mass spectrometry.

ECH 6847 Advanced Mathematics for Chemical Engineering 3 Credits

Grading Scheme: Letter Grade

Methods of linear systems, chemical engineering applications in finite and infinite dimensional spaces, concepts of stability, application to transport phenomena.

ECH 6851 Impedance Spectroscopy 3 Credits

Grading Scheme: Letter Grade

Intended for chemists, physicists, materials scientists, and engineers with an interest in applying electrochemical impedance techniques to study a broad variety of electrochemical processes.

Prerequisite: familiarity with applications of differential equations.

ECH 6905 Individual Work 1-6 Credits, Max 12 Credits

Grading Scheme: Letter Grade

Individual engineering projects suitable for a nonthesis Master of Engineering degree.

ECH 6910 Supervised Research 1-5 Credits, Max 5 Credits

Grading Scheme: S/U

Supervised Research

ECH 6926 Graduate Seminar 1 Credit, Max 10 Credits

Grading Scheme: Letter Grade

Graduate Seminar

ECH 6937 Topics in Chemical Engineering I 1-4 Credits, Max 9 Credits

Grading Scheme: Letter Grade

Separations processes, reactor design, applied molecular and kinetic theory, thermodynamics, particulate systems. Properties of chemical substances, transport phenomena, non-Newtonian fluid dynamics, turbulence, applied mathematics, computer science, biochemical and electrochemical engineering.

ECH 6939 Topics in Chemical Engineering III 1-4 Credits, Max 9 Credits

Grading Scheme: Letter Grade

Topics in Chemical Engineering III

ECH 6940 Supervised Teaching 1-5 Credits, Max 5 Credits

Grading Scheme: S/U

Supervised Teaching

ECH 6971 Research for Master's Thesis 1-15 Credits

Grading Scheme: S/U

Research for Master's Thesis

ECH 7938 Advanced Special Chemical Engineering Topics for Doctoral Candidates 1-4 Credits, Max 8 Credits

Grading Scheme: Letter Grade

Advanced Special Chemical Engineering Topics for Doctoral Candidates

ECH 7979 Advanced Research 1-12 Credits

Grading Scheme: S/U

Research for doctoral students before admission to candidacy. Designed for students with a master's degree in the field of study or for students who have been accepted for a doctoral program. Not appropriate for students who have been admitted to candidacy.

ECH 7980 Research for Doctoral Dissertation 1-15 Credits

Grading Scheme: S/U

Research for Doctoral Dissertation

EGN 5949 Practicum/Internship/Cooperative Work Experience 1-6 Credits, Max 6 Credits

Grading Scheme: S/U

Practical cooperative engineering work under approved industrial and faculty supervision.

Prerequisite: graduate student.

EGN 6640 Entrepreneurship for Engineers 3 Credits

Grading Scheme: Letter Grade

Introduction to entrepreneurship, idea generating and feasibility analysis, and business planning. Lectures, case studies, student-led discussions, team business plans, and investor presentations.

EGN 6913 Engineering Graduate Research 0-3 Credits, Max 12 Credits

Grading Scheme: S/U

Course will provide the student with supervised research in a laboratory setting.