Chemical and Biomolecular Engineering

Overview

The Department of Chemical and Biomolecular Engineering (CBE) provides the opportunity for undergraduate and graduate students to obtain a thorough fundamental knowledge of all fields in chemical and biomolecular engineering.

In broad terms, research conducted in the department can be divided into the following areas: catalysis and reaction engineering; electrochemical engineering; polymers and complex fluids; microsystems technology and microelectrics; molecular simulations and theory; interfacial engineering; biochemical and bioprocess engineering; biomedical engineering; and synthetic biology. The department also collaborates with the Lawrence Berkeley National Laboratory (http://www.lbl.gov).

Undergraduate Programs

Chemical Engineering (http://guide.berkeley.edu/archive/2019-20/undergraduate/degree-programs/chemical-engineering): BS, Minor
Chemical Engineering/Materials Science and Engineering (http://guide.berkeley.edu/archive/2019-20/undergraduate/degree-programs/chemical-engineering-materials-science-joint-major): BS (Joint Major offered in cooperation with the College of Engineering)
Chemical Engineering/Nuclear Engineering (http://guide.berkeley.edu/archive/2019-20/undergraduate/degree-programs/chemical-engineering-nuclear-joint-major): BS (Joint Major offered in cooperation with the College of Engineering)

Graduate Programs

Chemical Biomolecular Engineering (http://guide.berkeley.edu/archive/2019-20/graduate/degree-programs/chemical-biomolecular-engineering): MS (Product Development Program), PhD

Chemical and Biomolecular Engineering

Expand all course descriptions [+]Collapse all course descriptions [-]

CHM ENG 24 Freshman Seminars 1 Unit

Terms offered: Spring 2020, Spring 2019, Spring 2015
The Berkeley Seminar Program has been designed to provide new students with the opportunity to explore an intellectual topic with a faculty member in a small-seminar setting. Berkeley Seminars are offered in all campus departments, and topics vary from department to department and semester to semester.
Freshman Seminars: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of seminar per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

Freshman Seminars: Read Less [-]

CHM ENG 40 Introduction to Chemical Engineering Design 2 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Design and analysis of processes involving chemical change. Strategies for design, such as creative thinking and (re)definition of the design goal. Methods for analyzing designs, such as mathematical modeling, empirical analysis by graphics, and dynamic scaling by dimensional analysis. Design choices in light of process efficiency, product quality, economics, safety, and environmental issues.
Introduction to Chemical Engineering Design: Read More [+]
Rules & Requirements

Prerequisites: Math 1B OR Chem 4A

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 1.5 hours of discussion per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Introduction to Chemical Engineering Design: Read Less [-]

CHM ENG 84 Sophomore Seminar 1 or 2 Units

Terms offered: Spring 2013, Spring 2012, Spring 2010
Sophomore seminars are small interactive courses offered by faculty members in departments all across the campus. Sophomore seminars offer opportunity for close, regular intellectual contact between faculty members and students in the crucial second year. The topics vary from department to department and semester to semester. Enrollment limited to 15 sophomores.
Sophomore Seminar: Read More [+]
Rules & Requirements

Prerequisites: At discretion of instructor

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring:
5 weeks - 3-6 hours of seminar per week
10 weeks - 1.5-3 hours of seminar per week
15 weeks - 1-2 hours of seminar per week

Summer:
6 weeks - 2.5-5 hours of seminar per week
8 weeks - 2-4 hours of seminar per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: The grading option will be decided by the instructor when the class is offered. Final exam required.

Sophomore Seminar: Read Less [-]

CHM ENG 90 Science and Engineering of Sustainable Energy 3 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
An introduction is given to the science and technologies of producing electricity and transportation fuels from renewable energy resources (biomass, geothermal, solar, wind, and wave). Students will be introduced to quantitative calculations and comparisions of energy technologies together with the economic and political factors affecting the transition from nonrenewable to sustainable energy resources. Mass and energy balances are used to analyze the conversion of energy resources.
Science and Engineering of Sustainable Energy: Read More [+]
Rules & Requirements

Prerequisites: Chemistry 1A or 4A

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bell, Segalman

Science and Engineering of Sustainable Energy: Read Less [-]

CHM ENG 98 Directed Group Studies for Lower Division Undergraduates 1 - 3 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Supervised research on a specific topic.
Directed Group Studies for Lower Division Undergraduates: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Credit Restrictions: Enrollment is restricted; see the Introduction to Courses and Curricula section of this catalog.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of directed group study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Directed Group Studies for Lower Division Undergraduates: Read Less [-]

CHM ENG 98W Directed Group Study 1 Unit

Terms offered: Fall 2015
Directed group study consisting of supplementary problem sets, review sessions, and discussions related to chemical engineering. Topics vary with instructor.
Directed Group Study: Read More [+]
Rules & Requirements

Prerequisites: This Chemical Engineering 98W is planned for students who are concurrently enrolled in Chemical Engineering 140

Repeat rules: Course may be repeated for credit when topic changes.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of independent study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Directed Group Study: Read Less [-]

CHM ENG 140 Introduction to Chemical Process Analysis 4 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Material and energy balances applied to chemical process systems. Determination of thermodynamic properties needed for such calculations. Sources of data. Calculation procedures.
Introduction to Chemical Process Analysis: Read More [+]
Rules & Requirements

Prerequisites: Chemical Engineering 40 and Chemistry 4B (may be taken concurrently) or Chemistry 1B; and Physics 7B (may be taken concurrently)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Introduction to Chemical Process Analysis: Read Less [-]

CHM ENG 141 Chemical Engineering Thermodynamics 4 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Thermodynamic behavior of pure substances and mixtures. Properties of solutions, phase equilibria. Thermodynamic cycles. Chemical equilibria for homogeneous and heterogeneous systems.
Chemical Engineering Thermodynamics: Read More [+]
Rules & Requirements

Prerequisites: 140 with a grade of C- or higher; Engineering 7, which may be taken concurrently

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Chemical Engineering Thermodynamics: Read Less [-]

CHM ENG 142 Chemical Kinetics and Reaction Engineering 4 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Analysis and prediction of rates of chemical conversion in flow and nonflow processes involving homogeneous and heterogeneous systems.
Chemical Kinetics and Reaction Engineering: Read More [+]
Rules & Requirements

Prerequisites: 141 with a grade of C- or higher; 150B, which may be taken concurrently

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Chemical Kinetics and Reaction Engineering: Read Less [-]

CHM ENG 143 Computational Methods in Chemical Engineering 4 Units

Terms offered: Spring 2020, Spring 2019, Spring 2016
The purpose of Chemical Engineering Modeling and Computations in Chemical Engineering is to teach students the methodologies used in setting up mathematical models of simple chemical processes and operations, and the numerical techniques used to simulate them. Included are techniques to obtain physical properties of mixtures/solutions using equations of state. This is followed by simple processes such as vapor liquid equilibrium, separation operations such as distillation, heat transfer, and chemical reactions in ideal reactors such as stirred tank and plug flow. Later on, real chemical process equipment and processes are modeled and simulated, using many of the techniques learned earlier. Programming languages such as Matlab and...
Computational Methods in Chemical Engineering: Read More [+]
Objectives & Outcomes

Course Objectives: The focus of this course is on developing insights into chemical processes and operations through the use of modeling and computations. This is not a programming course. The instructors will provide introduction to the use of Aspen and the other codes, but the majority of the learning will be through the active use of these programs by the students in solving assigned problems.

Student Learning Outcomes: The course will be consistent with the overall objectives of the Chemical Engineering curriculum as outlined in the ABET guidelines.

Rules & Requirements

Prerequisites: E7 and CHM ENG 140

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Computational Methods in Chemical Engineering: Read Less [-]

CHM ENG 150A Transport Processes 4 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Principles of fluid mechanics and heat transfer with application to chemical processes. Laminar and turbulent flow in pipes and around submerged objects. Flow measurement. Heat conduction and convection; heat transfer coefficients.
Transport Processes: Read More [+]
Rules & Requirements

Prerequisites: 140 with a grade of C- or higher; Math 54, which may be taken concurrently

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Transport Processes: Read Less [-]

CHM ENG 150B Transport and Separation Processes 4 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Principles of mass transfer with application to chemical processes. Diffusion and convection. Simultaneous heat and mass transfer; mass transfer coefficients. Design of staged and continuous separations processes.
Transport and Separation Processes: Read More [+]
Rules & Requirements

Prerequisites: Chemical and Biomolecular Engineering 141 with a grade of C- or higher; Chemical and Biomolecular Engineering 150A with a grade of C- or higher; Engineering 7

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Summer: 8 weeks - 6 hours of lecture and 2 hours of discussion per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Transport and Separation Processes: Read Less [-]

CHM ENG 154 Chemical Engineering Laboratory 4 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Experiments in physical measurements, fluid mechanics, heat and mass transfer, kinetics, and separation processes. Emphasis on investigation of basic relationships important in engineering. Experimental design, analysis of results, and preparation of engineering reports are stressed.
Chemical Engineering Laboratory: Read More [+]
Rules & Requirements

Prerequisites: Chemical and Biomolecular Engineering 141, 142, and 150B

Hours & Format

Fall and/or spring: 15 weeks - 1 hour of lecture and 8 hours of laboratory per week

Summer: 8 weeks - 2 hours of lecture and 16 hours of laboratory per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Chemical Engineering Laboratory: Read Less [-]

CHM ENG 160 Chemical Process Design 4 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Design principles of chemical process equipment. Design of integrated chemical processes with emphasis upon economic considerations.
Chemical Process Design: Read More [+]
Rules & Requirements

Prerequisites: Chemical and Biomolecular Engineering 142, 150B, and 154. 154 can be taken concurrently

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 3 hours of laboratory per week

Summer: 8 weeks - 6 hours of lecture and 6 hours of laboratory per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Chemical Process Design: Read Less [-]

CHM ENG 161S Industrial Chemical Process Design 6 Units

Terms offered: Prior to 2007
Design of chemical processes and equipment, with an emphasis on industry-sponsored and/or industry-tailored processes
Industrial Chemical Process Design: Read More [+]
Objectives & Outcomes

Course Objectives: Teach students the strategies used in the design of chemical processes through an authentic industrial project.

Student Learning Outcomes: • Develop an ability to function on multi-disciplinary teams.
• Develop the ability to design an integrated chemical engineering-based process to meet stated objectives within realistic constraints.
• Establish proficiency in the design process and project management fundamentals.
• Gain an understanding of professional and ethical responsibilities.

Rules & Requirements

Prerequisites: Prerequisites: Chemical and Biomolecular Engineering 142, 150B, and 154

Hours & Format

Summer: 8 weeks - 6 hours of lecture and 6 hours of discussion per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bryan, Sciamanna

Industrial Chemical Process Design: Read Less [-]

CHM ENG 162 Dynamics and Control of Chemical Processes 4 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Analysis of the dynamic behavior of chemical processes and methods and theory of their control. Implementation of computer control systems on process simulations.
Dynamics and Control of Chemical Processes: Read More [+]
Rules & Requirements

Prerequisites: Chemical and Biomolecular Engineering 142 and 150B; Mathematics 53 and 54

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of laboratory per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Dynamics and Control of Chemical Processes: Read Less [-]

CHM ENG 170A Biochemical Engineering 4 Units

Terms offered: Fall 2020, Fall 2019, Fall 2018
This course intends to introduce chemical engineers to the essential concepts of bioprocessing for applications in the biopharmaceutical, industrial biotech, and food tech industries. The course focuses on the use of chemical engineering skills and principles, including but not limited to kinetics and reactor design, thermodynamics and transport phenomena in the analysis and design of biologically-based processes, as well as the economical analysis and ethics. The main emphasis of 170A, the first of a two-semester sequence will be on the upstream bioprocess of how to make products by designing unit operations and processes around living systems of cells.
Biochemical Engineering: Read More [+]

Rules & Requirements

Prerequisites: BIO ENG 11 or MCB 102 (or equivalent) highly recommended. Chem Eng 150B and Chem Eng 142 or concurrent, or consent of instructor(s)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Zhang, Ryder

Biochemical Engineering: Read Less [-]

CHM ENG 170B Biochemical Engineering 4 Units

Terms offered: Spring 2020, Spring 2019, Spring 2014
This course intends to introduce chemical engineers to the essential concepts of bioprocessing for applications in the biopharmaceutical, industrial biotech, and food tech industries. The course focuses on the use of chemical engineering skills and principles, including but not limited to kinetics and reactor design, thermodynamics and transport phenomena in the analysis and design of biologically-based processes, as well as the economical analysis and ethics. The main emphasis of 170B, the second of a two-semester sequence will be on the downstream bioprocess of recovery, separations and purification of bio-based products.
Biochemical Engineering: Read More [+]

Rules & Requirements

Prerequisites: BIO ENG 11 or MCB 102 (or equivalent) highly recommended. Chem Eng 150B and Chem Eng 142 or concurrent, or consent of instructor(s)

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Zhang, Ryder

Formerly known as: 170

Biochemical Engineering: Read Less [-]

CHM ENG C170L Biochemical Engineering Laboratory 3 Units

Terms offered: Fall 2020, Spring 2020, Spring 2019, Fall 2018, Spring 2014, Spring 2013
Laboratory techniques for the cultivation of microorganisms in batch and continuous reactions. Enzymatic conversion processes. Recovery of biological products.
Biochemical Engineering Laboratory: Read More [+]
Rules & Requirements

Prerequisites: Chemical Engineering 170A (may be taken concurrently) or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 7 hours of laboratory and 1 hour of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Also listed as: CHEM C170L

Biochemical Engineering Laboratory: Read Less [-]

CHM ENG 171 Transport Phenomena 3 Units

Terms offered: Fall 2018, Spring 2011, Spring 2009
Study of momentum, energy, and mass transfer in laminar and turbulent flow.
Transport Phenomena: Read More [+]
Rules & Requirements

Prerequisites: 150B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Transport Phenomena: Read Less [-]

CHM ENG 176 Principles of Electrochemical Processes 3 Units

Terms offered: Spring 2019, Spring 2018, Fall 2016
Principles and application of electrochemical equilibria, kinetics, and transport processes. Technical electrolysis and electrochemical energy conversion.
Principles of Electrochemical Processes: Read More [+]
Rules & Requirements

Prerequisites: Chemical and Biomolecular Engineering 141, 142, and 150B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Principles of Electrochemical Processes: Read Less [-]

CHM ENG C178 Polymer Science and Technology 3 Units

Terms offered: Fall 2020, Spring 2020, Spring 2019, Fall 2016, Spring 2016, Spring 2015
An interdisciplinary course on the synthesis, characterization, and properties of polymer materials. Emphasis on the molecular origin of properties of polymeric materials and technological applications. Topics include single molecule properties, polymer mixtures and solutions, melts, glasses, elastomers, and crystals. Experiments in polymer synthesis, characterization, and physical properties.
Polymer Science and Technology: Read More [+]
Rules & Requirements

Prerequisites: Junior standing

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Also listed as: CHEM C178

Polymer Science and Technology: Read Less [-]

CHM ENG 179 Process Technology of Solid-State Materials Devices 3 Units

Terms offered: Fall 2019, Fall 2018, Fall 2017
Chemical processing and properties of solid-state materials. Crystal growth and purification. Thin film technology. Application of chemical processing to the manufacture of semiconductors and solid-state devices.
Process Technology of Solid-State Materials Devices: Read More [+]
Rules & Requirements

Prerequisites: Engineering 45; one course in electronic circuits recommended; senior standing

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Process Technology of Solid-State Materials Devices: Read Less [-]

CHM ENG 180 Chemical Engineering Economics 3 Units

Terms offered: Fall 2020, Fall 2019, Spring 2019
Optimal design of chemical processes and unit operations, emphasizing the interactions between technical and economic considerations. Analysis of process risks. Chemical and biomolecular process design in the presence of uncertainties. Interest rate determinants and their effects on chemical process feasibility and choices. Relationships between structure and behavior of firms in the chemical processing industries. Multivariable input-output analyses.
Chemical Engineering Economics: Read More [+]
Rules & Requirements

Prerequisites: Chemical and Biomolecular Engineering 142 and 150B. Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Chemical Engineering Economics: Read Less [-]

CHM ENG 182 Nanoscience and Engineering Biotechnology 3 Units

Terms offered: Spring 2020, Fall 2018
This nanoscale science and biomolecular engineering course will cover emerging topics in applied biotechnology and nanotechnology. Topics include enzyme kinetics, enzyme inhibition, recombinant protein generation, cell culture, genome editing, drug design, nanoparticle-based gene and drug delivery, fluorescence imaging, and sensors. The course will also probe the interface of biology with nanomaterials, and standard microscopic techniques to image biological structures and nanoscale materials.
Nanoscience and Engineering Biotechnology: Read More [+]
Rules & Requirements

Prerequisites: Bio 1A or BioE 11 and Physics 7A

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternate method of final assessment during regularly scheduled final exam group (e.g., presentation, final project, etc.).

Instructor: Landry

Nanoscience and Engineering Biotechnology: Read Less [-]

CHM ENG 183 Climate Solutions Technologies 3 Units

Terms offered: Fall 2020
This course for upper division students in science and engineering disciplines covers energy and climate and specific technologies that can be implemented to reduce global warming. Topics include renewable energy (wind and solar), carbon management technologies including Carbon Capture, Utilization and Storage, and Negative Emissions Technologies. The technologies will be described and compared from an upper level chemical engineering perspective that includes fundamental concepts in thermodynamics and separations. We will also cover carbon economics and policies and life-cycle analysis. The course will be framed from a systems-thinking perspective. Throughout the course we will focus on key aspects of communicating climate science.
Climate Solutions Technologies: Read More [+]
Objectives & Outcomes

Course Objectives: After taking this course, students should be able to discuss and explain to peers the role of CO2 in the earth's climate, the greenhouse effect, the carbon cycle and how it relates to the fate of greenhouse gases on many time scales, and the role of fossil fuel combustion in the energy landscape and in CO2 emissions.
Students in this class will gain experience in applying principles of systems thinking, engineering design and analysis to specific technologies that are relevant for mitigating climate change in the immediate future.
Students will appreciate the critical role that communication plays in the path to implementation of solutions and will be comfortable engaging in a discussion about climate solutions with technical and non-technical peers.
Students will gain a basic understanding of economics relative to climate policies, and of climate solutions currently being discussed by policymakers; they will gain an understanding of how these individual solutions fit into a global scheme.
Students will gain knowledge about the most current technologies available for producing energy renewably, managing carbon, and reducing atmospheric greenhouse gas concentrations.

Rules & Requirements

Prerequisites: Chem 1A,B or 4A,B, Phys 7A,B, Math 1A,B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Instructor: Went

Climate Solutions Technologies: Read Less [-]

CHM ENG H193 Senior Honors Thesis 3 Units

Terms offered: Spring 2016, Fall 2015, Spring 2015
A senior honors thesis is written in consultation with the student's faculty research advisor. This is a required course for students wishing to graduate with honors in Chemical Engineering.
Senior Honors Thesis: Read More [+]
Rules & Requirements

Prerequisites: Senior standing, approval of faculty research advisor, overall GPA of 3.4 or higher

Hours & Format

Fall and/or spring: 15 weeks - 9 hours of independent study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Alternative to final exam.

Senior Honors Thesis: Read Less [-]

CHM ENG H194 Research for Advanced Undergraduates 2 - 4 Units

Terms offered: Spring 2020, Spring 2019, Summer 2016 10 Week Session
Original research under direction of one of the members of the staff.
Research for Advanced Undergraduates: Read More [+]
Rules & Requirements

Prerequisites: Minimum GPA of 3.4 overall at Berkeley and consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Research for Advanced Undergraduates: Read Less [-]

CHM ENG 195 Special Topics 2 - 4 Units

Terms offered: Spring 2020, Fall 2019, Fall 2018
Lectures and/or tutorial instruction on special topics. Please refer to the Notes section in the Academic Guide for the current course description.
Special Topics: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2-4 hours of independent study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Special Topics: Read Less [-]

CHM ENG C195A The Berkeley Lectures on Energy: Energy from Biomass 3 Units

Terms offered: Fall 2015, Fall 2014, Fall 2013
After an introduction to the different aspects of our global energy consumption, the course will focus on the role of biomass. The course will illustrate how the global scale of energy guides the biomass research. Emphasis will be placed on the integration of the biological aspects (crop selection, harvesting, storage and distribution, and chemical composition of biomass) with the chemical aspects to convert biomass to energy. The course aims to engage students in state-of-the-art research.
The Berkeley Lectures on Energy: Energy from Biomass: Read More [+]
Rules & Requirements

Prerequisites: Chemistry 1B or Chemistry 4B, Mathematics 1B, Biology 1A

Repeat rules: Course may be repeated for credit under special circumstances: Repeatable when topic changes with consent of instructor.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam required.

Instructors: Bell, Blanch, Clark, Smit, C. Somerville

Also listed as: BIO ENG C181/CHEM C138/PLANTBI C124

The Berkeley Lectures on Energy: Energy from Biomass: Read Less [-]

CHM ENG 196 Special Laboratory Study 2 - 4 Units

Terms offered: Spring 2020, Spring 2019, Spring 2016
Special laboratory or computational work under direction of one of the members of the staff.
Special Laboratory Study: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2-3 hours of independent study per week

Summer:
6 weeks - 5-8 hours of independent study per week
8 weeks - 3.5-6 hours of independent study per week
10 weeks - 3-4.5 hours of independent study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Letter grade. Final exam not required.

Special Laboratory Study: Read Less [-]

CHM ENG 197 Field Study in Chemical Engineering 1 - 4 Units

Terms offered: Spring 2020, Spring 2016, Fall 2015
Supervised experience in off-campus organizations relevant to specific aspects and applications of chemical engineering. Written report required at the end of the term. Course does not satisfy unit or residence requirements for the bachelor's degree.
Field Study in Chemical Engineering: Read More [+]
Rules & Requirements

Prerequisites: Upper division standing and consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of fieldwork per week

Summer:
6 weeks - 2.5-10 hours of fieldwork per week
8 weeks - 1.5-7.5 hours of fieldwork per week
10 weeks - 1.5-6 hours of fieldwork per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Instructor: Strauss

Field Study in Chemical Engineering: Read Less [-]

CHM ENG 198 Directed Group Study for Undergraduates 1 - 3 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Supervised research on a specific topic. Enrollment is restricted; see Introduction to Courses and Curricula section in the General Catalog.
Directed Group Study for Undergraduates: Read More [+]
Rules & Requirements

Prerequisites: Completion of 60 units of undergraduate study and in good academic standing

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-3 hours of lecture per week

Summer: 6 weeks - 2.5-7.5 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Directed Group Study for Undergraduates: Read Less [-]

CHM ENG 199 Supervised Independent Study and Research 1 - 4 Units

Terms offered: Spring 2016, Fall 2015, Spring 2015
Supervised Independent Study and Research: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-4 hours of independent study per week

Summer:
6 weeks - 2.5-10 hours of independent study per week
8 weeks - 1.5-7.5 hours of independent study per week
10 weeks - 1.5-6 hours of independent study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Undergraduate

Grading/Final exam status: Offered for pass/not pass grade only. Final exam not required.

Supervised Independent Study and Research: Read Less [-]

CHM ENG 230 Mathematical Methods in Chemical Engineering 3 Units

Terms offered: Fall 2018, Fall 2017, Fall 2014
The course aims to introduce a variety of mathematical and computational methods useful in solving research problems pertaining to chemical and biomolecular systems. The course covers a wide range of topics from linear algebra and matrices, differential equations, and stochastic methods. Even though the focus is primarily on analytical methods, most of the concepts will be demonstrated with computations and applications. The goal of the course is to ensure that the students are aware of a wide range of computational methods that can be useful in their research and to provide the students with sufficient background in applied mathematics that can be useful in reading the science and engineering literature.
Mathematical Methods in Chemical Engineering: Read More [+]
Rules & Requirements

Prerequisites: Math 53 and 54 or equivalent; open to seniors with consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Mathematical Methods in Chemical Engineering: Read Less [-]

CHM ENG 240 Thermodynamics for Chemical Product and Process Design 3 Units

Terms offered: Fall 2020, Fall 2019, Fall 2018
Topics covered include molecular thermodynamics of pure substances and mixtures, interfacial thermodynamics, statistical mechanics, and computer simulations.
Thermodynamics for Chemical Product and Process Design: Read More [+]
Rules & Requirements

Prerequisites: Math 53 and 54 or equivalent; 141 or equivalent; open to seniors with consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Thermodynamics for Chemical Product and Process Design: Read Less [-]

CHM ENG 244 Kinetics and Reaction Engineering 3 Units

Terms offered: Fall 2020, Fall 2019, Fall 2018
Molecular processes in chemical systems, kinetics and catalysis. Interaction of mass and heat transfer in chemical processes. Performance of systems with chemical reactors.
Kinetics and Reaction Engineering: Read More [+]
Rules & Requirements

Prerequisites: 142 or equivalent; open to seniors with consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Kinetics and Reaction Engineering: Read Less [-]

CHM ENG 245 Catalysis 3 Units

Terms offered: Fall 2020, Spring 2019, Spring 2018
Adsorption and kinetics of surface reactions; catalyst preparation and characterization; poisoning, selectivity, and empirical activity patterns in catalysis; surface chemistry, catalytic mechanisms and modern experimental techniques in catalytic research; descriptive examples of industrial catalytic systems.
Catalysis: Read More [+]
Rules & Requirements

Prerequisites: 244 or Chemistry 223, or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Catalysis: Read Less [-]

CHM ENG 246 Principles of Electrochemical Engineering 3 Units

Terms offered: Spring 2012, Fall 2010, Fall 2009
Electrode processes in electrolysis and in galvanic cells. Charge and mass transfer in ionic media. Criteria of scale-up.
Principles of Electrochemical Engineering: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Principles of Electrochemical Engineering: Read Less [-]

CHM ENG 248 Applied Surface and Colloid Chemistry 3 Units

Terms offered: Spring 2020, Spring 2014, Spring 2012
Principles of surface and colloid chemistry with current applications; surface thermodynamics, wetting, adsorption from solution, disperse systems, association colloids, interacting electrical double layers and colloid stability, kinetics of coagulation, and electrokinetics.
Applied Surface and Colloid Chemistry: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Applied Surface and Colloid Chemistry: Read Less [-]

CHM ENG 250 Transport Processes 3 Units

Terms offered: Fall 2020, Fall 2019, Fall 2018
Basic differential relations of mass, momentum, and energy including creeping, laminar, and turbulent flow, boundary layers, convective-diffusion in heat and mass transfer, and simultaneous multicomponent mass and energy transport. Analytic mathematical solution of the equations of change using classical techniques including: separation of variables, similarity solutions, and Laplace and Fourier transforms.
Transport Processes: Read More [+]
Rules & Requirements

Prerequisites: Chemical & Biomolecular Engineering 150A, 150B; Mathematics 53 and 54, or equivalent; open to seniors with consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Transport Processes: Read Less [-]

CHM ENG 256 Advanced Transport Phenomena 3 Units

Terms offered: Fall 2020, Fall 2018, Fall 2016
Formulation and rigorous analysis of the laws governing the transport of momentum, heat, and mass, with special emphasis on chemical engineering applications. Detailed investigation of laminar flows complemented by treatments of turbulent flow systems and hydrodynamic stability.
Advanced Transport Phenomena: Read More [+]
Rules & Requirements

Prerequisites: 230

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Advanced Transport Phenomena: Read Less [-]

CHM ENG C268 Physicochemical Hydrodynamics 3 Units

Terms offered: Spring 2017, Fall 2013, Fall 2011, Spring 2011
An introduction to the hydrodynamics of capillarity and wetting. Balance laws and short-range forces. Dimensionless numbers, scaling and lubrication approximation. Rayleigh instability. Marangoni effect. The moving contact line. Wetting and short-range forces. The dynamic contact angle. Dewetting. Coating flows. Effect of surfactants and electric fields. Wetting of rough or porous surfaces. Contact angles for evaporating systems.
Physicochemical Hydrodynamics: Read More [+]
Rules & Requirements

Prerequisites: A first graduate course in fluid mechanics sucs as 260A-260B

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Instructor: Morris

Also listed as: MEC ENG C268

Physicochemical Hydrodynamics: Read Less [-]

CHM ENG C270 Protein Engineering 3 Units

Terms offered: Fall 2015, Fall 2014, Fall 2010
An in-depth study of the current methods used to design and engineer proteins. Emphasis on how strategies can be applied in the laboratory. Relevant case studies presented to illustrate method variations and applications. Intended for graduate students.
Protein Engineering: Read More [+]
Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Instructor: Tullman-Ercek

Also listed as: BIO ENG C219

Protein Engineering: Read Less [-]

CHM ENG 274 Biomolecular Engineering 3 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
Fundamentals in biomolecular engineering. Structures, dynamics, and functions of biomolecules. Molecular tools in biotechnology. Metabolic and signaling networks in cellular engineering. Synthetic biology and biomedical engineering applications.
Biomolecular Engineering: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Biomolecular Engineering: Read Less [-]

CHM ENG 293C Curricular Practical Training Internship 0.0 Units

Terms offered: Prior to 2007
This is an independent study course for international students doing internships under the Curricular Practical Training program.
Curricular Practical Training Internship: Read More [+]
Rules & Requirements

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Summer: 8 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Curricular Practical Training Internship: Read Less [-]

CHM ENG C294A Mechanics and Physics of Lipid Bilayers 3 Units

Terms offered: Fall 2017
Lipid bilayers constitute the membrane that encloses every animal cell and many of its interior structures, including the nuclear envelope, the organelles and the endoplasmic reticulum. This is a unique course devoted to modern developments in this exceptionally active field of research, ranging from models based on continuum theory to recent developments based on statistical mechanics.
Mechanics and Physics of Lipid Bilayers: Read More [+]
Objectives & Outcomes

Student Learning Outcomes: To expose students to advanced current work on the mechanics and physics of lipid bilayers (a very active field of current research relevant to biomechanics and biophysics)

Rules & Requirements

Prerequisites: Mechanical Engineering 185 or equivalent

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Instructor: Steigmann

Also listed as: MEC ENG C285E

Mechanics and Physics of Lipid Bilayers: Read Less [-]

CHM ENG 295B Special Topics in Chemical Engineering: Electrochemical, Hydrodynamic, and Interfacial Phenomena 2 Units

Terms offered: Fall 2011, Spring 2011, Fall 2010
Current and advanced study in chemical engineering, primarily for advanced graduate students.
Special Topics in Chemical Engineering: Electrochemical, Hydrodynamic, and Interfacial Phenomena: Read More [+]
Rules & Requirements

Prerequisites: Open to properly qualified graduate students

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Special Topics in Chemical Engineering: Electrochemical, Hydrodynamic, and Interfacial Phenomena: Read Less [-]

CHM ENG 295K Design of Functional Interfaces 3 Units

Terms offered: Spring 2011, Spring 2005, Fall 2004
This course introduces students to the concepts and techniques involved in the design and physical characterization of advanced functional materials consisting of well-defined interfaces. Throughout the course, principles of supramolecular chemistry on solid surfaces are applied to functional systems. Materials with different connectivity and structure at the active site are compared for development of understanding. Specific topics include catalysis, separations, encapsulation, and biomedicine.
Design of Functional Interfaces: Read More [+]

Rules & Requirements

Prerequisites: Graduate standing

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Instructor: Katz

Design of Functional Interfaces: Read Less [-]

CHM ENG 295N Polymer Physics 3 Units

Terms offered: Spring 2015, Spring 2010, Spring 2008
This course, which is based on Gert Strobl's book addresses the origin of some of the important physical properties of polymer liquids and solids. This includes phase transitions, crystallization, morphology of multiphase polymer systems, mechanical properties, response to mechanical and electric fields, and fracture. When possible, we will develop quantitative molecular models that predict macroscopic behavior. The course will address experimental data obtained by microscopy, light and neutron scattering, rheology, and dielectric relaxation.
Polymer Physics: Read More [+]

Rules & Requirements

Prerequisites: 230 and 240

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Polymer Physics: Read Less [-]

CHM ENG 295P Special Topics in Chemical Engineering: Introduction to New Product Development 3 Units

Terms offered: Fall 2020, Fall 2019, Fall 2018
This course is part of the product development initative sponsored by the department of chemical engineering. It focuses on real-life practices and challenges of translating scientific discovery into commercial products. Its scope is limited in most circumstances to situations where some knowledge of chemical engineering, chemistry, and related disciplines might prove to be particularly useful. The course primarily uses case studies of real-world new product development situations to simulate the managerial and technical challenges that will confront students in the field. We will cover a wide range of topics including basic financial, strategic and intellectual property concepts for products, managing risk and uncertainity, the effective new product development team, the evolving role of corporate R&D, the new venture product company and the ethics of post-launch product management.
Special Topics in Chemical Engineering: Introduction to New Product Development: Read More [+]

Rules & Requirements

Prerequisites: Graduate standing or consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Instructor: Alexander

Special Topics in Chemical Engineering: Introduction to New Product Development: Read Less [-]

CHM ENG 295Q Special Topics in Chemical Engineering: Advanced Topics in New Product Development 3 Units

Terms offered: Spring 2020, Spring 2019, Spring 2018
This course is a part of the product development initiative sponsored by the department of chemical engineering. The course builds on the coverage in 295P of real-life practices of translating scientific discovery into commercial products. We will cover a wide range of advanced product development concepts including technology road maps, decision analysis, six sigma, product portfolio optimization, and best practices for field project management.
Special Topics in Chemical Engineering: Advanced Topics in New Product Development: Read More [+]

Rules & Requirements

Prerequisites: Graduate standing or consent of instructor. 295P recommended

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Instructor: Alexander

Special Topics in Chemical Engineering: Advanced Topics in New Product Development: Read Less [-]

CHM ENG 295T Hard-Technology Innovation: Proof-of-Commercial Value Method 3 Units

Terms offered: Not yet offered
This course is part of the Product Development Program initiative sponsored by the Department of Chemical and Biomolecular Engineering. The course builds on the coverage in Chemical Engineering 295P of real-life practices of translating scientific discovery into commercial products. In this course, we will cover a new risk-reduction methodology for bringing to market complex technical inventions that initially have a high risk profile that discourages investment for commercialization. The central learning objective in this course is: How might we utilize a new approach that would enable university-affiliated hard-tech innovators to sufficiently de-risk their venture propositions so that they become “fundable” by investors?
Hard-Technology Innovation: Proof-of-Commercial Value Method: Read More [+]

Rules & Requirements

Prerequisites: Instructor approval needed

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Instructors: Alexander, Joshi, Sciamanna

Hard-Technology Innovation: Proof-of-Commercial Value Method: Read Less [-]

CHM ENG C295A The Berkeley Lectures on Energy: Energy from Biomass 3 Units

Terms offered: Fall 2015, Fall 2014, Fall 2013
After an introduction to the different aspects of our global energy consumption, the course will focus on the role of biomass. The course will illustrate how the global scale of energy guides the biomass research. Emphasis will be places on the integration of the biological aspects (crop selection, harvesting, storage, and distribution, and chemical composition of biomass) with the chemical aspects to convert biomass to energy. The course aims to engage students in state-of-art research.
The Berkeley Lectures on Energy: Energy from Biomass: Read More [+]
Rules & Requirements

Prerequisites: Biology 1A; Chemistry 1B or 4B, Mathematics 1B

Repeat rules: Course may be repeated for credit under special circumstances: Repeatable when topic changes with consent of instructor.

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Instructors: Bell, Blanch, Clark, Smit, C. Somerville

Also listed as: BIO ENG C281/CHEM C238/PLANTBI C224

The Berkeley Lectures on Energy: Energy from Biomass: Read Less [-]

CHM ENG C295L Implications and Applications of Synthetic Biology 3 Units

Terms offered: Spring 2007
Explore strategies for maximizing the economic and societal benefits of synthetic biology and minimizing the risks; create "seedlings" for future research projects in synthetic biology at UC Berkeley; increase multidisciplinary collaborations at UC Berkeley on synthetic biology; and introduce students to a wide perspective of SB projects and innovators as well as policy, legal, and ethical experts.,Terms offered: Prior to 2007
Explore strategies for maximizing the economic and societal benefits of synthetic biology and minimizing the risks; create "seedlings" for future research projects in synthetic biology at UC Berkeley; increase multidisciplinary collaborations at UC Berkeley on synthetic biology; and introduce students to a wide perspective of SB projects and innovators as well as policy, legal, and ethical experts.
Implications and Applications of Synthetic Biology: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Instructors: Arkin, Keasling

Also listed as: BIO ENG C230

Implications and Applications of Synthetic Biology: Read Less [-]

CHM ENG C295L Implications and Applications of Synthetic Biology 3 Units

Terms offered: Spring 2007
Explore strategies for maximizing the economic and societal benefits of synthetic biology and minimizing the risks; create "seedlings" for future research projects in synthetic biology at UC Berkeley; increase multidisciplinary collaborations at UC Berkeley on synthetic biology; and introduce students to a wide perspective of SB projects and innovators as well as policy, legal, and ethical experts.,Terms offered: Prior to 2007
Explore strategies for maximizing the economic and societal benefits of synthetic biology and minimizing the risks; create "seedlings" for future research projects in synthetic biology at UC Berkeley; increase multidisciplinary collaborations at UC Berkeley on synthetic biology; and introduce students to a wide perspective of SB projects and innovators as well as policy, legal, and ethical experts.
Implications and Applications of Synthetic Biology: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of lecture and 1 hour of discussion per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Instructors: Arkin, Keasling

Also listed as: BIO ENG C230

Implications and Applications of Synthetic Biology: Read Less [-]

CHM ENG C295R Applied Spectroscopy 3 Units

Terms offered: Spring 2009, Spring 2007, Spring 2002
After a brief review of quantum mechanics and semi-classical theories for the interaction of radiation with matter, this course will survey the various spectroscopies associated with the electromagnetic spectrum, from gamma rays to radio waves. Special emphasis is placed on application to research problems in applied and engineering sciences. Graduate researchers interested in systematic in situ process characterization, analysis, or discovery are best served by this course.
Applied Spectroscopy: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing in engineering, physics, chemistry, or chemical engineering; courses: quantum mechanics, linear vector space theory

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Instructor: Reimer

Also listed as: AST C295R

Applied Spectroscopy: Read Less [-]

CHM ENG C295Z Energy Solutions: Carbon Capture and Sequestration 3 Units

Terms offered: Fall 2018, Spring 2017, Spring 2015, Spring 2014, Spring 2013
After a brief overview of the chemistry of carbon dioxide in the land, ocean, and atmosphere, the course will survey the capture and sequestration of CO2 from anthropogenic sources. Emphasis will be placed on the integration of materials synthesis and unit operation design, including the chemistry and engineering aspects of sequestration. The course primarily addresses scientific and engineering challenges and aims to engage students in state-of-the-art research in global energy challenges.
Energy Solutions: Carbon Capture and Sequestration: Read More [+]
Rules & Requirements

Prerequisites: Chemistry 4B or 1B, Mathematics 1B, and Physics 7B, or equivalents

Hours & Format

Fall and/or spring: 15 weeks - 3 hours of lecture per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Instructors: Bourg, DePaolo, Long, Reimer, Smit

Also listed as: CHEM C236/EPS C295Z

Energy Solutions: Carbon Capture and Sequestration: Read Less [-]

CHM ENG 296 Special Study for Graduate Students in Chemical Engineering 1 - 6 Units

Terms offered: Spring 2016, Fall 2015, Spring 2015
Special laboratory and theoretical studies.
Special Study for Graduate Students in Chemical Engineering: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: The grading option will be decided by the instructor when the class is offered.

Special Study for Graduate Students in Chemical Engineering: Read Less [-]

CHM ENG 298 Seminar in Chemical Engineering 1 Unit

Terms offered: Spring 2016, Fall 2015, Spring 2015
Lectures, reports, and discussions on current research in chemical engineering. Sections are operated independently and directed toward different topics.
Seminar in Chemical Engineering: Read More [+]
Rules & Requirements

Prerequisites: Open to properly qualified graduate students with consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2 hours of seminar per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Seminar in Chemical Engineering: Read Less [-]

CHM ENG 298B Seminar in Bioprocess Engineering 1 Unit

Terms offered: Fall 2020
Weekly seminar with industry partners invited to give presentations on bio-based research, technologies, equipment, processes, and/or products. Provides an interactive interface for students and the bioprocess industry. Offered Fall and Spring semesters.
Seminar in Bioprocess Engineering: Read More [+]
Rules & Requirements

Prerequisites: CBE 170A and CBE 170B (can be taken concurrently)

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1.5 hours of seminar per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Seminar in Bioprocess Engineering: Read Less [-]

CHM ENG 298C Colloquium in Chemical Engineering 1 - 2 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Lectures, reports, and discussions on current research in chemical engineering.
Colloquium in Chemical Engineering: Read More [+]
Rules & Requirements

Prerequisites: Open to properly qualified graduate students with consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 2-3 hours of colloquium per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Offered for satisfactory/unsatisfactory grade only.

Colloquium in Chemical Engineering: Read Less [-]

CHM ENG 299 Research in Chemical Engineering 1 - 12 Units

Terms offered: Fall 2020, Spring 2020, Fall 2019
Research.
Research in Chemical Engineering: Read More [+]
Rules & Requirements

Prerequisites: Consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 1-12 hours of independent study per week

Summer:
6 weeks - 2.5-30 hours of independent study per week
8 weeks - 1.5-22.5 hours of independent study per week
10 weeks - 1.5-18 hours of independent study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate

Grading: Letter grade.

Research in Chemical Engineering: Read Less [-]

CHM ENG 300 Professional Preparation: Supervised Teaching of Chemical Engineering 2 Units

Terms offered: Spring 2020, Spring 2019, Spring 2016
Discussion, problem review and development, guidance of large scale laboratory experiments, course development, supervised practice teaching.
Professional Preparation: Supervised Teaching of Chemical Engineering: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing, appointment as a Graduate Student Instructor, or consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Professional course for teachers or prospective teachers

Grading: Offered for satisfactory/unsatisfactory grade only.

Professional Preparation: Supervised Teaching of Chemical Engineering: Read Less [-]

CHM ENG 375 Professional Preparation: Supervised Teaching of Chemical Engineering 2 Units

Terms offered: Fall 2020, Fall 2019, Fall 2018
Discussion, problem review and development, guidance of large scale laboratory experiments, course development, supervised practice teaching.
Professional Preparation: Supervised Teaching of Chemical Engineering: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing, appointment as a Graduate Student Instructor, or consent of instructor

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/ Professional course for teachers or prospective teachers

Grading: Offered for satisfactory/unsatisfactory grade only.

Professional Preparation: Supervised Teaching of Chemical Engineering: Read Less [-]

CHM ENG 602 Individual Studies for Graduate Students 1 - 8 Units

Terms offered: Fall 2019, Spring 2019, Fall 2018
Individual study in consultation with the major field adviser for qualified students to prepare themselves for the various examinations required of candidates for the Ph.D.
Individual Studies for Graduate Students: Read More [+]
Rules & Requirements

Prerequisites: Graduate standing in Ph.D. program

Credit Restrictions: Course does not satisfy unit or residence requirements for doctoral degree.

Repeat rules: Course may be repeated for credit without restriction.

Hours & Format

Fall and/or spring: 15 weeks - 0 hours of independent study per week

Summer:
6 weeks - 1-5 hours of independent study per week
8 weeks - 1-4 hours of independent study per week

Additional Details

Subject/Course Level: Chemical & Biomolecular Engineering/Graduate examination preparation

Grading: Offered for satisfactory/unsatisfactory grade only.

Individual Studies for Graduate Students: Read Less [-]