

CHEMICAL AND BIOMOLECULAR ENGINEERING 140: CHEMICAL PROCESS ANALYSIS (4 units)

Course Overview

Summary

This course introduces the design of chemical process and its analysis using conservation of mass and energy in both steady-state and transient systems. Design problems are drawn from standard industrial processes and chemical engineering unit operations. This class helps build skills and knowledge for the subsequent courses in the chemical engineering curriculum. It is the first course in the series.

Prerequisites

- Chemistry 4B or 1B
- Physics 7B (recommended, not required)

Topics Covered

- Conservation of mass in steady state and transient systems, hydraulic residence time
- Construct process flow diagram
- Mass conservation in complex kinetics, batch reactors, CSTR, multiple steady states
- Analysis of chemical processes with recycle and purge streams
- Process economics analysis
- Multiphase mass transfer, mass transfer rate and timescales
- Equilibrium stages, countercurrent and multistage process design and McCabe-Thiele analysis
- Dimensional analysis and Buckingham Pi Theorem
- Conservation of energy and heat transfer
- Thermochemistry, heats of reaction

Workload

Course Work

- 13 problem sets (1 PS per week except for midterm week)
- 2 Group Design Projects
- 2 Midterm Exams and 1 Final Exam

Time Commitment

- 3 hours of lecture per week
- 1 hour of discussion per week
- 3-5 hours per problem set typically

Choosing the course

When to take

This course is foundational for the Chemical Engineering curriculum only offered during the fall semester. It is important for students who are majoring in Chemical Engineering to complete this course by the end of their sophomore year, or junior year for transfer students. It must be done before other ChemE classes.

What next?

- CBE 141: Chemical Engineering Thermodynamics
- CBE 150A: Transport Processes

Additional comments/tips

This course introduces the principles of material and energy balances and real fluid properties. The concepts taught in this course are the fundamental of the future courses in the CBE curriculum such as CBE141,142,150A and 150B. It is really important for CBE students to be familiar with the materials in this course.

This class expands upon concepts encountered in CBE 40. CBE 40 is not a requirement for this course, but helps provide a somewhat easier introduction into CBE 140. Many people do well in CBE 140 without having taken CBE 40.

Last edited: Spring 2018