Catalog Description:
Application of basic engineering principles to design, operation, and analysis of industrial reactors. Analysis and interpretation of kinetic data. Applied reaction kinetics. Introduction to homogeneous/heterogeneous catalysis. Ideal reactors and non-ideal reactors. Mass transfer accompanied by chemical reaction. Chemical Engineering majors must earn B or better.

Required Textbook:

Course Objectives
• Perform mole balances in systems involving chemical reaction
• Calculate conversion in batch and flow systems
• Size single and staged continuous-stirred tank, and plug flow reactors
• Develop rate laws from mechanisms and experimental data
• Calculate pressure drops and the effect on kinetics in packed-bed PFRs
• Apply the differential and integral methods of kinetic data analysis
• Maximize product selectivity for systems involving multiple reactions
• Understand effects of non-isothermal operation and unsteady-state behavior
• Apply rate limiting step and quantify performance in catalytic systems
• Quantify mass transfer limitations on heterogeneous systems
• Understand the idea of a residence time distribution, and the effect on reactor ideality

Topic Covered:
• Basic mole balances
• Basic chemical kinetics
• Reactor choice, sequences of reactors
• Simultaneous reaction and separation
• Multiple Reactions
• Review of thermochemistry
• Equilibrium conversion
• Unsteady-state operation
• Catalyst deactivation
• Diffusion and reaction in porous catalysts
• Packed bed reactors
• Residence time distributions
• Conversion
• Stoichiometry
• Pressure drop in reactors
• Analysis of rate data
• Enzymatic reactions
• Nonisothermal reactors
• Reactor stability
• Basic catalysis
• Diffusion effects
• Effectiveness factors
• Chemical vapor deposition
• Non-ideal reactors
Grading:  
A (90-100%), B (80-89%), C (70-79%). Final grade distribution for this course will be as follows:

Attendance/Participation  5%
Homework  10%
Quizzes  15%
Midterm 1  15%
Midterm 2  15%
Project  10%
Final  30%

Class Schedule:  Tuesday and Thursday 4:00 – 5:15 p.m., Jett Hall 283

Office Hours:  Tuesday and Thursday 3:00 – 4 p.m.

Instructor:

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The NMSU Department of Chemical and Materials Engineering maintains a syllabus addendum containing course requirements common to all courses with the CHME prefix online. This document is accessible from the URL:  
http://chme.nmsu.edu/academics/syllabi/#CHME_Common_Syllabus_Addendum