



Jordan University of Science and Technology
Faculty of Engineering
Chemical Engineering Department

ChE 332: Chemical Reaction Engineering I

3 credit hour, 3 contact hour lecture, 3 credit hour Eng.

Instructor

Instructor: Dr. Luay Zeatoun

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Textbooks & References

A. Textbook

	Textbook 1
Title	Elements of Chemical Reaction Engineering
Author(s)	H. Scott Fogler
Publisher	Prentice Hall International Inc
Year	2006
Edition	4 th Edition

B. References

1. Octave Levenspiel, "Chemical Reaction Engineering", 3rd Edition, John Wiley and Sons Inc., New York, 1998.
2. J. Smith, "Chemical Engineering Kinetics", 3rd Edition, McGraw-Hill, New York, 1981.

Specific Course Information

A. Course Catalog:

3 Credit hours (3 h lectures). Kinetics of homogeneous reactions. Mole balance. Design of isothermal reactors (batch, CSTR, and plug flow). Single and multiple ideal reactors. Non-elementary homogeneous reactions. Multiple reactions. Catalysis and catalytic reactors.

B. Prerequisites or co-requisites

1. ChE 301 Numerical Methods for Chemical Engineers
2. Che 342 Chemical Engineering Thermodynamics II

C. Required/Elective or Selected Elective

Required

Objectives and Outcomes*

1. Define the rate of chemical reaction [1,2]
2. Apply the mole balance equations to a batch reactor, CSTR, PFR, and PBR [1,2]
3. Define conversion and space time [1]
4. Write a rate law and define reaction order and activation energy [1]

* Number in brackets refer to the Program outcomes

5. Set up a stoichiometric table for both batch and flow systems and express concentration as a function of conversion [1]
6. Calculate the equilibrium conversion for both gas and liquid phase reactions [1,2]
7. Size batch reactors, semibatch reactors, CSTRs, PFRs, PBRs, and membrane reactors for isothermal operation given the rate law and feed conditions [1,2]
8. Account for the effects of pressure drop on conversion in packed bed reactors [1,2]
9. Determine the reaction order and specific reaction rate from experimental data [6]
10. Choose the appropriate reactor and reaction system that would maximize the selectivity of the desired product given the rate laws for all the reactions occurring in the system [2]
11. Use different software packages to solve reaction engineering problems [7]

Contribution of Course to Meeting the Professional Component

Relationship to Student Outcomes (%)

1	2	3	4	5	6	7
50	40				5	5

Relationship to Chemical Engineering Program Objectives

PEO1	PEO2	PEO3	PEO4	PEO5	PEO6
√	√	X	X	X	X

Topics Covered

Week	Topics	Chapter in Text
1	Introduction, Mole Balances	Chapter 1
2	Conversion and Reactor Sizing	Chapter 2
3	Rate laws and stoichiometry	Chapter 3
4,5	Isothermal Reactor Design	Chapter 4
6	Collection and Analysis of Rate Data	Chapter 5
7	Multiple Reactions	Chapter 6

Evaluation

Assessment Tool	Expected Due Date	Weight
Homework & Quizzes	One week after homework problems are assigned	10%
First Exam	According to the department schedule	25 %
Second Exam	According to the department schedule	25 %
Final Exam	According to the University final examination schedule	40 %