



FIRST SEMESTER 2015-16

Course Handout (Part II)

Date: 03/08/2015

In addition to part -I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : CHE F311

Course Title : KINETICS & REACTOR DESIGN

Instructor-in-charge : DR. PRADIPTA CHATTOPADHYAY

Other Instructors (Tutorial) : MR. SUBHAJIT MAJUMDER

Scope and Objective of the Course:

This course provides an introduction to chemical reaction kinetics, design and performance of various types of reactors for chemically reacting systems which yield industrially important products. The chief emphasis in this course will be to understand the fundamentals of kinetics of reactions, design and analysis of reactors.

Text Books:

T1 H.S. Fogler “Elements of Chemical Reaction Engineering”, Pearson Education, Inc., 4th Edition, 2006.

Reference Books:

R1 O. Levenspiel, “Chemical Reaction Engineering”, John Wiley, 3rd Edition., 1999.





Course Plan:

Lect. No.	Learning Objectives	Chief topics to be covered	Ref. Chap./Sec.#(Book)
1	Overview of the course	Introduction	
2-4	To know the concept of mole balances	Rate of reaction, mole balance equation, batch reactor, CSTR, tubular reactor, packed-bed reactor	Ch. 1, T1
5-8	To understand the aspects of conversion and reactor sizing	Design equations for reactors, reactors in series, space time, space velocity	Ch. 2, T1
9-12	To understand the concepts of rate laws, stoichiometry	Rate laws, reaction order, stoichiometry, flow systems	Ch. 3, T1
13-16	To study the various concepts of isothermal reactor design	Design of CSTR, tubular reactors, plug-flow design equation	Ch. 4, T1
17-20	To study the important concepts of analysis of rate data	Batch reactor data, integral method of data analysis	Ch. 5, T1
21-23	To understand the various aspects of multiple reactions	Parallel reactions, maximizing desired product in series reactions	Ch. 6, T1 & Ch. 7, R1
24-28	To understand the important concepts of catalysis, catalytic reactors	Steps in a catalytic reaction, the rate limiting step, synthesizing rate law, mechanism, rate-limiting step	Ch. 10, T1
29-34	To understand the various aspects of bioreactors	Bioreactors, cell growth, rate laws, stoichiometry	Ch. 7, T1
35-37	To understand the important concepts of steady state	Energy balance, calculation of heat of reaction, adiabatic operation	Ch. 8, T1





	nonisothermal reactor design		
38- 40	To understand the important concepts of residence time for chemical reactors	General characteristics, measurement of RTD, characteristics of RTD	Ch. 13, T1

Evaluation Scheme:

Component	Duration	Weightage	Date & Time	Remarks
Mid-Sem Test	90 min	90 marks	9/10 2:00 - 3:30 PM	CB
Surprise Tests	15 mins for tests only	75 marks	During tutorial session	-
Class Participation	-	15 marks	-	-
Comprehensive Exam	3 hours	120 marks	11/12 FN	CB+OB

Chamber Consultation Hour: To be announced in the class.

Notice: Notice will be displayed on Chemical Engineering Notice Board as necessary.

Make up Policy: No make up will be granted for Surprise Tests.

Instructor-in-charge

CHE F311

