Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2020-2021
Course Handout Part II

17/08/2020

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 and Reactor Design**
Instructor-in-Charge : **Dr. I SREEDHAR**

Scope and Objective of the Course:
This course is an introduction to the chemical reaction kinetics, design and performance of various types of chemical reactors for chemically reacting systems which yield industrially important products. The emphasis in this course will be to understand the fundamentals of kinetics of homogeneous reactions, design and analysis of ideal reactors; and non-ideal flow.

Textbooks:
1. Octave Levenspiel, Chemical Reaction Engineering. 3rd Ed
2. Scott Fogler, H. Scott "Elements of Chemical Reaction Engineering", Pearson Edu, 4th Ed, 2006.

Reference books
1. Fromment G.F. and Bischoff K.B., Chemical Reactor Analysis and Design, John Wiley 1994.

Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
L1-L3	Introduction	Scope and objectives of the course, methodology, concept of mole balances	TB -1 /2
L4-L8	Conversion and Reactor Sizing	Different types of reactors, Reactors in Series, Space time &Space Velocity	TB -1 /2
L8-L12	Rate Laws and Stoichiometry	Basic Definitions, Stoichiometry- Batch Systems Flow Systems	TB -1/2
L13-L20	Isothermal Reactor Design	Design Structure of Isothermal Reactors Design of CSTR and PFR Pressure Drop in Reactors Membrane reactors Unsteady-State operation of Stirred reactoe	TB -1/2
L-21-L26	Collection Analysis of Data Regression	Batch reactor Data: Differential, Integral Methods, Differential Reactors, Experimental Planning	TB -1/2
L-24-L30	Multiple reactions	Reactions of various orders	TB -1 /2

		Maximizing products in Parallel reactors Algorithm for the solution of Complex reactions. Multiple reaction in CSTR, PFR. Membrane Reactors to improve selectivity	
L31-36	Non-isothermal reactor Design	Energy balance, Adiabatic operations CSTR with Heat effects- Multiple steady states. Multiple reactions. Unsteady state operations.	TB -1 /2
L37-L40	Solid catalyzed reactions	Pore diffusion factors fitting first and second order Catalyst deactivation	TB -1 /2
L36-L42	Basics of non-ideal reactor	Non ideal behavior	TB -1 /2

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Test-1	30min	15 %	September 10 – September 20 (During scheduled class hour)	OB
Test-2	30min	15 %	October 09 –October 20 (During scheduled class hour)	OB
Test 3	30min	15 %	November 10 – November 20 (During scheduled class hour)	OB
Assignments	TBA	30 %	TBA	OB
Comprehensive Exam.	2hr	25 %	TBA	OB

Closed Book Test: No reference material of any kind will be permitted inside the exam hall.

Open Book Exam: Use of any printed / written reference material (books and notebooks) will be permitted inside the exam hall. Computers/mobile of any kind will not be allowed inside the exam hall. Use of calculators will be allowed in all exams. No exchange of any material will be allowed.

No Make up for Assignment. Any assignment start and end date will be informed in the class.

Chamber Consultation Hour: To be announced in the class.

Notices: All notices concerning this course will be displayed on the Notice Board of Chemical Engineering or CMS

Make-up Policy: Make-up for the test (test-1 and test-2) may be granted only with prior permission and valid justification from the Instructor-in-charge. No makeup for the quiz/surprise tests will be granted.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.