Date: 20/08/2021

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. Iyman Abrar**

**Course Description:**
Kinetics of homogeneous, heterogeneous reactions; ideal reactors, non-ideal flow; selectivity; analysis and design of chemical reactors.

**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.

**Course learning outcomes**: By the end of this course the student will be able to,

   a)   Develop performance equations for reactors and reactor design.

   b)   Decide on reactor design for appropriate processes.

   c)   Understand how non ideal reactors (reactors in the real world) operate differently from ideal reactors.

   d)   Learn how the chemical engineering industry depends on reactors and their design.

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

**Reference Books:**
   1.   Schmidt Lanny D., "The Engineering of Chemical Reactions", Oxford University Press, 2nd Ed., 2005.

**Course Plan:**

| Lecture | 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-L7 | Kinetics of reactions | Different types of reactors, mole balances | TB -1&2 |
| L8-L12 | Batch reactors | Conversion and reactor sizing | TB -1&2 |
| L13-L18 | CSTR and PFR reactors | Equations governing conversions | TB -1&2 |
| L-19-L23 | Multiple reactor systems | Reactors in series and parallel | TB -1&2 |
| L-24-L28 | Multiple reactions | Reactions of various orders | TB -1&2 |
| L29-L35 | Solid catalyzed reactions | Pore diffusion factors fitting first and second | TB -1&2 |

| | | order catalyst deactivation | |
|---|---|---|---|
| L36-L42 | Basics of non-ideal reactor | Non ideal behavior | TB -1&2 |

Number and sequence of lecture may be changed depending on the situation/requirements.

**Evaluation Schedule:**

| Component | Duration | Weightage | Date & Time | Nature of Component |
|---|---|---|---|---|
| Mid-term test | 90 minutes | 30% | 18/10/2021 3.30 - 5.00PM | OB |
| Quizzes (min 2) | 20 minutes | 15% | TBA | OB |
| Assignments (2) | 50 minutes | 15% | TBA | OB |
| Comprehensive exam | 120 minutes | 40% | 13/12 FN | OB |

**Open Book Test:** Use of any printed/written reference material (books and notebooks) will be permitted inside the exam hall. Loose sheets of paper will not be permitted. 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.

**Chamber Consultation Hour:** To be announced in the class.

**Notices:** All notices concerning this course will be displayed on the CMS portal.

**Make-up Policy:** Make-up for the mid-term and comprehensive exams 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.

**Dr. Iyman Abrar**
**Instructor-in-charge**
**Kinetics and Reactor Design**