

UG
Course Code: CH204
Credit: 4
Version: 1
Prerequisite Course: Nil

Department: **Chemical Engineering**
Course Name: **Chemical Reaction Engineering-I**
L-T-P: **3-1-0**
Approved on:

Introduction: Definition of reaction rates, variables affecting reaction rates, classification of reactions, order, molecularity.

Kinetics of Homogenous Reactions: Concentration dependent term of a rate equation, temperature dependent term of a rate equation, searching for a mechanism, reaction mechanism for biochemical and polymerization reactions.

Interpretation of Batch Reactor Data: Constant volume batch reactor, variable volume batch reactor, temperature and reaction rate.

Introduction to Reactor Design

Ideal reactors for single reaction: Ideal batch reactor, steady state Mixed Flow Reactor, steady state PFR, Holding time and space time for flow systems.

Design for single reactions: Size comparison, multiple reactor systems, recycle reactor, auto catalytic reactions.

Design for multiple reactions: Reactions in parallel, reactions in series, series-parallel reactions.

Temperature and Pressure Effects on Reactions: Single reactions: Heat of reaction, equilibrium constants, graphical design procedure, optimum temperature progression, adiabatic operations. Multiple reactions: Product distribution and temperature.

Stability of Multiple Steady-States: Multiple steady-states of a CSTR with a first order reaction; Ignition-extinction curve.

Books

1. Levenspiel, O., "*Chemical Reaction Engineering*", 3rd ed., John Wiley & Sons, Singapore, 1999.
2. Fogler, H. S., "*Elements of Chemical Reaction Engineering*," 3rd ed., Prentice Hall of India, 2003.
3. Smith, J. M., "*Chemical Engineering Kinetics*", 3rd ed. McGraw Hill, 1981.
4. Richardson, J.F., and Peacock D.G., "*Coulson and Richardson's Chemical Engineering*," vol. 3, 3rd ed., Asian Books Pvt. Ltd., New Delhi, 1998.