

1.	Title of the course	Heterogeneous Reaction Engineering
2.	Course number	CH3202
3.	Status of the course	Core
4.	Structure of credits	2-1-3-5
5.	Offered to	UG
6.	New course/modification to	New course
7.	To be offered by	Department of Chemical Engineering
8.	To take effect from	July 2020
9.	Prerequisite	Nil
10.	Whether approved by the Department	Yes
11.	Course Objective(s): To develop a rate equation and validate the proposed mechanism for heterogeneous reactions. To identify and include appropriate transport limitations into the design and analysis of heterogeneous reactors.	
12.	Course Content: Introduction to catalysis and heterogeneous reactions; Kinetics of heterogeneous catalytic reactions, reaction mechanisms and rate laws; Transport processes in heterogeneous reactions, effectiveness factor; Packed and fluidized bed catalytic reactors; Non-catalytic fluid-fluid and fluid-solid systems; Introduction to biochemical reactions. Laboratory: Kinetics of liquid phase reaction; Residence time distribution (RTD) studies in tubular flow reactor, single tank, series of tanks, and packed bed reactor; Kinetics of heterogeneous reactions.	
13.	Textbook(s): 1. Fogler S H, <i>Elements of Chemical Reaction Engineering</i> , 4th Edition, Prentice Hall India (2015). 2. Levenspiel O, <i>Chemical Reaction Engineering</i> , 3rd Edition, Wiley India (1999).	
14.	Reference(s): 1. Carberry J J, <i>Chemical and Catalytic Reaction Engineering</i> , 1st Edition, McGraw Hill (1976). 2. Doraiswamy L K and Uner D, <i>Chemical Reaction Engineering: Beyond the Fundamentals</i> , 1st Edition, CRC Press (2013). 3. Froment G F and Bischoff K B, <i>Chemical Reactor Analysis and Design</i> , 2nd Edition, John Wiley & Sons (1990). 4. Schmidt L D, <i>The Engineering of Chemical Reactions</i> , 2nd Edition, Oxford University Press (2005).	