UCH601 CHEMICAL REACTION ENGINEERING II

	L	T	P	Cr
	3	1	0	3.5

Course Objectives:

To understand the effect of non-ideal flow on reactor performance and to design reactors for heterogeneous reaction systems.

Non-ideal Flow: Residence time distribution (RTD) of fluids in vessels, RTD models - dispersion, tanks-in-series and multi-parameter models, Conversion calculations using RTD data for first order reactions.

Non-catalytic Heterogeneous Reactions: Fluid-solid reaction models, Fluid-Solid reaction kinetics, Determination of rate controlling step, Prediction of mean conversion in flow reactors, Fluid-solid contacting schemes, Reactor design.

Solid-catalyzed Reactions: Interaction of physical and chemical rate processes, Kinetics of catalytic reactions and application to reactor design for isothermal and adiabatic operations, Design of packed bed and fluidized bed reactors, Introduction to slurry and trickle-bed reactors.

Fluid-fluid Reactions: Introduction to fluid-fluid reaction systems, Rate equations, Reactor design with and without mass transfer considerations.

Laboratory work: Experiments on Batch reactor, Semi-batch reactor, Continuous stirred tank reactor, Tubular reactor, RTD studies, Fluid-solid reaction.

Course Learning Outcomes (CLO):

Upon completion of this course, the students will be able to:

1. predict the conversion in a non-ideal reactor using tracer information.
2. design reactors for fluid-solid reactions.
3. design reactors for catalytic reactions.
4. design towers for gas–liquid reactions with and without mass transfer considerations.

Text Books:

1. *Levenspiel, O., Chemical Reaction Engineering, John Wiley & Sons (2010).*
2. *Smith, J.M., Chemical Engineering Kinetics, McGraw Hill (1990).*

Reference Books:

1. *Fogler, H.S., Elements of Chemical Reaction Engineering, Prentice Hall of India (2009).*
2. *Denbigh, K.G., and Turner,J.C.R., Chemical Reactor Theory - An Introduction, Cambridge University Press (1984).*
3. *Nauman, E.B., Chemical Reactor Design, John Wiley & Sons (1987).*

Evaluation Scheme:

S. No.	Evaluation Elements	Weightage (%)
1	MST	25
2	EST	35
3	Sessional (May includes lab/ tutorials/ assignments/ quiz's etc)	40