

PCH234 POLYMER REACTION ENGINEERING

L	T	P	Cr
3	1	0	3.5

Course Objective:

To understand mathematical modeling of polymerizations, and design batch and continuous reactors.

Introduction: Review of types and methods of polymerization, MW and MWD in polymers, Important aspects of polymer science.

Polymerization Kinetics: Step growth and chain growth (free radical, anionic and cationic polymerization) kinetics, Modeling and Simulation, Diffusion controlled polymerization, Copolymerization.

Reactors: RTD, Macro and micro mixing in reaction vessels, Comparison of performances of batch reactors for ionic, free radical, and step growth polymerizations, their degree of polymerization and MWD.

Heterogeneous Polymerizations: Bulk, solution, suspension, and emulsion polymerization, Application of continuous emulsion polymerization, Co-ordination polymerization in fluidized bed reactor.

Reactor Design: Fundamentals of batch and continuous polymerizations reactors for tailor-making of polymers, Qualitative account of control engineering considerations.

Course learning outcomes (CLOs):

The students will be able to

1. perform mathematical modeling of different types of polymerizations
2. determine degree of polymerization and molecular weight distribution quantitatively
3. design batch and continuous reactors for the polymerization

Recommended Books:

1. Neil A.D., Rafael G., Laurence, R.L., and Tirrel, M., *Polymerization Process Modeling*, VCH (1996).
2. Kumar, A., and Gupta, S.K., *Fundamentals of Polymers*, McGraw Hill (1998).
3. Schork, F.J., Deshpande, P.B., and Kenneth W.L., *Control of Polymerization Reactors*, Marcel Dekker (1993).

Evaluation Scheme:

S.No.	Evaluation Elements	Weightage (%)
1.	MST	30
2.	EST	45
3.	Sessionals (may include Assignments/Projects/Tutorials/Quizes/Lab Evaluations)	25