

PCH114 BIOPROCESS ENGINEERING

L	T	P	Cr
3	1	0	3.5

Course Objective:

To introduce the engineering principles of bioprocesses including characteristics of different microbial cells, enzymes, microbial kinetics, and design considerations.

Biological Basics: Cell Structure and function, Chemicals, Cell metabolism.

Enzymes: Kinetics of enzymatic reactions and design of reactors, Immobilized enzymes and kinetics.

Microbial Growth: Kinetics of cell growth and metabolite production, Pure and mixed culture.

Mass Transfer: Transport phenomena in bioreactors, Mass transfer considerations in design and analysis of various types of bioreactors in batch, semi batch and continuous modes of operation.

Scale Up: Principles, instrumentation and control of bioprocesses.

Down-stream Processing: Separation and disintegration of cells, Extraction and concentration of metabolites.

Recombinant DNA: Recent advances in rDNA.

Course learning outcomes (CLOs):

The students will be able to

1. calculate the kinetic parameters of enzymatic reactions
2. calculate and analyze the kinetic parameters for the microbial growth
3. apply mass transfer principles in design and analysis of various types of bioreactors
4. solve problems related to extraction and concentration of metabolites

Recommended Books:

1. *Shuler, M. L., and Kargi, F., Bioprocess Engineering, Pearson Prentice Hall (2007).*
2. *Doran, P., Bioprocess Engineering Principles, Elsevier Inc. (1995).*
3. *Bailey, J. E., and Ollis, D. F., Biochemical Engineering Fundamentals McGraw Hill (1986).*
4. *Weith, W. F., Biochemical Engineering – Kinetics, Mass Transport, Reactors and Gene Expression, Wiley (1994).*

Evaluation Scheme:

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