

LESSON PLAN

Discipline: B.Tech in Biotechnology

Semester: 5th

Subject: BTPC3001 – Bioprocess Engineering - I (Upstream Processing)

No. of Days/Week: 3

Semester Duration: July – December

No. of Weeks: 15

Name of the Teaching Faculty: Dr. Smarita Lenka

Week	Class Day	Theory Topics
1st	1st	Introduction to Bioprocess Engineering
	2nd	Recap of Kinetics of Chemical & Biochemical Reactions
	3rd	Homogeneous Reactions in Batch & Semi-Batch Reactors
2nd	1st	Homogeneous Reactions in Batch & Semi-Batch Reactors
	2nd	Plug Flow Reactors (PFR)
	3rd	Continuous Stirred Tank Reactor (CSTR)
3rd	1st	Continuous Stirred Tank Reactor (CSTR)
	2nd	Fluidized Bed Reactor
	3rd	Bubble Column
4th	1st	Air-Lift Fermenters
	2nd	Unconventional Bioreactors
	3rd	Unconventional Bioreactors
5th	1st	Perfusion Reactor for Animal and Plant Cell Culture
	2nd	Perfusion Reactor for Animal and Plant Cell Culture
	3rd	Fed-Batch Reactors
6th	1st	Enzyme Catalyzed Reactions in CSTR
	2nd	CSTR with Recycle and Wall Growth
	3rd	Ideal Plug-Flow Tubular Reactors
7th	1st	Applications of Enzymes in Industry
	2nd	Enzymes in Detergent, Leather & Wool Industry
	3rd	Enzymes in Food Processing
8th	1st	Glucose Syrup from Starch via Enzymes
	2nd	Maltose Syrup & Sucrose Enzyme Applications
	3rd	Glucose from Cellulose, Lactase in Dairy
9th	1st	Methods of Enzyme Immobilization: Adsorption, Entrapment
	2nd	Methods of Enzyme Immobilization: Adsorption, Entrapment
	3rd	Covalent Linking and Cross-Linking
10th	1st	Kinetics of Immobilized Enzymes
	2nd	Biosensors
	3rd	Enzyme Electrocatalysis
11th	1st	Enzyme Immobilization in Electrodes
	2nd	Measurement of Enzyme Activity
	3rd	Cofactor Regeneration
12th	1st	Abzymes and Their Applications

	2nd	Elementary Concepts in Canning & Packaging
	3rd	Sterilization of Food Products
13th	1st	Pasteurization of Food Products
	2nd	Food Preservation Techniques
	3rd	Single Cell Protein: Spirulina and Yeast
14th	1st	Micro-algal Biotechnology: Dunaliella
	2nd	Micro-algal Biotechnology: Haematococcus
	3rd	Process Integration: From Fermenter to Product
15th	1st	Optimization of Parameters: pH, Temp, Aeration
	2nd	Monitoring Systems: Sensors and Controls
	3rd	Automation and Control in Bioprocessing
	4th	Recap of All Bioreactor Types