

Downstream Processing - Video course

COURSE OUTLINE

The course covers the fundamentals, and design concepts of various downstream purification steps (unit operations) involved in a biochemical process. Down stream process is required to take a crude product from a fermentor or a bioreactor and purify it to the desired level. Hence it may involve solids, liquid and gas processing.

The course covers cell breakage and recovery of intracellular material, Isolation of solids, Product recovery, Product enrichment/purification, Product polishing and finishing. This course is suitable for students pursuing their biotechnology, bioprocess engineering or other allied fields.

This course is also suitable for chemical engineers who would like to learn about separation techniques in biotechnology industries. The course will consist of lectures and solving problems. Problems will relate to design, estimating operating conditions and optimization of the process.

COURSE DETAIL

Module No.	Topic/s	Lectures
1	Introduction and course contents	1
2	Bioprocess case studies/flow sheet	2
3	Characteristics of biomolecules and their differences	1
4	Various down stream process steps	1
5	Fundamental principles of obtaining the product from cell cultures – intracellular vs. extracellular product	1
6	Cell disruption – mechanical, enzymatic, and chemical methods	2
7	Pre-treatment strategies	1
8	Solid-liquid separation – filtration and centrifugation	4
9	Adsorption	2
10	Liquid-liquid extraction	5



NP-TEL

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Biotechnology

Pre-requisites:

Basics of biochemical engineering and thermodynamics

Additional Reading:

Topics in Bioprocess technology/engineering, protein purification, and separation processes. Chemical engineering unit operations

1. Bioseparations - principles and techniques, B Sivasankar, Prentice Hall of India, N Delhi, 2005, pp 280
2. Bioseparation & bioprocessing (2nd Ed.) 2-Volume set, Ed SUBRAMANIAN Ganapathy, Wiley-VCH, (09-2007)
3. Mukesh D, Gaikar V and Anil Kumar Biotransformations & Bioprocesses, Marcell Dekker, New york,(Feb 2004).

Hyperlinks:

Related to Bioprocess technology/engineering, protein purification, and separation processes

Coordinators:

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11	Membrane separation – ultrafiltration and reverse osmosis, dialysis etc	3
12	Precipitation of proteins by different methods	1
13	Chromatograph – principles, instruments and practice	10
14	Crystallization	1
15	Distillation	1
16	Drying	1
17	lyophilization	1
18	Stabilization of bioproducts	1
19	Utilities (Air, water, steam etc)	1
Total		40

References:

1. Belter, P.A. and Cussler, E.L. Hu, W.S (1988), Bioseparation: Downstream processing for Biotechnology, Wiley, New York.
2. Ladisch, M.R., (2001), Bioseparation Engineering: Principles, Practice and Economics, Wiley, Interscience.