

Course contents for Advanced Bioseparation Techniques

1. **Faculty:** FLSB
2. **Course code:**
3. **Course title:** Advanced Bioseparation Techniques
4. **Number of credits:** Two
5. **Course Objectives:**

In this course, research scholars would learn about principles and strategies behind various separation techniques in biotechnology. Additionally, latest development in the field of purification of commercially important bioproducts including biomass, protein, and metabolites produced from fermentation and process industries.

6. Minimum prerequisites for taking this course, if any:

Basics of applied microbiology, fermentation technology and/or industrial biotechnology

7. Course structure with units, if applicable:

Introduction to bioseparations and purification: Products from industrial fermentation, biomass, protein, and valuable metabolites; various downstream process steps; bioproduct from cell culture-intracellular and extracellular.

Cell disruption: mechanical, enzymatic, and chemical methods.

Solid-liquid separation: filtration and centrifugation

Membrane separation: ultrafiltration, dialysis and reverse osmosis.

Precipitation of proteins: salting out, and solvent induced precipitation.

Chromatography: principles, techniques and methods of affinity chromatography, ion-exchange chromatography, hydrophobic interaction chromatography, and size exclusion chromatography.

Polishing and improving stability of bioproducts: Crystallization, Drying and lyophilization.

8. Suggested Readings:

1. Handbook of Bioseparations (Separation Science and Technology) Volume I-II, by Satinder Ahuja, Academic Press, USA.
2. Bioseparations-principles and techniques, B Sivasankar, Prentice Hall of India, N Delhi, 2005.
3. Bioseparation & bioprocessing, Subramanian Ganapathy, Wiley-VCH, 2007.
4. Bioprocess Engineering Basic Concepts, by M Shuler and F. Kargi, Prentice Hall (2002)
5. Research articles in Journals: Separation and Purification Technology (Elsevier publisher); Bioseparations in Journal of Chemical Technology and Biotechnology (SCI publisher)

9. Evaluation:

Theory:

Mid-semester Written Examination	: 40% Marks
End-semester Written Examination	: 40% Marks
Quiz / Assignment/Presentation (oral / poster)/other	: 20% Marks