

**Category-IV**

**Pool of Generic Electives (GE) Courses**

**Offered by Department of Biochemistry**

GENERIC ELECTIVES (GE-2)

**Credit distribution, Eligibility and Pre-requisites of the Course**

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical/ Practice		
Techniques in Biochemistry	04	02	0	02	Class XII passed with Biology	NIL

**Learning Objectives**

The objective of the course is to introduce different biophysical techniques to students that are used in biological research for separation, purification and identification from mixture of biomolecules. The emphasis is also on experimental skills in the form of practical exercises so that students can apply this knowledge to improve their understanding of the subject for better utilization of these techniques in research and will also help in their placement.

**Learning outcomes**

- Students will acquire knowledge about the principles and applications of separation and purification techniques like centrifugation and chromatography used in a biochemistry laboratory.
- Students will learn about the principles and applications of electrophoresis and spectroscopic techniques involved in estimation and identification of biomolecules.
- It will also give them an opportunity to get hands-on experience to develop their experimental skills which are required for biological research lab.

## **SYLLABUS OF GE-2**

### **B.Sc. (HONOURS) BIOCHEMISTRY (NEP STRUCTURE) BCH-GE-2: TECHNIQUES IN BIOCHEMISTRY**

#### **2.2 Course Contents**

##### **THEORY**

##### **Unit I: Separation techniques (08 Hours)**

Preparation of sample, different methods of cell lysis, salting out, dialysis. Principle and the factors affecting centrifugation Svedberg coefficient, types of rotors, principle and applications of differential and density gradient centrifugation.

##### **Unit II: Purification techniques (08 Hours)**

Classification of chromatographic techniques, principle and applications: Paper, thin layer, molecular sieve, ion exchange, and affinity chromatography.

##### **Unit III: Electrophoretic techniques (07 Hours)**

Principle of electrophoresis, various types of electrophoresis: Polyacrylamide gel (native), SDS PAGE and agarose gel, staining procedures for protein and nucleic acids.

##### **Unit IV: Spectroscopic techniques (07 Hours)**

Introduction to electromagnetic spectrum, Principle and working of UV-visible absorption spectrophotometer, single & double beam spectrophotometer, Beer's & Lambert's law, application of UV-visible spectrophotometer in biology.

#### **2.3 PRACTICALS – 60 Hours**

1. Preparation of cell free extract from *E.coli* culture.
2. Separation and identification of amino acid acids by thin layer chromatography.
3. Separation of molecules by gel filtration chromatography.
4. Determination of absorption maxima ( $\lambda_{\text{max}}$ ).
5. Calculate molar extinction coefficient of the given sample.
6. Demonstration of PAGE and Agarose gel electrophoresis.

#### **2.4 Essential Readings**

- Wilson, K. & Walker J. (2010). Principles and Techniques of Biochemistry and Molecular Biology, (7<sup>th</sup> ed.), Cambridge University Press; ISBN 978-0-521-51635-8.
- Boyer, R. F. (2012). Biochemistry Laboratory: Modern Theory and Techniques, (6<sup>th</sup> ed.), Boston, Mass: Prentice Hall; ISBN-13: 978-0136043027.

- Plummer, D. T. (1998). An Introduction to Practical Biochemistry (3<sup>rd</sup> ed.), Tata McGraw Hill Education Pvt. Ltd. (New Delhi); ISBN: 13: 978-0-07-099487-4 / ISBN:10: 0-07-099487-0.

#### **Suggested Readings**

- Cooper, T.G. (2011). The Tools of Biochemistry (2<sup>nd</sup> ed.), Wiley-Interscience Publication (New Delhi); ISBN: 13:9788126530168.
- Freifelder, D. (1982). Physical Biochemistry: Applications to Biochemistry and Molecular Biology, (2<sup>nd</sup> ed.), W.H. Freeman and Company (New York); ISBN:0-7167-1315-2 / ISBN:0-7167-1444-2.

#### **3. Keywords**

Centrifugation, Chromatography, Electrophoresis, Spectrophotometry, Proteins and Nucleic acids.

**Note: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.**