

Programme	BS Biochemistry	Course Code	BC. 403	Credit Hours	1 +2
Course Title	Biochemical Techniques				
Course Introduction					
<p>This course provides an in-depth exploration of various biochemical techniques, designed for undergraduate students majoring in Biochemistry and Biotechnology. The curriculum focuses on the principles and mechanisms of different equipment and the analysis of biochemical and biological samples. Students will gain hands-on experience with a variety of techniques, understand experimental design, and learn how to interpret results. The course will cover a range of methods including centrifugation, chromatography, electrophoresis, and spectroscopy.</p>					
Learning Outcomes					
<p>On the completion of the course, the students will:</p> <ul style="list-style-type: none"> • Describe the principles and techniques of common analytical instruments. • Apply analytical methods to identify and quantify chemical / biochemical substances. • Interpret data obtained from analytical techniques to solve chemical problems 					
Course Content					
<p>Theory Unit-</p> <ul style="list-style-type: none"> • Introduction to Biochemical Techniques, Overview, Importance and Applications • Principles of Centrifugation, Centrifugation Methods, Ultracentrifugation Application • Ultrafiltration and Dialysis, Principles of Ultrafiltration, Dialysis Methods • Lyophilization, Principles and Applications, Techniques • Chromatography Basics: Principles of Chromatography, Paper and Thin Layer Chromatography • Column Chromatography: Ion Exchange Chromatography, Gel Filtration Chromatography • Gas Chromatography (GC): Principles and Applications, GC Techniques • Advanced Chromatography: GC-MS/LC-MS, Techniques and Applications • Hydrophobic Interaction Chromatography: Principles and Methods, Applications • Affinity Chromatography: Principles and Methods, Applications • Electrophoresis Basics, Principles of Electrophoresis, Techniques • Capillary Electrophoresis: Principles and Methods, Applications • Spectroscopy Introduction: Principles of Spectroscopy Techniques, Infrared Spectroscopy--- Principles and Methods, FTIR Application • Visible and UV Spectroscopy: Principles and Methods, Applications • X-Ray diffraction, NMR • Experimental Design and Data Analysis: Basics of Experimental Design, Data Interpretation <p>Practical Unit-</p> <ul style="list-style-type: none"> • Lab safety instruction and familiarization with Hazardous symbols • Standard solution preparation techniques and calibration of solution • Standard use of centrifuges and dialysis method for purification of proteins • Demonstration of lyophilization • Thin layer chromatography • Column chromatography for protein purification • HPLC • Agarose gel electrophoresis • Polyacrylamide Gel Electrophoresis • Use of spectrophotometer for quantification • Analysis of Spectrophotometer analysis using standard curve 					

Textbooks and Reading Material

Textbooks.

- Jain, A., Jain, R., & Jain, S. (2020). *Basic techniques in biochemistry, microbiology and molecular biology* (pp. 9-10). New York, NY, USA:: Springer.
- Wang, Y., Li, P., & Baruscotti, M. (2022). Dissecting Traditional Medicine via Chemical and Biochemical Techniques: Advanced Analytics and Novel Paradigms. *Frontiers in Pharmacology*, 13, 839004.
- Wilson, K., Hofmann, A., Walker, J. M., & Clokie, S. (Eds.). (2018). *Wilson and Walker's principles and techniques of biochemistry and molecular biology*. Cambridge university press.

Teaching Learning Strategies

- Class lecture
- Class Discussions
- Class Tutorials

Assignments: Types and Number with Calendar

- 1st Quiz in 4th Week of 5 marks
- 2nd Quiz in 10th Week of 5 marks
- 3rd Quiz in 14th Week of 5 marks
- 1st Assignment in 8th Week of 10 marks

Assessment

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.