



# AMITY UNIVERSITY

— UTTAR PRADESH —

## FORMAT FOR COURSE CURRICULUM

**Course Title: Bioanalytical Techniques**

L	T	P/S	SW/FW	TOTAL CREDIT UNITS
3	-	-	-	03

**Course Code: BIOT 301**

**Credit Units: 03**

**Course Objectives:** A comprehensive knowledge of the instruments, techniques and aptitude to solve biochemical and biological problems are required. Keeping this objective in mind, this course has been designed to provide knowledge on principles and applications of various basic bioanalytical techniques with specific focus on the physical principles and practical aspects. This will enable the students to understand all subjects of Biotechnology as these tools and techniques will be used therein. This is a basic foundation course for the undergraduate students of Biotechnology.

**Pre-requisites:** General

**Student Learning Outcomes:**

At the end of the course, the students will be able to

- Append sufficient knowledge and understanding of the common laboratory techniques, preparation of solutions and starting materials for any experiment.
- Justify and decide an useful technique to solve a particular problem,
- Interpret the results/data obtained from selected experiments,
- Understand the physical, chemical and instrumental fundamentals underlying these experiments.

**Course Contents/Syllabus- Theory:**

	Weightage (%)

<b>Module I</b>	<b>20</b>
<p><b>Solutions and Buffers</b></p> <p>Preparation of solutions, Expression of concentrations of solution; pH, acid-base neutralization curves, Preparation of buffer, buffer action and various types of buffer solutions: Henderson-Hasselbach equation, Determination of pH; Basic concept of indicators, principle of pH meter- hydrogen electrode and glass electrode.</p>	
<b>Module II</b>	<b>20</b>
<p><b>Centrifugation</b></p> <p>Principle of centrifugation; different types of centrifuges and rotors, preparative and ultra centrifugation; Types of centrifugal separations: Principles and applications of Differential and Density gradient centrifugation methods in Biology.</p>	
<b>Module III</b>	<b>20</b>
<p><b>Microscopy</b></p> <p>Optical microscopy: Principles, Instrumentation and applications of Bright field, Phase contrast and fluorescence microscopy.</p> <p>Electron microscopy: Principles, Instrumentation and applications of Transmission and scanning electron microscopy, Atomic force microscopy.</p>	
<b>Module IV</b>	<b>20</b>
<p><b>Radioisotope techniques</b></p> <p>Study of radioisotopes in biological samples; Quantification of radioisotopes by proportional and GM counter, scintillation counters; Principles and application of autoradiography and Radioimmunoassay</p>	
<b>Module V</b>	<b>20</b>
<p><b>Spectroscopy</b></p> <p>Spectroscopy: Properties of electromagnetic radiation, interaction with matter; atomic absorption and emission spectroscopy; UV-Vis spectroscopy (principles, instrument, qualitative and quantitative applications) atomic absorption spectroscopy and spectrofluorimetry (principles, instrument and application); Infrared spectroscopy (principles, instrument and application).</p>	

**Pedagogy for Course Delivery:**

Lectures: 36

Tutorial: 4

Presentation/ Seminar: 4

Class Test: 2

Total: 45

**Lab/ Practical details, if applicable: NA**

**Theory Assessment (L&T):**

<b>Components (Drop down)</b>	<b>Class Test</b>	<b>Home Assignment</b>	<b>Presentation/ Seminar</b>	<b>Attendance</b>	<b>End Term Examination</b>
<b>Weightage (%)</b>	15	5	5	5	70

**Text & References:**

- Principles and Techniques of Biochemistry and molecular Biology, Edited by Keith Wilson & John Walker, Cambridge Publication, 6<sup>th</sup> Edition
- Biophysical Chemistry; applications to Biochemistry and Molecular Biology, By David Freifelder, 1982
- Introduction to protein structure, Carl Branden and Tooze, 2<sup>nd</sup> Edition, Garland Science Publishing, 1998
- Spectrophotometric identification of organic compounds, Robert M. Silverstein and Francis X. Webster, John Wiley and sons, Canada Ltd 1997
- Principles and Practice of Bioanalysis by Richard F. Venn
- Principles of Fermentation Technology, 2<sup>nd</sup> ed., Oxford/ N.Y.: Pergamon, 1995