

**Course Code: ZOO 433**

**Course Title: Biological Techniques**

**Number of Credits: 2**

**Effective from AY: 2020 -21**

<b>Prerequisite for the Course:</b>	Elementary knowledge of Physics, Chemistry besides Lifescience.	
<b>Objectives:</b>	<ol style="list-style-type: none"><li>1. To provide knowledge on physical and chemical principles involved in the laboratory instruments used for preparative and analytical biological methods.</li><li>2. To provide general overview of different biochemical experimental approaches to understand the structure and functions of cell and its components.</li></ol>	
<b>Content</b>	<p><b>Module 1</b></p> <p>Spectrophotometry techniques: Laws of radiant energy absorption, Radiant energy resources, Wavelength selectors, Sample containers, Detection devices, amplification and readout, Qualitative and quantitative applications.</p> <p>Molecular biology techniques: PCR and RT-PCR, working principles, data analysis, applications.</p> <p>Microscopic techniques: Visualization of cells and subcellular components by light microscopy, resolving powers of different microscopes, microscopy of living cells, scanning and transmission microscopes, Freeze-etch and Freeze-fracture methods for EM, image processing methods in microscopy.</p> <p>Radiolabeling techniques: Detection and measurement of different types of radioisotopes normally used in biology, incorporation of radioisotopes in biological tissues and cells, molecular imaging of radioactive material, safety guidelines.</p> <p><b>Module 2</b></p> <p>Chromatography techniques: Principle of chromatographic separations, Types of chromatographic techniques, Planar, Column, Thin layer, Displacement, Ion-exchange, Size exclusion, Gas and Liquid Chromatography (their working and application).</p> <p>Electrophoresis techniques: Concepts of Electrophoresis and Electro-osmosis; Slab Gel and Vertical gel assemblies, Agarose gel electrophoresis, PAGE, SDS-PAGE, Isoelectric focusing, 2D Gel electrophoresis, Recovery of materials from Electrophoretic gels.</p> <p>Centrifugation techniques: Types by rotor designs, Types by intended use, Centrifugal techniques (Differential, Density gradient, Rate Zonal, Isopycnic centrifugation).</p>	<p>03Hrs</p> <p>03 Hrs</p> <p>03 Hrs</p> <p>03 Hrs</p> <p>05 Hrs</p> <p>04Hrs</p> <p>03Hrs</p>
<b>Pedagogy:</b>	Lectures/ tutorials/Group discussions/PBL/self-study	
<b>Learning Outcome:</b>	<ol style="list-style-type: none"><li>1. Understanding the basic knowledge of some advance techniques and their uses and its potential application in animal biology.</li></ol>	
<b>References /Reading</b>	<ol style="list-style-type: none"><li>1. Cooper TG (1977), The Tools of Biochemistry, John Wiley publication, India.</li></ol>	

	<ol style="list-style-type: none"> <li>2. Dryer R and G. Lata G (1989), Experimental Biochemistry, Oxford University Press, Oxford.</li> <li>3. Ewing GW(2006), Instrumental Methods for Chemical Analysis, McGraw Hill Book Co., London Freifelder D (1982), Physical Biochemistry, W. H. Freeman &amp; Co., New York.</li> <li>4. Holme D and Peck H (1998), Analytical Biochemistry, Longman Scientific &amp; Technical Publication, England.</li> </ol>
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