

Programme	Biotechnology	Course Code	BT. 102	Credit Hours	3
Course Title	Biochemistry-I				
Course Introduction					
This course aims to provide students with fundamental knowledge of the molecules of life, as well as their structure and function in the context of a living cell. It will acquaint the student with the key concepts of intermediary metabolism of carbohydrates and lipids.					
Learning Outcomes					
By the end of this course, students will be able to:					
<ul style="list-style-type: none"><li>○ Explain the structure and function of carbohydrates and lipids.</li><li>○ Describe the fundamental biochemical pathways and their regulation.</li><li>○ Evaluate the role of vitamins and hormones in metabolic processes.</li></ul>					
Course Content					
Theory Unit					
<ul style="list-style-type: none"><li>• Introduction to biochemistry, History</li><li>• Biomolecules, Basic structure and functions of proteins</li><li>• Carbohydrates: Background, Classification, Monosaccharides, Monosaccharide derivatives, Oligosaccharides</li><li>• Polysaccharides (storage, structure), Structure and function of bacterial cell-walls</li><li>• Structure and Functions of Lipids, Classification of Lipids</li><li>• Membranes, Micelles, bilayers and liposomes</li><li>• Carbohydrate Metabolism: Glycolysis and its regulation,</li><li>• Citric acid cycle (Krebs' cycle) and its regulation,</li><li>• Pentose phosphate pathway and its regulation, Gluconeogenesis and its regulation</li><li>• Electron transport chain, Oxidative phosphorylation</li><li>• Glycogen metabolism and its regulation</li><li>• Lipid metabolism: Introduction to lipid digestion, absorption and transport,</li><li>• Lipolysis, Beta oxidation of fatty acids, its Regulation and Defects, Alpha oxidation of lipids, Omega oxidation</li><li>• Ketogenesis and Ketolysis</li><li>• Role of vitamins in metabolic pathways</li><li>• Hormones and Metabolism</li></ul>					
Practical Unit					
<ul style="list-style-type: none"><li>• Qualitative tests for carbohydrates and proteins</li><li>• Estimation of glucose (reducing sugars)</li><li>• Estimation of sucrose by spectrophotometer</li><li>• Iodine test for polysaccharides</li><li>• Formation of sugar derivatives</li><li>• Fermentation of sugars by Baker’s yeast</li><li>• To estimate the specific gravity of sugars</li><li>• Isolation of amylose and amylopectin from starch</li><li>• Chromatographic separation of proteins/amino acids</li><li>• Qualitative tests for lipids</li></ul>					

<ul style="list-style-type: none"> <li>• Extraction of lipids from different sources</li> <li>• Estimation of Lipids by TLC</li> <li>• Estimation of acid value of fats</li> <li>• Estimation of iodine value of fats</li> <li>• Estimation of saponification value of fats</li> <li>• Estimation of vitamins from different samples</li> </ul>			
<b>Textbooks and Reading Material</b>			
<ol style="list-style-type: none"> <li>1. Geoffrey Zubay et al., Principles of Biochemistry. 4th edition. William C Brown Publishers.</li> <li>2. David L. Nelson et al., Lehninger Principles of Biochemistry. 6th Edition; WH Freeman, New York. (available at <a href="http://www.ncbi.nlm.nih.gov">www.ncbi.nlm.nih.gov</a>)</li> <li>3. Stryer et al., 2006. Biochemistry. 6 th Edition; WH Freeman, New York. (available at <a href="http://www.ncbi.nlm.nih.gov">www.ncbi.nlm.nih.gov</a>)</li> <li>4. Voet D and Voet TG, 2008. Biochemistry. 4 th Edition; John Wiley and Sons, New York.</li> <li>5. Christopher Mathews et al., Biochemistry (4th Ed.). Pearson publishers, 2013.</li> <li>6. Emine E Abali et al., Lippincott Illustrated Reviews: Biochemistry. Wolters Kluwer Health publishers, 2021.</li> <li>7. Schantz JT, 2007. A Manual for Biochemistry Protocols. World Scientific Publishing. (available online)</li> <li>8. Arti Nigam. Lab Manual in Biochemistry, Immunology and Biotechnology, Tata McGraw-Hill Education publishers</li> <li>9. David T. Plummer, 2001. Introduction to Practical Biochemistry, Tata McGraw-Hill Education publishing company.</li> </ol>			
<b>Teaching Learning Strategies</b>			
<ul style="list-style-type: none"> <li>• Class Lecture</li> <li>• Class Discussions</li> <li>• Class Tutorials</li> <li>• Lab Demonstration</li> </ul>			
<b>Assignments: Types and Number with Calendar</b>			
<ul style="list-style-type: none"> <li>• 1<sup>st</sup> Quiz in 4<sup>th</sup> Week of 5 marks</li> <li>• 2<sup>nd</sup> Quiz in 10<sup>th</sup> Week of 5 marks</li> <li>• 3<sup>rd</sup> Quiz in 14<sup>th</sup> Week of 5 marks</li> <li>• 1<sup>st</sup> Assignment in 8<sup>th</sup> Week of 10 marks</li> </ul>			
<b>Assessment</b>			
Sr. No.	Elements	Weightage	Details
	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.

	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.
	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.