



University of Kerala

Discipline	BOTANY				
Course Code	UK2DSCBOT105				
Course Title	BIOMOLECULES				
Type of Course	DSC				
Semester	II				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	04	03 Hours	-	02 Hours	05 Hours
Pre-requisites	No Pre-requisites				
Course Summary	Biomolecules are components that interact in complex ways to form the basis of life. The molecular components include water, carbohydrates, lipids, amino acids, proteins, and nucleic acids. Studying the types, structure, and significance of these molecules will make you understand the role of biomolecules in metabolism and how the molecules are involved in the biochemical activities of living things.				

Detailed Syllabus:

Module	Unit	Content	Hrs
I	Introduction to Biomolecules		06
	1	Water- properties-weak interactions in aqueous systems-hydrogen bonding-Van der Waals forces-hydrophobic interactions	
	2	Ionization of water-pH-weak acids and weak bases-Henderson-Hasselbalch equation	
	3	Buffers in the biological system- phosphate buffer-bicarbonate/carbonic acid system	
II	Carbohydrates		07
	4	Monosaccharides- Glucose-Fructose-aldoses- ketoses-isomerism-cyclic structures-pyranoses-furanoses	
	5	Disaccharides-- glycosidic bonds-sucrose- lactose-reducing and non-reducing sugars-Oligosaccharides	
	6	Polysaccharides- Homo and Hetero polysaccharides-Structural polysaccharides - cellulose, peptidoglycans; storage polysaccharides -Inulin and starch; biological importance of carbohydrates	
III	Proteins		08
	7	General structure-zwitter ion-isomerism	
	8	Classifications of aminoacids, D-aminoacids- biologically active aminoacids	
	9	Peptides-peptide bond-oligopeptide-polypeptide.	

	10	Proteins- structure-primary-secondary-super secondary-motifs and domains (brief account)-tertiary-quaternary-structure-functions of proteins.	
IV	Lipids and Nucleic acids		09
	11	Classification of lipids-Fatty acids- saturated/unsaturated-mono/poly-triacyl glycerols	
	12	Membrane phospholipids- glycerophospholipids- sphingolipids-lipid bilayer- Steroids-cholesterol	
	13	Nucleic acids- nucleoside-nucleotide, Polynucleotides-phosphodiester bond, DNA - types (B-DNA, A&Z DNA (brief account); RNA- mRNA, rRNA, t-RNA, minor RNAs (brief account), significance of nucleic acids.	
V	Secondary Metabolites		15
	14	Introduction, Classification, Major secondary metabolites in plants.	
	15	Phenolics, lignins, flavonoids, tannins, terpenes, saponins, carotenoids and alkaloids	
	16	Function and significance of secondary metabolites.	

Practicals		
	<ol style="list-style-type: none"> 1. Measurement of pH 2. buffer preparation (Phosphate buffer) 3. Tests for carbohydrates- Iodine, Molisch's test, Benedict's, Fehling's test. 4. Qualitative test for proteins- biurette test 5. Separation of aminoacids using paper chromatography (demonstration). 6. Isolation of DNA from a plant source (Demonstration). 	30

Suggested Reading

1. Lehninger, Principles of Biochemistry, Eighth Edition, 2022.
2. Lubert Stryer, Biochemistry, 2022.
3. Dey, P.M., Harborne, Plant Biochemistry, 1997
4. Conn, E.E., Stumpf, P.K., Bruening, G. and Doi, R.H., Outlines of Biochemistry 5th edition, Wiley India Ltd., N.Delhi.
5. Primrose, S.B., 1987, Modern Biotechnology, Black Well Scientific Publications, Oxford
6. Jain, J.L., Jain, S., and Jain, N., Fundamentals of Biochemistry, S.Chand & Company.