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MST101: BIOCHEMISTRY		
Teaching Scheme	Examination Scheme	
Lectures: 3 hrs/Week	Class Test -12Marks	
Tutorials: 1 hr/Week	Teachers Assessment - 6Marks	
	Attendance – 12 Marks	
Credits: 4	End Semester Exam – 70 marks	

Course Objectives:

- The objectives of this course are to build upon undergraduate level knowledge of biochemical principles with specific emphasis on different metabolic pathways. The course shall make the students aware of various disease pathologies within the context of each topic.
- Students who complete this course will be able to understand fundamental properties of • elements, atoms, acids and bases, metals, non-metals, alloys and composites. They will appreciate the role of metals and radioisotopes in biology and will understand the applications of rare earth metals, transition metals and X-rays.
- Students will analyze the properties of common organic reagents and compounds, carry out selective reactions of organic functional groups and verify reactivity of organic functional groups.

Course content

Unit - I

Chemical basis of life; Composition of living matter; Water - properties, pH, ionization and hydrophobicity; Emergent properties of biomolecules in water; Biomolecular hierarchy; Macromolecules; Molecular assemblies; Structure-function relationships Amino acids - structure and functional group properties; Peptides and covalent structure of proteins; Elucidation of primary and higher order structures; Evolution of protein structure; Structure-function relationships in model proteins like ribonuclease A, myoglobin, hemoglobin, chymotrypsin etc.; Tools to characterize expressed proteins.

Unit - II

Enzyme catalysis - general principles of catalysis; Quantitation of enzyme activity and efficiency; Enzyme characterization and Michaelis-Menten kinetics; Relevance of enzymes in metabolic regulation, activation, inhibition and covalent modification; Single substrate enzymes

Unit - III

Sugars - mono, di, and polysaccharides; Suitability in the context of their different functions- cellular structure, energy storage, signaling; Glycosylation of other biomolecules - glycoproteins and glycolipids; Lipids - structure and properties of important members of storage and membrane lipids; lipoproteins

Unit - IV

Biomembrane organization - sidedness and function; Membrane bound proteins - structure, properties and function; Transport phenomena Nucleosides, nucleotides, nucleic acids - structure, diversity and function; sequencing; Brief overview of central dogma

Unit - V

Bioenergetics-basic principles; Equilibria and concept of free energy; Coupled processes; Glycolytic pathway; Kreb's cycle; Oxidative phosphorylation; Photosynthesis; Elucidation of metabolic pathways; Logic and integration of central metabolism; entry/ exit of various biomolecules from central pathways; Principles of metabolic regulation; Regulatory steps; Signals and second messengers.

Texts/References

1. V.Voet and J.G.Voet, Biochemistry, 3rd edition, John Wiley, New York, 2004.

2. A.L. Lehninger, Principles of Biochemistry, 4th edition, W.H Freeman and Company, 2004.

3. L. Stryer, Biochemistry, 5th edition, W.H. Freeman and Company, 2002.

Course outcome

1. Understand various applications of Biomolecules, their structure and function

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