Elective-I for BE-I

BIOLOGICAL CHEMISTRY

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3	0	0	3.0

Course Objective: To introduce structure, function and properties of some biologically important molecules and applications of biological chemistry.

Origin of life: Stanley Miller experiment, Three domains of life - eubacteria, eukaryotes, archaebacteria, General structure of amino acids, Components of nucleic acids, Lipids and sugars, Introduction to stem cells.

Bioenergetics: Biological systems and general laws of thermodynamics, Concept of entropy, High energy bonds, Biologoical oxidation and redox potentials, Mitochondrial electron transport chain.

Amino acids and proteins: Physical and chemical properties of amino acids, Titration curves, Peptide bond, Folding of peptide chains into regular repeating structure (α-helix, β-pleated sheets), β-turns in polypeptides, Amino acid sequencing of poly peptides, Native proteins and their conformations, Forces stabilizing structure, Shape of proteins, Denaturation of proteins.

Heme and non-heme metalloproteins: Haemoglobin and myoglobin as oxygen carriers, Bohr effect, Coordination chemistry of Fe(II) in haemoglobin and oxyhaemoglobin, Relaxed and tense configurations of haemoglobin, Electronic formulations and mode of bonding of dioxygen in haemoglobin, cytochromes, iron supply and transport in biological systems, Ferritin, Transferrin. Metal deficiency and disease, Toxic effects of metals, Metals used for diagnosis and chemotherapy.

Carbohydrate and triglycerides for biofuels: Introduction to alternative fuels, Security, cost and environmental considerations, Carbon sequestration and the impact of biofuels, Current processes for biofuel production from biomass, Biomass availability.

Course Outcome: The student will acquire the knowledge of

1. origin of life.
2. molecular level reactions, energies and arrangement of cell organelles.
3. processes involved in the living systems for betterment of society.

Text Books

1. *Jain, J. L., Jain, S., and Jain, N., Fundamentals of Biochemistry, S. Chand (2005), Multicolour Ed.*
2. *Stryer, L., Berg, J.M., and Tymoczko, J. L., Biochemistry,* ***W. H. Freeman*** *(2004) 4th ed.*
3. ***Voet****, D., and Voet, J.G., Biochemistry,* ***John Wiley*** *(1995) 2nd ed.*
4. *Mousdale, D.M., Introduction to Biofuels, Taylor & Francis Group, (2010).*

Reference Books

1. *Conn, E.E., and Stump, F., Outlines of Biochemistry, John Wiley (2006) 5th ed.*
2. *Nelson, D.L., and Cox, M.M., Principles of Biochemistry, W.h. Freeman (2004) 4th ed.*