

Principles of Biochemistry

Course Number: 140523

Credit hours:3

Department: Biochemistry, Biology and genetics

Course Level: First year

Faculty: Medicine

Long Course Description:

The course is designed to provide an understanding of the structure of the chemical components of living matter. The course will cover the four major classes of biological molecules: proteins, carbohydrates, lipids, and nucleic acids. Emphasis will be on the chemical properties and three-dimensional structure of these molecules in relationship to their biological function. Principles of bioenergetics, the mechanisms of enzyme action, enzyme kinetics, and the control mechanisms which regulate enzymatic reactions will be discussed.

COURSE OUTLINE:

LECTURE	TOPICS
1	Overview
2 + 3	Properties of water, intermolecular forces
4 + 5	Acid-base properties and buffers
6+ 7	Structure and properties of amino acids Structure , 20 common A A , Titration curves , Buffering capacity , Peptides
8 + 9	Introduction to proteins and primary sequences of proteins
10 + 11	Properties of peptide bond and secondary structures of proteins, tertiary and fibrous proteins
12 +13 +14 +15	Globular proteins and quaternary structures of proteins, protein denaturation and folding, Myoglobin and hemoglobin
16 +17	Separation and purification techniques of proteins
18	First Hour Exam. = 25 %
19 +20	Blood proteins Proteins of body fluids, Plasma Albumin (transport of metabolites, osmotic pressure & viscosity), Immunoglobulins structure and specificity, Myoglobin, Hemoglobin & gas transport
21 + 22	Thermodynamics & free energy of reactions General concepts, Types of energy, Free energy and equilibrium, Energy flow in biological systems, Thermodynamics of coupled reactions, High energy compounds
23+ 24 + 25	Enzymes Basics of catalysis, Enzymes as catalysts, Measurements of activity, Specificity, coenzymes & prosthetic groups, Metalloenzymes, Active centers, Thermodynamics of enzyme reactions, Mechanisms of catalysis
26 + 27 + 28	Enzyme kinetics Basics of kinetics, Velocity vs Substrate plots, Mechaeles- Menton kinetics,

	Enzyme inhibition (competitive, non-competitive, uncompetitive, irreversible, other types), Allosteric enzymes
29 + 30	Enzyme Modifications Reversible, Irreversible, Allosteric control, Isoenzymes
31 + 32 + 33	Carbohydrates Structures and properties of mono-, di- and polysaccharides, glycoconjugates
34 + 35 + 36	Lipids Structures and properties of fatty acids and lipids
37	Second Hour Exam. = 25 %
38 +39	Structure and properties of membranes Basic considerations, Phospholipids, Other membrane lipids, Membrane proteins, Membrane functions, Miscelles, liposomes and artificial membranes, Types of membranes
40	Membrane transport Types of transport proteins, Influx and efflux, transport energetics & kinetics
41 + 42	Nucleic Acids Structures and properties of nucleotides and nucleic acids
43 +44	DNA-Based Information Technologies DNA-Based Information Technologies
45	Final Exam. = 50 %

Course Assessment:

1- Exam I	25% of the Final Grade
2- Exam II	25% of the Final Grade
3- Exam III (Final Exam)	50% of the Final Grade
	100% Of the Final Grade

References:

- 1- Primary Text Book: *Lehninger Principles of Biochemistry* Lehninger, Nelson and Cox (Fourth Edition) FREEMAN 2005.
- 2- Recommended: *Textbook of Biochemistry with Clinical Correlations*. Devlin (Sixth Edition) WILEY – LISS 2005.
- 3- Recommended: *Molecular Biology of the Cell* Albert, Bray, Lewis, Raff, Roberts and Watson (Fourth Edition) GARLAND SCINCE 2002.
- 4- Recommended: *Biochemistry* – Chapme, Harvey and Ferrier LIPPINCOTT, WILLIAMS & WILKINS 2005.