

INSTITUTE	FACULTY OF PHYSIOTHERAPY
PROGRAM	BACHELOR OF PHYSIOTHERAPY
SEMESTER	1
COURSE TITLE	BIOCHEMISTRY
COURSE CODE	BPT-103
COURSE CREDITS	5

Objective:

- 1 Describe the structure, composition and functions of cell.
- 2 Describe the structure and functions of cell membrane.
- 3 Explain the metabolism of carbohydrates, Lipids, proteins and amino acids.
- 4 Describe the types, composition and utilization of vitamins.
- 5 Explain the effect of exercise related biochemical changes and its application to exercise prescription.

Course Outcomes: After completion of this course, student will be able to:

- 1 Describe the structure, composition and functions of cell.
- 2 Describe the structure and functions of cell membrane.
- 3 Explain the metabolism of carbohydrates, Lipids, proteins and amino acids.
- 4 Describe the types, composition and utilization of vitamins.
- 5 Explain the effect of exercise related biochemical changes and its application to exercise prescription.

Pre-requisite of course: A basic understanding of human biology and inorganic chemistry is often a fundamental prerequisite.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
90	0	0	25	15	10	0	0

Contents : Unit	Topics	Contact Hours
1	<p>Unit 1 Acid-Base balance - Acids, bases and buffers, pH. Buffer systems of the body, bicarbonate buffer system Role of lungs and kidneys in acid base balance, Acid base imbalance. , Carbohydrate Chemistry – Definition, general classification with examples, Glycosides bond Structures, composition, sources, properties and functions of Monosaccharides, Disaccharides, Oligosaccharides and Poly-saccharides. Glycosaminoglycan (mucopoly saccharides) Carbohydrate Metabolism - Introduction, Glycolysis – Aerobic, Anaerobic Citric acid cycle, Substrate level phosphorylation. Glycogen metabolism – Glycogenesis, GlycoGenolysis, Metabolic disorders glycogen, Gluconeogenesis, Cori cycle Hormonal regulation of glucose, Glycosuria, Diabetes mellitus. Definition, general classification Role of carbohydrates in diet: Digestible carbohydrates and dietary fibers., Lipid Chemistry – Definition, general classification, Definition, classification, properties and functions of Fatty acids, Triacylglycerol, Phospholipids, Cholesterol ,Essential fatty acids and their importance,Lipoproteins: Definition, classification, properties, Sources and function Ketone bodies ,Role of lipids in diet, Amino-acid Chemistry –Amino acid chemistry: Definition, Classification, Peptide bonds Peptides: Definition, Biologically important peptides Protein chemistry: Definition, Classification, Functions of proteins, Role of proteins in diet: Quality of proteins - Biological value, net protein utilization, Nutritional aspects of proteins-essential and non- essential amino acids. Nitrogen balance , Nutrition – Introduction, Importance of nutrition Calorific values, Respiratory quotient – Definition, and its significance Energy requirement of a person - Basal metabolic rate: Definition, Normal values, factor affecting BMR Special dynamic action of food. Physical activities - Energy expenditure for various activities. Calculation of energy requirement of a person Balanced diet i. ii. Recommended dietary allowances Nutritional disorders.</p>	45

Contents : Unit	Topics	Contact Hours
2	Unit 2 Enzymes – Definition, Active site, Cofactor (Coenzyme, Activator), Proenzyme. Classification with examples, Factors effecting enzyme activity, Enzyme inhibition and significance, Isoenzymes, Diagnostic enzymology (clinical significance of enzymes), Nucleotide and Nucleic acid Chemistry - Nucleotide chemistry: Nucleotide composition, functions of free nucleotides in body. Nucleic acid (DNA and RNA) chemistry: Difference between DNA and RNA, Structure of DNA (Watson and Crick model), Functions of DNA. Structure and functions of tRNA, rRNA, mRNA., Vitamins - Definition, classification according to solubility, Individual vitamins - Sources, Coenzyme forms, functions, RDA, digestion, absorption and transport, deficiency and toxicity., Mineral Metabolism- Definition, Sources, RDA, Digestion, absorption, transport, excretion, functions, disorder of Individual minerals - Calcium, phosphate, iron, Magnesium, fluoride, selenium, molybdenum, copper. Phosphate, calcium and iron in detail., Clinical Biochemistry - Normal levels of blood and urine constituents, Relevance of blood and urine levels of Glucose, Urea, Uric acid, Creatinine, Calcium, Phosphates, pH and Bicarbonate. Liver function tests, Renal function tests.	45
Total Hours		90

Textbook :

- 1 Textbook of Medical Biochemistry, M.N. Chatterjea & Rana Shinde, Jaypee Brothers Medical Publishers, 2025
- 2 Textbook of Biochemistry for Medical Students , D.M. Vasudevan, Sreekumari S, Kannan Vaidyanathan, Jaypee Health Sciences, 2023
- 3 Clinical Biochemistry: Metabolic and Clinical Aspects , William J. Marshall & Stephen K. Bangert, Churchill Livingstone (Elsevier Health Sciences), 2008
- 4 Biochemistry – Sutherland, Campbell & Smith, Churchill Livingstone, 1994

References:

- 1 Drugs in Sport, Drugs in Sport, David R. Mottram (with contributions from Sally Gunnell), E. & F.N. Spon (original editions); later editions by Routledge / Taylor & Francis, 2022
- 2 Normal and Therapeutic Nutrition, Normal and Therapeutic Nutrition, Corinne H. Robinson et al., Macmillan Publishing Company, New York, 1986
- 3 Review of Physiological Chemistry, Review of Physiological Chemistry, Harold A. Harper, Lange Medical Publications, 1977

Suggested Theory Distribution:

The suggested theory distribution as per Bloom’s taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery
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Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
0.00	0.00	35.00	35.00	30.00	0.00

Instructional Method:

- 1 Lecture
- 2 Tutorial
- 3 Demonstration using models including digital
- 4 Flipped class
- 5 Dissection