INSTITUTE	**FACULTY OF PHARMACY**
PROGRAM	**BACHELOR OF PHARMACY**
SEMESTER	**3**
COURSE TITLE	**BIOCHEMISTRY**
COURSE CODE	**13PH0303**
COURSE CREDITS	**6**

Objective:

1 Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and
the principles to understand metabolism of nutrient molecules in physiological and pathological
conditions. It is also emphasizing on genetic organization of mammalian genome and hetero &
autocatalytic functions of DNA.

2 Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

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

1 Understand the catalytic role of enzymes, importance of enzyme inhibitors in design of new drugs, therapeutic and diagnostic applications of enzymes.

2 Understand the metabolism of nutrient molecules in physiological and pathological conditions.

3 Understand the genetic organization of mammalian genome and functions of DNA in the synthesis of RNAs and proteins.

Pre-requisite of course: Biochemistry deals with complete understanding of the molecular levels of the chemical process associated with living cells. The scope of the subject is providing biochemical facts and the principles to understand metabolism of nutrient molecules in physiological and pathological conditions. It is also emphasizing on genetic organization of mammalian genome and hetero & autocatalytic functions of DNA.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	1	4	75	15	10	35	15

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Contents : Unit	Topics	Contact Hours
1	**Biomolecules:** Introduction, classification, chemical nature and biological role of carbohydrate, lipids, nucleic acids, amino acids and proteins. Bioenergetics: Concept of free energy, endergonic and exergonic reaction, Relationship between free energy, enthalpy and entropy; Redox potential. Energy rich compounds; classification; biological significances of ATP and cyclic AMP	8
2	**Carbohydrate metabolism:** Glycolysis – Pathway, energetics and significance Citric acid cycle- Pathway, energetics and significance HMP shunt and its significance; Glucose-6-Phosphate dehydrogenase (G6PD) deficiency Glycogen metabolism Pathways and glycogen storage diseases (GSD) Gluconeogenesis- Pathway and its significance Hormonal regulation of blood glucose level and Diabetes mellitus Biological oxidation: Electron transport chain (ETC) and its mechanism. Oxidative phosphorylation & its mechanism and substrate level phosphorylation Inhibitors ETC and oxidative phosphorylation/Uncouplers	10
3	**Lipid metabolism:** ß-Oxidation of saturated fatty acid (Palmitic acid) Formation and utilization of ketone bodies; ketoacidosis De novo synthesis of fatty acids (Palmitic acid) Biological significance of cholesterol and conversion of cholesterol into bile acids, steroid hormone and vitamin D, Disorders of lipid metabolism: Hypercholesterolemia, atherosclerosis, fatty liver and obesity., Amino acid metabolism: General reactions of amino acid metabolism: Transamination, deamination & decarboxylation, urea cycle and its disorders Catabolism of phenylalanine and tyrosine and their metabolic disorders (Phenylketonuria, Albinism, alkeptonuria, tyrosinemia) Synthesis and significance of biological substances; 5-HT, melatonin, dopamine, noradrenaline, adrenaline Catabolism of heme; hyperbilirubinemia and jaundice	10
4	**Nucleic acid metabolism and genetic information transfer** Biosynthesis of purine and pyrimidine nucleotides, Catabolism of purine nucleotides and Hyperuricemia and Gout Diseases Organization of mammalian genome Structure of DNA and RNA and their functions DNA replication (semi conservative model) Transcription or RNA synthesis Genetic code, Translation or Protein synthesis and inhibitors	10
5	**Enzymes:** Introduction, properties, nomenclature and IUB classification of enzymes Enzyme kinetics (Michaelis plot, Line Weaver Burke plot)Enzyme inhibitors with examples, Regulation of enzymes: enzyme induction and repression, allosteric enzymes regulation, Therapeutic and diagnostic applications of enzymes and isoenzymes Coenzymes–Structure and biochemical functions	7
Total Hours		**45**

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Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Practical** Experiment no.1 , Experiment no.2, Experiment no.3, Experiment no.4, Experiment no.5, Experiment no.6, Experiment no.7, Experiment no.8, Experiment no.9, Experiment no.10, Experiment no.11, Experiment no.12, Experiment no.13, Experiment no.14, Experiment no.15	48
2	**Tutorial** Workshop 1, Workshop 2, Workshop 3, Workshop 4, Workshop 5, Workshop 6, Workshop 7, Workshop 8, Workshop 9, Workshop 10, Workshop 11, Workshop 12, Workshop 13, Workshop 14, Workshop 15	15
Total Hours		**63**

Textbook :

1 Biochemistry, D. Satyanarayan and U.Chakrapani, Books And Allied (p) Ltd., 2008

References:

1 Lehninger Principles of Biochemistry, Lehninger Principles of Biochemistry, Lehninger, W. H. Freeman, 2013

2 Harper'S Illustrated Biochemistry, 27th International Edition , Harper'S Illustrated Biochemistry, 27th International Edition , Robert K. Murry, Daryl K. Granner and Victor W. Rodwell, cbspd, 2006

3 Clinical Companion (Biochemistry), Clinical Companion (Biochemistry), Lubert Stryer., W.H.Freeman & Co Ltd, 2002

4 A Textbook of Biochemistry, A Textbook of Biochemistry, Rama Rao, UBS Publishers' Distributors Pvt. Ltd., 2008

5 Fundamentals of Biochemistry , Fundamentals of Biochemistry , Ahill Chandra Deb, New Central Book Agency (p) Ltd, 2001

6 Outlines of Biochemistry Hardcover, Outlines of Biochemistry Hardcover, Conn and Stumpf, John Wiley & Sons, 1987

7 Practical Biochemistry 5Ed, Practical Biochemistry 5Ed, R.C. Gupta and S. Bhargavan., CBS, 2018

8 An Introduction to Practical Biochemistry , An Introduction to Practical Biochemistry , David T. Plummer. , McGraw Hill Education, 2017

9 Practical Biochemistry , Practical Biochemistry , Rajagopal and Ramakrishna., Ahuja Publishing House, 2005

10 Practical Clinical Biochemistry 4Ed, Practical Clinical Biochemistry 4Ed, Harold Varley, CBS, 2005

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					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
20.00	30.00	25.00	15.00	10.00	0.00

Instructional Method:

1. The course delivery method will depend upon the requirement of content and the need of students. The teacher in addition to the conventional teaching method by the blackboard may also use any tools such as demonstration, role play, quiz, brainstorming, MOOCs etc.
2. The internal evaluation will be done based on continuous evaluation of students in the laboratory and classroom.
3. Students will use supplementary resources such as online videos, NPTEL videos, MOOCs/ e-courses, virtual laboratories.

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