

15BT102	HUMAN PHYSIOLOGY AND HEALTH	L	T	P	C
	Total No. of Contact Hours - 30	2	0	0	2
	Prerequisite				
	Nil				
PURPOSE					
To provide a basic understanding of human physiological systems for a better comprehension of the problems faced by human.					
INSTRUCTIONAL OBJECTIVES					
1.	To familiarize the students with the basic organization of organisms and subsequent development to an organ system, and provide students with an understanding of the function and regulation of the human body and physiological integration of the organ systems to maintain homeostasis.				
2.	The functional aspects of various organ systems will help for further understanding of the cellular and molecular mechanisms of action in health and disease.				

UNIT I-PHYSIOLOGY OF CELLS AND MOLECULES (5 Hours)

Functional organization of cell-Physiology of membranes- Signal transduction-Regulation of gene expression- Action potential- Cellular physiology of skeletal, cardiac and smooth muscle

UNIT II- CELLULAR PHYSIOLOGY OF THE NERVOUS SYSTEM (5 Hours)

Organization and physiology of neurons-Circuits of the central nervous system-Autonomic nervous system-Neuronal microenvironment

UNIT III-CARDIOVASCULAR AND RESPIRATORY SYSTEMS (7 Hours)

Organization of the cardiovascular system-Arteries and veins-Cardiac electrophysiology-Heart as a pump-Organization of respiratory system-Mechanics of respiration-Acid/base physiology-Gas exchange in lungs

UNIT IV-GASTROINTESTINAL AND RENAL SYSTEMS (7 Hours)

Organization of the GI system-Gastric function-Pancreas and salivary glands-Hepatobiliary function-Organization of the urinary system-Glomerular filtration and Renal blood flow-Integration of salt and water balance

UNIT V-ENDOCRINE AND REPRODUCTIVE SYSTEMS

(6 Hours)

Organization of the endocrine control-Endocrine glands-Regulation of endocrine glands-Male and female reproductive system-Fertilization, pregnancy, and lactation

REFERENCES

1. W. F. Boron and E. L. Boulpaep, “*Medical physiology*,” Elsevier, 2005
2. I. Khurana, “*Essentials of Medical Physiology*,” Elsevier India, 2008
3. Bruce M. Koeppen and Bruce A. Stanton, “*Berne & Levy Physiology*,” 6th Updated Edition, Mosby, 2009

15BT102 HUMAN PHYSIOLOGY AND HEALTH												
Course designed by		Department of Biotechnology										
1	Student Outcomes	a	b	c	d	e	f	G	h	i	j	k
		X			X							
2	Mapping of instructional objectives with student outcomes	1			2							
3	Category	General (G)		Basic Sciences (B)			Engg. Sci. & Tech. Arts (E)		Professional Subjects (P)			
									X			
4	Broad Area (for courses under ‘P’ only)	Biotechnology			Bioprocess Engineering			Chemical Engineering				
		X			--			--				
5	Approval	23 rd meeting of Academic Council, May 2013										

15BT103	BIOCHEMISTRY	L	T	P	C
	Total No. of Contact Hours – 45	3	0	0	3
	Prerequisite				
	Nil				
PURPOSE					
To provide an understanding of the functions of various biomolecules and their metabolism.					
INSTRUCTIONAL OBJECTIVES					
1.	To study structural and functional properties of carbohydrates, proteins, lipids and nucleic acids				
2.	To emphasize the role of biomolecules by providing basic information on specific metabolic diseases and disorders				

UNIT 1 INTRODUCTION TO BIOCHEMISTRY (12 Hours)

Introduction-Chemical bonds-pH-Buffers-Carbohydrates-Lipids-Proteins

UNIT 2 METABOLISM OF CARBOHYDRATES (8 Hours)

Introduction to Metabolism-Glycolysis-Citric acid cycle-Gluconeogenesis-Glycogen metabolism-Glycogenesis-Glycogenolysis-Biochemical aspects of Diabetes Mellitus

UNIT 3 PROTEIN METABOLISM (9 Hours)

Introduction-Metabolism of amino acids-Transamination-Deamination-Metabolism of ammonia-Urea cycle-Biosynthesis of amino acids-Disorders of tyrosine (phenylalanine) metabolism

UNIT 4 FATTY ACID METABOLISM AND NUCLEIC ACID METABOLISM (8 Hours)

Introduction-Fatty acid oxidation-Ketone bodies & Ketogenesis-Biosynthesis of Fatty acids-Eicosanoids-Cholesterol Biosynthesis-Lipoproteins-Disorders of Lipid metabolism-Nucleic acids: Biosynthesis of Purine and Pyrimidines-Degradation of purine nucleotides and pyrimidine nucleotides-Disorders of Purine and pyrimidine metabolism

UNIT 5 OXIDATIVE PHOSPHORYLATION (8 Hours)

Introduction-Bioenergetics, High energy compounds, Biological oxidation-Electron transport chain, Oxidative phosphorylation, Chemiosmotic theory-

Shuttle pathway – Glycerol phosphate Shuttle, Malate aspartate Shuttle – Shunt pathways

REFERENCES

1. Jain, J L, Jain, Nitin, Sunjay Jain, “*Fundamentals of Biochemistry*,” S. Chand Group, ISBN: 8121924537
2. U.Satyanarayana & U. Chakrapani, “*Biochemistry*,” Books And Allied (p) Ltd., ISBN: 8187134801
3. David L. Nelson, Albert Lester Lehninger, Michael M. Cox, “*Lehninger Principles of Biochemistry*,” Edition 5, illustrated, W. H. Freeman, 2008
4. Jeremy M. Berg, John L. Tymoczko, Lubert Stryer, “*Biochemistry*,” Ed. 7, W. H. Freeman, 2012

15BT103 BIOCHEMISTRY												
Course designed by		Department of Biotechnology										
1	Student Outcomes	a	b	c	d	e	f	g	h	i	j	k
		X			X							
2	Mapping of instructional objectives with student outcomes	1			2							
3	Category	General (G)		Basic Sciences (B)		Engg. Sci. & Tech. Arts (E)		Professional Subjects (P)				
								X				
4	Broad Area (for courses under ‘P’ only)	Biotechnology		Bioprocess Engineering		Chemical Engineering						
		X		--		--		--				
5	Approval	23 rd meeting of Academic Council, May 2013										

15BT103L	BIOCHEMISTRY LABORATORY	L	T	P	C
	Total No. of Contact Hours – 30	0	0	4	2
	Prerequisite				
	BT 1004				

PURPOSE

To establish the basics of practical biochemistry and to provide a platform for understanding and analyzing the biomolecules

INSTRUCTIONAL OBJECTIVES

	To teach laboratory safety and standard operating procedures of common laboratory equipments
	To impart skills in preparation of solutions and biological buffers
	To extend knowledge in analysis, estimation and comparison of biomolecules in normal and diseased conditions
	To offer exposure on modern separation techniques for biomolecules

LIST OF EXPERIMENTS

- Introduction to commonly used instruments (pH meter, Spectrophotometer, Centrifuge, Microscopes etc..) and laboratory safety
- pH measurements and preparation of buffers
- Qualitative analysis of carbohydrates (Monosaccharide – Hexo, Pentose, Aldo, Keto sugars, Disaccharides – Reducing and non-reducing sugars, Polysaccharides)
- Estimation of blood glucose and comparison of normal and diabetes mellitus samples
- Estimation of blood plasma proteins
- Separation of amino acids on Thin layer chromatography
- Quantification of cholesterol and triglycerides from blood
- Biochemical estimation of nucleic acid using spectrophotometer
- HPLC determination of caffeine in urine – Demo
- Purification of biomolecules using FPLC - Demo

REFERENCE

1. Laboratory Manual

15BT103L BIOCHEMISTRY LABORATORY												
Course designed by		Department of Biotechnology										
1	Student outcomes	a	b	c	d	e	f	g		i	j	k
		x	x								x	
2	Mapping of instructional objective with student outcomes	1	1								4	
3	Category	General (G)			Basic Sciences (B)			Engg. Sci. & Tech. Arts (E)		Professional Subjects (P)		
										x		
4	Broad area (for 'P' category)	Biotechnology			Bioprocess Engineering			Chemical Engineering				
		X			--			--				
5	Approval	23 rd meeting of Academic Council, May 2013										