

ALLIED COURSE OFFERED BY BIOCHEMISTRY

FIRST YEAR : FIRST SEMESTER

ALLIED BIOCHEMISTRY I

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	Allied Biochemistry I	(Theory)Allied I	2	1	-	-	3	4	25	75	100

Learning objectives

The objectives of this course are to

- Introduce the structure and classification of carbohydrates
- Comprehend the metabolism of carbohydrates
- Study the classification and properties of amino acids
- Elucidate the various levels of organization of Proteins
- Study functions and deficiency diseases of vitamins

Module I: Definition and classification of carbohydrates, linear and cyclic forms (Haworth projection) for glucose, fructose and mannose and disaccharides (maltose, lactose, sucrose). General properties of monosaccharides and disaccharides. Occurrence and significance of polysaccharides. **12Hrs**

Module II: Metabolism- Catabolism and Anabolism. Carbohydrate metabolism- Glycolysis, TCA cycle, HMP shunt and glycogen metabolism and energetics **12Hrs**

Module III: Amino acids -Classifications, physical properties -amphoteric nature, isoelectric point and chemical reactions of carboxyl, amino and both groups. Amino acid metabolism- transamination, deamination and decarboxylation. **12Hrs**

Module IV: Proteins- classification - biological functions , physical properties- ampholytes, isoelectric point, salting in and salting out, denaturation, nature of peptide bond. Secondary structure, α -helix and β -pleated sheet, tertiary structure, various forces involved- quaternary structure. **12Hrs**

Module V: Vitamins- Fat (A,D,E and K) and water soluble vitamins(B complex and C)- sources, RDA, biological functions and deficiency diseases. **12 Hrs**

Course Outcome

CO	On completion of this course, students will be able to	Programme Outcome
CO1	Classify the structure of carbohydrates and its properties	PO1
CO2	Explain the metabolism of carbohydrates and its significance	PO1
CO3	Classify amino acids and its properties	PO1
CO4	Explain the classification and elucidate the different levels of structural organization of proteins	PO1
CO5	Identify the disease caused by the deficiency of vitamins	PO1

Text Books

- 1 Satyanarayan,U (2014) Biochemistry (4th ed), Arunabha Sen Books & Allied (P) Ltd, Kolkata.
- 2.Jain J.L.(2007) Fundamentals of Biochemistry,S.Chand publishers 311

Reference books

1. David L.Nelson and Michael M.Cox (2012) Lehninger Principles of Biochemistry (6th ed) W.H. Freeman.
2. Voet.D&Voet. J.G (2010) Biochemistry , (4th ed), John Wiley & Sons, Inc.
3. Lubert Stryer (2010) Biochemistry,(7th ed), W.H.Freeman
4. Satyanarayan,U (2014) Biochemistry (4th ed), Arunabha Sen Books & Allied (P) Ltd, Kolkata.
- 5.Jain J.L.(2007) Fundamentals of Biochemistry,S.Chand publishers 31

Web sources

- 1.onlinecourses.swayam2.ac.in/cec20_bt12
- 2 onlinecourses.swayam2.ac.in/cec20_bt19

Mapping with Program Outcome

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3						3			3
CO 3	3						3			3
CO 4	3						3			3
CO5	3						3	3		3

S - Strong (3) M - Medium (2) L -Low(1)

FIRST YEAR: SEMESTER I

ALLIED BIOCHEMISTRY PRACTICAL-I

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	Allied Biochemistry Practical I	Allied Practical I	-	-	3	-	3	4	25	75	100

Learning objectives

- Identify carbohydrates by qualitative test
- Estimate biomolecules volumetrically
- Estimate protein quantitatively

I Qualitative analysis of carbohydrates- 25Hrs

- a) Monosaccharides-Glucose, Fructose
- b) Disaccharides- Lactose, Maltose, Sucrose
- c) Polysaccharides-Starch

II Volumetric analysis -15 Hrs.

- a) Estimation of ascorbic acid using 2,6dichlorophenolindophenol as link solution
- b) Estimation of Glucose by Benedict's method
- c) Estimation of Glycine by Sorenson Formal titration

III Quantitative analysis (Demonstration Expt)-5 hrs

- a) Colorimetric estimation of protein by Biuret method

Course Outcome

CO	On completion of this course, students will be able to	Program Outcomes
CO1	Qualitatively analyze and report the type of carbohydrate based on specific tests	PO1,PO2,PO3
CO2	Quantitatively estimate the carbohydrates, amino acids and ascorbic acid	PO1,PO2,PO3
CO3	Estimate protein by colorimetric method	PO1,PO2,PO3

Text books

- 1.Laboratory manual in Biochemistry, J. Jayaraman, 2nd edition, New Age International Publishers, 2011,
2. An Introduction to Practical Biochemistry, David T. Plummer, 3 rd edition, Tata McGraw-Hill Publishing Company Limited, 2001.
3. Biochemical Methods, Sadasivam S and Manickam A, 4h edition, New Age International Publishers, 2016

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3	3				3	3	3	3
CO 2	2	3	3				3	3	3	3
CO 3	2	3	3				3	3	3	3

- Strong (3) M – Medium(2) L -Low(1)

FIRST YEAR ; SEMESTER II

ALLIED BIOCHEMISTRY II

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	Allied Biochemistry II	Allied II	2	1	-	-	3	4	25	75	100

Learning objectives

The objectives of this course are to

- Impart knowledge on the classification, properties and characterization of lipids.
- Comprehend the metabolism of Lipids
- Acquaint with the structure, properties and functions of nucleic acids
- Learn about the enzyme kinetics and inhibition
- Study the importance of Hormones

Module I : Lipids–Bloor’s classification of lipids- simple lipids, fatty acids (saturated and unsaturated), compound lipids, derived lipids. Properties of lipids- reduction, oxidation, halogenation, saponification and rancidity .Classification and functions of phospholipids, Cholesterol – structure and biological importance. **12 Hrs**

Module II: Lipid metabolism- Oxidation of fatty acids (Palmitic acid) – Beta oxidation-Role of Carnitine, energetics , alpha oxidation and omega oxidation. Biosynthesis of saturated fatty acids. **12 Hrs**

Module III: Purine and pyrimidine bases, nucleosides, nucleotides, polynucleotides, DNA structure, various types, properties- absorbance, effect of temperature. Different types of RNA, structure and function, Genetic code. **12 Hrs**

Module III : Enzymes - Nomenclature, IUB system of enzyme classification, active site, specificity, isoenzymes, units of enzyme activity factors affecting enzyme activity- substrate concentration, pH, temperature. Enzyme Kinetics- Michaelis and Menten(MM) equation. Lineweaver- Burk (LB) plot. Enzyme inhibition, competitive, uncompetitive and non-competitive inhibition **12Hrs**

Module V: Hormones -classification, Biological functions of Insulin, Thyroid and Reproductive hormones. **12Hr**

Course Outcome

CO	On completion of this course, students will be able to	Program Outcomes
CO1	Elaborate on classification, structure, properties, functions and characterization of lipids	PO1
CO2	Discuss the metabolism of lipids and its importance	PO1
CO3	Explain about structure, properties and functions of nucleic acids	PO1
CO4	Derive Michaelis Menten equation and concepts of enzyme inhibition	PO1,PO3
CO5	Classify the Hormones and its biological functions	PO1,PO4

Text books

- 1.Satyanarayan,U (2014) Biochemistry (4th ed), Arunabha Sen Books & Allied (P) Ltd, Kolkata.
- 2.Jain J.L.(2007) Fundamentals of Biochemistry,S.Chand publishers

Reference books

1. David L.Nelson and Michael M.Cox (2012) Lehninger Principles of Biochemistry (6th ed) W.H. Freeman.
2. Voet.D & Voet. J.G (2010) Biochemistry , (4th ed), John Wiley & Sons, Inc.
3. Lubert Stryer (2010) Biochemistry,(7th ed), W.H.Freeman

Web sources

- 1.online courses.swayam2.ac.in/cec20_bt12
- 2 onlinecourses.swayam2.ac.in/cec20_bt19

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	3						3			3
CO 2	3						3			3
CO 3	3		3				3			3
CO 4	3			3			3			3
CO5	3						3	3		3

S - Strong (3) M - Medium (2) L -Low(1)

FIRST YEAR: SEMESTER II
ALLIED BIOCHEMISTRY : PRACTICAL II

Course Code	Course Name	Category	L	T	P	S	Credits	Inst. Hours	Marks		
									CIA	External	Total
	AlliedBiochemistry Practical II	Allied Practical II	2	1	-	-	3	4	25	75	100

Learning objectives

The objectives of this course are to

- Identify amino acids by qualitative test
- Prepare biomolecules from its sources
- Estimate phosphorus quantitatively

I. Qualitative analysis of amino acids

a) Arginine b) Cysteine c) Tryptophan d) Tyrosine e) Histidine

II. Biochemical preparations

- a) Preparation of casein from milk.
b) Preparation of starch from potato.
c) Preparation of albumin from egg.

III. Group Experiment

Determination of Iodine/ Saponification number of an edible oil (Demonstration) .

Course Outcome

CO	On completion of this course, students will be able to	Programme Outcome
CO1	Qualitatively analyze the amino acids and report the type of amino acids based on specific tests	PO1,PO2,PO3
CO2	Prepare the macronutrients from the rich sources.	PO1,PO2,PO3
CO3	Check the quality of edible oil	PO1,PO2,PO3

Text books

1. Laboratory manual in Biochemistry, J. Jayaraman, 2nd edition, New Age International Publishers, 2011,
2. An Introduction to Practical Biochemistry, David T. Plummer, 3rd edition, Tata McGraw-Hill Publishing Company Limited, 2001.

Reference books

1. Biochemical Methods, Sadasivam S and Manickam A, 4h edition, NewAge International Publishers, 2016
2. Essentials of Food and Nutrition, Vol. I & II, M.S. Swaminathan.

Mapping with Program Outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PSO1	PSO2	PSO3	PSO4
CO 1	2	3	3				3	3	3	3
CO 2	2	3	3				3	3	3	3
CO 3	2	3	3				3	3	3	3

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