



Gyanmanjari
Innovative University

Course Syllabus

Gyanmanjari science college

Semester-1(M.Sc.)

Subject: Biomolecules and Biochemistry-MSZ011502

Type of course: Major

Prerequisite: To provide students the knowledge and skills to understand the chemical processes that occur in living organisms.

Rationale: By understanding the principles of biochemistry, students can gain a deeper understanding of how life around the world works.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks					Total Marks
CI	T	P		Theory Marks		Practical Marks		CA	
				ESE	MSE	V	P	ALA	
4	0	0	4	60	30	10	00	50	150

Legends: CI-Classroom Instructions; T-Tutorial; P-Practical; C-Credit; ESE-End Semester Examination; MSE-Mid Semester Examination; V-Viva; CA-Continuous Assessment; ALA-Active Learning Activities.

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	Presentation Faculty will assign the topic from syllabus to the students and students will prepare the presentation on given topic and upload it to GMIU web portal.	10
2	Brain writing Faculty will provide a picture, text passage or video clip, student observe, analyze and write about it and upload on GMIU web portal.	10
3	Theme based poster Faculty will provide specific theme to students and students will prepare specific theme based poster and upload on GMIU web portal	10



4	Paper Review Faculty will provide a particular portion of the research paper and a group of students will review it and prepare a conclusion in 100 words and upload it to GMIU web portal.	10
5	MCQ Test Faculty will provide the students a set of MCQs according to the leaning objective of the course and students will answer it individually on Moodle.	10
Total		50

CourseContent:

Unit No.	Course content	Hrs	% Weightage
1	Chapter-1 Carbohydrates Classification, Structure, nomenclature and Biological functions of carbohydrates. Monosaccharides; Glucose, fructose, galactose, mannose and ribose. Glycosidic bond. Disaccharides: Sucrose, Lactose and Maltose. Polysaccharides: Homopolysaccharides- Starch, Glycogen, Cellulose, Chitin, Dextrans. Heteropolysaccharides- Hyaluronic acid, Heparin. Glycoproteins and Mucoproteins Carbohydrate Metabolism Major metabolic pathways- Glycolysis, Citric acid cycle and its significance. Gluconeogenesis. Glycogen metabolism- Glycogenesis, Glycogenolysis, Role of insulin and glucagon. Regulation of glycogen synthesis.	15	25
2	Chapter-2 Proteins Structure, classification and properties of amino acids. Classification, properties and biological functions of proteins. Primary structure of protein (e.g. insulin). Secondary structure- Alpha helix, Collagen helix. Fibrous proteins- Keratin, Collagen. Tertiary structure- e.g. Myoglobin. Quaternary structure – e.g. Haemoglobin. Metabolism of Proteins Amino acid metabolism-Deamination, Transamination and Transdeamination. Formation and disposal of ammonia. Urea cycle. Fate of carbon skeletons of aminoacids: glucogenic, ketogenic, partly glucogenic and ketogenic with examples.	15	25

3	<p>Chapter- 3 Lipid</p> <p>Classification of lipids: simple, compound and derived lipids. Biological importance of lipids. Fatty acids: classification. Simple fats: Triacylglycerol (Triglycerides):- fats, oils and waxes. Physical properties. Reactions- Hydrolysis. Compound lipids: Phospholipids- Lecithin, Cephalins, Plasmologens. Glycolipids, Sphingolipids. Derived Lipids, Steroids: Biologically important steroids- cholesterol, Vitamin D.</p> <p>Chapter- Metabolism of Lipids</p> <p>Beta oxidation, alpha oxidation and omega oxidation of fatty acids. De novo synthesis of fatty acids. Lipid peroxidation. Free radicals and antioxidants, Generation of free radicals.</p>	15	25
4	<p>Chapter-5 Nucleic Acids</p> <p>Structure of nucleic acids, Structural organization of DNA (Watson-Crick model) Characteristic features of A, B, C and Z DNA.</p> <p>Enzymes:</p> <p>Classification- (I.U.B. system), co-enzymes, ribosome. Enzyme specificity. Mode of enzyme action: Concept of Active site, Formation of enzyme substrate complex.</p>	15	25

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30	30	20	20	0	0

Course Outcome: Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.



After learning the course the students should be able to:	
CO1	Identify the biological importance of biomolecules carbohydrates.
CO2	Understand biochemistry and metabolism of protein.
CO3	Pursue knowledge of biological metabolism of lipid.
CO4	Demonstrate the metabolism of macromolecules and their significance in human health.

Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

1. Creighton, T.E. (1993). Protein Structure and Molecular Properties. W.H. Freeman & Co, NY.
2. Deb, A.C. (2004). Fundamentals of Biochemistry. New Central Book Agency (P) Ltd. New Delhi.
3. Elliott, W.H and C. Elliott. (2003). Biochemistry and Molecular Biology. Oxford University Press, Oxford, UK.
4. Eric E. Conn, Paul K. Stumpf, George Bruening, Roy H. Doi, (2007). Outlines of Biochemistry. (5th edn). John Wiley & Sons Inc., NY.
5. Garret, R.H. and C.M. Grisham. (1995). Biochemistry. Saunders College Publishers, USA.



6. Hanes, B. D. and N.M. Hoopar.(1998). Instant notes: Biochemistry. University of Leeds, Leeds, UK.
7. Horton, H.R., Morsan, L.A., Scrimgeour, K.G.,Perry, M.D and J.D. Rawn. (2006). Principles of Biochemistry. Pearson Education International, New Delhi.
8. Keith Wilson and John Walker. (2008). Principles and Techniques of Biochemistry and Molecular biology (6th edn). Cambridge University Press, UK.
9. Nelson, D. L., & Cox, M. M. (2008). Lehninger: Principles of Biochemistry, Volume Edition 7th. W.H. Freeman & Co, UK.
10. Murray, K., Granner, D.K., Maynes, P.A and V.W. Rodwell, (2006). Harper's Biochemistry (25th edn). McGraw Hill, New York, USA.
11. Oser, B.L.(1965). Hawk's Physiological Biochemistry. McGraw Hill Book Co. New Delhi.
12. Palmer Trevor. (2001). Enzymes: Biochemistry, Biotechnology & Clinical chemistry. Horwood Publ.Com., England.
13. Rama Rao, A.V.S.S. (1986). Text Book of Biochemistry. L.K. & S Publishers, New Delhi.
14. Stryer, L. (2019). Biochemistry. (9th edn). W.H. Freeman & Co. NY.
15. Vasudevan, D.M. and S. Sreekumari. (2000). Text of Biochemistry for Medical Students. Jaypee Brothers, Medical Publishers (P) Ltd. New Delhi.
16. Voet, D., Voet, J. G., & Pratt, C. W. (2018). Principles of Biochemistry: Global Edition (5th Edition). John Wiley & Sons, NY.
17. Zubay, G, (1989). Biochemistry. McMillan Publishing Co., New York.

