MAHATMA GANDHI UNIVERSITY
NALGONDA

Biochemistry Common Syllabus for All Universities in Telangana

Syllabus of B.Sc. Biochemistry

(Effective from academic year 2025 – 2026 onwards)

Chairperson
Board of Studies in Biochemistry
University College of Science,
M.G. University, Nalgonda – 508254

Telangana State Council of Higher Education, Govt. of Telangana
B.Sc., CBCS Common Core Syllabi for all Universities in Telangana (w.e.f. 2025-26)

PROPOSED SCHEME FOR CHOICE BASED CREDIT SYSTEM IN B.Sc., BIOCHEMISTRY

SEMESTER I		
Course Type	**Course Title**	**Credits**
Core Courses DSC	**Chemistry of Biomolecules (Optional I)**	**4+1=5**
	Optional II	4+1=5
	Optional III	4+1=5
MIL/AEC (First Language)	English	5
Second Language (Telugu, Hindi, Urdu etc)	Second Language	5
	TOTAL	**25**
SEMESTER II		
Core Courses DSC	**Chemistry of Nucleic acids and Biochemical Techniques**	**4+1=5**
	Optional II	4+1=5
	Optional III	4+1=5
MIL/AEC (First Language)	English	5
Second Language (Telugu, Hindi, Urdu etc)	Second Language	5
	TOTAL	**25**

DSC- Discipline Specific Core

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DSC -1A

Semester – I: Paper-BS103 (Theory): Chemistry Of Biomolecules

(4 Credits; 4Hr/week)

Credit- I: Introduction

1. Scope of Biochemistry
2. Water as biological solvent
3. Weak acids and bases
4. pH and concept of Buffers
5. Biological buffers and their physiological importance
6. Henderson- Hasselbalch equation (Simple numerical problems)
7. Common functional groups in biomolecules.

Credit – II: Amino acids & proteins

1. Classification, structures, stereochemistry and chemical reactions of amino acids.
2. Titration curve of glycine &pK value.
3. Essential, nonessential amino acids and non-protein amino acids.
4. Peptide bond formation, Naturally occurring peptides: Glutathione and Enkephalin
5. Outline of protein classification, structural organization of proteins: primary, secondary, tertiary and quaternary structures (ex. hemoglobin & myoglobin)
6. General properties of proteins, denaturation and renaturation of proteins.
7. Determination of amino acid composition of proteins, Sequencing of amino acids.

Credit - III: Carbohydrates

1. Classification of carbohydrates
2. Monosaccharides : Structures, Fisher and Haworth projections
3. Reactions of monosaccharides, Mutarotation
4. Derivatives of monosaccharides: Amino sugars and Glycosides
5. Glycosidic bond formation, Disaccharides, Oligosaccharides
6. Polysaccharides, Storage and Structural Polysaccharides
7. Bacterial cell wall polysaccharides.

Credit – IV: Lipids

1. Classification of lipids, Reactions & properties of lipids
2. Saturated, Unsaturated and Essential fatty acids
3. Structure and functions of Neutral fats, waxes, phospholipids, sphingolipids,
4. Structure and functions of cholesterol and glycolipids.
5. Prostaglandins and lipoproteins.
6. Bio membranes, behavior of amphipathic lipids in water, formation of micelles, bilayers, vesicles, Liposomes
7. Membrane composition and fluid mosaic model.

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References:

1. Lehninger's Principles of Biochemistry – Nelson.D.L. and Cox.M.M., Freeman & Co.
2. Biochemistry – Berg.J.M.,Tymoczko.J.L. andStryer.L., Freeman & Co.
3. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons .
4. Textbook of Biochemistry – West.E.S.,Todd.W.R,Mason.H.S..and. Bruggen, J.T.V., Oxford & IBH Publishers.
5. Outlines of Biochemistry – Conn.E.E.,Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons .
6. Harper's Illustrated Biochemistry – Murray, R.K., Granner.D.K. &Rodwell,V.W., McGraw-Hill
7. Bichemistry-Lippincott's Illustrated Reviews. Champe, P.C. and Harvey, R. A. Lippincott
8. Fundamentals of Biochemistry –Jain, J.L., Jain, S., Jain, N. S. Chand & Co.
9. Biochemistry – Satyanarayana.U and Chakrapani.U, Books & Allied Pvt. Ltd.
10. Biochemistry for B.Sc., First Year - B. SashidharRao, K. Valipasha, KarunaRupula and S. Ravi Kiran, Vol. 1, Telugu Akademi Publishers, Hyderabad, 2018

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DSC – 1A

Semester – I: BS 103; Practical: Qualitative Analysis of Biomolecules

(1 Credits; 2Hr/week)

1. Laboratory general safety procedures
2. Preparation of standard solutions (Molar, Normal and percent solutions)
3. Determination of pKa values of amino acids by titration (Glycine)
4. Preparation of buffers (Acetate and Phosphate buffers)
5. Qualitative identification of Carbohydrates
6. Qualitative identification of Amino acids
7. Qualitative identification of Lipids

References

1. Experimental Biochemistry-A student companion-BeeduSashidharRao and VijayDeshpande.
2. Laboratory Manual in Biochemistry- Jayaraman, J. Wiley Eastern

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DSC – 1B

Semester – II: Paper-BS203 (Theory) Chemistry Of Nucleic Acids And Biochemical Techniques

(4 Credits; 4Hr/week)

Credit - I: Composition of Nucleic acids

1. Organization of DNA in the cell, Mitochondria and Chloroplasts.
2. Composition of nucleic acids (DNA & RNA)
3. Structure of purines and pyrimidines.
4. Nucleosides and Nucleotides
5. Stability and formation of phosphodiester linkages
6. Effect of acids, alkali and nucleases on phosphodiester linkages
7. Photochemical and Spectral characteristics of Nucleic acids.

Credit - II: Structure of Nucleic acids

1. Watson& Crick DNA double helix structure.
2. Introduction to circular DNA, supercoiling, helix to random coil transition,
3. Denaturation of nucleic acids.
4. Hyperchromic effect
5. Tm values and their significance.
6. Reassociation kinetics, Cot curves and their significance.
7. Different types of RNA and their biological functions.

Credit - III: Spectrophotometric and Centrifugation Techniques

1. Concept of absorbance, Electromagnetic spectrum.
2. Beer-Lamberts law and its limitations.
3. Principle of Colorimetry and spectrophotometry
4. UV and Visible spectra, Molar extinction coefficient.
5. Principle of Fluorimetry and applications
6. Principle of Centrifugation, Sedimentation coefficient
7. Types of Centrifugation and their applications

Credit – IV: Chromatography and Electrophoresis techniques

1. Introduction and principles of chromatographic techniques
2. Paper chromatography and applications
3. Thin layer chromatography and applications
4. Gel filtration (molecular sieve) chromatography
5. Ion exchange Chromatography
6. Affinity chromatography
7. Electrophoresis:Principle and applications - Native, SDS-PAGE and Agarose gel electrophoresis

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1. Biochemistry – Voet.D and Voet., J.G., John Wiley & Sons .
2. Textbook of Biochemistry – West.E.S.,Todd.W.R,Mason.H.S..and. Bruggen, J.T.V., Oxford & IBH Publishers.
3. Outlines of Biochemistry – Conn.E.E.,Stumpf.P.K., Bruening, G and Doi.R.H., John Wiley & Sons .
4. Principles and Techniques of Practical Biochemistry- Wilson, K. and Walker, J. Cambridge Press.
5. The Tools of Biochemistry- Cooper, T. G.John Wiley & Sons Press.
6. Physical Biochemistry- Friefelder, D.W.H. Freeman Press.
7. Analytical Biochemistry – Holme.D.J. and Peck.H., Longman.
8. Biophysical Chemistry: Principle and techniques- Upadhyay A, Upadhyay K and Nath. N. Himalaya Publishing House.
9. Experimental Biochemistry- Clark Jr. J.M and Switzer, R. L. Freeman &Co.
10. Biochemistry for B.Sc., First Year - B. SashidharRao, K. Valipasha, KarunaRupula and S. Ravi Kiran, Vol. I, Telugu Akademi Publishers, Hyderabad, 2018

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DSC – 1B

Semester – II: Paper-BS203; Practical's: Quantitative Analysis of Biomolecules

(1 Credit; 2Hr/week)

1. Amino acid Estimation by Ninhydrin method
2. Protein Estimation by Biuret method
3. Protein estimation by Folin`s Method
4. Estimation of Total Sugars by Anthrone Method
5. Estimation of Reducing Sugars by Dinitrosalicylate method
6. Estimation of Keto sugar by Roe`s resorcinol Method
7. Estimation of total sugars by Phenol-sulphuric acid method

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1. Experimental Biochemistry-A student companion-BeeduSashidharRao and VijayDeshpande.
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