FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF ZOOLOGY
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Life Science *(Degree/Honors)*			**Semester - V**	Session: **2024-2025**
1	**Course Code**	**ZOSE-03T**		
2	**Course Title**	**Biochemistry**		
3	**Course Type**	**Discipline Specific Elective**		
4	**Pre-requisite** (if, any)	*As per Program*		
5	**Course Learning. Outcomes (CLO)**	**After successfully completing this course, the students will be able to-** ➢ Understand the structure and biological significance of carbohydrates, amino acids, proteins, lipids and nucleic acids. ➢ Understand the concept of enzyme, its mechanism of action and regulation and its kinetics. ➢ Understand the process of DNA replication, transcription and translation. ➢ Learn the preparation of models of peptides and nucleotides. ➢ Analyze properties of biomolecules through biochemical tests for amino acids, carbohydrates, proteins and nucleic acids.		
6	**Credit Value**	**3 Credits**	***Credit = 15 Hours - learning & Observation***	
7	**Total Marks**	**Max. Marks: 100**		**Min Passing Marks: 40**

PART -B: Content of the Course		
Total No. of Teaching–learning Periods (01 Hr. per period) - 45 Periods (45 Hours)		
Unit	**Topics (Course contents)**	**No. of Period**
I	**Introduction to Biochemistry, Carbohydrates:** Introduction, scope and importance of Biochemistry. Carbohydrates: Classification and Chemical structure of: Reducing and non-reducing sugars: monosaccharides, Oligosaccharides, polysaccharides, Physical and Chemical properties, biological importance. Metabolism of carbohydrates and ATP production: Glycolysis, Krebs cycle, Electron transport chain and ATP synthesis, Phosphate pentose pathway, Gluconeogenesis, Glycogenolysis Glycogenesis and Cori cycle.	**12**
II	**Lipids: Structure and Biological significance:** Lipids: Structure and Biological significance. Fatty acids: Types and nomenclature (saturated and unsaturated). Classification: Triglycerides, Phospholipids, Sphingolipids, Cholesterol, β-oxidation and omega-oxidation of saturated fatty acids with even and odd number of carbon atoms. Biosynthesis of palmitic acid, Ketogenesis.	**11**
III	**Protein structure and metabolism: Proteins: Composition and Biological significance:** Amino acids: Structure, classification and properties. Primary, secondary, tertiary and quartnary structure of protein. Physiological importance of essential and non-essential amino acids. Catabolism of amino acids: Transamination, Deamination, Urea cycle. Enzymes: Nomenclature and classification, general properties, specificity. Mechanism of enzyme action (ES complex and lowering of activation energy, chemical catalysis). Regulation of enzyme activity, inhibition, allosteric regulation.	**11**
IV	**Nucleic acids and mechanisms of replication, transcription and translation:** Structure: Bases, nucleosides and nucleotides. DNA structure: Conformation (A, B and Z), DNA double helix (Watson and Crick model). DNA and RNA as genetic material. Organization of nucleosomes and higher order structure. DNA replication: Machinery and Basic mechanism (Prokaryotes). Transcriptional unit and basic mechanism of transcription (Prokaryotes). Genetic code and basic mechanism of translation (Prokaryotes).	**11**
Keywords	*Biomolecuules, Carbohydrates, Protein, Lipids, enzymes, Nucleic Acids*	
Signature of Convener & Members (CBoS) :		

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Deb A.C.,Fundamentals of Biochemistry, New Central Book Agency
- Jain J.L., Jain N, Jain s., Fundamentals of Biochemistry, S.Chand Publication

Reference Books Recommended –

- Nelson, D.L. & Cox, M.M. (2017) Lehninger Principles of Biochemistry (7th edition)Worth.
- Berg, J.M.; Tymoczko, J.L. and Stryer, L. (2012) Biochemistry (7th edition) Freeman.
- Zubay, G. (2017) Biochemistry (4th edition) McGraw-Hill.
- Conn, E.E.; Stumpf, P.K.; Bruening, G. and Doi, R.H. (2006) Principles of Biochemistry(5th edition) Wiley.

Online Resources–

- **http://ndl.iitkgp.ac.in/he_document/swayam_prabha/clbszfhqwd0**
- **http://ndl.iitkgp.ac.in/he_document/aklectures/4_1_1_2888**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**100 Marks**
Continuous Internal Assessment (CIA):	**30 Marks**
End Semester Exam (ESE):	**70 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **20 +20** Assignment / Seminar - **10** Total Marks - **30**	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against **30** Marks
End Semester Exam (ESE):	**Two section – A & B** Section A: **Q1**. Objective – **10 x1= 10** Mark; **Q2**. Short answer type- **5x4 =20 Marks** Section B: Descriptive answer type qts.,**1out of 2** from each unit-**4x10=40 Marks**	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
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PART- A: Introduction				
Program: Bachelor in Life Science *(Degree/ Honors)*			**Semester - V**	Session: **2024-2025**
1	**Course Code**	**ZOSE- 03P**		
2	**Course Title**	**Biochemistry**		
3	**Course Type**	**Discipline Specific Elective Lab Course**		
4	**Pre-requisite** (if, any)	***As per Program***		
5	**Course Learning. Outcomes (CLO)**	**After successfully completing this course, the students will be able to-** ➢ Learn qualitative analysis of bio molecules ➢ Students will use current biochemical and molecular techniques to plan and carry out experiments. ➢ They will undertake experiments to understand enzyme activity, ➢ Prepare models for biomolecules		
6	**Credit Value**	**1 Credits**	***Credit =30 Hours Laboratory or Field learning/Training***	
7	**Total Marks**	**Max. Marks: 50**	**Min Passing Marks: 20**	

PART -B: Content of the Course		
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)		
Module	**Topics (Course contents)**	**No. of Period**
Lab./Field Training/ Experiment Contents of Course	• Qualitative analysis of nutrients: Carbohydrate, Proteins, Lipids. • Preparation of models of amino acids and dipeptides. • Ninhydrin test for α-amino acids. • Preparation of models of nitrogenous bases, nucleosides and nucleotides. • Qualitative test for DNA & RNA. • Determination of the activity of enzyme (Urease). • Determination of pK and pI values of glycine • Group discussion/ Quiz/Seminar presentation on related topics. • Preparation of practical record.	**30**
Keywords	*Carbohydrates, lipids, Proteins, Nucleic acids, qualitative, quantitative analysis*	
Signature of Convener & Members (CBoS) :		

PART–C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Swaroop, Pathak and Arora. Laboratory technique
- Deb A.C.,Fundamentals of Biochemistry, New Central Book Agency
- Jain J.L., Jain N, Jain s., Fundamentals of Biochemistry, S.Chand Publication

Reference Books Recommended –

- Nelson, D.L. & Cox, M.M. (2017) Lehninger Principles of Biochemistry (7th edition)Worth.
- Berg, J.M.; Tymoczko, J.L. and Stryer, L. (2012) Biochemistry (7th edition) Freeman and Co.
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- Conn, E.E.; Stumpf, P.K.; Bruening, G. and Doi, R.H. (2006) Principles of Biochemistry(5th edition) Wiley.

Online Resources–

- **http://ndl.iitkgp.ac.in/he_document/swayam_prabha/pe9ddsufpck**
- **http://ndl.iitkgp.ac.in/he_document/swayamprabha/swayam_prabha/dsajwjhnmf8?e=8|*|||**

Online Resources–

- **e-Resources / e-books and e-learning portals**

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks:	**50 Marks**
Continuous Internal Assessment (CIA):	**15 Marks**
End Semester Exam (ESE):	**35 Marks**

Continuous Internal Assessment (CIA): **(By Course Teacher)**	Internal Test / Quiz-(2): **10 & 10** Assignment/Seminar +Attendance - **05** Total Marks - **15**	Better marks out of the two Test / Quiz **+** obtained marks in Assignment shall be considered against **15** Marks
End Semester Exam (ESE):	**Laboratory / Field Skill Performance: On spot Assessment** **A. Performed the Task based on lab. work - 20 Marks** **B. Spotting based on tools & technology (written) – 10 Marks** **C. Viva-voce (based on principle/technology) - 05 Marks**	**Managed by Course teacher as per lab. status**

Name and Signature of Convener & Members of CBoS: