



BHARATHIDASANUNIVERSITY, TIRUCHIRAPPALLI-620024

B.Sc. BIOTECHNOLOGY

**CHOICE BASED CREDIT SYSTEM–LEARNING OUTCOMES BASED
CURRICULUM FRAME WORK (CBCS - LOCF)**

(Applicable to the candidates admitted from the academic year 2026–2027 onwards)

Sem	Part	Courses	Title	Ins. Hrs.	Credits	Exam. Hours	Maximum Marks		
							Int.	Ext.	Total
I	I	Ability Enhancement Course – I (AEC - I)	(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100
	II	Ability Enhancement Course –II (AEC - II)	English Course - I	6	3	3	30	70	100
	III	Core Course -1 (CC - 1)	Cell biology	4	4	3	30	70	100
		Core Practical - 1 (CP - 1)	Cell biology (P)	4	4	3	40	60	100
		Allied Course – 1 (AC - 1)	Biochemistry	4	4	3	30	70	100
		Allied Course Practical - 1 (ACP-1)	Biochemistry and Microbiology (P)	2	**	**	**	**	**
	IV	Value Education		2	2	3	30	70	100
		Interdisciplinary Course – 1 (IDC - 1) #	One Course from Outside Department	2	2	3	30	70	100
	Total				30	22	--	--	--
II	I	Ability Enhancement Course –III (AEC - III)	(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100
	II	Ability Enhancement Course –IV (AEC - IV)	English Course - II	6	3	3	30	70	100
	III	Core Course- 2(CC - 2)	Molecular biology	4	4	3	30	70	100
		Core Practical - 2(CP - 2)	Molecular biology (P)	4	4	3	40	60	100
		Allied Course – 2 (AC - 2)	Microbiology	4	4	3	30	70	100
		Allied Course Practical - 1 (ACP-1)	Biochemistry and Microbiology (P)	2	4	3	40	60	100
	IV	Skill Enhancement Course - 1(SEC - 1) ##	Naan Mudhalvan Course	2	2	3	30	70	100
		Interdisciplinary Course – 2 (IDC - 2) #	One Course from Outside Department	2	2	3	30	70	100
	Total				30	26	--	--	--

III	I	Ability Enhancement Course –V(AEC - V)	(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100
	II	Ability Enhancement Course –VI (AEC - VI)	English Course - III	6	3	3	30	70	100
	III	Core Course- 3(CC - 3)	Genetics	4	4	3	30	70	100
		Core Practical - 3 (CP - 3)	Genetics (P)	4	4	3	40	60	100
		Allied Course – 3 (AC - 3)	Bioinstrumentation	4	4	3	30	70	100
		Allied Course Practical - 2 (ACP-2)	Bioinstrumentation and immunology (P)	2	**	**	**	**	**
	IV	Skill Enhancement Course - 2 (SEC - 2) ##	Naan Mudhalvan Course	2	2	3	30	70	100
		Interdisciplinary Course – 3 (IDC - 3) \$\$	One Course from Outside Department	2	2	3	30	70	100
		Health & Wellness @		--	1	--			100
	Total			30	23	--	--	--	800
I	Ability Enhancement Course –VII (AEC - VII)	(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100	
IV	II	Ability Enhancement Course –VIII (AEC - VIII)	English Course - IV	6	3	3	30	70	100
	III	Core Course- 4(CC - 4)	rDNA Technology	4	4	3	30	70	100
		Core Practical - 4(CP - 4)	rDNA Technology (P)	4	4	3	40	60	100
		Allied Course – 4 (AC - 4)	Immunology	4	4	3	30	70	100
		Allied Course Practical - 2 (MCP-II)	Bioinstrumentation and immunology (P)	4	4	3	30	70	100
	IV	Skill Enhancement Course - 3 (SEC - 3) ##	Naan Mudhalvan Course	2	2	3	30	70	100
		Interdisciplinary Course – 4 (IDC - 4) \$\$	One Course from Outside Department	2	2	3	30	70	100
	Total			30	26	--	--	--	800
	Summer Internship / Industrial Activity during the Summer Vacation after II Year								

ALLIED COURSE

First Year	Second Year
1. Biochemistry 2. Biochemistry (P) 3. Microbiology 4. Biochemistry and Microbiology (P)	1. Bioinstrumentation 2. Bioinstrumentation (P) 3. Immunology 4. Bioinstrumentation and immunology (P)

SKILL ENHANCEMENT COURSE(SEC)			
Sl. No.	Title of paper	Sl. No.	MANDATORY Naan Mudhalvan Scheme##
1.		1.	2nd Semester:
2.			
3.		2.	3rd Semester:
4.			
5.		3.	4th Semester:
6.			
7.		4.	5th Semester:
--		5.	6th Semester:

INTERDISCIPLINARY COURSE (IDC) FOR WHO HAVE OPT TAMIL AS PART-I (for other Department Students only)	
1 st Semester	Understanding Biodiversity
2 nd Semester	
3 rd Semester	
4 th Semester	

INTERDISCIPLINARY COURSE (IDC) # FOR WHO HAVE NOT OPTED TAMIL AS PART - I		
Those who have studied Tamil upto 10 th +2 but opt for other languages in degree	1 st Semester	Special Tamil - I
	2 nd Semester	Special Tamil - II
Those who have not studied Tamil in school level	1 st Semester	Basic Tamil - I
	2 nd Semester	Basic Tamil – II
Those students who opt for either special Tamil (or) Basic Tamil as IDCs, have to choose 2 more IDCs courses in their 3rd and 4th Semester from Outside his/her department.		

**INTERDISCIPLINARY COURSE (IDC) \$\$
FOR NCC CADETS ONLY**

NCC Course is a Compulsory Course for the NCC Cadets in the 3rd Semester:	NCC Course is a Compulsory Course for the NCC Cadets in the 4th Semester:
Introduction to NCC	1. Special Subject Army (or) 2. Special Subject Navy (or) 3. Special Subject Air force
Those students who opt for NCC Courses as IDCs, have to choose 2 more IDCs courses in their 1 st and 2 nd Semester from Outside his/her department.	

SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES

Sl. No.	Part	Types of the Courses	No. of Courses	Credits for each Course	Total Credits	Marks
1.	I	Ability Enhancement Course	4	3	12	400
2.	II	Ability Enhancement Course	4	3	12	400
3.	III	Core Course	11	4	44	1100
4.		Core Practical	5	4	20	500
5.		Allied Course	4	4	16	400
6.		Allied Course Practical	2	4	8	200
7.		Core Project Work (CPW)	1	4	4	100
8.	IV	Skill Enhancement Course (SEC)	7	2	14	700
9.		Interdisciplinary Course (IDC)	4	2	8	400
10.		Value Education	1	2	2	100
11.		Health and Wellness	1	1	1	100
12.		Introduction to Disaster Management	1	2	2	100
13.		Summer Internship / Industrial Activity	1	2	2	100
14.		Value Added Course	1	1	1	100
15.		Environmental Studies	1	2	2	100
16.		Gender Studies	1	1	1	100
17.		EXTENSION ACTIVITIES (NCC / NSS / SPORTS / ANTI DRUG CELL / YRC & Any Other Activities	--	1	1	--
Total			49	-	150	4900

\$ For those who have studied Tamil upto 10th+2 (Regular Stream)

+ Syllabus for other Languages should be on par with Tamil at degree level

Those who have studied Tamil upto 10th+2 but opt for other languages in degree level under Part – I should study special Tamil and those who have not studied Tamil in the school level should study Basic Tamil in Part– IV under the Interdisciplinary Course.

** Examination at the end of the next semester

Naan Mudhalvan Scheme: As per the Naan Mudhalvan Scheme instructions, 5 courses from 2nd to 6th semester should be studied under Skill Enhancement Course.

\$ NCC Course is one of the Choices in the Interdisciplinary Course.

\$ Only the NCC Cadets are eligible to choose this course. However, NCC Course is a Compulsory Course for the NCC Cadets.

@ **Health and Wellness: Assessments:**

- Use self-reflective worksheets to assess their understanding
- submit the worksheets to internal audit / external audit
- Every student's activity report should be documented and the same have to be assessed by the Physical Director with Mentor. The evaluation should be for 100 marks. No examination is required.

Scheme of Evaluation:

Part	Description	Marks
A	Report	40
B	Attendance	20
C	Activities (Observation During Practice)	40
Total		100

@ **Summer Internship / Industrial Activity**

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Internship will be carried out during the summer vacation after the second year. Viva-Voce will be conducted by the college and Marks shall be sent to the University and the same will be included in the 5th semester Mark Statement.

Summer Internship / Industrial Activity & Project Work

Scheme of Evaluation:

Description	Marks
Report	80
Viva-Voce	20
Total	100

* Extension Activities shall be outside instruction hours.

First Year
Code: CC 1

CORE COURSE I
CELL BIOLOGY
(Theory)

Semester I
Credits: 4

COURSE OBJECTIVES:

The main objectives of this course are to:

- Familiarize the student in different areas of cell biology, including cell structure and functions and its organelles.
- Develop a comprehensive understanding of the cellular membranes and matrices.
- Impart the knowledge of microscopic techniques to understand the cell structure.

UNIT – I FUNDAMENTALS OF CELL STRUCTURE:

Diversity of cell size and shape. Cell theory, Protoplasm theory, Isolation and growth of cells; Basic properties of cells; Different classes of cells – Prokaryotic and eukaryotic cells. Cell division and cell cycle - Mitosis and meiosis, their regulation, steps in cell cycle, regulation and control of cell cycle.

UNIT – II CELLULAR MEMBRANES AND MATRICES:

Chemical composition and fluidity of membranes; lipid bilayer and membrane protein. Dynamic nature of membranes; membrane potentials; transportation across the cell membrane; Diffusion, osmosis, ion channels, active transport, membrane pumps, mechanism of sorting and regulation of intracellular transport, Extracellular matrices – structure and function; cytoskeleton – structure and function.

UNIT –III CELLULAR ORGANELLES IN METABOLISM:

Endoplasmic reticulum (ER)– smooth & rough; functions of ER; Golgi complex – structure and function; Ribosomes – Types, structure and function; Morphology and functions of peroxisomes and glyoxisomes; Plant cell vacuoles; endocytic pathways – endocytosis, phagocytosis; membrane trafficking.

UNIT – IV ENERGY METABOLISM:

Mitochondria –Morphology – structural variations; Chemical compositions and Functions; Enzyme system of Mitochondria; Mode of energy production – oxidation of carbohydrates: Glycolysis, Krebs cycle- Chloroplast – structure and function. Photosynthesis;

UNIT – V CELL SIGNALING AND COMMUNICATION

Concept and significance of cell signaling; Types of cell signaling and cell surface/intracellular receptors; Signal transduction mechanisms, second messengers and major signaling pathways; Cell junctions, cell communication and apoptosis.

UNIT – VI CURRENT CONTOURS (For Continuous Internal Assessment only):

The recent advancements in the course topics will be explained to the students then and there through expert lectures, online seminars or webinars.

REFERENCES:

1. Watson JD, Gilman M, Witkowski J and Zoller M. 2010. Recombinant DNA. Scientific American Books. 4th Edition. New York.
2. Blackburn GM and Gait MJ. 2006. Nucleic Acids in Chemistry and Biology. Oxford University Press.
3. Lodish H, Baltimore D, Beck A, Zipursky SL, Matsudaria P and Darnell J. 2007. Molecular Cell Biology. 4th Edition. Scientific American Books.
4. Cooper M. 2007. The Cell- A Molecular Approach. 2nd Edition. ASM Press.
5. Lewis JK and Valerie M Kish. 1995. Principle of Cell and Molecular Biology 2nd Edition. Benjamin-Cummings Publishing Company.
6. De Robertis, EDP and E.M.F Robertis. 1987. Cell and Molecular Biology. 8th Edition. Saunders Company.
7. Brown. T.A. 2011. Introduction to genetics: A molecular approach. 1st Edition. Garland Science.
8. Watson, J. D. (2013). Molecular Biology of the Gene, Books a la Carte Edition. Benjamin Lewin. 2010. Genes XI. 11th Edition. Jones & Bartlett Learning.
9. Meyers, R. A. (Ed.). (1996). Molecular biology and biotechnology: a comprehensive desk reference. John Wiley & Sons.
10. Freifelder D. 1987. Molecular Biology, Narosa Publishing House. New Delhi.
11. Lewin B. 2017. Genes XII. Oxford University Press, London.
12. Ajoy Paul. 2014. Textbook of Cell and Molecular Biology. Books and Allied Ltd.
13. Karp, G., Iwasa, J., & Marshall, W. (2018). Karp's Cell Biology. John Wiley & Sons.
14. Alberts, B., Bray, D., Hopkin, K., Johnson, A. D., Lewis, J., Raff, M., & Walter, P. (2015). Essential cell biology. Garland Science.
15. Lodish, H., Berk, A., Kaiser, C. A., Kaiser, C., Krieger, M., Scott, M. P. & Matsudaira, P. (2008). Molecular cell biology. Macmillan.
16. Pollard, T. D., Earnshaw, W. C., Lippincott-Schwartz, J., & Johnson, G. (2016). Cell Elsevier Health Sciences.
17. Verma PS, Agarwal VK. 2016. Cell Biology. S.Chand & Company Pvt. Ltd.
18. <https://archive.nptel.ac.in/courses/102/103/102103012/>
19. <https://archive.nptel.ac.in/course.html>

COURSE OUTCOMES:

On the successful completion of the course, the students will be able to:

- Exhibit a knowledge base in classes of cells and types of cell division.
- Outline a clear and concise idea about cell membrane and cytoskeleton.
- Discuss the properties and functions of the cytoplasmic organelles.
- Illustrate the reactions that comprise energy metabolism.
- Explain the principles and applications of the microscopes.

First Year
Code: CP 1

CORE PRACTICAL I
CELL BIOLOGY
(Practical)

Semester I
Credits: 4

The main objectives of this course are to:

- Study the cells and their enumeration by appropriate techniques.
- Study the different types of cell division.
- Acquire knowledge in subcellular fractionation.

EXPERIMENTS:

1. Microscope – Bright field and Dark field.
2. Structure observation of Prokaryotic cells
3. Structure observation of Eukaryotic cell
4. Enumeration of Prokaryotic cells using Haemocytometer
5. Enumeration of Eukaryotic cells using Haemocytometer
6. Observation – Different types of cells – parenchyma, collenchyma, sclerenchyma, epithelium
7. Size and shape of an organism (prokaryote) – simple staining, use of ocular micrometer
8. Motility of an organism – Hanging drop
9. Cell Staining – Cytochemical methods.
10. Sub cellular fractionation.
11. Osmosis and tonicity
12. Cell division - Mitotic stages - Preparation of Onion Root Tip
13. Cell division - Meiotic stages - Preparation of Tradescantia Flower bud
14. Cell division – Binary fission of yeast
15. Polytene and diplotene chromosome – Chironomid larva

REFERENCES:

1. David A. Thompson. 2011. *Cell and Molecular Biology Lab Manual*. Create Space Independent Publishing Platform'
2. Harley, J., & P Harley, J. (2002). *Laboratory exercises in microbiology*. The McGraw – Hill.
3. Gunasekaran, P. (2007). *Laboratory manual in microbiology*. New Age International
4. <https://youtu.be/Izk1QMg8190>
5. <https://youtu.be/IR5jps-xmzA>

COURSE OUTCOMES:

On the successful completion of the course, the students will be able to:

- Describe the principle and applications of Microscope.
- Demonstrate the observation of different types of cells and their enumeration.
- Illustrate the different types of cell division.
- Outline a clear and concise idea about specialized chromosomes.
- Identify the motility of an organism.

First Year
Code: AC 1

ALLIED COURSE I
BIOCHEMISTRY
(Theory)

Semester I
Credits: 4

COURSE OBJECTIVES:

- Gain knowledge about the structure, properties and functions of biomolecules.
- Provide information about the deficiency manifestation of vitamins and
- Minerals

UNIT – I: STRUCTURE AND CATALYSIS

Water – Properties and significance; Weak Interactions in Aqueous Systems; Ionization of Water, Weak Acids, and Weak Bases; Biological buffer system.

UNIT – II: AMINO ACIDS, ENZYMES AND PROTEINS

Basic structure of amino acids - Peptide bond - Configuration and confirmation; Classification, properties and functions of amino acids; Zwitterion and isoelectric point; Proteins –structure (primary to quaternary).

Enzymes: Biocatalyst – Activation Energy – Active site – Allosteric site – Enzymes mechanism: Lock and Key and induced fit; Enzyme Kinetics – Michaelis and Menten Equation – Sigmoidal curve.

UNIT – III CARBOHYDRATES

Carbohydrates: Definition and classification of carbohydrates; structure, properties and functions: Monosaccharides – Glucose; Disaccharides – Sucrose; Polysaccharides – starch, glycogen and peptidoglycan. Isomerism, anomeric forms and mutarotation.

UNIT – IV LIPIDS

Definition and classification of lipids; Fatty acids – classification, properties and functions; Simple, compound and derived lipids; Structure and functions of phospholipids, glycolipids and steroids.

UNIT – V: NUCLEIC ACIDS

Structure and functions of nucleotides and nucleic acids; DNA – Watson and Crick model, forms and properties; RNA – structure, types and functions (mRNA, tRNA and rRNA).

UNIT – VI: CURRENT CONTOURS (Self-directed learning activities for Continuous Internal Assessments Only)

Students are encouraged to develop scientific knowledge, analytical thinking, research aptitude, communication skills, and lifelong learning (PO1, PO2, PO4, PO5, PO6, PO9, PO10) by undertaking self-directed activities such as preparing concept maps, developing molecular models, reviewing recent research articles, conducting nutritional or health awareness surveys, and presenting reports on the structure, functions, and applications of biomolecules, vitamins, and minerals in biological systems and human health.

Recommended Books, References, and e-Books:

1. Allan Fershi. 1984. Enzyme structure and mechanism. 2nd Edition. W.H. Freeman & Co. Ltd., USA.
2. Trevor Palmer, 1985. Understanding Enzymes. 2nd Edition. Ellis, Horwood Limited.
3. Victor W. Rodwell, David A Bender, Kathleen M. Botham, Peter J. Kennelly and Anthony P. Weli. 2015. Harper's Illustrated Biochemistry 30th Edition. Mc Graw Hill Lange Medical Books.
4. Donald Voet and Judith G.Voet, 2004. Biochemistry. 3rd Edition. John Wiley, New York.
5. <https://nptel.ac.in/courses/102/105/102105034/>
6. https://nptel.ac.in/content/storage2/courses/126104004/LectureNotes/Week-1_06-Carbohydrate.pdf

BIOCHEMISTRY Course Code: AC-1		
S. No.	Course Outcome	Knowledge Level
Upon completion of the course, the students will be able to		
CO1	Explain the classification, structure, properties, and biological significance of carbohydrates, including mono-, di-, homo-, and heteropolysaccharides.	K2
CO2	Describe the classification, properties, and functions of amino acids and explain the structural organization of proteins	K2
CO3	Explain the structure and functions of nucleic acids and distinguish between DNA and different types of RNA.	K3
CO4	Classify lipids and explain the structure, properties, and biological functions of fatty acids, phospholipids, glycolipids, and steroids.	K4
CO5	Explain the sources, functions, daily requirements, and deficiency disorders of vitamins and minerals and evaluate their nutritional significance.	K4

MAPPING WITH PROGRAMME OUTCOMES

- PO Mapping Strategy: The mapping reflects the strong alignment of Knowledge in Life Sciences (PO1), Problem analysis (PO3), and Practical skills / Experimental ability (PO3).
- Mean Calculation: Each CO mean is derived by calculating the average correlation score across all 10 POs. The Overall Mean Score of 2.30 indicates a moderate-to-high level of alignment between the course and the programme outcomes.

First Year ALLIED PRACTICAL COURSE 1 Semester I
Code: ACP 1 BIOCHEMISTRY AND MICROBIOLOGY Credits: **
(Practical)

COURSE OBJECTIVES:

The main objectives of this course are to:

- Impart knowledge of the safety measure for working in Biochemistry
- Laboratory.
- Acquire knowledge about the qualitative analysis of Biochemistry.
- Acquire knowledge about sterilization techniques
- Comprehend the various methods for identification of various types of microorganisms
- Study about the various culture techniques.

EXPERIMENTS:

BIOCHEMISTRY

1. General guidelines and laboratory safety measure for working in Biochemistry Laboratory.
2. Units of volume, weight, density and concentration measurements and their range in biological measurements.
3. Demonstration of proper use of volume and weight measurement devices.
4. Preparation of buffer –titration of a strong acid and a weak base.
5. Qualitative tests for carbohydrates – distinguishing reducing from non-reducing sugars
6. Qualitative analysis of amino acids (Tryptophan, Tyrosine, Arginine, Proline and Histidine)
7. Preparation of starch from potato.
8. Preparation of casein from milk.
9. Preparation of albumin from egg

MICROBIOLOGY

1. Standard Operating Procedure (SOP) and Good Laboratory Practices (GLP)
2. Sterilization – glassware & media – wet, dry & filtration
3. Preparation of Microbiological media
4. Isolation of microorganisms from various samples
5. Counting of microbes – Use of haemocytometer, colony counting
6. Biochemical identification of bacteria – IMViC
7. Staining of bacteria – Simple & differential staining - Gram, spore.
8. Motility Test – Hanging Drop Method
9. Culture Techniques - Pure culture - slant, stab, streak etc.
10. Staining of fungi – Lactophenol Cotton Blue

REFERENCES:

1. Dr. J. Jayaraman, 2011. Manuals in Biochemistry, New Age International Pub, Bangalore.
2. Plummer, 2000. Practical Biochemistry, New Delhi: Tata Mcgraw Hill Publishing Company.
3. S.Sadasivam, V.A Manickam, 2006. Biochemical methods –2 ed New Age International Publishers.
4. Anil Kumar, Sarika Garg and Neha Garg, 2012. Biochemical Tests – Principles and Protocols.
5. Gunasekaran, P. 2009. Laboratory Manual in Microbiology. 1st Edition. New Age International Publishers. Reprint 2009. Delacourt, D 2012. Laboratory Manual for General Microbiology. Lake – Sumter Community College, Leesbug, FL.
6. Brown, A., & Smith, H. (2014). Benson's Microbiological Applications, Laboratory
7. Manual in General Microbiology, Short Version. McGraw-Hill Education.
8. Leboffe, M. J., & Pierce, B. E. (2015). Microbiology: laboratory theory and application. Morton Publishing Company.
9. Atlas, R. M. (2004). Handbook of microbiological media. CRC press.
10. James G. Cappuccino and Natalie Sherman. 2013. Microbiology: A laboratory
11. Manual. 10th Edition. Benjamin Cummings.
12. Arnold L. Demain& Julian E. Davies. 1999. Manual of Industrial Microbiology and Biotechnology. 2nd Edition. ASM press.

BIOCHEMISTRY AND MICROBIOLOGY		
Course Code: ACP-1		
S. No.	Course Outcome	Knowledge Level
Upon completion of the course, the students will be able to		
CO1	Understand the principles, theory and calculations of each experiment.	K2
CO2	Gain hands-on preparation of all the solutions and standardize solutions individually.	K3
CO3	Acquire the concept of pH meter and preparation of Buffer solution.	K3
CO4	Gain practical knowledge about the chromatographic technique.	K3
CO5	Carry out qualitative analysis of carbohydrates and amino acids.	K4
CO6	Demonstrate the different types of sterilization used in microbiological laboratory	K3
CO7	Illustrate the methods used for the isolation and counting of microbes.	K3

C08	Summarise the various staining techniques for the identification of microbes	K2
C09	Apply various biochemical tests for the identification of bacteria	K4

MAPPING WITH PROGRAMME OUTCOMES

- **PO Mapping Strategy:** The Course Outcomes (COs) of the **Biochemistry and Microbiology Practical** course are mapped with the Programme Outcomes (POs) based on the extent to which the laboratory experiments contribute to the development of practical skills, scientific reasoning, analytical ability, research aptitude, and professional competence. The mapping follows a **three-point scale: 3 – High Correlation, 2 – Moderate Correlation, 1 – Low Correlation, and 0 – No Correlation**. The practical course strongly supports **PO1 (Disciplinary Knowledge), PO2 (Critical Thinking), PO3 (Practical Skills), PO4 (Scientific Reasoning), PO5 (Modern Tool Usage), PO6 (Research Aptitude), PO9 (Communication Skills), and PO10 (Lifelong Learning)** by enabling students to perform biochemical analyses, microbiological techniques, laboratory calculations, and bacterial identification using standard laboratory protocols.

- **Mean Calculation:** Each CO mean is derived by calculating the average correlation score across all 10 POs. The Overall Mean Score of 2.60 indicates a moderate-to-high level of alignment between the course and the programme outcomes.

First Year
Code: IDC 1

INTERDISCIPLINARY COURSE 1
UNDERSTANDING BIODIVERSITY
(Theory)

Semester I
Credits: 2

COURSE OBJECTIVES:

1. To understand the concept, levels, and measurement of biodiversity.
2. To describe the ecological, economic, ethical, and cultural importance of biodiversity.
3. To explain the major drivers responsible for biodiversity loss.
4. To identify biodiversity hotspots and species of conservation concern.
5. To describe conservation strategies and legal frameworks for biodiversity protection.
6. To create awareness of emerging trends and tools used in biodiversity conservation.

UNIT I: BIODIVERSITY AND ITS LEVELS

Concept and scope of biodiversity; importance of studying biodiversity. Hierarchical levels of biodiversity: genetic diversity, species diversity, and ecosystem diversity, with simple examples of each.

UNIT II: MEASURING BIODIVERSITY

Species richness and species evenness. Introduction to diversity indices: Shannon-Wiener Index and Simpson's Index (with simple numerical examples). Basic concept of Alpha, Beta, and Gamma diversity.

UNIT III: VALUE OF BIODIVERSITY

Ecosystem services; economic value; ethical and aesthetic value; traditional ecological knowledge and community biodiversity registers. Introduction to biopiracy and indigenous rights.

UNIT IV: THREATS TO BIODIVERSITY

The H.I.P.P.O framework: Habitat loss, Invasive species, Pollution, Population pressure, and Overexploitation. Impact of climate change on biodiversity.

UNIT V: BIODIVERSITY HOTSPOTS

Concept of biodiversity hotspots and mega-diversity regions; Western Ghats and Indo-Burma hotspots. Indicator species, flagship species, and keystone species.

UNIT VI: CONSERVATION AND EMERGING TRENDS

In-situ and ex-situ conservation. Convention on Biological Diversity (CBD); Kunming-Montreal Global Biodiversity Framework; Biological Diversity Act; National Biodiversity Authority. Brief introduction to emerging tools: environmental DNA (eDNA) and DNA barcoding, Artificial Intelligence (AI)/remote sensing/GIS in biodiversity monitoring, ecosystem restoration, and the One Health approach.

UNDERSTANDING BIODIVERSITY		
Course Code: IDC 1		
S. No.	Course Outcome	Knowledge Level
Upon completion of the course, the students will be able to		
CO1	Describe biodiversity at genetic, species, and ecosystem levels.	K2
CO2	Explain and apply basic biodiversity indices such as Shannon-Wiener and Simpson's Index.	K3
CO3	Explain the major drivers of biodiversity loss using the H.I.P.P.O framework.	K2
CO4	Identify biodiversity hotspots and prioritise areas for conservation.	K3
CO5	Describe conservation strategies and relevant legal frameworks.	K2
CO6	Discuss emerging trends in biodiversity conservation, including eDNA, DNA barcoding, AI, and GIS.	K3

MAPPING WITH PROGRAMME OUTCOMES

- **PO Mapping Strategy:** At the undergraduate level, this course primarily aligns with **Disciplinary Knowledge (PO1)**, **Environmental Sustainability (PO7)**, and **Lifelong Learning (PO10)**, with introductory exposure to Problem Solving (PO3) and Ethics (PO6). The syllabus builds foundational knowledge in biodiversity concepts, measurement, and conservation awareness appropriate for a first-degree science student.
- **Mean Calculation:** To be computed by the department from the UG PO–CO correlation matrix; the PG mean score of 2.47 does not carry over, as UG course outcomes are pitched at lower Bloom's knowledge levels (K2–K3) than the parent PG course (K3–K5).