CAUVERYCOLLEGE FOR WOMEN(AUTONOMOUS)

Nationally Accredited with 'A+' Grade by NAAC

TIRUCHIRAPPALLI

PG AND RESEARCH DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

SYLLABUS

2026 -2027 and Onwards

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)
PG AND RESEARCH DEPARTMENT OF MICROBIOLOGY

VISION

Our vision is to encourage eminent research work through the conception of an attractive and vibrant environment to achieve goals of our department.

MISSION

- To impart relevant, ultimate, principle-oriented education and practical expertise in the field of Microbiology.
- To strive to provide quality education conjugated with innovative technology so as to be able to gain technical and educational expertise locally, nationally, internationally.
- Our prime focus is to enrich the ambitions of our students, staff and steer with constructive collaboration towards excellence.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.

PROGRAMME OUTCOMES FOR B.Sc., MICROBIOLOGY PROGRAMME

PONO.	On completion of B.Sc., Microbiology, the students will be able to
PO1	**Academic Excellence and Competence:** Elicit firm fundamental knowledge in theory as well as practical for coherent understanding of academic field to pursue multi and inter disciplinary science careers in future.
PO2	**Holistic and Social approach:** Create novel ideas related to the scientific research concepts through advanced technology and sensitivity towards sustainable Environmental practices as well as social issues.
PO3	**Professional ethics and Team Work:** Explore professional responsibility through projects, internships, field trip/industrial visit and mentorship Programmes to transmit communication skills.
PO4	**Critical and Scientific thinking:** Equip training skills in Internships, Research Projects to do higher studies in multidisciplinary path with higher level of specialization to become professionals of high-quality standards.
PO5	**Social Responsibility with ethical values:** Ensure ethical, social and holistic values in the minds of learners and attain ender parity for building a healthy nation.

PROGRAMME SPECIFIC OUTCOMES FOR B.Sc., MICROBIOLOGY

PSO NO.	Students of B.Sc., Microbiology will be able to	Pos Addressed
PSO1	Improve their knowledge on the basic concepts for retaining competence and confidence which enables them to develop interest in the new arena of Microbiology	PO1, PO5
PSO2	Acquire expertise in practical work within dependent equipment Handling skill along with collection and interpretation of scientific data	PO2, PO3
PSO3	Legitimize knowledge by emerging multiple aspects of current research.	PO3, PO5
PSO4	Pursue the importance of substantial original Research to meet the current and future expectation.	PO4, PO1
PSO5	Beware of the ethical issues for the benefit of the society by adding skilled scientific work for across the country.	PO5, PO2

CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)

DEPARTMENT OF MICROBIOLOGY

B.Sc MICROBIOLOGY

CHOICE BASED CREDIT SYSTEM-LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (CBCS - LOCF)

(For the candidates admitted from the academic year 2026-2027 and onwards)

Semester	Part	Course	Course Title	Course Code	Inst. Hrs. /	Credits	Exam			Total
							Hrs.	Marks		
								Int	Ext	
I	I	Ability Enhancement Course – I (AEC - I)	Pothu Tamil - I	26ULT1	6	3	3	30	70	100
			Hindi Language & Literature - I	26ULH1						
			Basic French - I	26ULF1						
			Sanskrit Prose and Vocabulary	26ULS1						
	II	Ability Enhancement Course – II (AEC - II)	General English - I	26UE1	6	3	3	30	70	100
	III	Core Course – I(CC-I)	General Microbiology	26UMB1CC1	5	5	3	30	70	100
		Core Practical - I (CP-I)	General Microbiology (P)	26UMB1CP1	3	3	3	40	60	100
		Allied Course- I (AC-I)	Biochemistry - I	26UMB1AC1	3	3	3	30	70	100
		Allied Course Practical-I (ACP-I)	Biochemistry - I(P)	26UMB1ACP1	3	3	3	40	60	100
	IV	Ability Enhancement Compulsory Course-I (AECC-I)	Value Education	26UGVE	2	2	-	100	-	100
		Ability Enhancement Compulsory Course-II (AECC-II)	Cyber Security	26UGCS	2	2	-	100	-	100
	Total				**30**	**24**				**800**
II	I	Ability Enhancement Course – III (AEC - III)	Pothu Tamil - II	26ULT2	6	3	3	30	70	100
			Hindi Language & Literature - II	26ULH2						
			Basic French - II	26ULF2						
			Sanskrit Poetry and Grammar - I	26ULS2						
	II	Ability Enhancement Course – IV (AEC - IV)	General English - II	26UE2	6	3	3	30	70	100
	III	Core Course – II (CC-II)	Microbial Physiology	26UMB2CC2	5	5	3	30	70	100
		Core Practical - II (CP-II)	Microbial Physiology (P)	26UMB2CP2	3	3	3	40	60	100
		Allied Course- II (AC-II)	Biochemistry - II	26UMB2AC2	3	3	3	30	70	100
		Allied Course Practical-I(ACP-II)	Biochemistry - II (P)	26UMB2ACP2	3	3	3	40	60	100
	IV	Ability Enhancement Compulsory Course-III (AECC-III)	Environmental Science	26UGES	2	2	-	100	-	100
		Ability Enhancement Compulsory Course-IV (AECC-IV)	Innovation and Entrepreneurship	26UGIE	2	2	-	100	-	100
	Extra Credit Course #		SWAYAM	As per UGC Recommendation						
	Total				**30**	**24**				**800**

III	I	Ability Enhancement Course – V (AEC - V)	Pothu Tamil - III	26ULT3	6	3	3	30	70	100
			Hindi Language & Literature - III	26ULH3						
			Intermediate French - I	26ULF3						
			Sanskrit Didactics, Alankara and Grammar - II	26ULS3						
	II	Ability Enhancement Course – VI (AEC - VI)	Learning Grammar through Literature - I	26UE3	6	3	3	30	70	100
	III	Core Course–III (CC-III)	Introductory Virology	26UMB3CC3	6	5	3	30	70	100
		Core Practical -III(CP-III)	Introductory Virology (P)	26UMB3CP3	3	3	3	40	60	100
		Allied Course- III (AC-III)	Biostatistics	26UMB3AC3	4	3	3	30	70	100
		Allied Course Practical-III (ACP-III)	Biostatistics (P)	26UMB3ACP3	3	3	3	40	60	100
	IV	Interdisciplinary Course- I (ID-I)	Introduction to NCC@	26UNC3ID1	2	2	2	-	100	100
			Mushroom Technology	26UMB3ID1			3	30	70	
			Basic Tamil – I	26ULC3BT1						
			Special Tamil – I	26ULC3ST1						
		Ability Enhancement Compulsory Course-V (AECC-V)	Health and Wellness *	26UGHW	2*	1	-	100	-	100
	Extra Credit Course #		SWAYAM	As per UGC Recommendation						
	Total				**30**	**23**				**800**
IV	I	Ability Enhancement Course – VII (AEC - VII)	Pothu Tamil - IV	26ULT4	6	3	3	30	70	100
			Hindi Language & Literature - IV	26ULH4						
			Intermediate French - II	26ULF4						
			Sanskrit Drama and Grammar - III	26ULS4						
	II	Ability Enhancement Course – VIII (AEC - VIII)	Learning Grammar through Literature - II	26UE4	6	3	3	30	70	100
	III	Core Course – IV(CC-IV)	Immunology	26UMB4CC4	5	5	3	30	70	100
		Core Practical - IV(CP-IV)	Immunology (P)	26UMB4CP4	3	3	3	40	60	100
		Allied Course- IV (AC-IV)	Bioinformatics	26UMB4AC4	3	3	3	30	70	100
		Allied Course Practical-IV (ACP-IV)	Bioinformatics (P)	26UMB4ACP4	3	3	3	40	60	100
	IV	Interdisciplinary Course- II (ID-II)	Specialisation in Army@	26UNC4ID2	2	2	2	-	100	100
			Bio fertilizer Technology	26UMB4ID2			3	30	70	
			Basic Tamil – II	26ULC4BT2						
			Special Tamil – II	26ULC4ST2						
		Skill Enhancement Course – I (SEC-I)	Medical Laboratory Technology (P)	26UMB4SEP1	2	2	3	40	60	100
	Extra Credit Course #		SWAYAM	As per UGC Recommendation						
	Total				**30**	**24**				**800**

30 Days INTERNSHIP during Semester Holidays										
V	III	Core Course – V(CC-V)	Medical Microbiology	26UMB5CC5	6	5	3	30	70	100
		Core Course – VI (CC-VI)	Agricultural and Environmental Microbiology	26UMB5CC6	6	5	3	30	70	100
		Core Practical- V(CP-V)	Medical Microbiology (P)	26UMB5CP5	3	3	3	40	60	100
		Core Practical – VI(CP-VI)	Agricultural and Environmental Microbiology (P)	26UMB5CP6	3	3	3	40	60	100
		Internship *	Internship	26UMB5INT	-	2	-	20	80	100
		Discipline Centric Elective Course– I (DCEC-I)	A. Molecular Biology	26UMB5DCE1A	5	4	3	30	70	100
			B. Medical Parasitology	26UMB5DCE1B						
			C. Diagnostic Microbiology	26UMB5DCE1C						
		Discipline Centric Elective Course– II (DCEC-II)	A. Organic Farming	26UMB5DCE2A	5	4	3	30	70	100
			B. Microbial Biotechnology	26UMB5DCE2B						
			C. Microbial Ecology	26UMB5DCE2C						
		Ability Enhancement Compulsory Course-VI(AECC-VI)	Introduction to Disaster Management	26UGDM	2	2	-	100	-	100
		Extra Credit Course #	SWAYAM	As per UGC Recommendation						
	Total				**30**	**28**				**800**
VI	III	Core Course – VII(CC-VII)	Food and Dairy Microbiology	26UMB6CC7	6	5	3	30	70	100
		Core Course – VIII(CC-VIII)	Fermentation Technology	26UMB6CC8	5	5	3	30	70	100
		Core Practical –VII(CP-VII)	Food and Dairy Microbiology (P)	26UMB6CP7	3	3	3	40	60	100
		Core Practical –VIII(CP-VIII)	Fermentation Technology (P)	26UMB6CP8	3	3	3	40	60	100
		Discipline Centric Elective Course– III (DCEC-III)	A. Biological Techniques	26UMB6DCE3A	5	4	3	30	70	100
			B. Bioethics and IPR	26UMB6DCE3B						
			C. Microbial Nanotechnology	26UMB6DCE3C						
		Project	Project Work	26UMB6PW	5	3	-	20	80	100
	IV	Skill Enhancement Course – II (SEC-II)	Professional Competency- General Studies for Competitive Examinations	26UCH6SE2	2	2	2	-	100	100
		Ability Enhancement Compulsory Course-VII (AECC-VII)	Gender Studies	26UGGS	1	1	-	100	-	100
	V	Extension Activity *		26UGEA	-	1	-	-	-	-
				Total	**30**	**27**				**800**
				Grand Total	**180**	**150**				**4800**

- **@ NCC is one of the choices in GEC. Only the NCC cadets are eligible to chooses this course. However, NCC Course is a Compulsory Course for the NCC Cadets. If the Cadet has not studied Tamil in the school level, she has to take Basic Tamil Course.**
- ***Shall be outside instruction hours**
- **# Should complete a minimum of one Extra Credit Course from Semester II onwards**

DEPARTMENT OF MICROBIOLOGY
B.Sc MICROBIOLOGY
CHOICE BASED CREDIT SYSTEM-LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (CBCS - LOCF)
(For the Candidates admitted from the Academic year 2026-2027 and onwards)

Curriculum Structure

Courses & Credits for UG Science Programmes

Part	Course	No. of Courses	Hours	Credits	Total Credits
I	Ability Enhancement Course	4	6	12	12
II	Ability Enhancement Course	4	6	12	12
III	Core (Theory) Core (Practical)	8 8	5/6 3	8*5=40 8*3=24	**105**
	Project Work	1	5	3	
	Internship	1	-	2	
	Minor Courses	8	4/3	8*3=24	
	DCEC	3	5	3*4=12	
IV	IDC	2	2	2*2=4	20
	SEC	2	2	2*2=4	
	AECC-I -Value Education	1	2	2	
	AECC-II Cyber Security	1	2	2	
	AECC-III- Environmental Science	1	2	2	
	AECC-IV-Innovation and Entrepreneurship	1	2	2	
	AECC-V- Health and Wellness	1	-	1	
	AECC-VI - Introduction to Disaster Management	1	2	2	
	AECC-VII Gender Studies	1	1	1	
V	Extension Activities		-	1	01
		48		150	**150**

Semester: I	Internal Marks: 30	External Marks: 70		
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs./ Week**	**CREDITS**
26UMB1CC1	**GENERAL MICROBIOLOGY**	**CORE COURSE - I**	**5**	**5**

Course Objectives

- Recall the historical development and major milestones in the field of Microbiology.
- Explain the size, shape, and morphology of microorganisms using different microscopic techniques.
- Apply the basic concepts of structure and characteristics of bacteria and viruses in identifying microbial features.
- Differentiate and classify bacteria based on the principles of systematic classification.
- Demonstrate and evaluate various techniques and technologies used for microbial cultivation under laboratory conditions.

S. No.	Course Features	Relevance Status
1.	Course emphasis on Employability/Entrepreneurship/Skill Development	Employability, Skill Development
2.	Course integrates cross-cutting issues relevant to Professional Ethics/Gender sensitization/Environment and Sustainability/Human Values/ Indian Knowledge Systems	Environment and Sustainability
3.	Course relevant to Local/Regional/National/Global needs	Global Needs
4.	Course focus on Sustainable Developmental Goals	SDG 3, 4, 12

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Recite the Development of Microbiology	K1 & K2
CO2	Explain the Size and Shape of Microorganisms using Microscope	K3
CO3	Illustrate the knowledge about Bacteria and Viruses	K4
CO4	Revise the systematic classification of bacteria	K5
CO5	Apply various technology for microbial cultivation	K5

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	3	3	2	2	3	2	3
CO2	3	3	2	3	3	2	2	3	3	3
CO3	2	3	3	2	3	3	3	2	3	3
CO4	2	3	3	3	2	2	2	3	2	2
CO5	2	2	2	2	2	2	2	2	1	1

"1"– Slight (Low) Correlation "2"– Moderate (Medium) Correlation
"3"– Substantial (High) Correlation "-"– Indicates there is no Correlation

Syllabus

UNIT	CONTENT	HOURS	COS	COGNITIVE LEVEL
I	**Introduction of Microbiology** Definition, scope and History of Microbiology-theories of spontaneous generation. Domain and kingdom concepts. Microscopy: Principles and applications of brightfield, dark field, phase contrast, fluorescent SEM and TEM.	15	CO1, CO2, CO3, CO4	K1, K2, K3, K4
II	**Cell Structure** Difference between prokaryotic and eukaryotic microorganisms. Bergey's manual of systemic bacteriology. Structural organization of bacteria – Size, shape and arrangement of bacterial cells - Ultrastructure of a bacterial cell - cell wall, cell membrane, ribosomes, nucleoid, slime, capsule, flagella, fimbriae, spores, cysts, plasmid, mesosomes and cytoplasmic inclusions.	15	CO1, CO2, CO3, CO4	K1, K2, K3, K4
III	**General characteristics of microbes** Nature of Archaeobacteria, Cyanobacteria, Mycoplasma, Rickettsiae, Chlamydia, Spirochaetes, Actinobacteria, Protozoa, Algae, Fungi, lichens and Viruses. Basic understanding of classification of viruses -ICTV, algae - Fritch, fungi –Alexopoulos and protozoa.	15	CO1, CO2, CO3, CO4	K1, K2, K3, K4
IV	**Sterilization Techniques** Physical methods of Sterilization - Moist heat, dry heat and filtration and radiation – Chemical methods of sterilization – phenolics, alcohols, heavy metals, aldehydes and gaseous chemicals. Antimicrobial chemotherapy – Mode of action of antibiotics. Factors affecting the growth of microorganisms.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
V	**Culture media** – Types of Medium, simple, enriched, enrichment, selective, differential and transport medium. Classification medium. Common ingredients of culture media – peptone Sodium chloride, yeast extract beef extract and agaragar. Pure culture techniques – Serial dilution, pour plate, spread plate and streak plate technique. Aerobic and Anaerobic culture techniques. Preservation of microorganisms.	15	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **(Not to be included for External Examination)** Microscopic operations, Criteria for Classification of Microorganisms, cellular organizations, Isolation and identification of Microorganisms.	-	CO2, CO3, CO4 CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. Joanne M. Willey, Linda M. Sherwood and Christopher J. Woolverton (2020). Prescott's Microbiology, 11th Edition, McGraw Hill.
2. Michael T. Madigan, Kelly S. Bender, Daniel H. Buckley and W. Matthew Sattley (2021). Brock Biology of Microorganisms, 16th Edition, Pearson.
3. Gerard J. Tortora, Berdell R. Funke and Christine L. Case (2022). Microbiology: An Introduction, 13th Edition, Pearson.
4. Patrick R. Murray, Ken S. Rosenthal and Michael A. Pfaller (2021). Medical Microbiology, 9th Edition, Elsevier.
5. Ananthanarayan and Paniker (2021). Textbook of Microbiology, 11th Edition, Universities Press.

Reference Books

1. Whitman, W.B. (2022). Bergey's Manual of Systematics of Archaea and Bacteria, Wiley.
2. James M. Jay, Martin J. Loessner and David A. Golden (2020). Modern Food Microbiology, 8th Edition, Springer.
3. Larry L. Barton and Diana E. Northup (2021). Microbial Ecology, 3rd Edition, Wiley-Blackwell.
4. Geoffrey M. Gadd (2021). Fungi in Biogeochemical Cycles, Cambridge University Press.
5. Nicklin, J., Graeme-Cook, K., Paget, T. and Killington, R. (2020). Instant Notes in Microbiology, 4th Edition, Garland Science.

Web References

1. https://openstax.org/books/microbiology/pages/1-3-types-of-microorganisms?utm_source=chatgpt.com
2. https://bio.libretexts.org/Bookshelves/Microbiology/Microbiology_%28Bruslind%29/01%3A_Introduction_to_Microbiology?utm_source=chatgpt.com
3. https://www.learninsta.com/microbiology/?utm_source=chatgpt.com
4. https://sites.google.com/view/microbiology-bcs/digital-class/courses/bsc-i-sem-i?utm_source=chatgpt.com
5. https://courseware.cutm.ac.in/courses/fundamentals-of microbiology/?utm_source=chatgpt.com

Pedagogy

Chalk and talk, Power Point Presentation, Quiz, Assignments, Group Discussions, Seminar, and Assignment.

Course Designer

Dr.N.Sathammai Priya

Semester: I	Internal Marks: 40		External Marks: 60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs./Week**	**CREDITS**
26UMB1CP1	**GENERAL MICROBIOLOGY (P)**	**CORE PRACTICAL - I**	**3**	**3**

Course Objective

- To understand the rules and procedures to be observed in a laboratory.
- To know and familiarize with equipment and apparatus used in microbiology practical exercises.
- To familiarize and understand the parts and use of microscopes.
- To appreciate the abundance and diversity of microorganisms in different habitats

S.No	Course Features	Relevance Status
1.	Course emphasis on Employability/Entrepreneurship/Skill Development	Entrepreneurship, Skill Development
2.	Course integrates cross-cutting issues relevant to Professional Ethics/Gender sensitization/Environment and Sustainability /Human Values/ Indian Knowledge Systems	Professional Ethics
3.	Course relevant to Local/Regional/National/Global needs	Global Needs
4.	Course focus on Sustainable Developmental Goals	SDG 3, 4,9,15

Course Outcome

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Recall the safety practice in microbiological laboratory	K1
CO2	Demonstrate the pure culture technique	K2
CO3	Choose the microscopic techniques and staining methods	K3
CO4	Analyze the preparation of different media	K4
CO5	Discuss about different microorganisms in different media	K5

Mapping of CO with PO and PSO

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Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	3	3	3	3	2	3
CO2	2	3	2	2	2	3	3	2	3	3
CO3	3	2	3	3	2	2	3	3	3	2
CO4	3	3	3	3	3	3	3	2	2	3
CO5	2	3	2	2	3	3	2	3	2	2

"1"–Slight (Low) Correlation "2" – Moderate(Medium) Correlation

"3"–Substantial (High) Correlation "-" – Indicates there is no correlation

Syllabus

1. Safety & Good laboratory practices
2. Basic concepts of Microscope and its operation
3. Principles and operations of Basic instruments
    a) Autoclave
    b) Hot Air Oven
    c) Incubator
    d) Laminar Air Flow chamber
    e) Colony counter
    f) Centrifuge
    g) pH meter
    h) Colorimeter
    i) Spectrophotometer
4. Cleaning and sterilization of glassware.
5. Preparation of culture media
    a) Solid media
    b) Semi-solid media
    c) Liquid media
6. Demonstration of ubiquitous nature of microorganisms.
7. Measurement of size of microbes – micrometry.
8. Isolation of Microbes
    a) Bacteria
    b) Actinobacteria
    c) Fungi
    d) Algae
    e) Cyanobacteria.
9. Enumeration of bacterial numbers
    a) Viable count (Plate count)
    b) Total count (Haemocytometer count)
10. Pure culture techniques
    a) Streak plate
    b) Pour plate
    c) Spread plate
11. Test for motility of bacteria – Hanging drop method
12. Staining techniques
    a) Simple staining
    b) Gram's staining
    c) Spore-staining
    d) Capsular staining
    e) Lactophenol Cotton Blue staining
13. Observation of permanent slides to study the structural characteristics of
    a) Algae - Anabaena, Nostoc, Spirulina, Oscillatoria
    b) Fungi - Rhizopus, Saccharomyces, Penicillium, Aspergillus
    c) Protozoa - Entamoeba histolytica and Plasmodium spp.

Text Books

1. D.R. Arora, Bharti Arora (2023). Practical Microbiology (2nd edition). CBS Publishers and Distributors Pvt. Ltd. India.
2. Saha, R (2022). Microbiology Practical Manual (2nd edition) CBS Publishers & Distributors Pvt. Ltd. India.
3. Das, S (2020). Microbiology Practical Manual (1st edition) CBS Publishers & Distributors Pvt. Ltd. India.
4. Gunasekaran, P. (2018). Laboratory manual in Microbiology. New Age International Ld., Publishers, New Delhi.
5. R C Dubey and D K Maheswari (2010). Practical Microbiology. S. Chand Publishing house, India.
6. James G Cappucino and N. Sherman (2013). A lab manual Benjamin Cummins, New York.

Reference Books

1. Atlas.R (1997). Principles of Microbiology, 2nd Edition, Wm.C. Brown publishers.
2. Amita J, Jyotsna A and Vimala V (2018). Microbiology Practical Manual. (1st Edition). Elsevier India
3. Talib VH (2019). Handbook Medical Laboratory Technology. (2nd Edition). CBS
4. Wheelis M, (2010). Principles of Modern Microbiology, 1st Edition. Jones and BartlettPublication.
5. Lim D. (1998). Microbiology, 2nd Edition, WCB McGraw Hill Publications.

Web References

1. http://www.biologydiscussion.com/micro-biology/sterilisation-and-disinfection-methods-and- principles-microbiology/24403.
2. https://www.ebooks.cambridge.org/ebook.jsf?bid=CBO9781139170635
3. https://www.grsmu.by/files/file/university/cafedry//files/essential_microbiology.pdf
4. https://microbiologyinfo.com/top-and-best-microbiology-books/

Pedagogy

Chalk and talk, Power Point Presentation and Group Discussions

Course Designer

Dr. S. Jeyabharathi

Semester I	Internal Marks: 30	External Marks: 70		
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs./Week**	**CREDITS**
26UMB1AC1	**BIOCHEMISTRY-I**	**ALLIED COURSE-I**	**3**	**3**

Course Objectives

- Explain the structure, classification, and biological functions of major biomolecules
- Describe the chemical structure and properties of proteins and amino acids.
- Discuss the functions, sources, and deficiency disorders of lipids and vitamins.
- Analyze the metabolic disorders associated with carbohydrates, lipids, and proteins.

S. No	Course Features	Relevance Status
1.	Course emphasis on Employability/Entrepreneurship/Skill Development	Employability, Skill Development
2.	Course integrates cross-cutting issues relevant to Professional Ethics/Gender sensitization/Environment and Sustainability/Human Values/ Indian Knowledge Systems	Environment and Sustainability
3.	Course relevant to Local/Regional/National/Global needs	Global Needs
4.	Course focus on Sustainable Developmental Goals	SDG 3, 4, 12

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Recall and explain the basic structure and classification of biological macromolecules.	K1 & K2
CO2	Explain the functions of carbohydrates, proteins, lipids, and nucleic acids.	K3
CO3	Differentiate and categorize vitamins based on their properties and functions.	K4
CO4	Analyze the role of macromolecules in metabolism and disease conditions.	K5
CO5	Evaluate and illustrate the significance of biological macromolecules in health, biotechnology, and industry.	K6

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	3	3	2	2	3	2	3
CO2	3	3	2	3	3	2	2	3	3	3
CO3	2	3	3	2	3	3	3	2	3	3
CO4	2	3	3	3	2	3	2	3	3	3
CO5	2	2	2	2	2	2	2	1	1	1

"1"– Slight (Low) Correlation "2"– Moderate (Medium) Correlation

"3"– Substantial (High) Correlation "-"– Indicates there is no Correlation

Syllabus

UNIT	CONTENT	HOURS	COS	COGNITIVE LEVEL
I	**Carbohydrates**: Definition, sources, classification monosaccharide, disaccharide, oligosaccharide and Polysaccharide, biological role of cellulose, chitin, inulin, starch and glycogen	9	CO1, CO2, CO3, CO4	K1, K2, K3, K4
II	**Proteins**: Definition, sources, classification and structure of proteins – primary structure- peptide bond and its characteristics-secondary structure – alpha helix and beta-plated sheets, tertiary structure: Myogloblin, Quarternary structure - Hemoglobulin, Amino acids – classification based on its side chains	9	CO1, CO2, CO3, CO4	K1, K2, K3, K4
III	**Lipids:** Definition, Properties, Sources Classification of lipids. Fatty acids-Introduction, classification, nomenclature, structure and properties of saturated and unsaturated, essential, nonessential fatty acids. Biological significance of lipids	9	CO1, CO2, CO3, CO4	K1, K2, K3, K4
IV	**Vitamins:** Definition, sources and functions of Fat soluble vitamins (A, D, E and K) and Water-soluble vitamins (B complex and C).Disorders of vitamin metabolism – Night blindness Ricketts, Scurvy, sterility, beriberi and anemia	9	CO1, CO2, CO3, CO4	K1, K2, K3, K4
V	**Disorders of Metabolism:** Disorders of carbohydrate metabolism: diabetes mellitus hypoglycemia, Disorder of aminoacid metabolism: alkaptonuria, phenylketonuria Disorders of lipid metabolism hyperlipidemia hyperlipoproteinemia and hypercholesterolemia	9	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5
VI	**Self Study for Enrichment** **(Not to be included for External Examination)** Lactose intolerance - Inborn errors in aminoacid metabolism- Atherosclerosis – Myocardial infarction	-	CO1, CO2, CO3, CO4, CO5	K1, K2, K3, K4, K5

Text Books

1. Satyanarayana U & Chakrapani U (2026). Biochemistry, 7th Edition, Elsevier Publishers. (CBME- aligned comprehensive textbook for medical and allied health students)
2. D. M. Vasudevan, S. Sreekumari & K. Vaidyanathan (2026). Textbook of Biochemistry for Medical Students, 11th Edition, Jaypee Brothers Medical Publishers.
3. Rafi MD (2024). Textbook of Biochemistry, 5th Edition, Universities Press (India).
4. Destin Heilman, Stephen Woski, Donald Voet, Judith G. Voet & Charlotte W. Pratt (2024).
5. Fundamentals of Biochemistry, 6th Edition, John Wiley & Sons.
6. Pankaja Naik (2022). Essentials of Biochemistry.*Essentials of Biochemistry*, 3rd Edition,
7. Jaypee Brothers Medical Publishers.

Reference Books

1. R. M. Prasad (2026). Textbook of Biochemistry, 8th Edition, Prasad Book House.
2. P. Ramamoorthy (2026). Textbook of Biochemistry for Allied and Healthcare Students, 3rd Edition, Jaypee Brothers Medical Publishers.
3. Harbans Lal & Ashuma Sachdeva (2024). Textbook of Biochemistry, 5th Edition, CBS Publishers & Distributors – Covers macromolecules, metabolic pathways, clinical correlations and nutrition updated as per latest guidelines.
4. Sheela Tiwari (2024). Textbook of Biochemistry and Biophysics for B.Sc./Nursing, 1st Edition**,** CBS Publishers & Distributors – Tailored biochemistry resource for undergraduate allied science students.
5. Rebecca James Perumcheril (2025). Self Assessment and Review of Biochemistry, 9th Edition**,** Jaypee Brothers Medical Publishers – Exam-oriented practice book with high-yield MCQs and revision material.

Web References

1. https://www.slideshare.net/namarta28/monosaccharides
2. https://www.tuscany- diet.net/proteins/classification/#: ~:text=egg%20yolk%20phosvitin.
3. http://www.Protein%20classification%20based%20on%20shape,two%2 0classes%3A%20 f ibrous%20and%20globular.
4. https://byjus.com/biology/lipids/#:~:text=There%20are%20two%20major%20types,than % 20alcohol%20and%20fatty%20acids.
5. https://www.thoughtco.com/dna-versus-rna-608191

Pedagogy

Chalk and talk, PPT, Discussion, Assignment, Quiz and Seminar.

Course Designer

Dr.N.Pushpa

Semester: I	Internal Marks: 40		External Marks: 60	
COURSE CODE	**COURSE TITLE**	**CATEGORY**	**Hrs./Week**	**CREDITS**
26UMB1ACP1	**BIOCHEMISTRY - I (P)**	**ALLIED COURSE PRACTICAL - I**	**3**	**3**

Course Objectives

- To identify carbohydrates, proteins, and lipids by qualitative tests.
- To estimate glucose and ascorbic acid quantitatively.
- To detect DNA using Diphenylamine method.
- To develop basic biochemical laboratory skills.

S.No	Course Features	Relevance Status
1.	Course emphasis on Employability/Entrepreneurship/Skill Development	Entrepreneurship, Skill Development
2.	Course integrates cross-cutting issues relevant to Professional Ethics/Gender sensitization/Environment and Sustainability/Human Values/Indian Knowledge Systems	Professional Ethics
3.	Course relevant to Local/Regional/National/Global needs	Global Needs
4.	Course focus on Sustainable Developmental Goals	SDG 3, 4,9,15

Course Outcomes

Course Outcome and Cognitive Level Mapping

CO Number	CO Statement On the successful completion of the course, students will be able to	Cognitive Level
CO1	Recall the knowledge about Carbohydrates	K1
CO2	Analyze the constituents of proteins	K2
CO3	Assess the constituents of lipids	K3
CO4	Illustrate the Titrimetric estimation of Carbohydrates	K4
CO5	Apply various colorimetric estimation methods for of Protein, Lipids and DNA	K5

Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	3	3	2
CO2	3	3	3	3	2	1	3	3	3	1
CO3	3	3	1	3	3	3	2	2	2	1
CO4	3	3	2	3	3	3	3	1	3	2
CO5	3	3	3	2	2	3	3	2	2	2

"1"–Slight (Low) Correlation "2" – Moderate (Medium) Correlation

"3"–Substantial (High) Correlation "-" – Indicates there is no correlation

Syllabus (45 Hours)

1. Qualitative analysis of Carbohydrates
2. Qualitative analysis of Proteins
3. Qualitative analysis of Lipids
4. Quantitative analysis of Carbohydrates
5. Quantitative analysis of Proteins
6. Quantitative analysis of Lipids
7. Quantitative analysis of DNA

Reference Books

1. Vasudevan D.M. (2024). Practical Textbook of Biochemistry for Medical Students (4th edition.). Jaypee Brothers Medical Publishers.
2. Jha Pamela (Ed.). (2024). Practical Biochemistry. Bentham Science Publishers.
3. Damodaran Geetha K. (2024). Practical Biochemistry. Jaypee Brothers Medical Publishers.
4. Hussain Khursheed et al. (2024). Techniques for Biochemical Analysis. Elsevier.

Web References

1. https://jaypeebrothers.com/contents/9789356962903.pdf?utm_source=chatgpt.com
2. https://benthambooks.com/book/9789815165852?utm_source=chatgpt.com
3. https://benthamscience.com/public/ebook_volume/3756/?utm_source=chatgpt.com
4. https://microbiologyinfo.com/top-and-best-microbiology-books/
5. https://jaypeebrothers.com/products/9789354655104?utm_source=chatgpt.com

Pedagogy

Chalk and talk, Power Point Presentation and Group Discussions

Course Designer

D**r.B. Thamilmaraiselvi**