



Dr. N.G.P. ARTS AND SCIENCE COLLEGE

(An Autonomous Institution, Affiliated to Bharathiar University, Coimbatore)
Approved by Government of Tamil Nadu & Accredited by NAAC with A++ Grade (3rd Cycle - 3.64 CGPA)
Dr. N.G.P. - Kalapatti Road, Coimbatore - 641048, Tamil Nadu, India
Web: www.drngpasc.ac.in | Email: info@drngpasc.ac.in | Phone: +91-422-2369100

Regulations 2026-27 for Undergraduate Programme

(Outcome Based Education model with Choice Based Credit System)

B.Sc Microbiology Degree

(For the students admitted during the academic year 2026-27)

Programme : Microbiology

Eligibility:

A pass in Higher Secondary Examination with any Academic stream or Vocational stream with Biology/Zoology/Botany /Biotechnology/Microbiology/Life Science as one of the subject and as per the norms set by the Government of Tamil Nadu or an Examination accepted as equivalent thereto by the Academic Council, subject to such conditions as may be prescribed thereto are permitted to appear and qualify for the **Bachelor of Science (Microbiology)** Degree Examination of this College after a course study of three academic years.

Programme Objectives:

The Curriculum is designed to attain the following learning goals which students shall accomplish by the time of their graduation:

1. To inculcate practical knowledge in correlation with the theoretical knowledge.
2. To equip the students to meet the requirements of the current technology in Microbiology.
3. To motivate and train the students in various clinical and industrial sectors.
4. To encourage students to involve in research to explore microorganisms for the betterment of mankind.



PROGRAM OUTCOMES:

On the successful completion of the program, the following are the expected outcomes.

PO Number	PO Statement
PO1	To prepare microbiologists who are competent, creative, and highly valued professionals in academia, industry and private/public sector that is capable of excelling in careers of their choice.
PO2	To impart basic knowledge on the theoretical basis of the tools and techniques and to imbibe and demonstrate the practical skills in microbiology.
PO3	To disseminate knowledge in microbiological discipline and to promote and develop competency in microbiology that have enduring value beyond the classroom.
PO4	To instill a pattern of life-long learning and to translate the potentials of microorganisms to the welfare of biosphere.
PO5	To explore the scope of various branches of microbiology to become an entrepreneur.



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Credit distribution

Credit distribution for all UG programmes

Part	Subjects	No.of Papers	Credit	Semester No.
I (12 Credits)	Tamil / Hindi / French/Malayalam	4	4 x 3 = 12	I & IV
II (12 Credits)	English	4	4 x 3 = 12	I & IV
III (108 Credits)	Core (Credits 2,3,4,5)	17	70	I to VI
	Inter Departmental Course (IDC)	4	16	I to IV
	Discipline Specific Elective (DSE)	3	3 x 4 =12	V & VI
	Skill Enhancement Course (SEC)	4	8	III, IV, V & VI
	Industrial Training	1	2	V
IV (8 Credits)	Environmental Studies (AECC)	1	2	I
	Basic Tamil/ Advance Tamil /Human Rights & Women's Rights (AECC)	1	2	II
	Innovation & IPR/Innovation, IPR & Entrepreneurship (AECC)	1	2	VI
	Generic Elective (GE) (AECC)	1	2	V
V (2 Credits)	NSS/NCC/YRC/RRC/Yoga/Sports/Clubs/Health and Wellness	-	2	I -II
TOTAL CREDITS			142	



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CURRICULUM
B.SC. MICROBIOLOGY
A.Y. 2026-27

Course Code	Course Category	Course Name	L	T	P	Instruction Hours		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
First Semester												
Part - I												
26TLU1TA	Language - I	Tamil-I	4	1	-	5	60	3	25	75	100	3
26TLU1HA		Hindi-I										
26TLU1MA		Malayalam-I										
26TLU1FA		French -I										
Part - II												
26ELU1EA	Language - II	English - I	4	1	-	5	60	3	25	75	100	3
Part -III												
26MBU1CA	Core - I	Fundamentals of Microbiology	3	-	-	3	36	3	25	75	100	3
26MBU1CB	Core - II	Cell Biology	3	-	-	3	36	3	25	75	100	3
26MBU1CP	Core Practical - I	Fundamentals of Microbiology and Cell Biology	-	-	5	5	60	6	40	60	100	2
26BCU1IA	IDC - I	Biochemistry	3	-	-	3	36	3	25	75	100	3
26BCU1IP	IDC Practical - I	Biochemistry	-	-	4	4	48	4	40	60	100	2
Part -IV												
26CEU1AA	AECC-I	Environmental Studies	2	-	-	2	24	-	50	-	50	2
Part -V												
26MBU1XA	Extension Activity	NSS/NCC/YRC/ RRC/ Yoga/Sports	-	-	-	-	-	-	50	-	50	1
Total			19	1	10	30	360				800	22



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Course Code	Course Category	Course Name	L	T	P	Instruction Hours		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
Second Semester												
Part - I												
26TLU2TA	Language - I	Tamil-II	4	1	-	5	60	3	25	75	100	3
26TLU2HA		Hindi-II										
26TLU2MA		Malayalam- II										
26TLU2FA		French - II										
Part - II												
26ELU2EA	Language - II	English - II	4	-	1	5	60	3	25	75	100	3
Part -III												
26MBU2CA	Core - III	Microbial Physiology	4	-	-	4	48	3	25	75	100	4
26MBU2CB	Core - IV	Bioinstrumentation	3	-	-	3	36	3	25	75	100	3
26MBU2CP	Core Practical - II	Microbial Physiology and Bioinstrumentation	-	-	5	5	60	9	40	60	100	2
26CEU2IN	IDC - II	Basic Chemistry	2	-	4	6	72	3	40	60	100	4
Part-IV												
26TLU2AA 26TLU2AB 26CMU2AA	AECC-II	Basic Tamil/ Advanced Tamil/ Human Rights and Women's Rights	2	-	-	2	24	-	50	-	50	2
Part -V												
26MBU2XA	Extension Activity	NSS/NCC/YRC / RRC/Yoga/Sports/ Club/Health and Wellness	-	-	-	-	-	-	50	-	50	1
Total			19	1	10	30	360				700	22



Course Code	Course Category	Course Name	L	T	P	Instruction Hours		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
						Third Semester						
Part -I												
26TLU3TA	Language - I	Tamil-III	3	1	-	4	48	3	25	75	100	3
26TLU3HA		Hindi-III										
26TLU3MA		Malayalam- III										
26TLU3FA		French - III										
Part - II												
26ELU3EA	Language - II	English – III	3	1	-	4	48	3	25	75	100	3
Part -III												
26MBU3CA	Core - V	Microbial Diversity	4	1	-	5	60	3	25	75	100	4
26MBU3CB	Core - VI	Microbial Genetics	3	1	-	4	48	3	25	75	100	3
26MBU3CP	Core Practical - III	Microbial Diversity and Microbial Genetics	-	-	6	6	72	9	40	60	100	3
26MTU3IF	IDC - III	Principles of Biostatistics	4	-	-	4	48	3	25	75	100	4
26MBU3SA	SEC - I	Food and Water Quality Analysis	2	1	-	3	36	3	25	75	100	2
Total			19	4	7	30	360				700	22



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Course Code	Course Category	Course Name	L	T	P	Instruction Hours		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
Fourth Semester												
Part - I												
26TLU4TA	Language - I	Tamil-IV	3	1	-	4	48	3	25	75	100	3
26TLU4HA		Hindi-IV										
26TLU4MA		Malayalam-IV										
26TLU4FA		French -IV										
Part - II												
26ELU4EA	Language-II	English - IV	3	1	-	4	48	3	25	75	100	3
Part - III												
26MBU4CA	Core - VII	Immunology	4	-	-	4	48	3	25	75	100	4
26MBU4CM	Core - VIII	Food Microbiology	2	-	4	6	72	9	40	60	100	4
26MBU4CP	Core Practical - IV	Immunology & Recombinant DNA Technology	-	-	6	6	72	9	40	60	100	3
26BTU4IC	IDC - IV	Bioinformatics	3	-	-	3	36	3	25	75	100	3
26MBU4SA	SEC-II	Recombinant DNA Technology	2	1	-	3	36	3	25	75	100	2
Total			17	2	1	30	360				700	22



Course Code	Course Category	Course Name	L	T	P	Instruction Hours		Exam (h)	Max Marks			Credits
						Week	Total		CIA	ESE	Total	
Fifth Semester												
Part - III												
26MBU5CA	Core - IX	Medical Bacteriology	4	-	-	4	48	3	25	75	100	4
26MBU5CB	Core - X	Virology	4	-	-	4	48	3	25	75	100	4
26MBU5CC	Core - XI	Mycology and Parasitology	4	-	-	4	48	3	25	75	100	4
26MBU5CD	Core - XII	Advanced Diagnostic Microbiology	3	-	-	3	36	3	25	75	100	3
26MBU5CP	Core Practical - V	Medical Microbiology	-	-	6	6	72	9	40	60	100	3
26MBU5SA	SEC-III	Fermentation Technology	2	1	-	3	36	3	25	75	100	2
26MBU5DA	DSE-I	Microbial Product Development	4	-	-	4	48	3	25	75	100	4
26MBU5DB		Dairy Microbiology										
26MBU5DC		Communicable Disease Epidemiology										
26MBU5TA	IT	Industrial Training	-	-	-	-	-	-	40	60	100	2
Part - IV												
	GE		2	-	-	2	24	3	50	-	50	2
Total			23	1	6	30	360				850	28



Course code	Course category	Course name	L	T	P	Instruction Hours		Exam (h)	Max. Marks			Credits
						Week	Total		ESE	CIA	Total	
Sixth semester												
Part III												
26MBU6CA	Core-XIII	Environmental Microbiology	4	-	-	4	48	3	25	75	100	4
26MBU6CB	Core-XIV	Agricultural Microbiology	4	-	-	4	48	3	25	75	100	4
26MBU6CC	Core-XV	Microbial Product Recovery	3	-	-	3	36	3	25	75	100	3
26MBU6CP	Core Practical - VI	Environmental, Agricultural and Industrial Microbiology	-	-	6	6	72	9	40	60	100	3
26MBU6SA	SEC-IV	Pharmaceutical Microbiology	2	1	-	3	36	3	25	75	100	2
26MBU6DA	DSE-II	Phytochemical Drug Discovery	4	-	-	4	48	3	25	75	100	4
26MBU6DB		Entrepreneurial Microbiology										
26MBU6DC		Medical laboratory Techniques										
26MBU6DD	DSE-III	Microbial Fuel Technology	4	-	-	4	48	3	25	75	100	4
26MBU6DE		Quality Management in Microbiology Laboratories										
25MBU6DF		Clinical Research and Trials										
Part IV												
26CIU6AA	AECC-III	Innovation and IPR	2	-	-	2	24	-	50	-	50	2
Total			23	1	6	30	360				750	26
*Grand Total											4500	142



GENERIC ELECTIVE COURSES (GE)

The following are the courses offered under Generic Elective

Semester - V (GE)

S. No.	Course Code	Sem	Course Name
1	26MBU5GA	V	Microbes in Every Day Life

SELF STUDY COURSES

The following are the courses offered under self study

S. No.	Course Code	Sem	Course Name
1	26MBUSSA	III	Medical coding and Transcription
2	26MBUSSB	III	Scientific content writing in Microbiology


 BoS Chairman/HOD
 Department of Microbiology
 Dr. N. G. P. Arts and Science College
 Coimbatore - 641 048

 Dr.N.G.P. Arts and Science Co.		
APPROVED		
BoS- 21/07/2026 02/04/2026	AC -	GB -



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Semester - I CORE I : FUNDAMENTALS OF MICROBIOLOGY							
Semester	Course Code	Course Name	Category	L	T	P	Credits
I	26MBU1CA	FUNDAMENTALS OF MICROBIOLOGY	CORE	36	-	-	3

Preamble	This course has been designed for students to learn and understand - the development of microbiology from early observations to modern science. - observing and differentiating microorganisms in the laboratory. - the economic importance of microorganisms in medicine, industry, agriculture, and biotechnology
Prerequisite	Knowledge on types and characteristics of microorganisms

Course Outcomes (Cos)		
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Analyse historical scientific developments, and apply this knowledge to real-world microbiology contexts.	K2
CO2	Apply microscopy and staining techniques to identify and interpret microorganisms.	K3
CO3	Use appropriate sterilization and disinfection techniques to interpret sterility testing results.	K3
CO4	Develop pure microbial culture and evaluate methods for its maintenance and preservation.	K4
CO5	Critically evaluate the role of selected microorganisms in ecology, industry, and human welfare.	K5

Mapping with Program Outcomes:					
Cos / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	M	S	M
CO2	S	S	S	M	S
CO3	S	S	S	S	S
CO4	S	S	S	M	S
CO5	S	S	S	M	S



26MBU1CA	FUNDAMENTALS OF MICROBIOLOGY
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Syllabus

Unit	Content	Hrs	Resources
I	History and Scope of Microbiology - Spontaneous generation theory and its disproval - Contributions of Leuwenhoek, Louis Pasteur, Robert Koch, Edward Jenner, Joseph Lister, John Tyndall, Selmon A. Waksman, Martinus W.Beijerinck, Elie Metchnikoff, Fannie Eilshmius Hesse, Paul Ehrlich and Alexander Fleming. Scope of Microbiology.	8	Text book Reference Book Journals
II	Microscopy - Principles and application - Bright field, Dark field, Phase contrast, Confocal, Fluorescence, Stereomicroscope, SEM & TEM. Stains - Staining reactions - Types of staining - Simple, Differential (Gram's, Spore, AFB), Capsule and fungal staining.	7	Text book Reference Book
III	Sterilization and Disinfection- Principles- Methods of Sterilization - Physical methods: Dry Heat, Moist heat, Filtration and Radiation. Chemical methods - Formaldehyde, Alcohol, Phenol and Gaseous sterilizing agents. Sterility Testing.	7	Text book Reference Book
IV	Culture Media - Types of Media - Enriched, Selective, Differential and Special Purpose Media, Transport media (Stuart's medium), Media for Anaerobes (Robertson cooked meat medium) and Fungi - Pure culture techniques - Maintenance and Preservation of microbial cultures.	7	Text book Reference Book
V	General characteristics of Fungi, Algae and Protozoa - Morphology, General Characteristics, and economic importance of Fungi (Aspergillus, Penicillium), Algae (Anabena, Spirogyra), Protozoa - (Amoeba and Paramecium). Case Study: A researcher observed that certain mold colonies on his Petriplates inhibited bacterial growth, which ultimately led to the discovery of penicillin. Identify the scientist responsible for this discovery and explain how it transformed the fields of microbiology and medicine.	7	Text book Reference Book
Total		36	

Note: Case studies related to the above topics to be discussed (Examined Internal only)



Text book	1.	Willey, J. M., Sherwood, L. M., & Woolverton, C. J. (2022). <i>Prescott's Microbiology</i> (12th ed.). McGraw Hill.
Reference Books	1.	Salle AJ, 2014, Fundamental Principles of Bacteriology , 7th edition, Tata Mcgraw-Hill Publishing Company & New York, United States.
	2.	Madigan, M. T., Martinko, J. M., Bender, K. S., Buckley, D. H., & Stahl, D. A. (2020). <i>Brock Biology of Microorganisms</i> (16th ed.). Pearson Education.
	3.	Atlas RM. <i>Principles of Microbiology</i> . 2nd ed. Dubuque: William C Brown Publishers; 1996.
	4.	Jeffrey C Pommerville, 2013, Alcamo's Fundamentals of Microbiology , 10th Edition, Blackwell Publications & New Jersey, United States

Journal and Magazines	https://www.the-scientist.com › tag › microbiology
E-Resources and Website	https://usiu-ke.libguides.com/c.php?g=943666&p=6802092

Learning Method	Chalk and Talk/ Assignment/Seminar/ Group Discussion
Focus of the Course	Skill Development/Employability



Semester – I CORE II: CELL BIOLOGY							
Semester	Course Code	Course Name	Category	L	T	P	Credits
I	26MBU1CB	CELL BIOLOGY	CORE	36	-	-	3

Preamble	This course has been designed for students to learn and understand
	- The complexity and harmony of cell structure and functions of prokaryotic and eukaryotic life forms - The cellular changes occur during different phases of life cycle. - To understand the different modes of cellular differentiation and division
Prerequisite	Knowledge on basic of cell

Course Outcomes (Cos)		
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Identify prokaryotic cell structures and relate them to their roles in clinical, industrial, and environmental microbiology practices.	K2
CO2	Relate the structure and functions of Eukaryotic cell organelles to their roles in health, disease, and industrial applications.	K2
CO3	Apply concepts of cell signaling and quorum sensing in disease progression and host-pathogen interactions.	K3
CO4	Investigate intracellular protein transport systems and interpret their significance in therapeutic and biotechnological processes.	K4
CO5	Apply the understanding of mitosis and meiosis in breeding programs and genetic engineering.	K5

Mapping with Program Outcomes:					
Cos / POs	PO1	PO2	PO3	PO4	PO5
CO1	M	M	M	S	S
CO2	S	S	M	M	S
CO3	S	S	S	M	S
CO4	M	S	S	S	M
CO5	S	S	S	S	M



26MBU1CB CELL BIOLOGY

Syllabus

Unit	Content	Hrs	Resources
I	Prokaryotic cell Definition - Shape, arrangement and Size - Cell Organization - Structure and function - Cell wall Gram positive and Gram negative - Cell membrane - Nuclear material - plasmids - ribosomes - inclusion bodies-Flagella - Pili - Capsule - Slime - Endospore formation.	8	Text book Reference Book
II	Eukaryotic cell Eukaryotic Cell Organization - Structure and Function of - Cell wall -Cell membrane - Nucleus (organization of genetic material) - Mitochondria - Endoplasmic reticulum - Ribosomes - Golgi Apparatus -Lysosomes - Extra cellular matrix - Chloroplast & Cytoskeleton - actin filaments, intermediate filaments, microtubules - flagella - cilia	7	Text book Reference Book
III	Cell-cell interactions Cell-cell interactions in eukaryotes - adhesion junctions, tight junctions, gap junctions, and plasmodesmata - Quorum sensing (in prokaryotes) Cell Signaling - Signalling molecules and their receptors Function of cell surface receptors, Cyclic AMP pathway	7	Text book Reference Book
IV	Extracellular protein transport Extracellular protein transport - targeting and insertion of proteins in the ER, export of proteins to Golgi apparatus, Protein sorting and export from Golgi apparatus to Lysosomes	7	Text book Reference Book
V	Cell Division Prokaryotes - Binary fission in Bacteria - Eukaryotic Cell cycle and Cell division - Mitosis: Mitotic Spindle - Centromere - Centrioles (Prophase -Metaphase - Anaphase- Telophase). Meiosis: Stages and Synapsis (Crossing Over) Case Study: A hospital reports reveals that, a sudden rise in device-associated infections in ICU patients. The infections are persistent and do not respond well to standard antibiotics. Find the problem and submit the repost.	7	Text book Reference Book
Total		36	

Note: Case studies related to the above topics to be discussed (Examined Internal only)

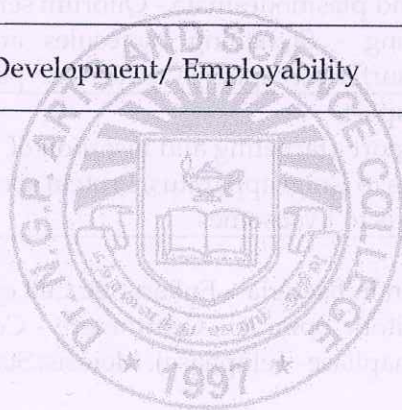


Text book	1.	Joanne Wiley, Linda Sherwood, Christopher J Woolverton, 2020, Prescott's Microbiology, 11th edition, McGraw Hill Company, New Delhi, India
	2.	Karp G, 2016, Cell and Molecular Biology: Concepts and Experiments. 8 th edition. John Wiley & Sons. Inc..
Reference Books	1.	Hardin J, Bertoni G and Kleinsmith LJ, 2010, Becker's World of the Cell, 8 th edition, Pearson, New Delhi, India.
	2.	De Robertis, EDP and De Robertis EMF. 2006, Cell and Molecular Biology, 8 th edition. Lipincott Williams and Wilkins, Philadelphia
	3.	Molecular Biology of the Cell – Bruce Alberts et al., 7 th Edition (2022), Garland Science
	4.	Cooper, G.M. and Hausman, R.E. 2009, The Cell: A Molecular Approach, 5 th Edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA..

Journal and Magazines	https://rupress.org/jcb
E-Resources and Website	http://www.bio-nica.info/Biblioteca/Bolsover2004CellBiology.pdf

Learning Method	Chalk and Talk and Group Discussion
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Focus of the Course	Skill Development/ Employability
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Semester - I							
CORE PRACTICAL -I: Fundamentals of Microbiology and Cell Biology							
Semester	Course Code	Course Name	Category	L	T	P	Credits
I	26MBU1CP	FUNDAMENTALS OF MICROBIOLOGY AND CELL BIOLOGY	CORE		-	60	2

Preamble	This course has been designed for students to learn and understand • Develop fundamental laboratory skills in microbiology and cell biology. • Perform culture, isolation, enumeration, and staining techniques. • Understand microscopic observation of microorganisms.
Prerequisite	Basic knowledge of microbiology and fundamental laboratory skills.

Course Outcomes (Cos)		
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Prepare contamination-free culture media and cleaning solutions for microbiological experiments.	K2
CO2	Obtain and quantify pure microbial cultures from samples.	K3
CO3	Identify, differentiate, and interpret bacterial and fungal cells.	K3
CO4	Apply appropriate preservation methods for long-term use of microbial cultures.	K4
CO5	Design and carry out experiments for isolation and analysis of microorganisms from environmental samples	K5

Mapping with Program Outcomes:					
Cos / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M
CO2	S	S	S	S	S
CO3	S	M	S	S	S
CO4	M	S	S	S	S
CO5	S	S	S	S	S



26MBU1CP	FUNDAMENTALS OF MICROBIOLOGY AND CELL BIOLOGY
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S. No**List of Programs**

- 1 Preparation of cleaning solutions - Detergent-Based
- 2 Media preparation - Nutrient Broth, Nutrient Agar (Plate, Deep, Slant and semisolid media)
- 3 Preparation of differential medium and selective medium
- 4 Decimal Dilution Technique.
- 5 Pure culture techniques - Streak plate, Pour plate and Spread plate method.
- 6 Isolation and Enumeration of bacteria, fungi and actinomycetes from soil.
- 7 Bacterial staining Techniques - Simple Staining & Differential staining - Gram's Staining, Acid Fast, Capsule and Spore staining.
- 8 Fungal staining - Lacto phenol Cotton Blue Mount.
- 9 Slide culture Technique (DBT Star Scheme).
- 10 Fungal Cell Observation by Stereo Microscope (DBT Star Scheme).
- 11 Screening of PHB production (DBT Star Scheme).
- 12 Microscopic studies of cell organelles - Plant and Animal cells.
- 13 Observation of permanent slide for stages of mitosis and meiosis, Algae, Fungi and Protozoa.

Text Books	1.	Aneja. K.R. 2023. Experiments in Microbiology, plant pathology and biotechnology, 6 th Edition. New age publishers.
	2.	James.C.Cappuccino. 2019. Microbiology A laboratory manual. 12 th edition, Pearson education publishers.
	3.	Kannan, N. 2003. Hand book of Laboratory culture media. 1 edition, Panima publishing house.

Learning Method

Demonstration/ Hands on Experiments

Focus of the Course

Skill Development/ Employability



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B.Sc. Microbiology (Students admitted during the AY 2026-27)

Semester - I
IDC : BIOCHEMISTRY

Semester	Course Code	Course Name	Category	L	T	P	Credits
I	26BCU1IA	BIOCHEMISTRY	IDC	36	-	-	3

Preamble	This course has been designed for students to learn and understand • The structure and properties of carbohydrates and lipids. • The structure and properties of amino acids, proteins and nucleic acids. The essentials of minerals and vitamins and role of hormones.	
Prerequisite	Knowledge on biological sciences	
Course Outcomes (COs)		
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Outline carbohydrate structure, classification and function.	K3
CO2	Know the structure and properties of lipids.	K1
CO3	Understand the structural and functional aspects of amino acids and proteins.	K3
CO4	Describe the structure, types and properties of nucleic acids.	K2
CO5	Understand the types and significance of vitamins, minerals and hormones.	K3

Mapping with Program Outcomes:

COs / POs	PO1	PO2	PO3	PO4	PO5
CO1	✓	✓		✓	✓
CO2	✓	✓		✓	✓
CO3	✓	✓		✓	✓
CO4	✓	✓	✓	✓	✓
CO5	✓	✓	✓	✓	✓



26BCU1IA - Biochemistry

Syllabus

Unit	Content	Hours	E-Contents / Resources
I	Carbohydrates – classification, structure, properties and chemical reactions of monosaccharide – Glucose, Fructose, Galactose, Mannose, Arabinose. Disaccharides – Maltose, Lactose and Sucrose. Polysaccharides – Homo polysaccharides – Starch, Glycogen and Cellulose and Hetero polysaccharides – Hyaluronic acid, Heparin, Chondroitin sulphate and Bacterial cell wall polysaccharides.	08	Text Book
II	Lipids -Definition, classification of lipids, physiochemical properties. Storage lipids – types. Structural lipids – phospholipids, glycolipids and sphingolipids. Structure and biological role of cholesterol.	06	Reference Book
III	Aminoacids - Classification of amino acids, general properties, non protein amino acids. Peptide bond – structure and conformation, Proteins - classification and physiochemical properties. Organization of protein Structure– Primary, secondary tertiary, quaternary structure and Protein denaturation.	07	Text Book
IV	Nucleic acids - Structures of Purines, Pyrimidines, Nucleoside and Nucleotides. Properties of nucleic acids. DNA - Double helical structure, Isoforms of DNA Denaturation and Renaturation. RNA – Types structure and function. Enzymes - Concepts of enzymes, classification, characteristic features, coenzymes, cofactors clinical and industrial applications.	08	NPTEL
V	Micronutrients - Minerals in biological system and their importance – Iron, calcium, phosphorous, iodine, copper, zinc. Vitamins – Definition, classification -Fat soluble Vitamins - A, D, E and K. Water Soluble vitamins –Vitamin B Complex, Vitamin C- sources, functions and deficiencies. Hormones involved in regulatory metabolism-Insulin, Glucagon and Thyroid hormones.	07	You Tube Videos
	Total	36	



Text Book	1.	Satyanarayana U and Chakrapani U, 2013, "Biochemistry", 4rth Edition, , Elsevier, India.
Reference Books	1.	[Deb AC, 2001, "Fundamentals of Biochemistry", 7th Edition New central Agency, Calcutta.]
	2.	[Cooper, G M and Hausman R E, 2013, The cell: A Molecular Approach, 6th Edition, Sinauer Associates, Inc.Publishers, Sunderland, Massachusetts.]
	3.	[DM. Vasudevan, Sreekumari S., Kannan Vaidyanathan , 2019. Textbook Of Biochemistry For Medical Students, 9th Edition, Jaypee Brothers Medical Publishers, India].
	4.	Jain J L, Jain S and Jain N, 2012, "Biochemistry", 1st Edition, S. Chand and Company Pvt Ltd, New Delhi..

Journal and Magazines	https://ocw.mit.edu/courses/5-07sc-biological-chemistry-i-fall-2013/pages/module-i/
E-Resources and Website	https://www.khanacademy.org/search?page_search_query=biochemistry

Learning Method	Chalk and Talk/Assignment/Seminar
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Focus of the Course	Skill Development/Employability
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Semester – I IDC PRACTICAL -I: Biochemistry							
Semester	Course Code	Course Name	Category	L	T	P	Credits
I	26BCU1IP	Biochemistry	IDC		-	48	2

Preamble	This course has been designed for students to learn and understand • Fundamental knowledge and hands-on experience in the qualitative and quantitative analysis of carbohydrates, amino acids, and proteins. • Different classes of biomolecules such as monosaccharides, disaccharides, polysaccharides, and amino acids, along with estimation techniques
Prerequisite	Basic knowledge of Biochemical analysis.

Course Outcomes (Cos)		
CO Number	Course Outcomes (COs) Statement	Bloom's Taxonomy Knowledge Level
CO1	Explain the principles involved in qualitative analysis of carbohydrates, amino acids, and proteins.	K2
CO2	Perform standard biochemical tests to identify monosaccharides, disaccharides, polysaccharides, and amino acids.	K3
CO3	Apply appropriate methods to estimate acid number, iodine number, and quantify biomolecules using standard procedures.	K3
CO4	Analyze experimental results to differentiate between various biomolecules based on their chemical properties.	K4
CO5	Evaluate the accuracy and reliability of biochemical estimation methods such as Lowry's and DNSA methods.	K5

Mapping with Program Outcomes:

Cos / POs	PO1	PO2	PO3	PO4	PO5
CO1	S	S	S	S	M
CO2	S	S	S	S	S
CO3	S	M	S	S	S
CO4	M	S	S	S	S
CO5	S	S	S	S	S



26BCU1IP	IDC PRACTICAL - I BIOCHEMISTRY	SEMESTER I
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Total Credits: 2
Total Instructions Hours: 48 h

S.No	Contents
1	Qualitative analysis of Monosaccharides - Pentose - Arabinose
2	Qualitative analysis of Hexoses - Glucose, Fructose
3	Qualitative analysis of Disaccharides - Sucrose, Maltose and Lactose
4	Qualitative analysis of Polysaccharide - Starch
5	Qualitative analysis of Histidine
6	Qualitative analysis of Tyrosine
7	Qualitative analysis of Tryptophan
8	Qualitative analysis of Arginine
9	Estimation of Acid Number
10	Estimation of Iodine Number
11	Quantification of Protein by Lowry's method
12	Quantification of Carbohydrate by DNSA method

References

- 1 Sadasivam S and Manikam A, 1996, "Biochemical methods ", 2nd Edition, New Age International publishers, New Delhi
- 2 Plummer D T, 2004, " An Introduction to practical Biochemistry", 3rd Edition, Tata McGraw-Hill Education Pvt. Ltd, New Delhi
- 3 Jayaraman J, 2015, "Laboratory manual in Biochemistry" 5th Edition, New Age International (P) Ltd.
- 4 Pattabiraman T N and Sitarama Acharya U, 2015, "Laboratory Manual in Biochemistry", 4th Edition. , All India Traveller Book Seller

