



MUSLIM ARTS COLLEGE

(Autonomous)

(Accredited by NAAC with B+ grade & Affiliated to Manonmaniam Sundaranar University,
Tirunelveli; Recognized US 2(f) 12 (B) of UGC Act.)

Thiruvithancode, Kanyakumari District, Tamil Nadu - 629174.

DEPARTMENT OF MICROBIOLOGY

CBCS SYLLABUS

Learning Outcome-based Curriculum Framework for

MICROBIOLOGY (B.Sc.)

*Applicable for students admitted from June 2026 as per the Resolutions of the Academic Council Meeting held
on 01.06.2026*

Vision

- To develop skilled professionals in microbiology with strong knowledge of microorganisms and their impact on society, contributing to research, healthcare, and biotechnology through innovation and ethical practices.

Mission

- To provide comprehensive education in microbiology
- To develop practical skills through laboratory training
- To encourage critical thinking and scientific research
- To promote ethical values and social responsibility
- To prepare students for careers in healthcare, research, and industry

Academic and Professional Attributes of the Graduates

1. **Scientific Knowledge and Technical Competence**
Demonstrate comprehensive knowledge of microbiology, including microbial diversity, genetics, immunology, molecular biology, environmental microbiology, industrial microbiology, and biotechnology, supported by strong laboratory competencies.
2. **Analytical and Critical Thinking**
Apply scientific reasoning, analytical skills, and evidence-based approaches to investigate microbiological problems, interpret experimental results, and make informed decisions.
3. **Laboratory and Research Skills**
Perform microbiological techniques proficiently, maintain laboratory safety and quality standards, design experiments, analyze data, and communicate research findings effectively.
4. **Communication Skills**
Communicate scientific concepts, laboratory observations, technical reports, and research outcomes effectively through oral, written, and digital media for academic, industrial, and public health contexts.
5. **Ethical and Professional Responsibility**
Demonstrate integrity, ethical conduct, biosafety awareness, environmental responsibility, and adherence to professional standards while handling microorganisms and biological materials.
6. **Problem-Solving and Innovation**
Utilize microbiological knowledge and emerging technologies to develop innovative solutions for challenges in healthcare, agriculture, food safety, environmental management, and biotechnology.
7. **Leadership, Teamwork, and Interpersonal Skills**
Work effectively as an individual and as a member or leader of multidisciplinary teams, demonstrating collaboration, adaptability, and professional responsibility.
8. **Digital and Technological Competence**
Utilize modern laboratory instruments, bioinformatics tools, computational resources, and information technology for microbiological analysis, data interpretation, and scientific communication.

9. Employability and Entrepreneurship

Develop professional competencies required for careers in clinical laboratories, pharmaceutical industries, biotechnology, food and dairy industries, environmental monitoring, research organizations, and entrepreneurial ventures.

10. Lifelong Learning and Global Perspective

Engage in continuous learning, professional development, and adaptation to emerging scientific advancements while recognizing the global significance of microbiology in public health, sustainable development, and environmental conservation.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Upon completion of the B.Sc. Microbiology Degree Programme, students will be able to	Mapping with Mission
PEO1	Demonstrate comprehensive knowledge of microbiology and allied life sciences with strong practical skills to address challenges in healthcare, agriculture, food, environment, and biotechnology.	M1 & M2
PEO2	Apply scientific reasoning, critical thinking, analytical ability, and research skills to investigate microbiological problems and develop innovative, evidence-based solutions.	M3 & M4
PEO3	Exhibit professional ethics, biosafety practices, environmental responsibility, effective communication, teamwork, and leadership while contributing to society and industry.	M4 & M5
PEO4	Pursue higher education, research, entrepreneurship, and lifelong learning by adapting to emerging technologies and advancements in microbiology and related disciplines.	M3 & M5

Programme Outcomes (POs)

POs	Upon completion of the B.Sc. Microbiology Degree Programme, students will be able to	Mapping with PEOs
PO1: Disciplinary Knowledge	Demonstrate comprehensive knowledge and understanding of microbiology and allied biological sciences, including microbial diversity, genetics, immunology, molecular biology, biotechnology, environmental and industrial microbiology.	PEO1
PO2: Critical Thinking	Apply scientific reasoning, critical thinking, and analytical skills to evaluate microbiological concepts, interpret scientific evidence, and make informed decisions in academic and professional contexts.	PEO1, PEO2
PO3: Problem Solving	Identify, analyse, and solve microbiological problems using appropriate laboratory techniques, scientific methods, and innovative approaches relevant to healthcare, agriculture, food safety, and environmental management.	PEO1, PEO2
PO4: Analytical Reasoning	Design experiments, analyse qualitative and quantitative data, interpret laboratory findings, and draw valid scientific conclusions using appropriate	PEO2

	statistical and computational tools.	
PO5: Scientific and Research Competence	Demonstrate proficiency in microbiological laboratory practices, biosafety, research methodology, scientific documentation, and dissemination of research outcomes following ethical standards.	PEO2, PEO3
PO6: Digital and Technological Competence	Utilize modern laboratory instruments, bioinformatics tools, computational software, and digital technologies for microbiological analysis, data management, and scientific communication.	PEO1, PEO4
PO7: Ethics, Environment and Sustainability	Practice professional ethics, biosafety, biosecurity, environmental stewardship, and social responsibility while addressing microbiological and public health challenges.	PEO3
PO8: Communication and Teamwork	Communicate scientific ideas effectively through oral, written, and digital platforms and work collaboratively in multidisciplinary teams with leadership and interpersonal skills.	PEO3
PO9: Employability and Entrepreneurship	Apply microbiological knowledge and technical competencies to pursue careers in healthcare, diagnostics, pharmaceuticals, biotechnology, food industries, environmental organizations, research institutions, or establish entrepreneurial ventures.	PEO3, PEO4
PO10: Lifelong Learning	Engage in self-directed learning, professional development, higher education, and continuous skill enhancement to adapt to emerging trends and innovations in microbiology and allied sciences.	PEO4

Programme Specific Outcomes (PSOs)

PSOs	Upon completion of the B.Sc. Microbiology Degree Programme, students will be able to	Mapping with POs
PSO1: Fundamental Knowledge and Laboratory Competence	Demonstrate a strong foundation in microbiology and allied biological sciences, and perform microbiological experiments proficiently using standard laboratory techniques, instrumentation, aseptic practices, and biosafety protocols.	PO1, PO4, PO5
PSO2: Microbial Analysis and Problem Solving	Apply microbiological principles, analytical reasoning, and scientific methods to identify microorganisms, analyse microbiological data, diagnose microbial problems, and propose evidence-based solutions in healthcare, agriculture, food, and environmental sectors.	PO2, PO3, PO4, PO5
PSO3: Research, Innovation and Technological Skills	Design and execute microbiological research, utilize molecular biology, biotechnology, bioinformatics, and modern laboratory technologies to investigate scientific problems and develop innovative solutions.	PO3, PO5, PO6, PO10

PSO4: Industrial and Clinical Applications	Apply microbiological knowledge in clinical diagnostics, pharmaceutical industries, food and dairy microbiology, environmental monitoring, industrial biotechnology, and quality assurance while adhering to professional ethics and regulatory standards.	PO1, PO6, PO7, PO9
PSO5: Communication, Leadership and Professional Development	Demonstrate effective scientific communication, teamwork, leadership, entrepreneurship, ethical responsibility, and lifelong learning skills necessary for higher education, research, and successful professional careers in microbiology and allied disciplines.	PO7, PO8, PO9, PO10

Mapping of Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

POs / PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
PO1: Disciplinary Knowledge	3	2	2	3	1
PO2: Critical Thinking	2	3	3	2	2
PO3: Problem Solving	2	3	3	2	2
PO4: Analytical Reasoning	3	3	2	2	2
PO5: Scientific and Research Competence	3	3	3	2	2
PO6: Digital and Technological Competence	2	2	3	3	2
PO7: Ethics, Environment and Sustainability	2	2	2	3	3
PO8: Communication and Teamwork	1	2	2	2	3
PO9: Employability and Entrepreneurship	2	2	2	3	3
PO10: Lifelong Learning	2	2	3	2	3

•3 – High Correlation

•2 – Moderate Correlation

•1 – Low Correlation

COURSES OFFERED SEMESTER I

Part	Course Code	Title of the Course	Credits	Hours / Week
Part I	AGTL11/ AGMY11/ AGAB11	Language: Tamil /Malayalam/Arabic	3	6
Part II	AGEN11	English:	3	6
Part III	AMMB11	Core Course I: Fundamentals of Microbiology and Microbial Diversity	5	5
	AMMBP1	Core Course II: Practical I- Fundamentals of Microbiology and Microbial Diversity	5	5
	AEMB11	Elective Course I: Basic and Clinical Biochemistry	3	4
Part IV	ASMB11	Skill Enhancement Course SEC I: Social and Preventive Medicine	2	2
	AFMB11	Foundation Course: Basics in	2	2

		Microbiology		
Total			23	30

SEMESTER I

CORE COURSE I: FUNDAMENTALS OF MICROBIOLOGY AND MICROBIAL DIVERSITY

Course Code:

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
AMMB11	Core	Y	Y	-	-	5	5	25	75	100

Learning Objectives

The course aims to:

1. Learn the fundamental principles about different aspects of Microbiology including recent developments in the area.
2. Describe the structural organization, morphology and reproduction of microbes.
3. Explain the methods of cultivation of microbes and measurement of growth.
4. Understand the microscopy and other basic laboratory techniques – culturing, disinfection and sterilization in Microbiology.
5. Compare and contrast the different methods of sterilization.

Course Outcomes (COs)

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

CO No.	Course Outcomes	BT Level
CO1	Study the historical events that led to the discoveries and inventions and understand the Classification of Microorganisms.	K2
CO2	Gain Knowledge of detailed structure and functions of prokaryotic cell organelles.	K2
CO3	Understand the various microbiological techniques, different types of media, and techniques involved in culturing microorganisms.	K2
CO4	Explain the principles and working mechanism of different microscopes/Microscope, their function and scope of application.	K3
CO5	Understand the concept of asepsis and modes of sterilization and disinfectants.	K2

Bloom's Taxonomy Levels

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 – Create

Course Content

Units	Contents	No. of Hours

I	History and Evolution of Microbiology, Classification – Three kingdom, five kingdom, six kingdom and eight kingdom. Microbial biodiversity: Introduction to microbial biodiversity- ecological niche. Basic concepts of Eubacteria, Archaeobacteria and Eucarya. Conservation of Biodiversity.	15
II	General characteristics of cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) and acellular microorganisms - (Viruses, Viroids, Prions), Differences between prokaryotic and eukaryotic microorganisms. Structure of Bacterial cell wall, cell membrane, capsule, flagella, pili, mesosomes, chlorosomes, phycobilisomes, spores, and gas vesicles. Structure of fungi (Mold and Yeast), Structure of microalgae.	15
III	Bacterial culture media and pure culture techniques. Mode of cell division, Quantitative measurement of growth. Anaerobic culture techniques.	15
IV	Microscopy – Simple, bright field, dark field, phase contrast, fluorescent, electron microscope – TEM & SEM, Confocal microscopy, and Atomic Force Microscopy. Stains and staining methods.	15
V	Sterilization–moist heat - autoclaving, dry heat – Hot air oven, radiation – UV, Ionization, filtration – membrane filter and disinfection, antiseptic; Antimicrobial agents.	15
	Total	75

S. No.	Text Book
1	Pelczar.M. J., Chan E.C.S. and Noel. R.K. (2007). Microbiology. 7thEdition.,McGraw Hill, New York.
2	Willey J., Sherwood L., and Woolverton C. J., (2017). Prescott’s Microbiology. 10th Edition., McGraw-Hill International edition.
3	Tortora, G.J., Funke, B.R., Case,C.L. (2013). Microbiology. An Introduction 11thEdition., A La Carte Pearson.
4	Salle. A.J (1992). Fundamental Principles of Bacteriology. 7thEdition., McGraw Hill Inc.New York.
5	Boyd, R.F. (1998). General Microbiology,2ndEdition., Times Mirror, Mosby CollegePublishing, St Louis.

S. No.	Reference Books
1	Jeffrey C. Pommerville., Alcamo’s Fundamentals of Microbiology (9thEdition). Jones &Bartlett learning 2010.
2	Stanier R.Y, Ingraham J. L., Wheelis M. L., and Painter R. R. (2010). General Microbiology, 5thEdition., MacMillan Press Ltd
3	Tortora, G.J., Funke, B.R. and, Case, C.L (2013). Microbiology-An Introduction, 11thEdition., Benjamin Cummings.
4	Nester E., Anderson D., Roberts C. E., and Nester M. (2006). Microbiology -A Human Perspective, 5thEdition., McGraw Hill Publications.
5	Madigan M.T., Martinko J.M., Stahl D.A, and Clark D. P. (2010). Brock - Biology of

	Microorganisms, 13th Edition Benjamin-Cummings Pub Co.
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S. No.	Web Resources
1	https://www.cliffsnotes.com/study-guides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology
2	https://www.keyence.com/ss/products/microscope/bz-x/study/principle/structure.jsp
3	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6604941/#
4	https://bio.libretexts.org/@go/page/9188
5	https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-nutrition/

Mapping with Programme Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	2	1	2	1	1	1
CO2	3	2	2	3	2	1	1	1	1	1
CO3	3	3	3	2	3	2	2	2	2	1
CO4	3	3	2	3	3	3	1	2	2	2
CO5	3	2	3	2	3	2	3	1	2	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	3	2	2	1	1
CO3	3	3	2	2	2
CO4	3	3	3	2	2
CO5	3	3	2	3	2
Weightage	15	13	10	9	8
Weighted percentage of Course Contribution to PSOs	3	2.6	2	1.8	1.6

Mapping Scale: 3 – Strong Correlation, 2 – Moderate Correlation, 1 – Low Correlation

FIRST YEAR - SEMESTER I**CORE II - PRACTICAL I- FUNDAMENTALS OF MICROBIOLOGY AND
MICROBIAL DIVERSITY**

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
AMMBP1	Core	-	-	Y	Y	5	5	25	75	100

Learning Objectives

The course aims to:

1. Acquire knowledge on Cleaning of glass wares, GLP and sterilization.
2. Gain knowledge on media preparation and cultural characteristics.
3. Learn the pure culture technique
4. Learn the microscopic techniques and staining methods.
5. Acquire knowledge on stain and staining methods.

Course Outcomes

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

CO No.	Course Outcomes	BT Level
CO1	Practice sterilization methods; learn to prepare media and their quality control.	K5
CO2	Learn streak plate, pour plate and serial dilution and pigment production of microbes.	K4
CO3	Understand Microscopy methods, different Staining techniques and motility test.	K2
CO4	Observe culture characteristics of microorganisms.	K2
CO5	Study on Microbial Diversity using Hay Infusion Broth-Wet mount	K2

Bloom's Taxonomy Levels

K1 – Remember, **K2** – Understand, **K3** – Apply, **K4** – Analyse, **K5** – Evaluate, **K6** – Create

Course Content

Units	Contents	No. of Hours
I	Cleaning of glass wares, Microbiological good laboratory practice and safety. Sterilization and assessment of sterility– Autoclave, hot air oven, and membrane filtration.	15
II	Media preparation: liquid media, solid media, semi-solid media, agar slants, agar deeps, agar plates.	15
III	Preparation of basal, differential, enriched, enrichment, transport, and selective media preparation- quality control of media, growth supporting properties, sterility check of media. Pure culture techniques: streak plate, pour plate, decimal dilution.	15
IV	Culture characteristics of microorganisms: growth on different media, growth characteristics, and description. Demonstration of pigment production. Microscopy: light microscopy and bright field microscopy.	15

V	Staining techniques: smear preparation, simple staining, Gram's staining and endospore staining. Study on Microbial Diversity using Hay Infusion Broth-Wet mount to show different types of microbes, hanging drop.	15
	Total	75

S. No.	Text Book
1	James G Cappucino and N. Sherman MB(1996). A lab manual Benjamin Cummins, New York 1996.
2	Kannan. N (1996). Laboratory manual in General Microbiology. Palani Publications.
3	Sundararaj T (2005). Microbiology Lab Manual (1st edition) publications.
4	Gunasekaran, P. (1996). Laboratory manual in Microbiology. New Age International Ltd., Publishers, New Delhi.
5	R C Dubey and D K Maheswari (2002). Practical Microbiology. S. Chand Publishing.

S. No.	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 Bartlett Publication.
5	Lim D. (1998). Microbiology, 2nd Edition, WCB McGraw Hill Publications.

S. No.	Web Sources
1	http://www.biologydiscussion.com/micro-biology/sterilisation-and-disinfectionmethods-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/
5	https://www.cliffsnotes.com/studyguides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology

Mapping with Programme Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	3	2	3	2	2	2	2	2
CO2	3	3	3	3	3	2	2	2	2	2
CO3	3	2	2	3	3	2	2	2	2	1
CO4	3	2	2	2	2	2	2	2	2	1
CO5	3	2	2	2	3	2	3	2	2	2

3 – Strong, 2 – Medium, 1 – Low

Mapping with Programme Specific Outcomes

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	2	2	2
CO2	3	3	2	2	2
CO3	3	3	2	2	2
CO4	3	2	2	2	2
CO5	3	3	2	2	2
Weightage	15	13	10	10	10
Weighted percentage of Course Contribution to PSOs	3	2.6	2	2	2

Mapping Scale: 3 – Strong Correlation, 2 – Moderate Correlation, 1 – Low Correlation

FIRST YEAR - SEMESTER I

ME 1– BASICS AND CLINICAL BIOCHEMISTRY (ELECTIVE)

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
AEMB11	Core	Y	Y	-	-	4	4	25	75	100

Learning Objectives

The course aims to:

1. Attain thorough knowledge on carbohydrates and lipids, their characteristic properties and organization in carrying out all the living functions which constitute the life.
2. Explain the biological activity of amino acids and proteins.
3. Identify the metabolic errors in enzymes of carbohydrates and lipids.
4. Describe the disorders in amino acid metabolism.
5. Interpret the consequences, biochemical, clinical features, diagnosis and treatment of metabolic diseases of day today life.

Course Outcomes

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

CO No.	Course Outcomes	BT Level
CO1	Explain the structure, classification, biochemical functions and significance of carbohydrates and lipids.	K4
CO2	Differentiate essential and non-essential amino acids, biologically important modified amino acids and their functions, Illustrate the role, classification of Proteins and recognize the structural level organization of proteins, its functions and denaturation.	K5
CO3	Assess defective enzymes and Inborn errors. Recognize diseases related to carbohydrate and lipid metabolism.	K2
CO4	Discuss and evaluate the pathology of amino acid metabolic disorders.	K5
CO5	Appraise the imbalances of enzymes in organ function and relate the role of Clinical Biochemistry in screening and diagnosis.	K3

Bloom's Taxonomy Levels

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 – Create

Course Content

Unit	Contents	No. of Hours
I	Bio molecules -Carbohydrate – General properties, function, structure, classification– mono saccharides (Glucose, Fructose, Galactose), Oligoaccharides (Sucrose, Maltose, Lactose) and polysaccharides (Starch, Glycogen,) and biological significance. Lipids – General properties, functions, structure, classification (Simple, Derived and Complex), Cholesterol, LDL, HDL – biological significance.	15
II	Bio molecules - Amino acids – General properties, functions, structure, classification and biological significance. Proteins– General structure, Properties, functions, classification and biological significance.	15
III	Disorders of Metabolism: Disorders of carbohydrate metabolism: diabetes mellitus, ketoacidosis, hypoglycemia, glycogen storage diseases, galactosemia and lactose intolerance. Disorders of lipid metabolism: hyperlipidemia, hyperlipoproteinemia, hypercholesterolemia, hypertriglyceridemia, sphingolipidosis.	15
IV	Disorders of Metabolism: Disorders of amino acid metabolism: alkaptonuria, phenylketonuria, phenylalaninemia, homocystinuria, tyrosinemia, aminoacidurias.	15
V	Evaluation of organ function tests: Assessment and clinical manifestations of renal, hepatic, pancreatic, gastric and intestinal functions. Diagnostic enzymes: Principles of diagnostic enzymology. Clinical significance of aspartate aminotransferase, alanine aminotransferase, creatine kinase, aldolase and lactate dehydrogenase.	15
	Total	75

S. No.	Text Books
1	Satyanarayana, U. and Chakrapani, U (2014). Biochemistry, 4th Edition, Made Simple Publisher.
2	Jain J L, Sunjay Jain and Nitin Jain (2016). Fundamentals of Biochemistry, 7th Edition, S Chand Company.
3	Ambika Shanmugam's (2016). Fundamentals of Biochemistry for Medical Students, 8th Edition. Wolters Kluwer India Pvt Ltd.
4	Vasudevan. D.M. Sreekumari. S, Kannan Vaidyanathan (2019). Textbook Of Biochemistry For Medical Students. Kindle edition, Jaypee Brothers Medical Publishers
5	Jeremy M. Berg, Lubert Stryer, John L. Tymoczko, Gregory J. Gatto (2015). Biochemistry, 8th edition. WH Freeman publisher.
S. No.	Reference Works
1	Amit Kessel & Nir Ben-Tal (2018). Introduction to Proteins: structure, function and motion. 2nd Edition, Chapman and Hall.
2	David L. Nelson and Michael M. Cox (2017). Lehninger Principles of Biochemistry, 7th Edition W.H. Freeman and Co., NY.
3	Lupert Stryer, Jeremy M. Berg, John L. Tymoczko, Gatto Jr., Gregory J (2019).

	Biochemistry. 9th Edition, W.H. Freeman & Co. New York.
4	Donald Voet, Judith Voet, Charlotte Pratt (2016). Fundamentals of Biochemistry: Life at the Molecular Level, 5th Edition, Wiley.
5	Joy PP, Surya S. and Aswathy C (2015). Laboratory Manual of Biochemistry, Edition 1., Publisher: Kerala agricultural university.
S. No.	Web Sources (URL)
1	https://www.abebooks.com
2	https://kau.in/document/laboratory-manual-biochemistry
3	https://metacyc.org
4	https://www.medicalnewstoday.com
5	https://journals.indexcopernicus.com

Mapping with Programme Outcomes

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	2	2	2	1	1	1	1	1
CO2	3	3	2	3	3	2	1	2	2	1
CO3	2	3	3	3	3	2	2	2	2	1
CO4	2	3	3	3	3	2	2	2	2	2
CO5	3	3	3	3	3	2	2	2	3	2

3 – Strong, 2 – Medium, 1 - Low

Mapping with Programme Specific Outcomes

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	2	1
CO2	3	3	2	2	2
CO3	2	3	2	3	2
CO4	2	3	3	2	2
CO5	3	3	3	3	2
Weightage	13	14	11	12	9
Weighted percentage of Course Contribution to PSOs	2.6	2.8	2.2	2.4	1.8

Mapping Scale: 3 – Strong Correlation, 2 – Moderate Correlation, 1 – Low Correlation

SEMESTER I

NON MAJOR ELECTIVE I (NME) SOCIAL AND PREVENTIVE MEDICINE

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	Marks		
								CIA	External	Total
ASMB11	Core	Y	-	-	-	2	2	25	75	100

Learning Objectives

The course aims to:

1. Describe the concepts of health and disease and their social determinants.
2. Summarize the health management system.
3. Know about the various health care services.
4. Outline the goals of preventive medicine.
5. Gain knowledge about alternate medicine.

Course Outcomes

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

CO No.	Course Outcomes	BT Level
CO1	Identify the health information system	K2
CO2	Associate various factors with health management system	K3
CO3	Choose the appropriate health care services	K3
CO4	Appraise the role of preventive medicine in community setting	K4
CO5	Recommend the usage of alternate medicine during outbreaks	K3

Bloom's Taxonomy Levels

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 – Create

Course Content

Unit	Contents	No. of Hours
I	Social Medicine: History, Concepts and Health Policies Introduction to social medicine: History of social medicine-concepts of health and disease social determinants of health and disease-Health and quality of life-Health information system- measures of population health-health policies.	6
II	Health Management and National Health Programs: Health management: Applications of behavioural sciences and psychology in health management- nutritional programs for health management-water and sanitation in human health-national programs for communicable and non-communicable diseases- environmental and occupational hazards and their control.	6

III	Community Health Care and Services: Health care and services: Health care of the community-information, education, communication and training in health-maternal & child health-school health services- Geriatrics-care and welfare of the aged-mental health-health services through general practitioners.	6
IV	Principles and Practices of Preventive Medicine: Preventive Medicine: Introduction- role of preventive medicine- levels of prevention-Risk assessment in communities and vulnerable population – surveillance, monitoring and reporting of disease outbreaks - forecasting and control measures in community setting – early detection methods.	6
V	Alternate Medicine and Global Health Response to Epidemics Prevention through alternate medicine: Unani, Ayurveda, Homeopathy, Naturopathy systems in epidemic and pandemic outbreaks. International health regulations. Infectious disease outbreak case studies and Precautionary response during SARS and MERS corona virus, Ebola and novel SARS-COV2 outbreaks.	6
	Total	30

S. No.	Text Book
1	Park.K (2021). Textbook of preventive and social medicine, 26th edition. BanarsidasBhanot publishers.
2	Mahajan& Gupta (2013). Text book of preventive and social medicine, 4thedition. Jaypeebrothers medical publishers.
3	Chun-Su Yuan, Eric J. Bieber, Brent Bauer (2006). Textbook of Complementary and Alternative Medicine. Second Edition. Routledge publishers.
4	Vivek Jain (2020). Review of Preventive and Social Medicine: Including Biostatics. 12th edition, Jaypee Brothers Medical Publishers.
5	Lal Adarsh Pankaj Sunder (2011). Textbook of Community Medicine: Preventive and Social Medicine, CBS publisher.

S. No.	Reference Books
1	Howard Waitzkin, Alina Pérez, Matt Anderson (2021). Social Medicine and the coming Transformation. First Edition. Routledge publishers.
2	GN Prabhakara (2010). Short Textbook of Preventive and Social Medicine. Second Edition. Jaypee publishers.
3	Jerry M. Suls, Karina W. Davidson, Robert M. Kaplan (2010).Handbook of Health Psychology and BehavioralMedicine.Guilford Press.
4	Marie Eloïse Muller, Marie Muller, MarthieBezuidenhout, KarienJooste (2006).Health Care Service Management. Juta and Company Ltd.
5	Geoffrey Rose (2008).Rose's Strategy of Preventive Medicine: The Complete.OUP Oxford.

S. No.	Web Resources
1	https://www.omicsonline.org/scholarly/social--preventive-medicine-journals-articles-ppts-list.php
2	https://www.teacheron.com/online-md_preventive_and_social_medicine-tutors
3	https://www.futurelearn.com
4	https://www.healthcare-management-degree.net
5	https://www.conestogac.on.health-care-administration-and-service-management

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES (POs)

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	2	2	1	1	2	1	2	2	2	1
CO2	2	2	2	2	2	2	2	2	2	2
CO3	2	2	3	2	2	2	2	3	3	2
CO4	2	3	3	3	3	2	3	2	2	2
CO5	1	2	2	2	2	2	3	2	2	3

3 – Strong Correlation, 2 – Moderate Correlation, 1 – Low Correlation.

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOMES (PSOs)

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	1	1	2	1
CO2	2	2	2	2	2
CO3	2	2	2	3	2
CO4	2	3	2	3	3
CO5	1	2	2	3	3
Weightage	9	10	9	13	11
Weighted percentage of Course Contribution to PSOs	1.8	2	1.8	2.6	2.2

3 – Strong Correlation, 2 – Moderate Correlation, 1 – Low Correlation

FIRST YEAR – SEMESTER I
FOUNDATION COURSE-BASIC IN MICROBIOLOGY

Subject Code	Category	L	T	P	S	Credits	Inst. Hours	CIA	External	Total
AFMB11	Foundation Course	Y	Y	-	-	2	2	25	75	100

Learning Objectives

The course aims to:

1. Understand the basic concepts, classification, structure, and diversity of microorganisms, including bacteria, viruses, fungi, algae, and protozoa.
2. Explain the morphology, physiology, and significance of microorganisms in human health, agriculture, industry, and the environment.
3. Describe the principles of microbial taxonomy, cultivation, identification, and preservation techniques.
4. Develop fundamental knowledge of microbiological methods, culture media, and aseptic laboratory practices.
5. Recognize the importance and applications of microorganisms in biotechnology, environmental sustainability, and public health.

Course Outcomes

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

CO No.	Course Outcomes	BT Level
CO1	Describe the basic characteristics, classification, and structure of prokaryotic and eukaryotic microorganisms.	K1
CO2	Explain the diversity, economic importance, and applications of microorganisms in various fields of life sciences.	K2
CO3	Apply the principles of microbial taxonomy and identify microorganisms using standard classification systems and microbiological techniques.	K3
CO4	Demonstrate basic microbiological techniques including isolation, cultivation, identification, and preservation of microorganisms.	K3
CO5	Interpret the role of microorganisms in healthcare, agriculture, food industry, environmental management, and biotechnology.	K5

Bloom's Taxonomy Levels

K1 – Remember, K2 – Understand, K3 – Apply, K4 – Analyse, K5 – Evaluate, K6 – Create

Course Content

Unit	Contents	No. of Hours
I	Viral Classification and Cultivation Techniques Difference between Prokaryotes and Eukaryotes. Bacteria-basic cell structure with examples. Microbial cell division. Classification, Isolation, purification and cultivation of viruses.	6
II	Classification and Characteristics of Bacteria Bergey's Classification. Eubacteria: Cultural and Biochemical characters of aerobic Gram positive bacteria and Gram negative bacteria. Five Kingdom Classifications.	6
III	Classification and Economic Importance of Fungi Alexopoulos classification. General features and reproduction of filamentous fungi (Actinomycetes), molds (Aspergillus), macroscopic fungi (mushroom-Agaricus bisporus) - unicellular fungi (Yeast-Saccharomyces cerevisiae). Economic importance of fungi.	6
IV	Important Source of Microbes Important microbes in soil, water, Air, Food and other sources	6
V	Bacteriological Techniques Pure culture isolation: Streaking, Serial dilution and plating methods; cultivation, maintenance and preservation, Microbiological media: Nutrient Agar and Potato Dextrose Agar.	6
	Total	30

S. No.	Text Books
1	Dubey, R.C. and Maheswari, S.A Text Book of Microbiology. S. Chand and Co, New Delhi. 2003.
2	Kanika, S. Textbook of Microbiology–Tools and Techniques. (1stedn), Ane Books Pvt. Ltd, New Delhi. 2011.
3	Pelczar, M.J.et al., Microbiology. McGraw- Hill Inc New York. 1993.
4	Power CB, Dagina Wala. General Microbiology Volume II, Himalaya Publishing House, Delhi. 2010.
5	Power CB, Dagina Wala. General Microbiology Volume I, Himalaya Publishing House, Delhi. 2010.

S. No.	Reference Books
1	Atlas, R. Principles of Microbiology (2nd ed), Wm.C. Brown publishers.1997.

2	Prescott, L. M. et al., Microbiology. 9th edition. McGraw- Hill Inc, New York. 2013.
3	Salle, A.J. Fundamental Principles of Bacteriology. (7th edn), Tata McGraw-Hill Publications Ltd. 1984.
4	Oarsman S.N.J., et al. Virology Illustrated colour text, 1st ed. Elsevier Health Sciences. 2012.
5	Stanier, Y. et al., General Microbiology. MacMillan Press LTD, Houndmills, Basingstoke, Hampshire, London. 1999
S. No.	Web Resources
1	https://learnenglish.britishcouncil.org
2	https://www.bbc.co.uk/learningenglish
3	https://www.cambridgeenglish.org/learning-english
4	https://www.oxfordlearnersdictionaries.com
5	https://owl.purdue.edu

MAPPING OF COURSE OUTCOMES WITH PROGRAMME OUTCOMES (POs)

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	2	1	2	2	1	1	1	1	1
CO2	3	2	2	2	2	1	1	2	2	1
CO3	3	3	2	3	2	2	1	2	2	1
CO4	2	3	3	2	3	2	2	2	2	2
CO5	2	2	3	2	2	2	2	2	2	2

Mapping Scale

3 – Strong Correlation, 2 – Moderate Correlation, 1 – Low Correlation

MAPPING OF COURSE OUTCOMES WITH PROGRAMME SPECIFIC OUTCOMES (PSOs)

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	1	1
CO2	3	2	2	1	2
CO3	3	3	2	2	2
CO4	2	3	3	2	2
CO5	2	2	3	2	3
Weightage	13	12	11	8	10
Weighted percentage of Course Contribution to PSOs	2.6	2.4	2.2	1.6	2

Mapping Scale

3 – Strong Correlation, 2 – Moderate Correlation, 1 – Low Correlation