



MUHAMMEDABDURAHIMAN MEMORIAL ORPHANAGE (MAMO) COLLEGE

[Govt. Aided First Grade College & Affiliated to University of Calicut. Re-Accredited by NAAC with A Grade]



OFFICE OF THE PRINCIPAL

PEOs, PSOs, POs & COs B.Sc MICROBIOLOGY

1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Table 1: Programme Educational Objectives of B.Sc Microbiology

PEO1	Pursue any of the following three alternatives: (i) immediately take up a career in any area of Microbiology and work productively as a successful microbiologist in diverse career paths including supportive and leadership roles on multidisciplinary teams, (ii) broaden the scope of the career path by pursuing higher studies and research in the field of Microbiology and (iii) go for taking up the challenge and spearheads start-ups by positively exploiting the diverse potentials of the microbiological field.
PEO2	Graduates will communicate effectively, recognize and incorporate societal needs and constraints in their professional endeavours, and practice their profession with high regard to legal and ethical responsibilities.
PEO3	Be original, creative, innovative and systematic in their all endeavours, including individual, collaborative and entrepreneurial ventures with meticulous strategic thinking, planning and execution.
PEO4	Have sufficient breadth of understanding to enable continued professional development and lifelong learning throughout their career.

2. PROGRAMME SPECIFIC OUTCOMES (PSOs)

Table 2: Programme Specific Outcomes of B.Sc Microbiology

PSO1	The students able to understand the theoretical knowledge in the field of microbiology like general, analytical, clinical, food and industrial sectors
PSO2	The students able to expertise in applying practical knowledge in medical, biochemical and industrial sectors
PSO3	The students acquire research knowledge in industrial training and summative projects.
PSO4	The students able to analyse socially acceptable solutions to complex environmental problems with applications of modern and appropriate techniques for sustainable development.
PSO5	The students able to create bio products like microbial inoculums, biologically active compounds and probiotics.



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3. PROGRAMME OUTCOMES (POs)

Table 3: Programme Outcomes of B.Sc Microbiology

P01	SCIENTIFIC & PRACTICAL KNOWLEDGE: Apply scientific and practical methods to analyse microorganisms from different sources.
P02	PROBLEM ANALYSIS: Identify, formulate, review research literature, and analyze complex real-life problems reaching substantiated conclusions using first principles of statistics, natural sciences, and bioinformatics.
P03	DESIGN/DEVELOPMENT OF SOLUTIONS: Design solutions for complex real-life problems or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
P04	CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
P05	MODERN TOOL USAGE: Apply appropriate and modern practical techniques, resources, and modern bioinformatics software including prediction and modeling to complex biomolecules with an understanding of the limitations.
P06	THE MICROBIOLOGICAL PROFESSION AND SOCIETY: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practice.
P07	ENVIRONMENT AND SUSTAINABILITY: Understand the impact of the environmental pollutions and their solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
P08	ETHICS: Apply ethical principles and commit to professional ethics and responsibilities and norms of the microbiological practice.
P09	INDIVIDUAL AND TEAM WORK: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
P10	COMMUNICATION: Communicate effectively on complex microbial activities with the community and with society at large, such as, being able to comprehend and write effective reports and analyses the microbial activities, make effective presentations, and give and receive clear instructions.
P11	PROJECT MANAGEMENT AND FINANCE: Demonstrate knowledge and understanding of the microbiological principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.



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Table 3: Programme Outcomes of B.Sc Microbiology

P12	LIFE-LONG LEARNING: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of changing environment
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4. COURSE OUTCOMES (COs)

Table 4: Courses Outcomes of B.Sc Microbiology

COURSE 1: ENG1A01:TRANSACTIONS: ESSENTIAL ENGLISH LANGUAGE SKILLS

C01	To impart the necessary macro and micro English language skills to the learners to enable them to express their feelings, opinions, ideas and thoughts fluently and accurately in a variety of personal and professional contexts.
C02	To create in learners a definitive sense of the stylistic variations of English and how they are used in real life situations.
C03	To inculcate in learners a taste for deeper pursuit and acquisition of advanced level of skills in English.
C04	To guide them on how to participate in discussions and make seminar presentations with special focus on specific vocabularies and styles of usage in such contexts.

COURSE 2: ENGA02:WAYS WITH WORDS: LITERATURES IN ENGLISH

C01	To help students develop the acumen to read, appreciate and discuss literature
C02	To introduce students to the linguistic qualities of a literary text and to unravel the many meanings Of the text
C03	To acquaint the students with different genres of literature and to analyse them.

COURSE 3: ARB1A07(2):BASIC SKILLS IN ARABIC

C01	To teach the students the basics of interpersonal interaction in Arabic.
C02	To train the students to communicate in Arabic in selected situations
C03	Enhancement of communication skills in Arabic



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Table 4: Courses Outcomes of B.Sc Microbiology

C04	Knowledge of writing letters, ads, notifications, tenders and quotations in Arabic
C05	Enhancement of translation skills from Arabic to English and vice versa
COURSE 4: HIN1A07(3):PROSE &ONE ACT PLAYS	
C01	Approach literary texts in terms of genre, gender and the canon
C02	Understand and use academic conventions: referencing and bibliography.
C03	The learner will be aware of socio-political and economic conditions of the society from different periods
C04	Be familiar with the theoretical foundations of the genre;
C05	Be able to compare and contrast the genre with other dramatic forms;
COURSE 5: MAL1A07(3):MALAYALA SAHITHYAM - 1	
C01	To gain an understanding of the relations between culture, history and texts. They learn to use texts as a gateway to various cultural traditions and interpret them in their historical contexts.
C02	To create in learners a definitive sense of the stylistic variations of Malayalam and how they are used in real life situations.
C03	To inculcate in learners a taste for deeper pursuit and acquisition of advanced level of skills in Malayalam.
C04	To guide them on how to participate in discussions and make seminar presentations with special focus on specific vocabularies and styles of usage in such contexts.
COURSE 6: MBG1B01:GENERAL MICROBIOLOGY	
C01	Get an idea about the historical events in microbiology
C02	Understand the diversity in microbiology
C03	Know the scope of microbiology



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Table 4: Courses Outcomes of B.Sc Microbiology

C04 Know the details about bacterial staining techniques

COURSE 7: BCH3C01: BIOCHEMISTRY-I

C01 To understand the basics of biochemistry

C02 Describe the concepts of the concepts of solutions, electrolytes, electrolytic dissociation, pH and its significance buffer colloids and their properties and importance.

C03 Discussed about techniques in biochemistry, their mechanism and their wide range of applications.

C04 Conceptual knowledge about blood ,proteins and their factors

COURSE 8: MBG1C01:BIOSTATISTICS

C01 To understand the measures of central tendency and measures of dispersion.

C02 To learn the history and scope of biostatistics.

C03 To understand probability distributions.

C04 To analyse various distributions.

COURSE 9: AUD1E01:ENVIRONMENTAL STUDIES

C01 To learn the environment in the Indian context

C02 Understand renewable and non-renewable resources

C03 To learn structure and function of an ecosystem

C04 To learn about biodiversity and its concepts

C05 To learn about environmental pollution

COURSE 10: ENG2A03:WRITING FOR ACADEMIC AND PROFESSIONAL



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Table 4: Courses Outcomes of B.Sc Microbiology

C01	To develop writing skills, to learn to integrate writing and thought and to apply the conventions of academic writing correctly.
C02	To acquire the correct sense of format, syntax, grammar, punctuation and spelling.
C03	To acquire concepts, principles and vocabulary of reasoning and argumentation and use analysis, synthesis, and evaluations to advance arguments.
C04	To gain an understanding of discourse conventions ranging from structure and paragraphing to tone and mechanics

COURSE 11: ENG2A04:ZEITGEIST - READINGS ON CONTEMPORARY CULTURE

C01	To inculcate the values enshrined in the constitution of India and to provide an insight on the secular framework of the country.
C02	To familiarize the learners with concepts such as conservation, sustainability and the life of the marginalized and their interconnectedness.
C03	To foster among the learners an awareness of the diverse problems faced by women and the sexual minorities and to promote a culture of inclusion and mutual respect.
C04	To understand the "human" as articulated among the various cultures and promote a multicultural and plural understanding of rights.

COURSE12: ARB2A08(2):READING ARABIC LITERATURE

C01	To understand the literary traditions of Arabs
C02	To study how Arabic literature acted as a medium of resistance against European colonialism In Medieval Malabar.
C03	Understanding the language of Arabic poetry of the classical and modern period

COURSE 13: HIN2A08(3):POETRY AND SHORT STORIES

C01	Understand the common techniques underlying free verse and traditional forms of poetry
C02	Identify personal experiences that can be used when writing poems
C03	Understand the basic terminology and practical elements of poetry.



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C04	Students get to know various cultures and construction of gender, nation and race throughout the history.
C05	The prescribed fiction helps the students to learn human values and the behavioural patterns from great works of art, and develops the ability to understand human race.

COURSE 14: MAL2A08(3):MALAYALA SAHITHYAM – 2

C01	To help students develop the acumen to read, appreciate and discuss literature.
C02	To acquire concepts, principles and vocabulary of reasoning and argumentation and use analysis, synthesis, and evaluations.
C03	To inculcate in learners a taste for deeper pursuit and acquisition of advanced level of skills in Malayalam
C04	To guide them on how to participate in discussions and make seminar presentations with special focus on specific vocabularies and styles of usage in such contexts.

COURSE 15: MBG1B01:MICROBIAL PHYSIOLOGY AND TAXONOMY

C01	Understand the taxonomic classification of microorganisms
C02	Know general bacteriology and microbial techniques for isolation of pure cultures, bacteria, fungi and algae.
C03	Understand concepts of growth and reproduction of bacteria
C04	Understand the microbial transport systems and the modes and mechanisms of energy conservation in microbial metabolism.

COURSE 16: BCH3C02:BIOCHEMISTRY-II

C01	Overview of the major biomolecules carbohydrate, lipid, protein amino acids and nucleic acids.
C02	To understand classification structure function of carbohydrate, lipid and proteins
C03	Conceptual knowledge about biochemical evolution of microorganisms
C04	Understand about nature and scope of biochemistry.



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Table 4: Courses Outcomes of B.Sc Microbiology

COURSE 17: MBG2C04:BIOSTATISTICS II

C01	To understand the idea of hypothesis.
C02	To analyse variance and regression.
C03	To learn correlation and regression .
C04	To test the applications of correlations.

COURSE 18: AUD2E02:DISASTER MANAGEMENT

C01	Impart basic knowledge about Hazards and Disasters
C02	Impart basic knowledge about Natural Disasters
C03	Prepare for disaster Preparedness and Response
C04	Prepare for rehabilitation, reconstruction and recovery

COURSE 19: MBG3B03:ENVIRONMENTAL AND SANITATION MICROBIOLOGY

C01	To understand different techniques used to treat solid and liquid waste.
C02	Understand Methods of air sampling and monitoring
C03	Have an idea about Bioremediation and biodegradation of xenobiotic compound
C04	To understand about microbes in soil and sediments.

COURSE 20: BCH3C03:BIOCHEMISTRY-III

C01	Conceptual knowledge of properties, structure, functions of enzymes enzyme kinetics and their regulation and application of enzymes in industrial process.
C02	conceptual knowledge of aerobic and anaerobic metabolism of carbohydrates



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Table 4: Courses Outcomes of B.Sc Microbiology

C03	Conceptual knowledge of aerobic and anaerobic respiration and various intermediary mechanisms involved, oxidative phosphorylation.
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C04	Specify the biological significance of photosynthesis
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COURSE 21: A11:BIODIVERSITY SCOPE AND RELEVANCE

C01	To understand about plant and animal interaction and support in the food chain or food web.
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C02	Identify human caused species loss.
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C03	Explain the species diversity level of biodiversity.
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C04	Explain how disappearance of one species affects other species.
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COURSE 22 : A12:RESEARCH METHODOLOGY

C01	To equip students with a basic understanding of the underlying principles of quantitative and qualitative research methods.
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C02	To understand about the ethical and philosophical issues associated with research in education.
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C03	Enable students to acquire expertise in the use and application of the methods of data collection and analysis.
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C04	Provide learning opportunities to critically evaluate research methodology.
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COURSE 23: MBG3C06:COMPUTER APPLICATION FUNDAMENTALS

C01	To understand computer fundamentals and organization
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C02	To analyse the word processing concepts
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C03	To understand the spreadsheet concepts
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C04	To create charts and graphs
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Table 4: Courses Outcomes of B.Sc Microbiology

COURSE 24: BCS5B10: SOIL AND AGRICULTURAL MICROBIOLOGY

C01	Understand the various biogeochemical cycles-microbes involved and biochemical mechanisms of carbon, nitrogen, phosphorus cycles etc.
C02	Learn in detail the types and the mechanisms of nitrogen fixation and application of microorganisms as biofertilizers and their production techniques.
C03	To understand about plant microbe interaction and microbiology of soil fertility.
C04	Learn in detail about plant pathology.

COURSE 25: BCH3C04: BIOCHEMISTRY-IV

C01	Overview view about metabolism of lipids storage transport and their metabolism
C02	specify the biological significance of amino acid and proteins metabolism
C03	Conceptual knowledge about biochemical basis of inheritance.
C04	Understanding the knowledge of hormones and their action in human body
C05	Understanding the concept of biomolecules.

COURSE 26: MBG4C09: COMPUTER APPLICATION FUNDAMENTALS

C01	To understand programming concepts
C02	To evaluate conditional expressions, print operations
C03	To analyse the conditions of statements
C04	To learn the functions, arguments and local variables
C05	To learn structure and union type statements, database languages

COURSE 27: A14: INTELLECTUAL PROPERTY RIGHTS



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Table 4: Courses Outcomes of B.Sc Microbiology

C01	Understand about intellectual property rights and its role in different industries.
C02	Have ideas about patency, copyright etc..
C03	To give ideas about different IPR and its legal strength.
C04	Have an idea about trademark, industrial design and geographical indicators.
COURSE 28: A13: NATURAL RESOURCE MANAGEMENT.	
C01	Understand the factors affecting the need to find sustainable practices for production of food, feed and fibre crops.
C02	Understand the basics of sustainable utilization of natural resources.
C03	Understand about the different types of natural resources and their threats and preservation strategies.
C04	Have an idea about national and international movements regarding their protections.
COURSE 29: MBG5B07: FOOD AND DAIRY MICROBIOLOGY	
C01	Understand the significance and activities of microorganisms in food and role of intrinsic and extrinsic factors on growth and survival of microorganisms in food
C02	Know the spoilage mechanisms in food and thus identify methods to control deterioration.
C03	Understand the beneficial role of microorganisms in fermented food and food processing and the microbiology of different types of fermented food products.
C04	Learn various methods for isolation, detection and identification of microorganisms in food
COURSE 30: MBG5B06: INDUSTRIAL MICROBIOLOGY	
C01	Know about design of bioreactors, factors affecting growth and production, heat transfer, oxygen transfer.
C02	Understand the rationale in medium formulation and design for microbial fermentation, sterilization of medium and air.



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Table 4: Courses Outcomes of B.Sc Microbiology

C03	Understand the biochemistry of various fermentation.
C04	Have an idea about different types of fermentation process.
COURSE 31: MBG5B08: IMMUNOLOGY	
C01	To understand about the key concepts in immunology along with the overall organisation of immune systems.
C02	To understand the salient features of antigen antibody reaction and its uses in diagnostic and various other studies.
C03	To understand immunoprophylaxis and immunotherapy.
C04	To have a base about autoimmune disorders.
COURSE 32: MBG5B09: MEDICAL MICROBIOLOGY I	
C01	To understand about the basic principles of medical microbiology.
C02	Have a detailed idea about bacteriology.
C03	Role of different microorganisms in disease causage and its epidemiological study.
C04	To understand about their prophylaxis.
COURSE 33: CHE5D01: ENVIRONMENTAL CHEMISTRY	
C01	Recall the technical/scientific terms involved in pollution.
C02	Understand the causes, effects and consequences of different types of pollution
C03	Describe water quality parameters.
C04	Study various pollution control measures.
C05	Understand the basics of green Chemistry.



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Table 4: Courses Outcomes of B.Sc Microbiology

COURSE34: BCM5D03: BASIC ACCOUNTING

C01	To enable the students to acquire knowledge of Accounting Principles
C02	Acquire basic skills in handling Subsidiary Books
C03	Acquire basic skills in handling Final Accounts

COURSE 35: BCS5D01: INTRODUCTION TO COMPUTERS AND OFFICE AUTOMATION

C01	Describe the usage of computers and why computers are essential components in business and society.
C02	Solve common business problems using appropriate Information Technology applications and systems.
C03	Ability to Choose electronic tools best suitable for the business requirements at hand.
C04	Develop new designs that is suitable for a given case.

COURSE 36: BCS5D01: INTRODUCTION TO COMPUTERS AND OFFICE AUTOMATION

C01	Familiarising non economics students with the most basic concepts of economics.
C02	Helps them to understand various theories and laws applied in economics
C03	Enables them to apply various concepts of economics in their daily life
C04	Analyse the manner in which price, income and other variables are determined

COURSE 37: ENG5D01: ENGLISH FOR COMPETITIVE EXAMINATIONS

C01	Understand the historical background of travel in India
C02	Identify important tourist destinations in India
C03	Analyse the basic components of Tourism



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C04	Understand the cultural heritage of Kerala
C05	Classify important tourist attractions in India based on their nature.
COURSE 38: HIS5D02: HISTORICAL TOURISM	
C01	Understand the historical background of travel in India
C02	Identify important tourist destinations in India
C03	Analyse the basic components of Tourism
C04	Understand the cultural heritage of Kerala
COURSE 39: BBA5D1: E-COMMERCE	
C01	Analyse the impact of E- E-Commerce Describe
C02	Describe the major types of E E-Commerce
C03	Explain the process that should be followed in building an E-Commerce
C04	Identify the key security threats in the E-Commerce
COURSE 40: MTA5D02: MATHEMATICS FOR NATURAL SCIENCES	
C01	Explain the basic mathematical ideas of functions, their graphs and their applications in daily life for those students not having mathematics as a course in their degree programme.
C02	Familiarise the important concepts of limits, continuity and differentiation to nedy students.
C03	Enable them to apply these ideas in daily life.
COURSE 41: PE5D03: PHYSICAL ACTIVITY - HEALTH & WELLNESS	
C01	Impart concepts of physical education and fitness



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Table 4: Courses Outcomes of B.Sc Microbiology

C02	Practice basic exercise principles, first aid and nutrition
C03	Introduce yoga, stress management and postural deformities
C04	Basic knowledge on vital signs, lifestyle/hypokinetic diseases and its management
COURSE 42: PHY5D01(1): NON-CONVENTIONAL ENERGY SOURCES	
C01	Understand the importance of non conventional energy sources
C02	Understand basic aspects of solar energy
C03	Understand basic principles of wind energy conversion
C04	Understand the basic ideas of geothermal and biomass energy and recognize their merits and demerits
C05	Understand the basic ideas of oceans and chemical energy resources and recognize their merits and demerits
COURSE 43: MBG6B10: GENETICS AND GENETIC ENGINEERING.	
C01	Explain the concept of recombination and linkage mapping.
C02	To study about physical traits and their inheritance, chemical structures that influence those traits.
C03	Understand about the importance sequences related to gene expressions.
C04	Have an idea about the outcomes of genetic crosses when parental genotypes and phenotypes are known.
COURSE 44: MBG6B11: MEDICAL MICROBIOLOGY	
C01	To understand about medically important virus families, their replication strategies and mechanisms for development of viral infectious diseases.
C02	To understand about parasitology.



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Table 4: Courses Outcomes of B.Sc Microbiology

C03	Have an idea about mycology.
C04	To understand about antiviral immunity and viral evasion.
C05	Understand about treatment for different fungal diseases.
COURSE 45: MBG6B15: CELL AND TISSUE CULTURE	
C01	Successfully maintain cultures of cell lines with good viability , minimal contamination and appropriate documentation.
C02	Perform supportive tasks relevant to cell cultures, including preparation and evaluation of media, , cryopreservation and recovery.
C03	Understand various stages of cell growth on culturing.
C04	Recognise and troubleshoot problems common to routine cell cultures.
C05	To understand different gene transfer techniques.
COURSE 46: MBG6B15: BIOINSTRUMENTATION	
C01	To understand centrifugation technique
C02	To understand spectroscopy technique and chromatographic technique
C03	To analyse electrophoresis and radioisotopes
C04	To understand chromatographic technique
COURSE 47: MBG6B15(E2): MOLECULAR BIOLOGY	
C01	To understand structure and functions of genetic material
C02	To understand analyse gene mutations and repair mechanisms.
C03	To know cell replication in detail.



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PEOs, PSOs, POs & COs B.Sc MICROBIOLOGY

Table 4: Courses Outcomes of B.Sc Microbiology

C04	To understand gene regulations, translation and transcription.
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