



**Dr. MGR-JANAKI COLLEGE  
OF ARTS & SCIENCE FOR WOMEN**

SATHYABAMA MGR MALIGAI  
11 & 13, Durgabai Deshmukh Road, RA Puram, Chennai - 28

An ISO 9001:2015 CERTIFIED INSTITUTION  
Affiliated to the University of Madras



**DR.MGR JANAKI COLLEGE OF ARTS  
AND SCIENCE FOR WOMEN**

**DEPARTMENT OF MICROBIOLOGY**



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## M.Sc. Microbiology

(With effect from the Academic Year 2023-24)

TANSICHE REGULATIONS ON LEARNING OUTCOMES - BASED CURRICULUMFRAME WORK FOR POST GRADUATE EDUCATION	
<b>Programme:</b>	M.Sc. MICROBIOLOGY
<b>Programme code:</b>	22PGMB
<b>Duration:</b>	2 Years [PG]
<b>Programme Outcomes:</b>	<p><b>PO1: Disciplinary Knowledge</b> Capable of demonstrating detailed knowledge and expertise in all the disciplines of the subject.</p> <p><b>PO2: Communication Skills</b> Able to express thoughts, ideas, concepts, scientific information, experiments and its significance effectively in writing and verbal, communicate with confidence to different groups, using appropriate media.</p> <p><b>PO3: Moral and Ethical Awareness</b> Ability to employ values in conducting one's life, use ethical practice at work, avoiding fabrication, misinterpretation and plagiarism, adhering to intellectual property rights and appreciate ethical solutions for environmental sustainability.</p> <p><b>PO4: Analytical Reasoning</b> Ability to evaluate the reliability and relevance of evidence, identify flaws, analyze and synthesize data from different sources.</p> <p><b>PO5: Contribution to Society</b> Solve public issues concerned with public health and safety for the welfare of the society.</p> <p><b>PO6: Scientific Reasoning</b> Ability to identify, analyze, interpret and draw conclusions from qualitative and quantitative data, critically evaluate ideas, evidences and experiences, with an open mind and reasoned perspective.</p> <p><b>PO7 : Employability Skill</b> Equip with skills, based on current trends and future expectations for career</p>



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development and placements.

**PO8: Entrepreneurial Skill**

To create efficient entrepreneurs by accelerating critical thinking, problem solving, decision making and leadership qualities to facilitate startups.

**PO9: Research Related Skill**

A sense of inquiry and capability for questioning, problem arising, synthesizing and articulating. Ability to recognize cause and effect relationships, define problems, formulate and test hypothesis, analyze, interpret and draw conclusions from data, establish hypothesis, predict cause and effect relationships, ability to plan, execute and report the results of an experiment or investigation.

**PO10: Lifelong Learning**

Identify the need for skills necessary to be successful in future, through self-paced and self-directed learning aiming at personal development, meeting economic, social and cultural objectives, adapting to changing trends and demands of work place.

**PO11: Instrumentation Skill**

Able to handle conventional and sophisticated instruments thereby acquiring employability skills.

**PO12: Leadership Readiness and Qualities**

Capability for building a team, identifying the tasks, setting direction, formulating an inspiring vision, employing skills to reach the right destination, smoothly.

**PO13: Information/ Digital Literacy**

Ability to use software for interpretation and analysis of data in a variety of learning situations.

**PO14: Cooperation and Team Work**

Ability to work effectively with diverse teams, facilitate cooperative or coordinated effort on the part of a group and act together as a group or as a team in the interest of a common cause and work efficiently as a member of a team.



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## **M.Sc MICROBIOLOGY**

*(With effect from the Academic Year 2022- 2023)*

### **PREAMBLE**

Microbiology is the branch of Science that deals with microorganisms. Microbiology is a broad term that includes Bacteriology, Virology, Mycology, Parasitology, and other branches. The programme M.Sc. in Microbiology, is a promising branch in the field of Life Sciences. It is all about the microorganisms and their behavior in different environments such as aquatic, terrestrial, and atmosphere and their associations with other living organisms. This programme includes Clinical, Food & Dairy Microbiology, Industrial and Fermentation Technology, Environmental Microbiology, Microbial Biotechnology, and Agricultural Microbiology. There is a continuous demand for microbiologists as workforce in education, industry, and research. Hence, microbiological tools and techniques are used in almost all fields which are indispensable for people working in fields like Agriculture, Food Industry, Medical Sciences, Environmental Science, Pharmaceutical Science etc. The syllabi for the two-year M.Sc. degree course in Microbiology are framed in such a way that the students at the end of the course, can be adept at Microbiological techniques for pursuing higher studies and can also apply Microbiological methods judiciously to the various types of industrial needs.

### **PROGRAMME LEARNING OUTCOME NATURE AND EXTANT OF THE PROGRAMME**

The postgraduate programme in Microbiology course focuses on advanced studies in Microbiology, Molecular Biology, Microbial Technology, Food, etc. This course provides wider arena for research in various fields. It is beneficial for the aspiring researchers in various fields of Life Sciences including Biotechnology and Pharmaceutical Industries. After obtaining this degree, a Microbiologist may enter into the job market or opt for undertaking further higher studies in the subject and the students may join industry, academia, or public health departments and effectively contribute as Microbiologists, not only to the enrichment of the existing fund of knowledge but also contribute largely to the welfare of the society. Thus the postgraduate level degree in microbiology must prepare the students for all these objectives. The LOCF curriculum has been developed encompassing all the diversified aspects of Microbiology with reasonable depth of knowledge and skills, so as to specialize them in the various aspects of the subject. It also equips them with the expected professional expertise



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## AIM OF THE PROGRAMME

The aim of the postgraduate degree in Microbiology is to make students knowledgeable about the various advanced concepts, in a wide-ranging context that involve the use of knowledge and skills of Microbiology. Their understanding, knowledge, and skills in Microbiology need to be developed through a systematic teaching-learning process in the class, practical skills and research work through the hands-on, their presentation and articulation skills, exposure to industry and interaction with industry experts.

## GRADUATE ATTRIBUTES

The students graduating in this degree must have an intricate knowledge of the advanced level of Microbiology as applicable to wide ranging contexts. They should have the appropriate skills of Microbiology, so as to perform their duties as Microbiologists. They must be able to analyze the problems related to microbiology and come up with most suitable solutions. As Microbiology is an interdisciplinary subject, the students might have to take inputs from other areas of expertise. So the students must develop the spirit of team work. Microbiology is a very dynamic subject and practitioners might have to face several newer problems. To this end, the Microbiologists must be trained to be innovative to solve such newer problems. Several newer developments are taking place in Microbiology. The students are trained to pick up leads and see the possibility of innovations, translating their ideas into prototypes and products, culminating in successful entrepreneurship. Furthermore, the students are made to interact with industrial experts, transforming them to budding entrepreneurs. They are also made aware of the requirements of developing a Microbiology enterprise by acquiring knowledge of patentship, copyright and various regulatory processes.

Besides attaining the attributes related to the profession of Microbiology, the postgraduates in this discipline should also develop ethical awareness which is mandatory for practising a scientific discipline including ethics of working in a laboratory and ethics followed for scientific publishing of their research work in future. The students graduating in Microbiology should also develop excellent communication skills both in the written as well as spoken language, managerial skills and computing skills which is indispensable for them to pursue higher studies from some of the best and internationally acclaimed Universities and Research Institutions spread across the globe



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## PROGRAMME EDUCATION OBJECTIVE (PEO)

- This course provides an introduction to the significance and effect of microorganisms in various fields of Life Sciences.
- This course explains the advanced sections of Microbiology like Microbial Taxonomy, Immunology, Microbial Genetics, Food Microbiology, Medical Microbiology, Agricultural Microbiology, Environmental Microbiology, Industrial Microbiology and Bioinformatics.
- This course provides necessary theoretical and practical experience in all divisions of microbiology to become an efficient professional.
- The course helps to work in research organizations, hospitals, biotechnological, agricultural, food and pharmaceutical industries.
- This course provides an in-depth understanding of the role of microbes in human, animals, plants & environment and also creates opportunities for higher studies.

## PROGRAMME OUTCOMES (POs)

- To have a better understanding on key principles of microbial functioning at an advanced level of Taxonomy, Molecular, Biochemical, Industrial, Medical and other Basic and Applied applications.
- To understand the fundamental principles of biology include central dogma, diversity of life, inheritance and how these principles related to microorganisms.
- To familiarize with the role of microbes in human, animal and plant diseases and also with the environment.
- To develop proficiency in the quantitative skills, necessary to analyze biological problems with knowledge of specialized techniques used in the field of Life Sciences.
- To provide broad exposure to various microbial communities, ecological and commercial issues related to the field of Microbiology.
- To collect, analyze, interpret scientific data, and carry out the research experiments, using microbiological laboratory techniques and safety procedures.
- To get an awareness about career opportunities and ethical concerns in Microbiological research.



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**PROGRAMME SPECIFIC OUTCOMES (PSOs)**

**PSO 1:** The Postgraduate students will acquire fundamental and applied knowledge in history, classification, morphology and physiological characteristic of Microorganisms.

**PSO 2:** Understand the epidemiological status, pathogenesis, immune response, diagnosis, treatment, prevention and control of Microbial diseases in Human being and plants.

**PSO 3:** Understand the role of Microorganism in Medical, Food, Pharmaceutical, Industrial, Soil, Agricultural and Environmental Microbiology.

**PSO 4:** Become an expertise with Good Manufacturing Practices and Good Laboratory Practices in advanced Microbiological, Immunological and Molecular techniques.

**PSO 5:** Enhance the skills in Entrepreneurship and career opportunities in various fields of Life Sciences.

**PSO 6:** Develop social accountability through Microbiological importance for the betterment of the environment and mankind at National and Global perspective.

**CHEME OF EXAMINATIONS:**

**FIRST SEMESTER**

Semester	Course component	Name of the Subject	Hour allotment /week	Credits	Exam hour	Maximum Mark		
						Internal	External	Total
I	Core I – Theory	Microbial Diversity and Taxonomy	5	4	3	25	75	100
I	Core II – Theory	General Microbiology and Laboratory Animal Science	5	4	3	25	75	100
I	Core III – Theory	Immunology	5	4	3	25	75	100
I	Core IV– Practical*	General Microbiology and Immunology	6	4	6	40	60	100
I	Elective I – Theory	Microbial Metabolic Pathways	4	3	3	25	75	100
I	Elective II– Theory	Pharmaceutical Microbiology	4	3	3	25	75	100
I	<b>Soft Skills I</b>	<b>Soft Skills I</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>25</b>	<b>75</b>	<b>100</b>



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## SECOND SEMESTER

Semester	Course component	Name of the Subject	Hour allotment /week	Credits	Exam hour	Maximum Mark		
						Internal	External	Total
II	Core V – Theory	Virology	5	4	3	25	75	100
II	Core VI – Theory	Medical Bacteriology	5	4	3	25	75	100
II	Core VII – Theory	Medical Mycology and Parasitology	5	4	3	25	75	100
II	Core VIII – Practical*	Medical Bacteriology, Medical Mycology & Parasitology and Virology	6	4	6	40	60	100
II	Elective III – Theory	Industrial and Fermentation Technology	4	3	3	25	75	100
II	Extra disciplinary Elective I – Theory	Biostatistics, Bioinformatics and Bioinstrumentation	4	3	3	25	75	100
II	<b>Soft Skills II</b>	<b>Soft Skills 2</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>25</b>	<b>75</b>	<b>100</b>

## THIRD SEMESTER

Semester	Course component	Name of the Subject	Hour allotment /week	Credits	Exam hour	Maximum Mark		
						Internal	External	Total
III	Core IX – Theory	Microbial Genetics	5	4	3	25	75	100
III	Core X – Theory	Genetic Engineering	5	4	3	25	75	100
III	Core XI – Theory	Molecular Biology	5	4	3	25	75	100
III	Core XII – Practical*	Microbial Genetics, Molecular Biology & Genetic Engineering	6	4	6	40	60	100
		Soil and						





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III	Elective IV – Theory	Agricultural Microbiology	4	3	3	25	75	100
III	Extra Disciplinary Elective II	Microbial Remediation	4	3	3	25	75	100
III	<b>Internship</b>	<b>Internship**</b>	-	2	-	-	-	<b>100</b>
III	<b>Soft Skills III</b>	<b>Soft Skills 3</b>	1	2	3	25	75	<b>100</b>

## FOURTH SEMESTER

Semester	Course component	Name of the Subject	Hour allotment /week	Credits	Exam hour	Maximum Mark		
						Internal	External	Total
IV	Core XIII – Theory	Food, Dairy and Environmental Microbiology	5	4	3	25	75	100
IV	Core XIV – Practical*	Soil, Agricultural, Food and Environmental Microbiology	6	4	6	40	60	100
IV	Elective V – Theory	Research Methodology	4	3	3	25	75	100
IV	Core XV Project viva voce*	Research Project***	14	4	3	40	60	100
IV	Soft Skills IV	Soft Skills 4	1	2	3	25	75	100

\*Practical Examinations will be conducted in Even Semester only.

\*\* Internship will be carried out during the summer vacation of the Second Semester (Minimum period of 21 days) and thereport will be evaluated by Two Examiners within the Department of the College and the marks should be included in the Third-Semester statement of marks.

\*\*\*Industrial Visit should be incorporated along with the Project work as a report (minimum of 10 pages) possibly with geo-tagged photographs.

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**LEARNING OUTCOME:**

Programme Name		MSC MICROBIOLOGY	
Shift		I	
Course Name	Course Code	Course Outcome	
<b>SEMESTER I</b>			
General Microbiology, Physiology and Microbial Diversity	416C1A	<ol style="list-style-type: none"> <li>1. Acquire knowledge on the principles of different types of microscopes and their applications.</li> <li>2. Compare and contrast the structure of bacteria and fungi. Illustrate nutritional requirements and growth in bacteria.</li> <li>3. Exemplify, isolate and cultivate microalgae from diverse environmental sources.</li> <li>4 Explain various pure culture techniques and discuss sterilization methods.</li> <li>5 Discuss the importance and conservation of microbial diversity</li> </ol>	<a href="https://egovernance.unom.ac.in/syllabuspg2324/pdf/416C1A.pdf?486889904">https://egovernance.unom.ac.in/syllabuspg2324/pdf/416C1A.pdf?486889904</a>
Immunology and Microbial Genetics	416C1B	<ol style="list-style-type: none"> <li>1 Discuss immunity, organs and cells involved in immunity. Compare the types of antigens and their properties.</li> <li>2 Describe immunoglobulin and its types. Categorize MHC and understand its significance.</li> <li>3 Elucidate the mechanisms of different hypersensitivity reactions. List out the Vaccines and discuss their development.</li> <li>4 Acquire knowledge the structure DNA in prokaryotes and eukaryotes</li> <li>5 Explain out gene transfer studies in microbes.</li> </ol>	<a href="https://egovernance.unom.ac.in/syllabuspg2324/pdf/416C1B.pdf?1191181686">https://egovernance.unom.ac.in/syllabuspg2324/pdf/416C1B.pdf?1191181686</a>
Forensic Science	416E1A	<ol style="list-style-type: none"> <li>1 Understand the Scope, need and learn the tools and techniques in forensic science.</li> <li>2 Comprehend organizational setup of a forensic science laboratory.</li> <li>3 Identify and Examine body fluids for identification.</li> <li>4 Extract DNA from blood samples for investigation.</li> <li>5 Recognize medico legal post mortem procedures and their importance</li> </ol>	<a href="https://egovernance.unom.ac.in/syllabuspg2324/pdf/416E1A.pdf?1307727555">https://egovernance.unom.ac.in/syllabuspg2324/pdf/416E1A.pdf?1307727555</a>
Bioinstrumentation	416E1D	<ol style="list-style-type: none"> <li>1 Explain the principles and working mechanisms of laboratory instruments.</li> <li>2 Discuss chromatography techniques and molecular biology techniques.</li> <li>3 Illustrate molecular techniques in biological applications.</li> <li>4 Acquire knowledge on spectroscopic techniques</li> <li>5 Demonstrate the use of radio isotopes in various techniques</li> </ol>	<a href="https://egovernance.unom.ac.in/syllabuspg2324/pdf/416E1D.pdf?1699274292">https://egovernance.unom.ac.in/syllabuspg2324/pdf/416E1D.pdf?1699274292</a>



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Practical I General Microbiology, Physiology, Microbial Diversity, Immunology and Microbial Genetics	416C1C	<ol style="list-style-type: none"> <li>1 Gain knowledge on the fundamentals, handling and applications of microscopy, sterilization methods. Identify microbes by different staining methods.</li> <li>2. Prepare media for bacterial growth. Discuss plating and growth measurement techniques.</li> <li>3. Acquire adequate skills to perform blood grouping and serological reactions.</li> <li>4. Provide fundamental skills in preparation, separation and purification of immunoglobulin.</li> <li>5. Apply the knowledge of molecular biology skills in clinical diagnosis</li> </ol>	<a href="https://egovernance.unom.ac.in/syllabuspg2324/pdf/416C1C.pdf?449222281">https://egovernance.unom.ac.in/syllabuspg2324/pdf/416C1C.pdf?449222281</a>
<b>SEMESTER II</b>			
Medical Bacteriology and Mycology	416C2A	<ol style="list-style-type: none"> <li>1 Acquire Knowledge on collection, transportation and processing of various kinds of clinical specimens.</li> <li>2 Explain morphology, characteristics and pathogenesis of bacteria.</li> <li>3 Discuss various factors leading to pathogenesis of bacteria.</li> <li>4 Acquire knowledge on antifungal agents and their importance.</li> <li>5 Describe various diagnostic methods available for fungal disease diagnosis</li> </ol>	<a href="https://egovernance.unom.ac.in/syllabuspg2324/pdf/416C2A.pdf?1657239705">https://egovernance.unom.ac.in/syllabuspg2324/pdf/416C2A.pdf?1657239705</a>
Medical Virology and Parasitology	416C2B	<ol style="list-style-type: none"> <li>1 Describe the replication strategy and cultivation methods of viruses.</li> <li>2 Acquire knowledge about oncogenic virus and human viral infections.</li> <li>3 Develop diagnostic skills, in the identification of virus infections.</li> <li>4 Impart knowledge about parasitic infections.</li> <li>5 Develop diagnostic skills, in the identification of parasitic infections.</li> </ol>	<a href="https://egovernance.unom.ac.in/syllabuspg2324/pdf/416C2B.pdf?762709543">https://egovernance.unom.ac.in/syllabuspg2324/pdf/416C2B.pdf?762709543</a>
Core-Practical II Medical Bacteriology, Mycology, Virology & Parasitology	416C2C	<ol style="list-style-type: none"> <li>1 Develop skills in the diagnosis of bacterial infections and antimicrobial sensitivity.</li> <li>2 Impart knowledge on fungal infections and its diagnosis.</li> <li>3 Diagnose parasitic</li> <li>4 To gain knowledge about industrially important microbes.</li> <li>5 Screen and utilize microorganisms for effective industrial production of metabolites</li> </ol>	<a href="https://egovernance.unom.ac.in/syllabuspg2324/pdf/416C2C.pdf?1455892416">https://egovernance.unom.ac.in/syllabuspg2324/pdf/416C2C.pdf?1455892416</a>
Bioremediation	416E2C	<ol style="list-style-type: none"> <li>1 Describe the nature and importance of bioremediation and use in real world applications.</li> <li>2 Describe the typical composition of waste water and application of efficient technologies for water treatment.</li> <li>3 Explain the fundamentals of treatment technologies and the considerations for its design and implementation in treatment plants.</li> <li>4 Explain the potential of microbes in ore extraction and acquaint students with methods of reducing health risks caused by xenobiotics.</li> </ol>	<a href="https://egovernance.unom.ac.in/syllabuspg2324/pdf/416E2C.pdf?380822417">https://egovernance.unom.ac.in/syllabuspg2324/pdf/416E2C.pdf?380822417</a>



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		5 Familiarize the role of plants and their associated microbes in remediation and management of environmental pollution	
Nanobiotechnology	416E2E	1 Analyze nanomaterials based on the understanding of nanobiotechnology. 2 Discuss the methods of fabrication of nanomaterials. 3 Gain Knowledge on characterization of nanomaterials. 4 Discover nanomaterials for targeted drug delivery. 5 Explain nanomaterials in nanomedicine and environmental pollution.	<a href="https://egovernance.unom.ac.in/syllabuspg2324/pdf/416E2E.pdf?1314215001">https://egovernance.unom.ac.in/syllabuspg2324/pdf/416E2E.pdf?1314215001</a>
<b>SEMESTER III</b>			
Microbial Genetics	MQ23A	1. Know about the principles of genetics and genetic material. 2. Familiarize on the organization of genetic material and gene regulations. 3. Learn on the types, properties of plasmids widely used in gene cloning and gene transfer. 4. Explore the impact of mutation, repair mechanism and detection of mutation. 5 Imparts knowledge on genetic recombination, transposons and gene mapping in bacteria, yeast and viruses.	<a href="https://egovernance.unom.ac.in/ugsyllabus/pg/MAM-SY.pdf?t=1107805472">https://egovernance.unom.ac.in/ugsyllabus/pg/MAM-SY.pdf?t=1107805472</a>
Genetic Engineering	MQ23B	1. Provides knowledge on the various enzymes used in genetic engineering. 2, Familiarize oncloning vectors used in genetic engineering. 3. Gain sound knowledge on the gene cloning strategies and transfer methods. 4. Acquire knowledge on various blotting techniquesand PCR. 5. Learn the techniques of protoplast fusion, DNA finger printing techniques and application of genetic engineering in various fields.	<a href="https://egovernance.unom.ac.in/ugsyllabus/pg/MAM-SY.pdf?t=1107805472">https://egovernance.unom.ac.in/ugsyllabus/pg/MAM-SY.pdf?t=1107805472</a>
Molecular Biology	MQ23C	1. Gain complete knowledge on biomolecules and Nucleic acids. 2. Explores the detailed processes of DNA replication, recombination, damage and repair mechanisms. 3. Learn about RNA synthesis and processing and RNA transport. 4. Understand the process of protein synthesis, inhibition factors and post translation modification of protein. 5. Get an idea on control of gene expression at transcription, translation level and gene silencing.	<a href="https://egovernance.unom.ac.in/ugsyllabus/pg/MAM-SY.pdf?t=1107805472">https://egovernance.unom.ac.in/ugsyllabus/pg/MAM-SY.pdf?t=1107805472</a>



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<p>CORE XII – PRACTICAL: MICROBIAL GENETICS, MOLECULAR BIOLOGY AND GENETIC ENGINEERING</p>		<p>1. Learn the techniques for isolation of plasmid and genomic DNA, estimation of DNA by chemical and U-V method.</p> <p>2. Know the techniques for isolation of RNA from yeast, estimation of RNA by chemical and U-V method and isolation of antibiotic resistant auxotrophic mutants.</p> <p>3. Get hands on training on protein estimation, determination molecular weight of protein, 2D-Gel electrophoresis, Isoelectric focusing, Separation of amino acids by TLC and paper chromatography.</p> <p>4. Gains experimental knowledge on separation of proteins using chromatography. Immobilization of enzymes and whole cells. Western blotting. Protoplast and spheroplast isolation. Induction of beta-galactosidase activity in E. coli using IPTG.</p> <p>5. Acquire knowledge on the lab skills for competent cell preparation, transformation, PCR, Native PAGE and Restriction analysis.</p>	<p><a href="https://egovernance.unom.ac.in/ugsyl/labus/pg/MAM-SY.pdf?t=1107805472">https://egovernance.unom.ac.in/ugsyl/labus/pg/MAM-SY.pdf?t=1107805472</a></p>
<p>Soil and Agricultural Microbiology</p>	<p>MQ43A</p>	<p>1. Imparts knowledge on types of soil and microbial interaction in soil.</p> <p>2. Insight on biofertilizers and biopesticides.</p> <p>3. Gain basic knowledge about plant diseases and defense mechanism of plants.</p> <p>4. Familiarize on different plant disease and its management.</p> <p>5. Throws light on biogeochemical cycles and nitrogen fixation.</p>	<p><a href="https://egovernance.unom.ac.in/ugsyl/labus/pg/MAM-SY.pdf?t=1107805472">https://egovernance.unom.ac.in/ugsyl/labus/pg/MAM-SY.pdf?t=1107805472</a></p>
<p>Microbial Remediation</p>	<p>MQ33A</p>	<p>1. Imparts basic knowledge on bioremediation, bioaugmentation and risk associated with pollutants.</p> <p>2. Insights on degradation of xenobiotics and other environmental pollutants.</p> <p>3. Gain knowledge about the concepts of aerobic and anaerobic digesters, dendroremediation and biodegradation of industrial waste.</p> <p>4. Throws light on enzymes from fungi and its biodegradable properties and to understand the concept of solid and liquid waste treatment.</p> <p>5. Gain in-depth knowledge about phycoremediation of domestic wastewater.</p>	<p><a href="https://egovernance.unom.ac.in/ugsyl/labus/pg/MAM-SY.pdf?t=1107805472">https://egovernance.unom.ac.in/ugsyl/labus/pg/MAM-SY.pdf?t=1107805472</a></p>
<p>SEMESTER IV</p>			
<p>CORE XIII - THEORY - FOOD, DAIRY AND ENVIRONMENTAL MICROBIOLOGY</p>		<p>1. Gain knowledge about different principles involved in food preservation, microbiological quality control and prevention of food-borne diseases.</p> <p>2. Throws light on the role of microorganisms in milk, fermented foods and in food processing, different types of fermented food products.</p> <p>3. Familiarize the diversity of microorganisms</p>	<p><a href="https://egovernance.unom.ac.in/ugsyl/labus/pg/MAM-SY.pdf?t=1107805472">https://egovernance.unom.ac.in/ugsyl/labus/pg/MAM-SY.pdf?t=1107805472</a></p>



# Dr. MGR-JANAKI COLLEGE OF ARTS & SCIENCE FOR WOMEN

SATHYABAMA MGR MALIGAI  
11 & 13, Durgabai Deshmukh Road, RA Puram, Chennai - 28

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		in air, exemplify the air quality, explore the impact of air borne diseases. 4. Learn the role of indicator microorganisms in water quality. 5. Gain in-depth knowledge about the degradation of xenobiotics in the environment.	
CORE XIV – PRACTICAL - SOIL, AGRICULTURAL , FOOD AND ENVIRONMENT AL MICROBIOLOGY		1. Imparts basic knowledge about soil inhabiting microbes and its impact in soil. 2. Gain knowledge about plant diseases. 3. Throws light on food spoilage, enumeration and quality assessment. 4. Learn about extracellular enzyme activity & quantification of microbes in air. 5. Gain knowledge of about the microbiological analysis of water.	<a href="https://egovernance.unom.ac.in/ugsyllabus/pg/MAM-SY.pdf?t=1107805472">https://egovernance.unom.ac.in/ugsyllabus/pg/MAM-SY.pdf?t=1107805472</a>
ELECTIVE V– THEORY - RESEARCH METHODOLOGY		1. Understand the objectives of research, design of research and analysis of data. 2. Gain basic knowledge about dissertation and publication ethics. 3. Provides perceptions about funded projects. 4. Learn about research metrics & ethics. 5. Throws light on statistical tools in biological science, software for plagiarism and reference.	<a href="https://egovernance.unom.ac.in/ugsyllabus/pg/MAM-SY.pdf?t=1107805472">https://egovernance.unom.ac.in/ugsyllabus/pg/MAM-SY.pdf?t=1107805472</a>

## ASSESSMENT PATTERN

CORE PAPERS, ELECTIVE PAPERS AND EXTRA DISCIPLINARY PAPERS

**INTERNAL ASSESSMENT: 25 Marks**

**EXTERNAL ASSESSMENT: 75 Marks**

**TOTAL: 100 Marks**

### INTERNAL ASSESSMENT PATTERN

Attendance (5 Marks)			Seminar	Assignment	Test	Total
90-100	80-90	70-80	(5 Marks)	(5 Marks)	(10 Marks)	25



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**EXTERNAL ASSESSMENT**

End Semester External University Examination: 75 MARKS

Duration 3 Hours

- Part -A-(10X1=10) Answer any 10 out of 12 Questions 1-12
- Part -B-(5X5=25) Answer any 5 out of 7 Questions 13-19
- Part -C-(4X10=40) Answer any 4 out of 6 Questions 20-25

**QUESTION PAPER PATTERN**

Subject Name	Marks	Total
Core, Elective, Extra Disciplinary, Soft skills,	PART- A: 10 out of 12 = $10 \times 1 = 10$ marks	75
	PART- B: 5 out of 7 = $5 \times 5 = 25$ marks	
	PART- C: 3 out of 5 = $4 \times 10 = 40$ marks	