# School of Sciences

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# Master of Science

# (MICROBIOLOGY)

**( 2 YEARS FULL TIME POST GRADUATE PROGRAMEE)**

## SEMESTER PATTERN

**(2025- 2027)**

# Syllabus M.Sc. Microbiology

**GENERAL INTRODUCTION OF THE DEPARTMENT**

MATS School of Sciences (MSS) was established with a vision to create technocrats in the applied branches of Biological and Chemical Sciences to convey updated scientific knowledge. In the school theperformances of the students are constantly monitored by continuous assessment. The School believes in supplementing academic input of students with the help of regular Seminar, Guest Lectures, Industrial/Research Institute visits and encouraging the students to participate in National & International Seminars, Conferences and Workshops.

**DEPARTMENT HIGHLIGHTS**

- Research focus on frontier of Life Sciences and affordable healthcare
- Highly acclaimed scientists as faculty
- State-of-the-art Lab facilities
- Hand-on training on sophisticated equipments
- Academia – Industry interface
- Multidisciplinary research in affordable healthcare, Agriculture and Food

**COURSEDESIGN**

The department follows a unique course-design which is contemporary and cutting-edge. It includes modern and advanced papers/ subjects including the papers from Management Science as given in the curriculum matrix

**PEDAGOGY**

- Chalk Board, LCD and Projector based teaching
- Research based teaching
- Project based learning
- Separate lab bench for each student

**FACILITIES**

State-of-the-art facilities include:

- Double beam UV- Visible Spectrophotometer, Cooling Centrifuge, Microfuge, Incubators, Microscopes, Laminar flow hoods, Colorimeter, Micro- and regular balance, Electronic Balance Autoclave, Glass distillation apparatus, Computers, Deep freeze, DNA/RNA & Protein Electrophoresis apparatus, Plant Tissue Culture racks with light arrangements, Shakers, BOD incubator & Orbital Shaking Incubator etc
- Microbial cell culture
- Plant tissue culture

**FACULTIES**

- Well experienced faculties from Academic Institutes and Industries
- Invited lectures by eminent scientists from different countries

**M. Sc. MICROBIOLOGY: SCOPE AND CONTENT**

Microbiology is the research-oriented science, dealing with the Microorganisms & microbial Technology. This study includes a large variety of subjects including General Microbiology, Biochemistry, Computer, Bioinformatics& Biostatistics, Instrumentation, Management in Practice, Cell & Molecular Biology, Microbial Physiology & Metabolism, Immunology, Microbial Genetics, Entrepreneurship, Environmental Microbiology Medical Microbiology, Industrial Microbiology, Food & Dairy Microbiology, IPR Bioethics & Research

Methodology, Dissertation etc. Microbiology features the use of living cells and bacteria in the industrial process. Microbiology

can be applied in developing various vaccines, medicines and diagnostics, improving energy production and conservation and increasing productivity.

**OBJECTIVES OF THE M.Sc. MICROBIOLOGY PROGRAM**

1. To impart knowledge and skills of various aspects of microbiology.
2. To train the students for industrial need and to pursue further education.
3. To develop human resource and entrepreneurs in Microbiology with the ability to independently starttheir own ventures or small biotech units in the field of biotechnology.
4. Understand modern microbiology - practices and approaches with an emphasis in technology applicationin pharmaceutical, medical, industrial, environmental and agricultural areas.
5. Become familiar with public policy, bio-safety, and intellectual property rights issues related to microbiology applications nationally and globally
6. Gain experience with standard molecular tools and approaches utilized: manipulate genes, gene productsand organisms.
7. Develop skills in international teamwork and research collaboration.

**ELIGIBILITY FOR ADMISSION:**

Interested aspirants for M.Sc. Microbiology degree need to fulfill the below mentioned minimum eligibility criteria.

- Completion of UG (10+2+3) level of education.
- Biology as one of the subjects at UG level

Instead of biology, one may even have had any subject related to biological sciences as one of the main subject ofstudy.

**PROGRAM OUTCOME:**

1. Post graduates will be able to apply knowledge, concepts to solve issues related to their course.
2. Post graduates will have ability to identify problems related to their subjects.
3. Post graduates will have ability to analyze and derive valid conclusions with fundamental knowledge in their respective subjects.
4. Post graduates upon the needs of environment and society, will be able to fulfill the same in the form ofsolutions within the safety limit of prevalent rules and guidelines.
5. Post graduates will have ability to design, conduct experiments, analyze and interpret data for investigatingproblems in their respective fields.
6. Post graduates will have ability to select and apply appropriate tools and techniques.
7. Post graduates will have knowledge for assessing societal, health, safety and legal aspects and the duties asresponsible citizen of country.
8. Post graduates will have the knowledge for the need of sustainable development.
9. Post graduates will have the knowledge of ethics and regulatory norms of their respective course.
10. Post graduates will have oral, written communications skill along with team spirit.

**PROGRAM SPECIFIC OUTCOMES:**

After successful completion of the M.Sc. Microbiology program, students will be able to:

**PSO1:** Demonstrate comprehensive knowledge of microbial biology and apply it to health, environment, and industry.

**PSO2:** Perform microbiological experiments, conduct research, analyze data and solve scientific problems.

**PSO3:** Practice ethical and safe microbiology, communicate effectively, and integrate interdisciplinary approaches for global challenges.

**CAREER PROSPECTS:**

The microbiology & bio-technology Industry is constantly growing and in the past 10 years, human resources in the field have grown drastically. Today, Indian biotech sector comprises of lot many companies and bio suppliers, generating ample amounts of revenues. Indian biotech industry comprises of clinical research, new drug discovery,bioinformatics, R&D, biopharmaceuticals etc. Bio-tech industry has rapid growth rate per annum. As there is increasing popularity and explosive growth, there are plenty of opportunities available in Biotechnology field. One can be a Research Scientist, Teacher, Marketing manager, Science Writer, Bioinformatician, Quality Control Officer or Production in-charge in the Food, Chemical and Pharmaceutical industry, Analyst, Environmental / Safety Specialist .

**THE MAIN JOB SECTORS ARE AS FOLLOWS:**

Biotechnology companies, Health service organizations, Pharmaceutical companies, Universities and Research institute, Horticultural industries, Conservation organizations, Food and drink manufacturers, Water industry, Agricultural industry, Law Enforcement.

**ATTENDANCE:**

A candidate shall be deemed to have undergone a regular course of study in the University, if he/she has attended at least 60% of the lectures in each subject will be at least 75% in the aggregate of lectures, tutorials and practical in order to be eligible to appear at the Final Examination.

**SCHEME OF EXAMINATION, EVALUATION AND DISTRIBUTION OF MARKS**

1 The overall weightage of a course in the Syllabi and Scheme of Teaching & Examination shall bedetermined in terms of Marks assigned to the course.

2 The evaluation of students in a course shall have two components unless specifically statedotherwise in the Scheme of Teaching & Examination and Syllabi:
(i) Evaluation through a semester-end examination (University Examination Marks)
(ii) Continuous evaluation by the teacher(s) of the course.

3 Continuous Evaluation (Internal Marks)

**i) Theory courses**

The division of internal marks will of 50% marks for mid semester examination and 50%

of marksfor the internal class tests. There shall be three class tests held during each semester. The three class tests shall ordinarily be held after 4 weeks, 8 weeks and 12 weeks of teaching in accordance with the University Academic Calendar.

**(ii) Practical/Laboratory courses**

The total internal marks in practical /Laboratory courses shall be based on performance in the laboratory, regularity, practical exercises /assignments, quizzes, etc. The assessment shall be given at three nearly equi-spaced intervals.

Evaluation through a semester-end examination

The distribution of weightage for various components of evaluation shall be as given below:

| | | Bachelor's degree/ Under-graduate diploma | Master's degree/ Post-graduate diploma |
|---|---|---|---|
| A. | THEORY COURSES | | |
| (i) | Semester-end examination | 70% | 70% |
| (ii) | Continuous evaluation by the teachers | 30% | 30% |
| B. | PRACTICAL/LABORATORY COURSES | | |
| (i) | Semester-end examination | 70% | 70% |
| (ii) | Continuous evaluation by the teachers | 30% | 30% |
| C. | DISSERTATION/THESIS | | |
| (i) | Assessment by External Examiner | 70% | 70% |
| (ii) | Assessment by Internal Examiner | 30% | 30% |

**PASSING MARKS:**

For postgraduate students, obtaining a minimum of 45% marks in aggregate in each course shall be essential for passing the course and earning its assigned credits. A candidate, who secures less than 45% of marks in a course, shall be deemed to have failed in that course.

**GRADING SYSTEM:**

**For UG:**

80% and above – "10 Grade Point" and Letter Grade "O" (Outstanding)

40% and above but below 45% - "Grade Point 4" and Letter Grade "P" (Pass)

**For PG:**

80% and above – "10 Grade Point" and Letter Grade "O" (Outstanding)

45% and above but below 50% - "Grade Point 4" and Letter Grade "P" (Pass)

**PROGRAM DURATION:**

The maximum permissible period for completing a program for which the prescribed program duration is **n semesters**, shall be **(n+4)** semesters. All the program requirements shall have to be completed in (n+4) semesters.

**ATKT criteria:**

ATKT Candidate means a candidate who failed in not more than forty percent of the total number of Core and Corebracket papers, excluding the Practical Examination/Project Work/Viva Voce Examination in the Semester Examination and is appearing in the Examination of same semester again which is organized with the next Semester Examination. Forty percent (of the total number of Core and Core bracket papers) will be rounded off to higher side in case it is not a whole number. In case a Students fails or was absent in Practical

Examination/ Project Work / Viva Voce Examination, he/she may be allowed to have ATKT exam on his/her own expenses.