



MATS
UNIVERSITY



MATS University

MATS SCHOOL OF SCIENCES

SYLLABUS

FOR

Three Year Full Time Bachelor Degree Program



BACHELOR OF SCIENCE

B.Sc. Microbiology

SEMESTER PATTERN
(2025 - 2028)



GENERAL INTRODUCTION OF THE DEPARTMENT

MATS School of Sciences (MSS) was established with a vision to create technocrats in the applied branches of Sciences to convey updated scientific knowledge. In the school the performances 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, pH meter, conductivity meter, 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

 President -  Vice-Chancellor -  Vice-Chancellor -  Vice-Chancellor -



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

B. SC. MICROBIOLOGY: SCOPE AND CONTENT

Microbiology is the research-oriented science including a fusion of biology and technology. This study includes a large variety of subjects including Cellular Genetics, Molecular biology, Plant Diversity, Chemistry, General Microbiology, Animal Sciences, Plant Sciences, Environmental Studies, Computer applications, Biostatistics, Biochemistry, Medical Microbiology & Immunology, Genetic Engineering, Entrepreneurship, Languages English & Hindi, Industrial Microbiology, Principles of Management, Plant & Animal Microbiology, Anatomy, Physiology & Reproductive Biology, Principles of Marketing Project work 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 B.Sc. MICROBIOLOGY PROGRAM (Three Years and Four Year (Research/ Honors

1. To impart basic 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 start their own ventures or small biotech units in the field of Microbiology.
4. Understand modern Microbiology - practices and approaches with an emphasis in technology application in 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.
7. Develop skills in teamwork.

ELIGIBILITY FOR ADMISSION:

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

- Completion of Higher Secondary (10+2) level of education.
- Physics, chemistry and biology as main subjects at HSC level
- Instead of biology, one may even have had any subject related to biological sciences as one of the main subject of study.

PROGRAM OUTCOME:

1. Students will be able to gain fundamental knowledge of skills and vocational certificates and their applications.
2. Students will be able to demonstrate and apply the principles of skills and vocational training certificates.
3. Diploma holders will be able to apply knowledge, concepts to solve issues related to their course.
4. Diploma holders will have ability to analyze and derive valid conclusions with fundamental knowledge in their respective subjects.



5. Diploma holders upon the needs of environment and society, will be able to fulfill the same in the form of solutions within the safety limit of prevalent rules and guidelines.
6. Graduate will have ability to design, conduct experiments, analyze and interpret data for investigating problems in their respective fields.
7. Graduate will have ability to select and apply appropriate tools and techniques.
8. Graduate will have knowledge for assessing societal, health, safety and legal aspects and the duties as responsible citizen of country.
9. Honors degree holders will have the knowledge for the need of sustainable development.
10. Honors degree holders will have the knowledge of ethics and regulatory norms of their respective course.
11. Honors degree holders will have oral, written communications skill along with team spirit.

PROGRAM SPECIFIC OUTCOMES:

1. Application of knowledge and techniques of basic sciences related to biological and chemical sciences.
2. Scale up of biochemical process after designing, optimization and analysis for developing products required for society.
3. Tabulation and interpretation of Biological data using computer software.
4. Students will be equipped to understand three fundamental aspects in biological phenomenon: a) what to seek; b) how to seek; c) why to seek?

CAREER PROSPECTS:

The microbiology 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 Microbiology 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:

Microbiology 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:

President
Vice Chancellor



1. The overall weightage of a course in the Syllabi and Scheme of Teaching & Examination shall be determined in terms of Marks assigned to the course.
2. The evaluation of students in a course shall have two components unless specifically stated otherwise 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.

		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%

CONTINUOUS EVALUATION (INTERNAL MARKS)

(i) Theory courses

The division of internal marks will of 50% marks for mid semester examination and 50% of marks for the internal class tests. There shall be three class tests held during each semester. These 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.

PASSING MARKS:

For undergraduate students, obtaining a minimum of 40% marks in aggregate in each course shall be essential for passing the course and earning its assigned credits. A candidate, who secures less than 40% 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 Core bracket 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 will be rounded off to higher side in case it is not a whole number. In case a Student 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.

President
Vice Chancellor



Programme: Bachelor of Microbiology (B.Sc) Sem: I										
NHEQF Level: 5 Courses				Teaching Scheme				Evaluation Scheme		Total Marks
Course Category	Course Sub Category	Course Name	Code	Hours			Credits			
				Theory	Tutorial	Practical		CIA	ESE	
Discipline Specific Core Course (DSCC)	Major	Microbio-I: General Microbiology	BSC DSC - 015	3	0	0	3	70	30	100
	Major	Bioscience-I: Plant Diversity	BSC DSC - 010	3	0	0	3	70	30	100
	Major	Fundamental Chemistry - I	BSC DSC - 011	3	0	0	3	70	30	100
Discipline Specific Core Practical (DSCCP)	Major	Microbiology Lab – I	BSC DSC - 012	0	0	2	1	35	15	50
	Major	Bioscience Lab - I	BSC DSC - 013	0	0	2	1	35	15	50
	Major	Chemistry Lab - I	BSC DSC - 014	0	0	2	1	35	15	50
General Elective Inter/Multidisciplinary/ Allied Courses (GEC)	GEC	Nutrition for Health	GE 005	4	0	0	4	70	30	100
Ability Enhancement Course (AEC)	AEC	Communication Skill	AEC 001	2	0	0	2	35	15	50
Skill Enhancement Course (SEC)	SEC	Instrumentation and System Biology	SEC 005	2	0	0	2	35	15	50
Value Added Course (VAC)	VAC	Yoga and Human Consciousness	VAC 001 T	1	0	0	2	35	15	50



Value Added Course (VAC)	VAC	Yoga and Human Consciousness	VAC 001 P	0	0	1	1	35	15	50
Total				18	0	7	22	525	225	750

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Programme: Bachelor of Microbiology (B.Sc) Sem: II										
NHEQF Level: 5 Courses				Teaching Scheme				Evaluation Scheme		Total
Course Category	Course Sub Category	Course Name	Code	Hours			Credits	CIA		Marks
				Theory	Tutorial	Practical				
Discipline Specific Core Course (DSCC)	Major	Microbio-II: General Biochemistry	BSC DSC - 044	3	0	0	3	70	30	100
	Major	Bioscience-II: Animal Kingdom	BSC DSC - 045	3	0	0	3	70	30	100
	Major	Fundamental Chemistry - II	BSC DSC - 046	3	0	0	3	70	30	100
Discipline Specific Core Practical (DSCCP)	Major	Microbiology Lab - II	BSC DSC - 047	0	0	2	1	35	15	50
	Major	Bioscience Lab - II	BSC DSC - 048	0	0	2	1	35	15	50
	Major	Chemistry Lab - II	BSC DSC - 049	0	0	2	1	35	15	50
General Elective Inter/Multidisciplinary/ Allied Courses (GEC)	GEC	Intellectual Property Rights (IPR)	GE 014	3	1	0	4	70	30	100
Ability Enhancement Course (AEC)	AEC	Science Communication Skills		2	0	0	2	35	15	50
Skill Enhancement Course (SEC)	SEC	Vermicomposting and Organic Farming	SEC 019	2	0	0	2	35	15	50
Value Added Course (VAC)	VAC/IKS	Environmental Studies & Disaster Management		2	0	0	2	35	15	50
Total				18	1	6	22	490	210	700



Programme: Bachelor of Microbiology (B.Sc) Sem: III

NHEQF Level: 5 Courses				Teaching Scheme				Evaluation Scheme		Total	
Course Category	Course Sub Category	Course Name	Code	Hours			Credits		CIA	ESE	Marks
				Theory	Tutorial	Practical					
Discipline Specific Core Course (DSCC)	Major	Microbio-III: Cell Biology (SWAYAM)	BSC DSC - 318/ BSC DSC - 318M	3	0	0	3	70	30	100	
	Major	Bioscience-III: Structure, Development and Reproduction in Flowering Plants	BSC DSC - 319	3	0	0	3	70	30	100	
	Major	Inorganic and Physical Chemistry - I	BSC DSC - 320	3	0	0	3	70	30	100	
Discipline Specific Core Practical (DS CCP)	Major	Microbiology Lab – III	BSC DSC - 321	0	0	2	1	35	15	50	
	Major	Bioscience Lab – III	BSC DSC - 322	0	0	2	1	35	15	50	
	Major	Chemistry Lab – III	BSC DSC - 323	0	0	2	1	35	15	50	
General Elective Inter/Multidisciplinary/ Allied Courses (GEC)	GEC	Food Toxicology and Adulteration	GE 311	3	1	0	4	70	30	100	
Ability Enhancement Course (AEC)	AEC	Hindi Bhasha	AEC 301	2	0	0	2	35	15	50	
Skill Enhancement Course (SEC)	SEC	Computational Biology and Bioinformatics	SEC 304	2	0	0	2	35	15	50	



Value Added Course (VAC)	VAC	Ayurvedic Biology	VAC 311	2	0	0	2	35	15	50
Total				18	1	6	22	490	210	700



Programme: Bachelor of Microbiology (B.Sc) Sem: IV

NHEQF Level: 5 Courses				Teaching Scheme				Evaluation Scheme		Total
Course Category	Course Sub Category	Course Name	Code	Hours			Credits			Marks
				Theory	Tutorial	Practical		CIA	ESE	
Discipline Specific Core Course Core (DSCC)	Major	Microbio-IV: Fermentation Technology	BSC DSC - 418	3	0	0	3	70	30	100
	Major	Bioscience-IV: Medical Biotechnology (SWAYAM)	BSC DSC - 413	3	0	0	3	70	30	100
	Major	Organic and Physical Chemistry-I	BSC DSC - 414	3	0	0	3	70	30	100
Discipline Specific Core Practical (DSCCP)	Major	Microbiology Lab - IV	BSC DSC - 415	0	0	2	1	35	15	50
	Major	Bioscience Lab - IV	BSC DSC - 416	0	0	2	1	35	15	50
	Major	Chemistry Lab - IV	BSC DSC - 417	0	0	2	1	35	15	50
Discipline Specific Elective Course (DSEC)	Minor	Plant Pathology/Microbial Diseases	BSC DSE - 407/BSC DSE - 408	3	1	0	4	70	30	100
Ability Enhancement Course (AEC)	AEC	Society, Culture & Human Behaviour	AEC 309	2	0	0	2	35	15	50
Skill Enhancement Course (SEC)	SEC	Computer Application	SEC 404	2	0	0	2	35	15	50
Value Added Course (VAC)	VAC	Presentation Skills	VAC 314	2	0	0	2	35	15	50
Total				18	1	6	22	490	210	700