

## **Department of Microbiology**

### **Courses Offered**

- (1) M. Sc. Microbiology, M.Sc. Biotechnology, M.Sc. Clinical Research
- (2) M. Phil. Microbiology
- (3) Ph. D. Microbiology

### **About the Department**

Department of Microbiology was established in 1976. Department offers M. Sc. Degree in Microbiology with specialization in Environmental Microbiology and Biotechnology. Department is also have the facility for M.Phil. and Ph.D. degrees in various field of Microbiology. Department is engaged in active research and have completed many research projects worth over Rs. 2 corers funded by government funding agencies like UGC, DST, DBT, GSBTM, GMDC as well as private sectors and industries like British petroleum, Pharmaceuticals, Textile, Steel, Agro, etc. The department is having faculties with specialization in various areas of microbiology and microbial technology. Research facilities are available for the major thrust area in the field of metal bioleaching, bioremediation of organic and inorganic pollutants such as metals, petroleum hydrocarbons, synthetic dyes etc., microbial diversity, extremophiles, microbial polymers, biofertilizers, PGPR, pesticide degradation and microbial enzymes. Till date 32 students have obtained Ph. D., 80 students have obtained M. Phil and more than 1400 students have obtained M. Sc. from the department. Department is one of the biggest department in India with having the student intake capacity of 50 students per year.

The reputation of the departmental research activities has been well recognized hence the department is continuously receiving research grants from various funding agencies. The department is also involved in solving the problems and guiding industries at various fronts with respect to microbial applications. With the

vision of imparting specialized training to the microbiologists related to their field, the department has taken initiatives to provide them industrial training as well as deep information to cope up with the day to day development in the field. Thus, the department of Microbiology is on the forefront in providing trained microbiologists for pharmaceuticals and food industries as well as agriculture and environmental sectors.

Since the inception of the department, students from this department have secured good positions in industries, research labs and academics in country and abroad. Currently many alumni are heading the department in their field of work. Apart from this, some of them are successful entrepreneurs working for the betterment of the society.

Faculties of the department are also coordinating and conducting M.Sc. course in Biotechnology with intake of **23±2** students since 2005 with major emphasis on microbial biotechnology in general and industrial and environmental biotechnology in particular.

From the year 2010 the department has started M.Sc. in Clinical Research and other diploma and certificate courses with collaboration with Shivrath and GSBTM.

Department is also one of the nodal centre for conducting M.Phil. in Bioinformatics under the Bit-Virtual Programme with GSBTM.

Every year various industries are arranging their campus interview for the selection of the students of Microbiology and Biotechnology.

Prof. S. R. Dave is recognized by Saurashtra University, Rajkot, Gujarat Vidhyapith, Ahmedabad and Swami Ramanand Teerth Marathwada University, Nanded as a Ph. D. research Guide. Prof. M. S. Saraf is a recognized guide by

the University working in the field of PGPR biofuels and biopesticides. Dr. B. V. Patel, Associate Professor is working in the field of pesticide degradation. The research interests of Prof. S.R. Dave and Dr. D. R. Tiple, Assistant Professor are bioleaching, bioremediation, microbial diversity, extremophiles, microbial enzymes, biofertilizers and environmental microbial technology.

### **Infrastructure and facilities:**

Department is having separate laboratory facility and classrooms for M.Sc., M. Phil and Ph. D. students. Departmental Library is equipped with more than 750 books along with additional books in the central library of the University. Department is having various audio visual teaching aids useful in effective teaching. Equipments necessary for research studies in the field of Microbiology and Biotechnology are available in the department. The list of the major equipments is as follows.

### **List of equipments available in the department**

<b>No.</b>	<b>Major Equipment</b>
1.	Biolog software system for Microbial Identification
2.	Epifluorescence Research Microscope
3.	UV-Vis Spectrophotometer
4.	Gel documentation system
5.	Elisa Plate reader
6.	Polarograph
7.	Gradient PCR
8.	HPLC
9.	AAS
10.	Lab-scale Fermenters
11.	Pilot scale Bioreactors
12.	Bio-spectrophotometer
13.	Refrigerated and high speed Centrifuges

14.	Nanophotometer
15.	DGGE
16.	Electoporator
17.	Brookfield Viscometer
18.	Flame photometer

### **Highlights and Achievements**

The Department of Microbiology, Gujarat University was established in the year 1976 and since then the major thrust areas of the Department are Systematic Bacteriology, industrial and environmental microbial technology. Departmental faculties have guided Ph.D. students in major field of microbiology such as environmental microbial technology, plant and soil microbiology, microbial metal leaching and remediation, microbial diversity. Even at postgraduate level since last 20 years department offers the special paper on Environmental Biotechnology. In M.Sc. final the major thrust is on Bioprocess and Industrial Microbiology. Nearly 1400 students have successfully completed their Masters Degrees, 80 M. Phil and 32 Ph.D. from this Department. Department has developed some promising strains of Biofertilizer which are used by GUJCOMASOL. Unique Metal Bioleaching consortia are developed which are efficiently used for metal extraction from polymetallic ores and concentrates by ecofriendly process for GMDC and other sulphidic mines of India. Dr. Vikram Sarabhai Biotechnology award for the year 2003-04 has been awarded for this research work. Students of this department are holding valuable positions in various Universities, Industries and Research Laboratories in India and abroad and also in Indian Army as scientist.

Gujarat University was inducted as a part of the National Biotechnology M.Sc. Course in the year 1999. From the year 2005 Gujarat University has also introduced self financed Biotechnology Course for Masters Degree. These courses are currently conducted in the premises of Microbiology Department.

The main thrust areas of this Biotechnology course are Industrial and Environmental Biotechnology.

### **Eligibility for M.Sc. Microbiology**

Graduates in Microbiology of this University or any other University recognized as equivalent. Candidates should have scored at least 50% marks at graduate level.

### **Admission Criteria for M.Sc. Microbiology**

Every year announcement of the course appears in Gujarati and English news papers. Admission is given based on the B.Sc. external marks. For the students other than this university, the merit list is having weightage of personal interview as well as graduation external marks.

### **Intake Capacity for M.Sc. Microbiology**

Every year 50 students are admitted. Out of 50 seats, 20 seats are for high payment seats meeting the eligibility criteria. Reservation of seats for candidates belonging to SC/ST/SEBC/PH etc. in both the categories as per rules of the Gujarat University.

### **Fee Structure for M.Sc. Microbiology**

Fee structure is as follows:

General Seats (30) : Rs. ~3500/- (Boys) and ~Rs.2000/- (Girls) per semester per student

High Payment Seats (20) : ~13500/- (Boys) and ~Rs.12000/- (Girls) per semester per student

An examination fee of Rs. 500/- per semester is collected along with the examination form. The convocation fee is charged as per university rules.

Fees once paid shall not be refunded under any circumstances.

Eligibility, Admission Criteria, Intake Capacity and Fee Structure for M.Phil. and Ph.D. (Microbiology) is as per University norms.

### **Course Structure for M.Sc. Microbiology**

The medium of teaching is English. The two year post graduate course consists of four semesters. In the first, second and third semester there are 4 theory papers in each semester of 100 marks. First, second and third semesters are having two practical in each semester. The total marks in first, second and third semester is 600 each. Internal assessment is based on internal exams evaluation, experiment, viva voce, attendance, seminar, quiz, assignments, industrial visit, etc. The fourth semester is having dissertation, project work, seminars, assignments, industrial visit, industrial training, etc. and carries 600 marks. Grand total of marks is 2400.

Microbiology department is emphasizing the teaching on major aspects of microbial diversity, physiology, biochemistry, genetics and enzymology. Apart from teaching, the fundamentals of microbiology, department is nurturing the students in the field of microbial technology for pharmaceutical, food, agriculture and environmental processes. During the post graduation teaching, department is also catering fundamental knowledge immunology, molecular biology, bioprocess and bioengineering, bioinformatics as well as biostatistics.

### **Scheme of Examination**

Semester examination will be held in the month of December and May every year. The following shall be the scheme of examination.

### **Evaluation**

The distribution of marks for theory papers shall be as follows:

External marks for all the paper is awarded based on examination conducted by University at the end of each semester and the internal marks is based on the two tests conducted by the faculties. ATKT system shall be followed as per the university rules.

## **M.Sc. Microbiology**

### **First Semester**

Theory Papers		Course Credits	External Marks	Internal Marks
MIC 401	Microbial Diversity and Physiology	4	70	30
MIC 402	Microbial Biochemistry and Genetics	4	70	30
MIC 403	Microbial Growth, Enzymology and Bioinstrumentation	4	70	30
MIC 404 E	Immunology and Biostatistics	4	70	30
MIC 405 PR	Lab 1	4	70	30
MIC 406 PR	Lab 2	4	70	30
Total		24	420	180

### **Second Semester**

Theory Papers		Course Credits	External Marks	Internal Marks
MIC 407	Biochemical Engineering and Bioinformatics	4	70	30
MIC 408	Molecular Biology and Genetic Engineering	4	70	30

MIC 409	Bioprocess Technology	4	70	30
MIC 410 E	Microbial Technology	4	70	30
MIC 411 PR	Lab 1	4	70	30
MIC 412 PR	Lab 2	4	70	30
Total		24	420	180

### Third Semester

Theory Papers		Course Credits	External Marks	Internal Marks
MIC 501	Microbiology of Food, Agriculture and Fuel	4	70	30
MIC 502	Environmental Microbiology	4	70	30
MIC 503	Biogeotechnology and Waste Management	4	70	30
MIC 504 E	Fermentation Economics and Regulatory Affairs	4	70	30
MIC 505 PR	Lab 1	4	70	30
MIC 506 PR	Lab 2	4	70	30
Total				

### Fourth Semester

		Course Credits	Marks
MIC 507	Project	16	400



PT			
MIC 508 S	Seminar/Field Work/Study Tour	4	100
MIC 509 M	Assignments, Group Discussion/Industrial Training	4	100
Total		24	600

### **Eligibility for M.Sc. Biotechnology**

Graduates in Biotechnology, Microbiology, Biochemistry, Botany, Zoology, Vocational Biotechnology and other equivalent biological sciences of this University or any other University recognized as equivalent. Candidates should have scored at least 50% marks at graduate level.

### **Admission Criteria for M.Sc. Biotechnology**

Every year announcement of the course appears in Gujarati and English news papers. Admission is given based on the B.Sc. external marks. For the students other than this university, the merit list is having weightage of personal interview as well as graduation external marks.

### **Intake Capacity for M.Sc. Biotechnology**

Every year 22 students are admitted. Out of 22 seats 16 seats are payment seats and 6 seats are high payment seats. Only one seat belongs to the students from other than Gujarat University. Reservation of seats for candidates belonging to SC/ST/SEBC/PH etc. as per rules of the Gujarat University in total seats (both category).

### **Fee Structure for M.Sc. Biotechnology**

Fee structure is as follows:

For both boys and girls the payment seat: ~17,000/- per semester per student.

High Payment Seats: ~52,000/- (Boys / Girls) per semester per student

An examination fee of Rs. 500/- per semester is collected along with the examination form. The convocation fee is charged as per university rules.

Fees once paid shall not be refunded under any circumstances.

### **Course Structure for Biotechnology**

The medium of teaching is English. The two year post graduate course consists of four semesters. In the first, second and third semester there are 4 theory papers in each semester of 100 marks. First, second and third semesters are having two practical in each semester. The total marks in first, second and third semester is 600 each. Internal assessment is based on internal exams evaluation, experiment, viva voce, attendance, seminar, quiz, assignments, industrial visit, etc. The fourth semester is having dissertation, project work, seminars, assignments, industrial visit, industrial training, etc. and carries 600 marks. Grand total of marks is 2400.

Biotechnology department is emphasizing the teaching on major aspects of microbial diversity, physiology, biochemistry, genetics, enzymology, plant biotechnology, animal biotechnology and environmental biotechnology. Apart from teaching, the fundamentals of microbial biotechnology, department is nurturing the students in the field of microbial biotechnology for pharmaceutical, food, agriculture and environmental processes. During the post graduation teaching, department is also catering fundamental knowledge of immunology, molecular biology, bioprocess and bioengineering, bioinformatics as well as biostatistics.

### **Scheme of Examination**

Semester examination will be held in the month of December and May every year. The following shall be the scheme of examination.

### **M.Sc. Biotechnology**

### First Semester

Theory Papers		Course Credits	External Marks	Internal Marks
BT 401	Bio diversity and physiology	4	70	30
BT 402	Biochemistry and genetics	4	70	30
BT 403	Enzymology, and bioinstrumentation	4	70	30
BT 404 E	Immunology and biostatistics	4	70	30
BT 405 PR	Lab 1	4	70	30
BT 406 PR	Lab 2	4	70	30
Total		24	420	180

### Second Semester

Theory Papers		Course Credits	External Marks	Internal Marks
BT 407	Biochemical engineering and bioinformatics	4	70	30
BT 408	Molecular biology and genetic engineering	4	70	30
BT 409	Bioprocess technology	4	70	30
BT 410 E	Microbial Technology	4	70	30
BT 411 PR	Lab 1	4	70	30
BT 412 PR	Lab 2	4	70	30
Total		24	420	180

### Third Semester

Theory Papers		Course Credits	External Marks	Internal Marks
BT 501	Food and Agriculture Biotechnology	4	70	30
BT 502	Environmental Biotechnology	4	70	30
BT 503	Biotechnology of Natural Resources	4	70	30
BT 504 E	Tissue culture and Pharmaceuticals Biotechnology	4	70	30
BT 505 PR	Lab 1	4	70	30
BT 506 PR	Lab 2	4	70	30
Total				

#### Fourth Semester

		Course Credits	Marks
BT 507 PT	Project	16	400
BT 508 S	Seminar/Field work/Study tour	4	100
BT 509 M	Assignments, Group discussion/Industrial training	4	100
Total		24	600