GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)

(Deemed to be University)

VISAKHAPATNAM * HYDERABAD * BENGALURU

Accredited by NAAC with A^{++} Grade

GITAM School of Science

CURRICULUM AND SYLLABUS

2 Year Postgraduate Programme
PMFST01: M.Sc. Microbiology

w.e.f. 2025-26 admitted batch

(Updated on July 2025)

Academic Regulations

Applicable for the Postgraduate Programmes in the Schools of Humanities & Social Sciences and Science (except M.C.A)

https://www.gitam.edu/academics/academic-regulations

GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT

Vision

GITAM will be an exceptional knowledge-driven institution advancing on a culture of honesty and compassion to make a difference to the world.

Mission

- Build a dynamic application-oriented education ecosystem immersed in holistic development.
- Nurture valuable futures with global perspectives for our students by helping them find their ikigai.
- Drive impactful integrated research programmes to generate new knowledge, guided by integrity, collaboration, and entrepreneurial spirit.
- Permeate a culture of kindness within GITAM, fostering passionate contributors.

Quality Policy

To achieve global standards and excellence in teaching, research, and consultancy by creating an environment in which the faculty and students share a passion for creating, sharing and applying knowledge to continuously improve the quality of education.

GITAM School of Science

Vision

Nurturing a high-quality Science Education and Research by providing a best learning ecosystem to create world class academicians and researchers.

Mission

- To teach the most renewed curriculum that lay the foundation for students to start exciting careers in academia, research, and industry.
- To foster an environment of healthy curiosity, an innovative mindset, and a strong desire to contribute to the science world.
- To advance our understandings of the natural processes of Physical, Chemical and Biological systems for a better habitable world.
- To inculcate a strong sense of empathy, integrity, and trust in the GITAM Fraternity with a strong commitment towards society and environment.

VISION AND MISSION OF THE DEPARTMENT

VISION

Fostering a seamless and innovative interdisciplinary research-driven academic ecosystem to address complex biological challenges, by reinforcing critical thinking, creativity, and collaboration

MISSION

- Holistic development of the students through interdisciplinary research and teaching programs with focus on contemporary problems in health, food, disease and environment
- Encourage students to embrace their curiosity to understand the natural processes and boost entrepreneurship for sustainable development
- To emerge as centre of excellence by addressing global challenges in personalized food and medicine, sustainable agriculture and environment through cutting-edge and collaborative research
- Nurture a culture of honesty, kindness, empathy and trust among the Life Sciences fraternity with a strong commitment towards all life on earth and its environment

Programme Educational Objectives (PEOs)

PEO 1: To provide knowledge to the student in the theory and laboratory skills in microbiology.

PEO 2: To train the students for attaining academic excellence in the field of microbiology.

PEO 3: To make students competent in Microbiology and allied areas through hands-on experience in basic tools and techniques.

PEO 4: To instil research and entrepreneurship ability in the students with strong ethics and communication skills.

PEO 5: To make students capable of integrating various aspects of microbiology in order to achieve holistic and societal development.

PEO Articulation

	PEO1	PEO2	PEO3	PEO4	PEO5
M1	3	3	3	2	2
M2	3	2	3	3	2
M3	2	3	1	3	3
M4	3	2	3	3	1

3 - High Correlation, 2 - Medium Correlation, 1 - Low Correlation

Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

At the end of the Programme the students would be able to demonstrate:

PO1: Learn and apply advanced conceptual knowledge across diverse microbiological disciplines, including bacteriology, virology immunology, molecular biology, mycology, and parasitology.

PO2: Demonstrate expertise in the pathogenesis, diagnosis, transmission, prevention, and control of regionally prevalent infectious diseases, grounded in core principles of microbial biology and host interactions.

PO3: Develop technical proficiency in core and advanced microbiological techniques, ensuring adherence to laboratory safety protocols and the ability to critically analyze, interpret, and communicate scientific data in clinical, research, and public health settings.

PO4: Integrate microbiological principles to address real-world challenges in healthcare, industry, and environmental sustainability through evidence-based problem-solving and innovation.

PO5: Uphold ethical standards, scientific integrity, and social responsibility in research, clinical practice, and industrial applications, prioritizing safety, equity, and sustainability.

PSO1: Analyze foundational principles of microbiology across sub-disciplines (bacteriology, virology, immunology, molecular biology, and mycology) to address real-world challenges in clinical, industrial, and environmental contexts.

PSO2: Execute advanced chromatographic and electrophoretic techniques for protein purification, demonstrating proficiency in experimental design, protocol optimization, and quality assessment.

PSO3: Apply advanced spectrophotometric methods to quantify biomolecules in complex solutions, ensuring accuracy in data interpretation and reporting.

PSO4: Design strategies for disease prevention and health promotion by integrating knowledge of medical microbiology, pathogenesis, and diagnostic principles into public health challenges.

PSO5: Translate microbiological concepts into innovative, ethical, and sustainable solutions that address societal needs in healthcare, agriculture, and environmental stewardship.

Curriculum Structure

(Flexible Credit System)

Minimum Credit Requirements to Award Degree Under Each Category

Duration & Name of the Programme				S.No	Course Category		Minimum Credit Requirement		
Programme	Eligibility	Programme	Eligibility				2 Year PG (2nd year- Course Work alone)	2 Year PG (2nd year - Course Work and Research)	2 Year PG (2nd year - Research alone)
2-year PG Degree (with exit option at the end of first year)	3-year UG Degree	1 year & PG Diploma	3-year UG Degree	1	Programme Core Courses & Labs	PC	28	28	28
				2	Programme Electives Courses	PE	8	8	8
				3	Research Methodology	FC	4	4	4
				4	Seminar	FC	1	1	1
				5	Term Paper	FC	1	1	1
				6	Internship	FC	4	4	4
				Total (At the end of I Year)			46	46	46
		1 year & PG Degree	4-year UG Degree	7	Programme Core Courses	PC	40	20	0
				8	Programme Electives Courses	PE			
				9	Research Project	FC	0	20	0
				10	Research Dissertation	FC	0	0	40
				Total (At the end of II Year)			86	86	86

2 Year PG programme:

Semester I and II: Common Structure for Course Work, Course Work & Research and Research Alone

Course Code	Category	Level	Course Title	L	T	P	S	J	C
Semester - I									
25MFST6001	PC	600	Bacteriology and Virology	4	0	0	0	0	4
25MFST6011	PC	600	Structure and Function of Biomolecules	4	0	0	0	0	4
25MFST6021	PC	600	Bioanalytical Techniques	4	0	0	0	0	4
25MFST6031	PC	600	Bacteriological Methods Laboratory	0	0	4	0	0	2
25MFST6041	PC	600	Bioanalytical techniques Laboratory	0	0	4	0	0	2
25MFST6666	FC	600	Seminar	0	0	0	0	2	1
Choose any one of the following electives:									
25MFST6051	PE	600	Advanced Virology	4	0	0	0	0	4
25MFST6061	PE	600	Foodborne Infections, Intoxication and Food Safety	4	0	0	0	0	4
25MFST6071	PE	600	Soil and Agricultural Microbiology	4	0	0	0	0	4
			Total Credits						**21**
Semester - II									
25MFST6081	PC	600	Advances in Molecular Biology and Genetic Engineering	4	0	0	0	0	4
25MFST6091	PC	600	Microbial Physiology and Metabolism	4	0	0	0	0	4
25MFST6101	PC	600	Molecular Microbiology Laboratory	0	0	4	0	0	2
25MFST6111	PC	600	Microbial Physiology Laboratory	0	0	4	0	0	2
25MFST6444	FC	600	Research Methodology	4	0	0	0	0	4
25MFST6777	FC	600	Term Paper	0	0	0	0	2	1
25MFST6333	FC	600	Internship	0	0	0	0	8	4
Choose any one of the following electives:									
25MFST6121	PE	600	Cell Biology and Genetics	4	0	0	0	0	4
25MFST6131	PE	600	Basic and Applied Phycology	4	0	0	0	0	4
25MFST6141	PE	600	Mycology and Plant Pathology	4	0	0	0	0	4
			Total Credits						**25**

2nd Year - Research alone:

Course Code	Category	Level	Course Title	L	T	P	S	J	C
Semester - III									
25MFST7888	FC	700	Research Dissertation - I	0	0	0	0	40	20
			Total Credits						**20**
Semester – IV									
25MFST7999	FC	700	Research Dissertation - II	0	0	0	0	40	20
			Total Credits						**20**

2nd Year – 'Course Work alone' & 'Coursework and Research':

Semester – III (Common Structure for 'Course Work alone' & 'Course Work and Research')									
Course Code	**Category**	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
25MFST7001	PC	700	Essentials of Human Immunology	4	0	0	0	0	4
25MFST7011	PC	700	Clinical and Diagnostic Microbiology	4	0	0	0	0	4
25MFST7021	PC	700	Fermentation Technology	4	0	0	0	0	4
25MFST7031	PC	700	Diagnostic Microbiology and Immunology Laboratory	0	0	4	0	0	2
25MFST7041	PC	700	Fermentation Technology Laboratory	0	0	4	0	0	2
Choose any one of the following electives:									
25MFST7051	PE	700	Public Health Research and Epidemiology	4	0	0	0	0	4
25MFST7061	PE	700	Microbial Genomics and Proteomics	4	0	0	0	0	4
25MFST7071	PE	700	Microbial Ecology	4	0	0	0	0	4
			Total Credits						**20**

Course Work alone

Semester - IV									
Course Code	**Category**	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
25MFST7081	PC	700	Environmental Microbiology and Bioremediation	4	0	0	0	0	4
25MFST7091	PC	700	Marine Microbial Ecology	4	0	0	0	0	4
25MFST7101	PC	700	Environmental Microbiology and Bioremediation Laboratory	0	0	4	0	0	2
25MFST7111	PC	700	Marine Microbial Ecology Laboratory	0	0	4	0	0	2
Choose any one of the following electives:									
25MFST7121	PE	700	Vaccinology and Immunotherapy	4	0	0	0	0	4
25MFST7131	PE	700	Bioethics and IPR	4	0	0	0	0	4
25MFST7141	PE	700	Mushroom Technology	4	0	0	0	0	4
Choose any one of the following electives:									
25MFST7151	PE	700	Microbiome in human health and disease	4	0	0	0	0	4
25MFST7161	PE	700	Microbial Biofilms and Quorum sensing	4	0	0	0	0	4
25MFST7171	PE	700	Molecular Diagnostics and Forensics	4	0	0	0	0	4
			Total Credits						**20**

Coursework and Research

Semester – IV									
Course Code	**Category**	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
25MFST7555	FC	700	Research Project	0	0	0	0	40	20
			Total Credits						**20**

GITAM School of Science

GITAM (Deemed to be University)

Visakhapatnam | Hyderabad | Bengaluru