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
PMATH01: M.Sc. Applied Mathematics

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

To provide quality education and research in Mathematical Sciences by creating an enabling and enjoyable learning experiences and fostering a community of passionate learners

MISSION

- Inculcate an application-oriented education in mathematical sciences, preparing students for successful careers in academia, research, and industry.
- Conduct innovative research in mathematics and statistics, including mathematical modelling and interdisciplinary problems, to advance knowledge and benefit communities.
- Identify and nurture students' strengths, fostering curiosity, innovation, and a commitment to contributing to the science world.
- Promote a diverse and inclusive environment, ensuring equity, fairness, and empathy in all academic and professional endeavours, with a strong commitment to society and the environment.

Programme Educational Objectives (PEOs)

PEO 1: To apply basic knowledge of mathematics and science to understand the real world problems.

PEO 2: To establish the methodologies for core mathematical problems.

PEO 3: To implement computer solution methods for large systems.

PEO 4: To perform inter-disciplinary research objectives

PEO 5: To imbibe professional and ethical responsibility towards the society

PEO Articulation

	PEO1	PEO2	PEO3	PEO4	PEO5
M1	2	3	1	3	3
M2	2	3	3	1	4
M3	3	2	1	2	2
M4	3	2	2	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: Apply basic knowledge of mathematics and science to understand the real world problems.

PO2: Develop complexity problem solving techniques using mathematical tools.

PO3: Establish the methodologies for core mathematical problems.

PO4: Implement computer solution methods for large systems.

PO5: Assess the influence of global changes on organization for effective decision making business problems.

PO6: Acquire knowledge of fast changing methodologies for solving engineering and science problems.

PO7: Exhibit leadership capabilities.

PO8: Perform inter-disciplinary research objectives.

PO9: Communicate effectively in peer and research related conferences.

PO10: Acquire skills to become a good researcher.

PO11: Engage in life-long learning environment.

PO12: Imbibe professional and ethical responsibility towards the society.

PSO1: Create Mathematical Models (along with solution) for various physical needs.

PSO2: Use Mathematics, not only in the discipline of Mathematics, but also in other disciplines and in their future endeavours

PSO3: Develop the statistical and computer programming skill for solving various physical problems.

Curriculum Structure

(Flexible Credit System)

Minimum Credit Requirements to Award Degree Under Each Category

S.No	Course Category		Minimum Credit Requirement		
			2 Year PG (2nd year-Course Work alone)	2 Year PG (2nd year - Course Work and Research)	2 Year PG (2nd year - Research alone)
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
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									
25MATH6001	PC	600	Real Analysis	4	0	0	0	0	4
25MATH6091	PC	600	Differential Equations	4	0	0	0	0	4
25MATH6021	PC	600	Linear Algebra	4	0	0	0	0	4
25MATH6031	PC	600	MATLAB for Beginners	0	0	4	0	0	2
25MATH6041	PC	600	Python Tools for Mathematics Laboratory	0	0	4	0	0	2
Choose any one of the following electives:									
25MATH6051	PE	600	Topology	4	0	0	0	0	4
25MATH6061	PE	600	Finite Fields and Coding Theory	4	0	0	0	0	4
25MATH6071	PE	600	Mathematical Modelling	4	0	0	0	0	4
25MATH6081	PE	600	Fluid Dynamics	4	0	0	0	0	4
			Total Credits						**20**
Semester - II									
25MATH6011	PC	600	Mathematical Methods	4	0	0	0	0	4
25MATH6101	PC	600	Complex Analysis	4	0	0	0	0	4
25MATH6111	PC	600	Numerical Computing Laboratory using MATLAB	0	0	4	0	0	2
25MATH6121	PC	600	Mathematical Methods Using MATLAB	0	0	4	0	0	2
25PHYS6444	FC	600	Research Methodology	4	0	0	0	0	4
25MATH6666	FC	600	Seminar	0	0	0	0	2	1
25MATH6777	FC	600	Term Paper	0	0	0	0	2	1
25MATH6333	FC	600	Internship	0	0	0	0	8	4
Choose any one of the following electives:									
25MATH6131	PE	600	Groups, Rings and Modules	4	0	0	0	0	4
25MATH6141	PE	600	Differential Geometry of curves and surfaces	4	0	0	0	0	4
25MATH6351	PE	600	Numerical Analysis	4	0	0	0	0	4
25MATH6151	PE	600	Bio-Fluid Mechanics	4	0	0	0	0	4
25MATH6161	PE	600	Discrete Mathematics	4	0	0	0	0	4
			Total Credits						**26**

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**
25MATH7001	PC	700	Probability and Statistics	4	0	0	0	0	4
25MATH7011	PC	700	Measure and Integration	4	0	0	0	0	4
Choose any two of the following laboratory courses:									
25MATH7021	PC	700	Probability Theory and Statistical Analysis Laboratory using Python	0	0	4	0	0	2
25MATH7031	PC	700	Computational Linear Algebra Laboratory (SageMath)	0	0	4	0	0	2
25MATH7051	PC	700	Statistical Interference and Linear Models using Python Laboratory	0	0	4	0	0	2
Choose any two of the following electives:									
25MATH7061	PE	700	Advanced Linear Algebra	4	0	0	0	0	4
25MATH7071	PE	700	Algebraic Topology	4	0	0	0	0	4
25MATH7081	PE	700	Differential Manifolds	4	0	0	0	0	4
25MATH7091	PE	700	Operations Research	4	0	0	0	0	4
25MATH7101	PE	700	Finite Element Methods	4	0	0	0	0	4
25MATH7111	PE	700	Dynamical Systems	4	0	0	0	0	4
25MATH7121	PE	700	Lie Groups and Lie Algebras	4	0	0	0	0	4
25MATH7131	PE	700	Galois Theory	4	0	0	0	0	4
25MATH7141	PE	700	Representation theory of finite Groups	4	0	0	0	0	4
25MATH7151	PE	700	Topological Dynamics	4	0	0	0	0	4
25MATH7171	PE	700	Fuzzy Set and Fuzzy Logic	4	0	0	0	0	4
25MATH7181	PE	700	Optimization Techniques	4	0	0	0	0	4
			Total Credits						**20**

2nd Year - Research alone:

Course Code	**Category**	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
Semester - III									
25MATH7888	FC	700	Research Dissertation - I	0	0	0	0	40	20
			Total Credits						**20**

2nd Year - Course Work alone

Semester - IV									
Course Code	**Category**	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
25MATH7191	PC	700	Functional Analysis	4	0	0	0	0	4
25MATH7201	PC	700	Numerical Analysis for Differential Equations	4	0	0	0	0	4
Choose any two of the following laboratory courses:									
25MATH7211	PC	700	Numerical Methods using Python	0	0	4	0	0	2
25MATH7221	PC	700	Computational Commutative Algebra (GAP, CoCoA) Laboratory	0	0	4	0	0	2
25MATH7231	PC	700	Numerical Solutions of Differential Equations using MATLAB Laboratory	0	0	4	0	0	2
Choose any two of the following electives:									
25MATH7241	PE	700	Advanced Measure Theory	4	0	0	0	0	4
25MATH7251	PE	700	Riemann Surfaces	4	0	0	0	0	4
25MATH7261	PE	700	Computational Fluid Dynamics	4	0	0	0	0	4
25MATH7271	PE	700	Graph theory	4	0	0	0	0	4
25MATH7281	PE	700	Advanced Operations Research	4	0	0	0	0	4
25MATH7291	PE	700	Algebraic Number theory	4	0	0	0	0	4
25MATH7301	PE	700	Introduction to Algebraic Geometry	4	0	0	0	0	4
25MATH7311	PE	700	Advanced Complex Analysis	4	0	0	0	0	4
25MATH7321	PE	700	Machine learning	4	0	0	0	0	4
25MATH7331	PE	700	Classical Mechanics	4	0	0	0	0	4
25MATH7341	PE	700	Theory of Computation	4	0	0	0	0	4
			Total Credits						**20**

2nd Year - Coursework and Research

Semester – IV									
Course Code	**Category**	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
25MATH7555	FC	700	Research Project	0	0	0	0	40	20
			Total Credits						**20**

2nd Year - Research alone:

Semester – IV									
Course Code	**Category**	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
25MATH7999	FC	700	Research Dissertation - II	0	0	0	0	40	20
			Total Credits						**20**

GITAM School of Science

GITAM (Deemed to be University)

Visakhapatnam | Hyderabad | Bengaluru