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
PBCBI01: M.Sc. Biochemistry and Molecular Biology

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: Exhibit an ability to apply fundamental knowledge related to biochemical sciences in an interdisciplinary manner for providing solutions to need based problems.

PEO 2: Engross an ability to decisively analyse scientific data, draw objective inferences and apply this knowledge for human welfare.

PEO 3: Be able to demonstrate proficiency and ethical perception on areas relevant to Biochemistry and Molecular Biology.

PEO 4: Acquire communication skills and exhibit commitment towards teamwork which is necessary for functioning productively and professionally on multidisciplinary fields of Biochemistry and Molecular Biology.

PEO Articulation

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

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: The post graduates should be able to:

- Understand various aspects of biomolecules and an overview of their metabolic, cellular events, and genetic basis of life and gain knowledge in diagnosis, prognosis and management of various diseases and addressing clinical problems

PO2: The post graduates should be able to:

- Gain knowledge in conventional techniques, modern analytical techniques, omics, bioinformatic approaches and nanotechnologies to apply in biological research and in discovery of new products.

PO3: The post graduates should be able to:

- Gain knowledge in Information Technology and Communication skills in English and apply effectively in professional context.

PO4: The post graduates should be able to:

- Gain an overview of the organization of vital physiological systems, their function and abnormalities in both animal and plant systems.

PO5: The post graduates should be able to:

- Gain theoretical and practical knowledge of genome, expression of genes and, their regulation, repair and application of rDNA technology for superior traits.
- Gain knowledge of clinically and industrially important microorganisms and understand their role in elicitation of immune response and find their applications in bioprocess technology.

PO6: The post graduates should be able to:

- Acquire knowledge regarding ethical conduct of research, clinical trials, economic, political, ELSI of the HGP and apply intellectual property rights (IPR) principles to real problems and analyse the social impact.

PSO1: Gain knowledge and insights on various aspects of Biochemistry.

PSO2: Apply knowledge, tools and techniques for solving biochemical problems.

PSO3: Acquaint Central Dogma of life and understands the various facets of Molecular Biology.

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									
25BCBI6001	PC	600	Molecular Cell Biology and Genetics	4	0	0	0	0	4
25BCBI6011	PC	600	Biomolecules	4	0	0	0	0	4
25BCBI6021	PC	600	Biochemical Techniques	4	0	0	0	0	4
25BCBI6031	PC	600	Cell Biology and Genetics Laboratory	0	0	4	0	0	2
25BCBI6041	PC	600	Biochemical Techniques Laboratory	0	0	4	0	0	2
Choose any one of the following electives:									
25BCBI6051	PE	600	Human Physiology	4	0	0	0	0	4
25BCBI6061	PE	600	Biostatistics	4	0	0	0	0	4
25BCBI6071	PE	600	Functional Foods and Nutraceuticals	4	0	0	0	0	4
			Total Credits						**20**
Semester - II									
25BCBI6081	PC	600	Enzymology and Enzyme Technology	4	0	0	0	0	4
25BCBI6091	PC	600	Metabolism and Bioenergetics	4	0	0	0	0	4
25BCBI6101	PC	600	Enzymology Laboratory	0	0	4	0	0	2
25BCBI6111	PC	600	Quantitative analysis Laboratory	0	0	4	0	0	2
25BCBI6444	FC	600	Research Methodology	4	0	0	0	0	4
25BCBI6777	FC	600	Term Paper	0	0	0	0	2	1
25BCBI6666	FC	600	Seminar	0	0	0	0	2	1
25BCBI6333	FC	600	Internship	0	0	0	0	8	4
Choose any one of the following electives:									
25BCBI6121	PE	600	Host-Microbe Interaction	4	0	0	0	0	4
25BCBI6131	PE	600	Bioinformatics	4	0	0	0	0	4
25BCBI6141	PE	600	Ecological Principles	4	0	0	0	0	4
			Total Credits						**26**

2nd Year - Research alone:

Course Code	Category	Level	Course Title	L	T	P	S	J	C
Semester - III									
25BCBI7888	FC	700	Research Dissertation - I	0	0	0	0	40	20
			Total Credits						**20**
Semester – IV									
25BCBI7999	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**
25BCBI7001	PC	700	Molecular Biology	4	0	0	0	0	4
25BCBI7011	PC	700	Immunology and Immunotechnology	4	0	0	0	0	4
25BCBI7021	PC	700	Molecular Biology Laboratory	0	0	4	0	0	2
25BCBI7031	PC	700	Immunology Laboratory	0	0	4	0	0	2
Choose any two of the following electives:									
25BCBI7041	PE	700	Cancer-Diagnosis, Therapy and Prevention	4	0	0	0	0	4
25BCBI7051	PE	700	Genetic Engineering	4	0	0	0	0	4
25BCBI7061	PE	700	Systems Biology	4	0	0	0	0	4
25BCBI7071	PE	700	Evolution	4	0	0	0	0	4
25BCBI7081	PE	700	Neuroscience	4	0	0	0	0	4
25BCBI7091	PE	700	Clinical Biochemistry	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**
25BCBI7101	PC	700	Plant Biochemistry	4	0	0	0	0	4
25BCBI7111	PC	700	Bioprocess Technology	4	0	0	0	0	4
25BCBI7121	PC	700	Plant Biochemistry Laboratory	0	0	4	0	0	2
25BCBI7131	PC	700	Bioprocess Technology Laboratory	0	0	4	0	0	2
Choose any two of the following electives:									
25BCBI7141	PE	700	Drug Designing	4	0	0	0	0	4
25BCBI7151	PE	700	Molecular Cell Dynamics and Imaging	4	0	0	0	0	4
25BCBI7161	PE	700	Stem cell Biology	4	0	0	0	0	4
25BCBI7171	PE	700	Lifestyle Diseases	4	0	0	0	0	4
25BCBI7181	PE	700	Biological Time	4	0	0	0	0	4
25BCBI7191	PE	700	Biophysics	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**
25BCBI7555	FC	700	Research Project	0	0	0	0	40	20
			Total Credits						**20**

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