GANDHI INSTITUTE OF TECHNOLOGY AND MANAGEMENT (GITAM)

(Deemed to be University)

VISAKHAPATNAM * HYDERABAD * BENGALURU

Accredited by NAAC with A^{++} Grade

GITAM School of Core Engineering

CURRICULUM AND SYLLABUS

4 Year Undergraduate Programme
UMECH01: B.Tech. Mechanical Engineering

w.e.f. 2025-26 admitted batch

(Updated on July 2025)

Academic Regulations

Applicable for the Undergraduate Programmes in the School of Core Engineering

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.

VISION AND MISSION OF THE SCHOOL

VISION

To become a global leader in holistic engineering education and research

MISSION

- To impart a strong academic foundation and practical education through a flexible curriculum, state-of-the-art infrastructure, and best learning resources
- To actively pursue academic and collaborative research with industries and research institutions, both in India and abroad
- To build a congenial and innovative eco system by enabling the latest technologies, thus helping the students, to solve the challenges of societal importance
- To provide our students with the appropriate leadership, management, communication skills and professional ethics for career success and to continuously impact the global lives.

VISION AND MISSION OF THE DEPARTMENT

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

- Nurture the learning environment by imparting activity-based learning enabling the student fraternity to come up with innovative solutions.
- Create significant impact through dissemination of research through public and private partnerships and solving real-world complex problems.
- Provide professional development opportunities through skill development activities, workshops, corporate and community outreach activities.
- Develop entrepreneurial mindset through industry collaborations, incubation centers and by promoting a competitive environment.

UMECH01: B.Tech. Mechanical Engineering
(w.e.f. academic year 2024-25 admitted batch)

Programme Educational Objectives (PEOs)

PEO 1 Apply their engineering knowledge, critical thinking abilities, managerial and communication skills to establish themselves as professionals in various disciplines of Mechanical Engineering.

PEO 2 Continue their learning path through a combination of higher studies, upskilling, professional development and research in the latest areas of mechanical engineering and related disciplines.

PEO 3 Cultivate leadership qualities through professional experience, entrepreneurship and/or public service.

PEO 4 Demonstrate and uphold elevated standards of professional integrity, ethics and inclusivity in their professional and daily endeavors.

PEO Articulation

	PEO1	PEO2	PEO3	PEO4
M1	H	H	L	M
M2	M	H	M	H
M3	M	M	H	M
M4	M	M	H	H

H – High, M – Medium, L – Low

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

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

PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO1 Employ the principles of Mechanical Engineering and its allied disciplines to design and realize mechanical devices and systems in compliance with regulatory standards.

PSO2 Perform rudimentary research in the areas of emerging technologies related to Mechanical Engineering.

PSO3 Collaborate in teams to address multifaceted challenges associated with societal and environmental issues.

Curriculum Structure

(Flexible Credit System)

Minimum Credit Requirements for the Award of Degree

S.No.	Course Category and Category Code	Minimum Credits	% of credits in the Programme
1.	University Core (UC)	19	11.87
2.	Faculty Core (FC)	53	33.13
3.	Programme Core (PC)	49	30.62
4.	Programme Electives (PE)	15	09.38
5.	Open Electives (OE)	24	15.00
	Total	**160**	**100**

University Core (UC) : 19 Credits								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
Ability Enhancement Courses								
LANG1201	100	Critical Thinking	2	0	0	0	0	2
LANG1242	100	Communicative English - I	0	0	4	0	0	2
LANG1252	100	Communicative English - II	0	0	4	0	0	2
IENT1051	100	Fundamentals of Entrepreneurship	2	0	0	0	0	2
Skill Enhancement Courses								
GCGC1001	100	Aptitude and Self-Management Skills	0	0	2	0	0	1
GCGC1011	100	Integrated Aptitude and Ethical Communications	0	0	2	0	0	1
GCGC1021	100	Applied Communication and Quantitative Skills	0	0	2	0	0	1
GCGC1031	100	Placement Preparation and Professional Readiness	0	0	2	0	0	1
Value Added Courses								
ENVS1003	100	Environmental Studies*	3	0	0	0	0	3
POLS1051	100	The Indian Constitution	1	0	0	0	0	1
Pass / Fail Courses (Mandatory)								
FINA1081	100	Personal Financial Planning *	1	0	0	0	0	1
PHPY1011	100	Gandhi and the Contemporary World *	1	0	0	0	0	1
Pass / Fail Courses (Any one course to be chosen)								
DOSP1181	100	Yogasana	0	0	0	2	0	1
MFST1002	100	Health and Wellbeing *	0	0	2	0	0	1
DOSL1081	100	Student Life Activities (Participant)	0	0	0	2	0	1
DOSL1091	100	Student Life Activities (Organizer)	0	0	0	2	0	1
DOSL1101	100	Student Life Activities (Competitor)	0	0	0	2	0	1
DOSL1111	100	Foundations of Student (Leadership)	0	0	0	2	0	1
DOSL1042	100	Community Services – Volunteer	0	0	2	0	0	1
DOSL1052	100	Community Services – Mobilizer	0	0	2	0	0	1
DOSP1003	100	Badminton	0	0	0	2	0	1
DOSP1033	100	Football	0	0	0	2	0	1
DOSP1043	100	Volleyball	0	0	0	2	0	1
DOSP1053	100	Kabaddi	0	0	0	2	0	1
DOSP1073	100	Table Tennis	0	0	0	2	0	1
DOSP1083	100	Handball	0	0	0	2	0	1
DOSP1093	100	Basketball	0	0	0	2	0	1
DOSP1113	100	Throw ball	0	0	0	2	0	1
DOSP1142	100	Cricket	0	0	0	2	0	1
DOSP1132	100	Functional Fitness	0	0	0	2	0	1
DOSP1171	100	Martial Arts/Self Defence	0	0	0	2	0	1

* Massive Open Online Course (MOOC)

FACULTY CORE (FC) : 53 credits								
Course code	**Level**	**Course title**	**L**	**T**	**P**	**S**	**J**	**C**
MATH1341	100	Calculus and Differential Equations	3	1	0	0	0	4
MATH1272	100	Linear Algebra	3	1	0	0	0	4
MATH2561	200	Probability and Statistics for Engineering	3	1	0	0	0	4
MATH2601	200	Numerical Methods	3	0	2	0	0	4
PHYS1301	100	Basics of Engineering Physics	3	0	2	0	0	4
CHEM1111	100	Engineering Chemistry	2	1	2	0	0	4
24CSEN1031	100	Programming for Problem Solving - 1 (Programming with Python)	0	0	6	0	0	3
24CSEN1041	100	Programming for Problem Solving - 2 (Programming with C)	0	0	6	0	0	3
24XXXXXXXX	xxx	Engineering Basket - Choice 1	2	0	2	0	0	3
24XXXXXXXX	xxx	Engineering Basket - Choice 2	2	0	2	0	0	3
MECH1011	100	Engineering Visualization and Product Realization	0	0	4	0	0	2
MECH1041	100	Technology Exploration and Product Engineering	0	0	4	0	0	2
24PROJ4777	400	Capstone Project - Introduction	0	0	0	0	2	1
24IENT3777	300	Internship-1	0	0	0	0	2	1
24PROJ4888 / 24IENT4888 / 24RESH4888	400	Capstone Project - Final / Internship-2 / Research	0	0	0	0	16	8
HSMCH102	100	Universal Human Values 2: Understanding Harmony	2	1	0	0	0	3

Engineering Basket 1 & 2

Six credits have to be chosen from the basket other than Parent Department course.

Course code	**Level**	**Course title**	**L**	**T**	**P**	**S**	**J**	**C**
24EECE2221	200	Fundamentals of Sensors and Internet of Things	2	0	2	0	0	3
24EECE2211	200	Fundamentals of Electrical and Electronics Engineering	2	0	2	0	0	3
24EECE2231	200	Foundations of Electrical and Electronics Engineering	3	0	2	0	0	4
24MECH1001	100	Introduction to Mechanical Engineering	2	0	2	0	0	3
24CIVL1001	100	Introduction to Civil Engineering	2	0	2	0	0	3
24BTEN1021	100	Biotechnology and Bioengineering	2	0	2	0	0	3
24BTEN1031	100	Introduction to Biomedical Engineering	2	0	2	0	0	3
24CSEN2261	200	Data Structures and Algorithms	2	0	2	0	0	3

Programme Core (PC) : 49 credits								
B.Tech: Mechanical Engineering								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
24MECH2001	200	Engineering Mechanics	3	0	0	0	0	3
24MECH2011	200	Thermodynamics	3	0	0	0	0	3
24MECH2021	200	Material Science and Engineering	2	0	2	0	0	3
24MECH2031	200	Industrial Engineering Management	3	0	0	0	0	3
24MECH2041	200	Measurements and Metrology	2	1	0	0	0	3
24MECH3001	300	Strength of Materials	3	1	0	0	0	4
24MECH3011	300	Mechanics of Machinery	3	1	0	0	0	4
24MECH3021	300	Applied Thermodynamics	3	0	2	0	0	4
24MECH3031	300	Fluid Mechanics	2	1	0	0	0	3
24MECH3041	300	Manufacturing Processes	3	0	2	0	0	4
24MECH3051	300	CAD-CAM using Software	2	0	2	0	0	3
24MECH4001	400	Design of Machine Elements	3	1	0	0	0	4
24MECH4011	400	Heat and Mass Transfer	3	0	2	0	0	4
24MECH4021	400	Finite Element Analysis	2	1	2	0	0	4

Programme Elective (PE) : 15 credits								
A minimum of 15 credits from any one of the tracks								
Track # : PROGRAM ELECTIVES – DIGITAL MANUFACTURING TRACK								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
24MECH3061	300	Introduction to Digital Manufacturing	3	0	0	0	0	3
24MECH3071	300	Computer-Aided Design(CAD) for Manufacturing	2	1	0	0	0	3
24MECH3081	300	Robotics and Automation in Manufacturing	2	1	0	0	0	3
24MECH3091	300	Digital Quality Control and Inspection	2	1	0	0	0	3
24MECH3101	300	Industry 4.0 and the Future of Manufacturing	3	0	0	0	0	3
24MECH3111	300	Computer-Aided Manufacturing(CAM)	2	1	0	0	0	3
24MECH3121	300	Lean Manufacturing Techniques	3	0	0	0	0	3
24MECH3131	300	Product Life Cycle Management(PLM)	3	0	0	0	0	3
24MECH3141	300	Manufacturing execution Systems(MES)	3	0	0	0	0	3
24MECH3151	300	Model Based Systems Engineering Design	2	1	0	0	0	3
24MECH3161	300	Additive manufacturing	2	1	0	0	0	3
24MECH4031	400	AI in Preventive Maintenance and Diagnosis	3	0	0	0	0	3

Track # : PROGRAM ELECTIVES - AUTOMOTIVE TRACK								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
24MECH3171	300	Introduction to Automotive Engineering	3	0	0	0	0	3
24MECH3181	300	Vehicle Dynamics Handling	3	0	0	0	0	3
24MECH3191	300	Automotive powertrain Systems	3	0	0	0	0	3
24MECH2051	200	Hydrogen Energy and Fuel cells	3	0	0	0	0	3
24MECH3201	300	Automotive Materials and Manufacturing Processes	3	0	0	0	0	3
24MECH4041	400	Vehicle Acoustics and NVH (Noise, Vibration, and Harshness)	2	1	0	0	0	3
24MECH3211	300	Hybrid and Electrical Vehicle Technology	3	0	0	0	0	3
24EECE3621	300	Vehicle Electrical and Electronic Systems	3	0	0	0	0	3
24MECH3221	300	Autonomous Systems and Autonomous Vehicles	2	1	0	0	0	3
24MECH3151	300	Model Based Systems Engineering Design	2	1	0	0	0	3
24MECH3371	300	Control Systems Engineering	2	1	0	0	0	3

Track # : PROGRAM ELECTIVES - GENERAL								
Course code	**Level**	**Course Title**	**L**	**T**	**P**	**S**	**J**	**C**
MECH2331	200	Introduction to Operations Research	3	0	0	0	0	3
MECH2281	200	Supply Chain Management	3	0	0	0	0	3
MECH3191	300	Waste to Energy	3	0	0	0	0	3
MECH3271	300	Total Quality Management	3	0	0	0	0	3
MECH2181	200	Renewable Energy Technology	3	0	0	0	0	3
MECH3201	300	Energy Conservation and Management	3	0	0	0	0	3
MECH2311	200	Fundamentals of Project Management	3	0	0	0	0	3
MECH2301	200	Engineering Economics	3	0	0	0	0	3
MECH3151	300	Product Design	3	0	0	0	0	3
24MECH3331	300	Introduction to Robotics	3	0	0	0	0	3
MECH2201	200	Solar Energy	3	0	0	0	0	3
MECH3274	300	Wind Energy	3	0	0	0	0	3

Open Electives (OE)

The minimum credit requirement under this category of course is 24. Students can earn up to 9 credits from courses offered by other departments in the same school and up to 15 credits are courses offered by other schools of the university.

Minor

Students may opt to enroll in a Minor programme for 20 Credits extra beyond the academic requirement of 160 Credits to obtain the B.Tech. degree.

The list of available Minor Programmes are listed **here**

GITAM School of Core Engineering

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