

Mechanical Engineering

The major in Mechanical Engineering is structured around in-depth courses in the mechanics of machines, mechanical design, thermo-fluids, materials, manufacturing, and manufacturing systems. The use of simulation and design, and extensive hands-on courses on experimentation and design-to-manufacturing provide a rich understanding of innovation in these fields. The overall approach is to integrate the different subfields and bring out the cross-disciplinary nature of engineering in general, and Mechanical Engineering in particular.

The curriculum is designed to address two aspects, viz., breadth in engineering via the Engineering Foundation coursework, and depth in the discipline via the major core courses. The focus is on strong and rigorous fundamentals, applications to engineered equipment and systems, and hands-on learning of products and equipment in a multi-subject setting. The pedagogy emphasises questioning, experimenting and developing learning skills to face a career where change is the norm. Students are exposed to the engineering of products and design in a laboratory setting using contemporary tools of analysis and design, including software packages widely used in engineering industries. Teamwork is emphasised alongside strong engineering skills.

One of the unique aspects of an Ahmedabad engineering education is its Engineering Foundation. The Engineering Foundation is a core that is common to all engineering majors. It comprises courses that cover the foundational knowledge of most engineering disciplines. It encompasses topics in electrical, computer science, chemical and mechanical engineering, amongst other fields. Besides imparting breadth, these courses will enable students and graduates to work in interdisciplinary teams and provide a robust foundation to becoming a contemporary engineer.

On completion of the major, the student will be able to:

- Build strong understanding of Mechanical engineering fundamentals and learn to apply them to real world applications through product-based learning.
- Become industry-ready by understanding requirements from industry and learn to apply engineering knowledge to solve problems from Industry.
- Develop skills for imagination and creative thinking through innovations on multidisciplinary domains such as Mechatronics, Machine Learning, Healthcare, Electric Vehicles and Industry 4.0.
- Use computational softwares such as CAD/CAM, FEA/CFD and automation tools required for the analysis and design in practice.
- Be a good team player and learn to effectively communicate while working with cross-disciplinary teams and industry professionals with the use of latest tools such as online meetings, presentations and documentation.
- Understand the societal issues such as water and air pollution, climatic changes, energy generation and agricultural productivity and learn to develop innovative solutions.

Graduates in mechanical engineering are equipped for a variety of tasks spanning a range of industries, services, and other fields. Career paths include working in engineering firms, entrepreneurship, and undertaking further studies globally. The cross-disciplinary focus of the curriculum equips graduates with the ability to learn and grow in new fields, which is essential to pursuing a successful career in most engineering and technology settings.

Major Must Knows

Offered by	School of Engineering and Applied Science
Programme	Bachelor of Technology
Degree	Bachelor of Technology
Minimum Programme Credits	146
Minimum Major Credits	86

Mechanical Engineering is also offered as a MINOR

Curriculum Structure (Bachelor of Technology Programme)

I Foundation Programme	12 Credits	⬆️
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All students entering the undergraduate programme complete our common core, The Foundation Programme, in the first year. The Foundation Programme is designed around four Studios, each of three credits. They are:

- Democracy and Justice
- Environment and Climate Change
- Neighbourhoods
- Water

The studios deliver interdisciplinary learning around six domains:
Data Science, Communication, Behaviour, Constitution & Civilisation, Materials, and Biology & Life.

II General Education Requirement	30 Credits	⬆️
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- Humanities & Languages Elective
- Social Sciences: Managerial Economics OR Microeconomics OR Macroeconomics
- Biological & Life Sciences Elective
- Mathematical & Physical Sciences: Data Science
- Performance & Visual Arts Elective
- GER Elective 1: Communication I

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GER Elective 2: Communication II	
GER Elective 3: Multivariable Calculus	
GER Elective 4: Any course at the university outside the major	
GER Elective 5: Any course at the university outside the major	

III Major Requirements	86 Credits	⬆
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Major Requirements	Credits
Engineering Foundation	20
Materials Science and Engineering	
Mechanics of Rigid Bodies	
Fundamentals of Computer Programming	
Electronics and Magnetic Circuits and Devices	
Sensors, Instruments and Experimentation	
Visualisation	
Product Realisation	
Design, Innovation and Making	
Communication III: Engineering Report Writing	
Major Core	45
Chemistry	
Differential Equations and Linear Algebra	
Fluid Mechanics	
Heat Transfer	
Thermodynamics I	
Kinematics and Structure of Machines	
Dynamics of Machines and Vibrations	
Control Engineering Theory and Applications	
Materials and Processes of Manufacture	
Design, Materials and Manufacturing	
Thermal Energy Systems	
Manufacturing Systems and Operations	

Computer Aided Design and Manufacturing	
Integrated Mechanical Laboratory I	
Integrated Mechanical Laboratory II	
Learning Factory Project	
Major Electives	12
Robotics	
Industrial Automation	
Automobile Engineering	
Introduction to Composites	
Mobile Robots	
Solar Thermal Energy	
Pollution Control	
Production and Operations Management	
Computational Fluid Dynamics	
Mechatronics	
Renewable Energy Technology	
Machine Vision, Learning and Applications	
Internship + Undergraduate Thesis/Capstone Project OR Off-Campus Industry Project (summer plus one semester)	9

IV Free Electives

18 Credits



Free Electives provide flexibility to students to customise their education at the University.

1. Free Electives allow you to take additional courses as per your choice (apart from the Foundation Programme, GERs and Major Requirements), upto 18 credits, across the university to increase your depth or breadth.
2. A student can take a Minor in any area designated as a Minor at any School or Centre of the University. Some Minors may have specific pre-requisites. Free Electives can also be used along with some courses from the Major Requirements and GERs towards a Minor.

V Volunteerism

Required



All students will complete 30 hours of engagement with society to develop a sense of engagement, concern, build problem solving skills, and understand the role of an engaged member of a society. This will be done through a mandatory course, *Engagement with Society*, that would be a graduation requirement. This course can be taken anytime during the stay at the University but it is advised that the student engage with the courses during the first two years at the University. The 30 hours of volunteer work may be completed during one semester or during the Winter or Summer Break.

Note: Most courses have a laboratory/workshop course attached to it to provide hands-on learning. Some courses are exclusively laboratory/project-based courses.



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