

Computer Science and Engineering

The curriculum design of the major in Computer Science and Engineering is in keeping with the multidisciplinary emphasis of the BTech programme as a whole. It combines a rigorous grounding in the field of computer science with added emphasis on the physical and architectural design of modern computer systems. Based on the breadth of the education provided, graduates will be able to design, develop and deploy computing systems across the hardware–software spectrum.

The core courses in Computer Science and Engineering introduce students to themes such as digital electronics, data structures, database management system, computer organisation, computer architecture, algorithm design, operating systems, computer networks, embedded system design, and theory of computing. These courses will enable students to develop expertise as well as widen their competence through exposure to deep research in the areas of data science, cyber physical systems, intelligent systems, and theoretical computer science. Electives will allow students to develop their own area of specialization within the major.

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 the completion of the major, students will:

- Have a sound knowledge of the fundamentals of Computer Science and Engineering including hardware and software
- Be able to undertake rigorous analysis, design, development, deployment, and testing skills to formulate appropriate computing solutions in order to solve business and societal needs
- Be able to use various programming languages, tools and technology supporting modern software frameworks for solving problems involving a large volume of data in various domains

The Computer Science and Engineering programme of Ahmedabad University prepares students to be versatile and choose from diverse career paths. Our education equips students to pursue research, higher education and employment alike in software engineering, hardware design, IoT, data analytics, and other areas.

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

Computer Science and Engineering is also offered as a MINOR

Curriculum Structure (Bachelor of Technology Programme)

I	Foundation Programme	12 Credits	
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- 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
- 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
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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
Object Oriented Programming Laboratory	
Discrete Mathematics	
Applied Linear Algebra	
Signal and Systems	
Data Structures	
Probability and Stochastic Processes	
Digital Design	
Database Management System	
Computer Organisation and Architecture	
Design and Analysis of Algorithms	
Operating Systems	
Embedded System Design	
Computer Networks	
Theory of Computing	
Major Electives	12
VLSI Design	
Parallel and Distributed Systems	
Machine Vision : Learning and Applications	
Advanced Computer Arithmetic: Algorithms and Sub-systems	

Probabilistic Graphical Models	
Internet of Things	
Cloud Computing	
Artificial Intelligence	
Optimisation Theory and Algorithms	
High Performance Computing	
Mobile Robots	
High Performance Computing	
Data Analytics and Visualisation	
Digital Signal Processing	
Algorithms & Optimisation for Big Data	
Machine Learning	
Integrated Circuit Device and Technology	
Renewable Energy Technology	
Human Computer Interaction	
Computer Vision	
Introduction to Blockchain: Technologies, Approaches and Applications	
Advanced Statistics	
Big Data Analytics	
Social Network Analysis	
Python Programming	
Software Engineering	
High Speed Computer Architecture	
Mooc: Mathematics For Machine Learning Specialisation	
Internship + Undergraduate Thesis/Capstone Project OR Off-Campus Industry Project (summer plus one semester)	9

IV Free Electives	18 Credits	⬆
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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	⬆
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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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