



VIT[®]
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

School of Mechanical Engineering (SMEC)

B.Tech. Mechanical Engineering

CURRICULUM: AY 2025-2026 onwards

Duration 4 Years	Total Credits 160	Degree B.Tech	Medium English
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1. Programme Overview

The B.Tech in Mechanical Engineering at VIT Vellore is a rigorous four-year undergraduate programme designed to mould technically proficient, innovative, and socially responsible engineers. Built on the ACE (Adaptive Curriculum for Excellence) framework, the programme seamlessly integrates foundational engineering sciences with cutting-edge specialisations in Smart Manufacturing, Electric Vehicles, Robotics and Automation, Green Energy, Industrial Engineering and Aeronautics.

Highlights of the B.Tech. Mechanical Engineering at VIT, Vellore

- NBA Accredited (Tier-I) for the maximum period of 6 years.
- Ranked 148th globally and 8th in India in QS World University Rankings by Subject 2026 for Mechanical Engineering.
- Industry-aligned curriculum focused on Industry 4.0, Smart Manufacturing, Automation, Sustainability, Aeronautical Engineering, and Electric Mobility, with opportunities to specialize through eight future-ready concentrations:
 - Product Design and Development
 - Smart Manufacturing
 - Mechatronics and Robotics
 - Green Energy Technologies and Sustainability
 - Electric Vehicles
 - Industrial Systems Engineering
 - Aeronautical Engineering
 - BAJAJ E-Mobility
- Access to 40+ advanced laboratories including Robotics, Additive Manufacturing, Electric Powertrain, Autonomous Vehicles, CNC Machining, Renewable Energy, Materials Characterization Labs, etc.
- Industry-sponsored Centres of Excellence in collaboration with Valeo, Rane NSK, Autodesk, and the Bajaj Auto Foundation.
- Dedicated Bajaj Engineering Skills Training (BEST) Centre for hands-on training in EV technologies, battery systems, and E-Mobility.
- Strong focus on internships, live projects, undergraduate research, innovation, and experiential learning.
- 24×7 laboratory access and vibrant technical clubs, competitions, and professional chapters.
- Excellent placement opportunities with leading multinational companies and emerging technology industries.
- Alumni pursuing higher studies and research at globally reputed universities.
- One of the largest and leading Mechanical Engineering schools in India with a strong research and innovation ecosystem.

2. Programme Credit Structure

The total credit requirement for the B.Tech programme is 160 credits, distributed across University Core, Professional Core, and Open Elective categories as detailed below.

Category	Credits Required
University Core Courses	60
Professional Core Courses (Programme Core + Concentration)	60
→ Programme Core	40
→ Concentration	20
Open Elective Courses	40
TOTAL GRADED CREDIT REQUIREMENT	160

3. University Core Courses (60 Credits)

University Core Courses form the bedrock of an engineer's education at VIT. Spanning mathematics, sciences, computing, communication, and humanistic studies, these courses equip students with the analytical, computational, and interpersonal skills demanded by modern engineering practice. The inclusion of project-based learning modules (Innovative Design Project, Research Project, Capstone), two internship credits, and extracurricular engagement ensures holistic development beyond the classroom.

Course Code	Course Title	L	T	P	C
BAPHY101	Applied Physics for Engineers	3	0	2	4
BACHY109	Applied Chemistry for Engineers	3	0	2	4
BAMAT205	Multivariable Calculus and Differential Equations	3	0	2	4
BAMAT206	Linear Algebra and Integral Transforms	3	1	0	4
BAMAT101	Basic Engineering	3	0	2	4
BACSE101	Problem Solving Using Python	0	0	4	2
BACSE102	Problem Solving Using Java	0	0	4	2
BAENG101	Technical English Communication	3	0	2	4
BASTS101	Qualitative and Quantitative Skills Practice I	3	0	0	1
BASTS102	Qualitative and Quantitative Skills Practice II	3	0	0	1
BAFLC100	Foreign Language	1	0	2	2
BAHSM100	Humanities, Social Science and Management	3	0	0	3
BAHUM101	India Studies	1	0	0	1
BACHY101	Environmental Sciences	2	0	0	2
BAHUM102	Ethics in Engineering	2	0	0	2
BAMGT101	Entrepreneurship	3	0	0	3
BAMEE191	Basic Multidisciplinary Project	0	0	4	2
BAMEE291	Innovative Design Project	0	0	4	2

Course Code	Course Title	L	T	P	C
BAMEE391	Research / Design Project	0	0	6	3
BAMEE491	Technical Answers for Real World Problems	1	0	4	3
BAMEE399	Internship I	0	0	2	1
BAMEE499	Internship II / Capstone Project	0	0	12	6
BAENG100	Effective English Communication (NCC)	0	0	4	2
BAEXC100	Extracurricular Activities (NCCM)	0	0	4	2

L: Lecture**T: Tutorial****P: Practical****C: Credit**

4. Professional Core Courses (60 Credits)

4.1 Programme Core Courses (40 Credits)

Programme Core Courses deliver the essential theoretical and practical foundation of Mechanical Engineering. These ten courses — spanning manufacturing, materials, thermodynamics, fluids, design, and computation — are mandatory for all students. They are carefully sequenced to build conceptual depth progressively, with integrated lab components ensuring hands-on mastery of fundamental skills.

Course Code	Course Title	L	T	P	C
BAMEE101	Manufacturing Processes	3	0	2	4
BAMEE201	Mechanics of Materials	2	1	2	4
BAMEE202	Metallurgy and Mechanical Behaviour of Materials	3	0	2	4
BAMEE203	Thermodynamics and Thermal Systems	2	1	2	4
BAMEE204	Fluid Mechanics and Machinery	2	1	2	4
BAMEE205	Engineering Innovation and Modelling	1	1	4	4
BAMEE301	Computer Aided Design and Manufacturing	3	0	2	4
BAMEE302	Machine Design	3	1	0	4
BAMEE303	Control Systems	3	0	2	4
BAMEE304	Computational Engineering	2	1	2	4

4.2 Mechanical Engineering Core Concentration (20 Credits)

The Core Concentration deepens students' expertise in the fundamental disciplines of Mechanical Engineering — precision metrology, dynamics, heat transfer, and production management — augmented by a forward-looking course in AI-Driven Engineering Design. This combination ensures graduates are both classically grounded and future-ready.

Course Code	Course Title	L	T	P	C	Pre-Requisite
BAMEE331	Precision Engineering and Metrology	3	0	2	4	BAMEE101
BAMEE332	Kinematics and Dynamics of Machines	2	1	2	4	BAPHY101
BAMEE336	Heat and Mass Transfer	2	1	2	4	Nil
BAMEE342	Production and Operations Management	3	1	0	4	Nil
BAMEE411	AI Driven Engineering Design	3	1	0	4	Nil

5. Additional Concentrations Under Open Electives (40 Credits)

VIT's B.Tech Mechanical Engineering programme offers 7 specialised concentration concentrations under Open Electives plus additional standalone Open Elective courses. Students choose courses totalling 40 credits to craft a personalised learning pathway aligned with their career goals. Each concentration represents a high-growth sector of the global economy, supported by strong industry demand and premium job opportunities.

1. Product Design and Development

This concentration trains students in the full product development lifecycle — from human-centred ideation and materials selection through design optimisation, lifecycle management, and IP strategy. Graduates become versatile product engineers capable of leading innovation from concept to market.

Course Code	Course Title	L	T	P	C
BAMEE206	Human-Centered Design and Innovation	3	0	2	4
BAMEE207	Materials Selection in Design	3	0	2	4
BAMEE305	Design for Excellence	3	0	2	4
BAMEE306	Product Lifecycle Management	3	1	0	4
BAMEE401	Intellectual Property and Technology Commercialization	3	1	0	4

2. Smart Manufacturing

Industry 4.0 is reshaping global manufacturing. This concentration prepares students to design, deploy, and manage smart factories integrating additive manufacturing, AI-based quality systems, IIoT connectivity, and cyber-physical production systems — the technologies driving the next industrial revolution.

Course Code	Course Title	L	T	P	C
BAMEE208	Additive Manufacturing: Processes and Design	3	0	2	4
BAMEE307	Artificial Intelligence in Manufacturing	3	1	0	4
BAMEE308	Industrial Internet of Things	3	0	2	4
BAMEE309	Industrial Automation and Robotics	3	0	2	4
BAMEE403	Cyber Physical Systems in Manufacturing Industry	3	0	2	4

3. Mechatronics and Robotics

Robotics and mechatronics sit at the intersection of mechanical, electrical, and computing disciplines. This concentration develops engineers who can design autonomous systems, robotic manipulators, vision-guided machines, and intelligent embedded platforms — capabilities in extraordinary global demand.

Course Code	Course Title	L	T	P	C
BAMEE310	Fundamentals of Mechatronics Systems	3	0	2	4
BAMEE311	Electronics and Embedded Systems	3	0	2	4
BAMEE312	Machine Vision and AI	3	1	0	4
BAMEE313	Robot Mechanics and Control	3	0	2	4
BABMH404	Digital Manufacturing	3	1	0	4

4. Green Energy Technologies and Sustainability

The global energy transition is the defining engineering challenge of our era. This concentration equips students with the technical, policy, and economic knowledge to drive decarbonisation across power generation, industry, and transport — from energy audits and renewable system design to climate policy analysis.

Course Code	Course Title	L	T	P	C
BAMEE314	Energy Audit and Conservation	2	1	2	4
BAMEE315	Energy Policy and Economics	3	1	0	4
BAMEE316	Climate Change and Sustainable Development	3	1	0	4
BAMEE317	Sustainable Energy Technologies	3	0	2	4
BAMEE402	Energy System Modelling and Analysis	3	1	0	4

5. Electric Vehicles

The global automotive industry is undergoing the most disruptive shift in a century. This concentration gives students deep expertise in EV powertrain design, vehicle dynamics, autonomous driving systems, and automotive electronics — precisely the skills automakers and mobility startups are desperate to hire.

Course Code	Course Title	L	T	P	C
BAMEE318	Vehicle Systems Engineering	3	0	2	4
BAMEE319	Autonomous Vehicles	3	0	2	4
BAMEE320	Vehicle Dynamics	3	0	2	4
BAMEE321	Powertrain for Electric Vehicles	3	0	2	4
BAMEE405	Automotive Electrical and Electronic Systems	3	0	2	4

6. Industrial Systems Engineering

Industrial Systems Engineering focuses on optimising complex production systems, supply chains, and operations for efficiency, quality, and sustainability. This concentration is ideal for students who want to transform how industries operate, reduce waste, and deliver value at scale.

Course Code	Course Title	L	T	P	C
BAMEE322	Industrial Engineering	3	1	0	4
BAMEE323	Operations Research and Decision Analytics	3	1	0	4
BAMEE324	Production Planning and Control	3	1	0	4
BAMEE325	Sustainable Manufacturing and Circular Economy	3	1	0	4
BAMEE406	Quality Control and Reliability	3	1	0	4

7. Aeronautical Engineering

The Aeronautical Engineering concentration extends Mechanical Engineering fundamentals into the domains of flight — covering aerodynamics, aircraft structural design, propulsion, and flight mechanics. Students gain skills applicable to aircraft manufacturers, space agencies, and defence organisations.

Course Code	Course Title	L	T	P	C	Pre-Requisite
BAMEE338	Introduction to Aeronautics	3	1	0	4	Nil
BAMEE339	Aircraft Structures	3	1	0	4	BAMEE201
BAMEE340	Propulsion Systems	3	1	0	4	BAMEE203
BAMEE415	Aerodynamics	3	0	2	4	BAMEE204
BAMEE416	Flight Mechanics	3	0	2	4	Nil

8. Industry Concentration Courses

E-Mobility (Under Bajaj Engineering Skills Training)

In April 2026, the Bajaj Auto Foundation partnered with Vellore Institute of Technology to establish the Bajaj Engineering Skills Training (BEST) Centre at VIT with an investment of over ₹8 crores. The Centre focuses on advanced E-Mobility training in EV Fundamentals, Battery Technology, Battery Management Systems, and EV Charging Systems through industry-grade hardware and software platforms. The initiative aims to bridge the gap between academia and industry by equipping students with practical skills and industry-ready expertise in emerging E- Mobility Technologies.

Course Code	Course Title	L	T	P	C	Pre-Requisite
BAMEEXXX	Electric Vehicle Instrumentation and Data Analytics	3	0	2	4	Nil
BAMEEXXX	Battery Pack Design and Battery Management System	3	0	2	4	Nil
BAMEEXXX	Electric Vehicle Charger Development and Testing	3	0	2	4	Nil
BAMEEXXX	Motor Design, Drive Development and Testing	3	0	2	4	Nil
BAMEEXXX	Electric Vehicle Testing and Validation	3	0	2	4	Nil

6. Additional Open Elective Courses from Mechanical Engineering

In addition to the above concentrations, students can also select from a curated list of Open Elective courses that broaden their technical horizon. These courses span advanced materials, machining technologies, energy systems, thermal management, vibrations, CFD, and supply chain management — allowing students to tailor their degrees for niche industry roles or specialised postgraduate programmes.

Course Code	Course Title	L	T	P	C	Pre-Requisite
BAMEE326	Advanced Engineering Materials	3	1	0	4	Nil
BAMEE329	Advanced Machining and Forming Technologies	3	1	0	4	BAMEE101
BAMEE330	Advanced Welding and Casting Technologies	3	0	2	4	BAMEE101
BAMEE333	Mechanical Vibrations	3	0	2	4	BAMEE201
BAMEE334	Finite Element Analysis	2	1	2	4	BAMEE201
BAMEE335	Energy Conversion and Power Generation Systems	3	1	0	4	BAMEE203
BAMEE336	IC Engines and Gas Turbines	3	0	2	4	Nil
BAMEE337	Heating Ventilation Air Conditioning and Refrigeration	2	1	2	4	Nil
BAMEE341	Global Supply Chain Management	3	1	0	4	Nil
BAMEE407	Polymers and Composite Materials	3	1	0	4	Nil
BAMEE410	Semiconductor Manufacturing and Microfabrication Technology	3	1	0	4	Nil
BAMEE412	Digital Twin in Engineering Design	3	1	0	4	Nil
BAMEE413	Computational Fluid Dynamics	3	0	2	4	BAMEE204
BAMEE414	Thermal Management in Engineering Systems	3	0	2	4	BAMEE203