COEP TECHNOLOGICAL UNIVERSITY

PUNE – 411005

(A Unitary Public University of Government of Maharashtra)

(Formerly College of Engineering Pune)

M.Tech. in Automotive Systems

(for Working Professionals)

2 YEARS DEGREE PROGRAMME

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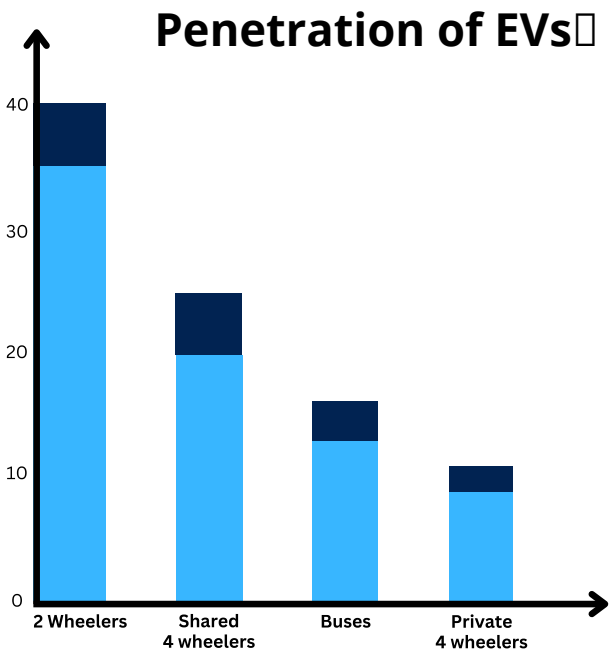
COEP Technological University Wellesely road, Shivajinagar, Pune.

E-Mobility in the Indian Automotive Industry

The Indian automotive industry is at a pivotal point, with electric vehicles (EV) and hybrid systems poised to dominate the market due to environmental concerns, technological advancements, and changing consumer preferences. However, there is a significant gap between the current engineering
workforce's skills and the industry's evolving needs. Our MTech programme in Automotive System aims to bridge this gap, ensuring the workforce is equipped for the future of e-mobility.

The penetration of EVs and hybrid vehicles in the Indian market has risen from 1% in 2020 to ~ 30% by 2030. This growth is fueled by several factors, including improved battery technologies,
governmental incentives, and increasing consumer awareness of environmental issues. Despite this promising growth, the industry faces challenges,
particularly in developing a skilled workforce adept in the latest automotive technologies.
The Government of India has taken several
initiatives to promote the growth of the EV industry. These include the FAME India schemes and the two-production linked incentive (PLI) schemes. NITI Aayog has projected that by the year 2030 the
penetration of various categories of EVs is likely to be as follows:

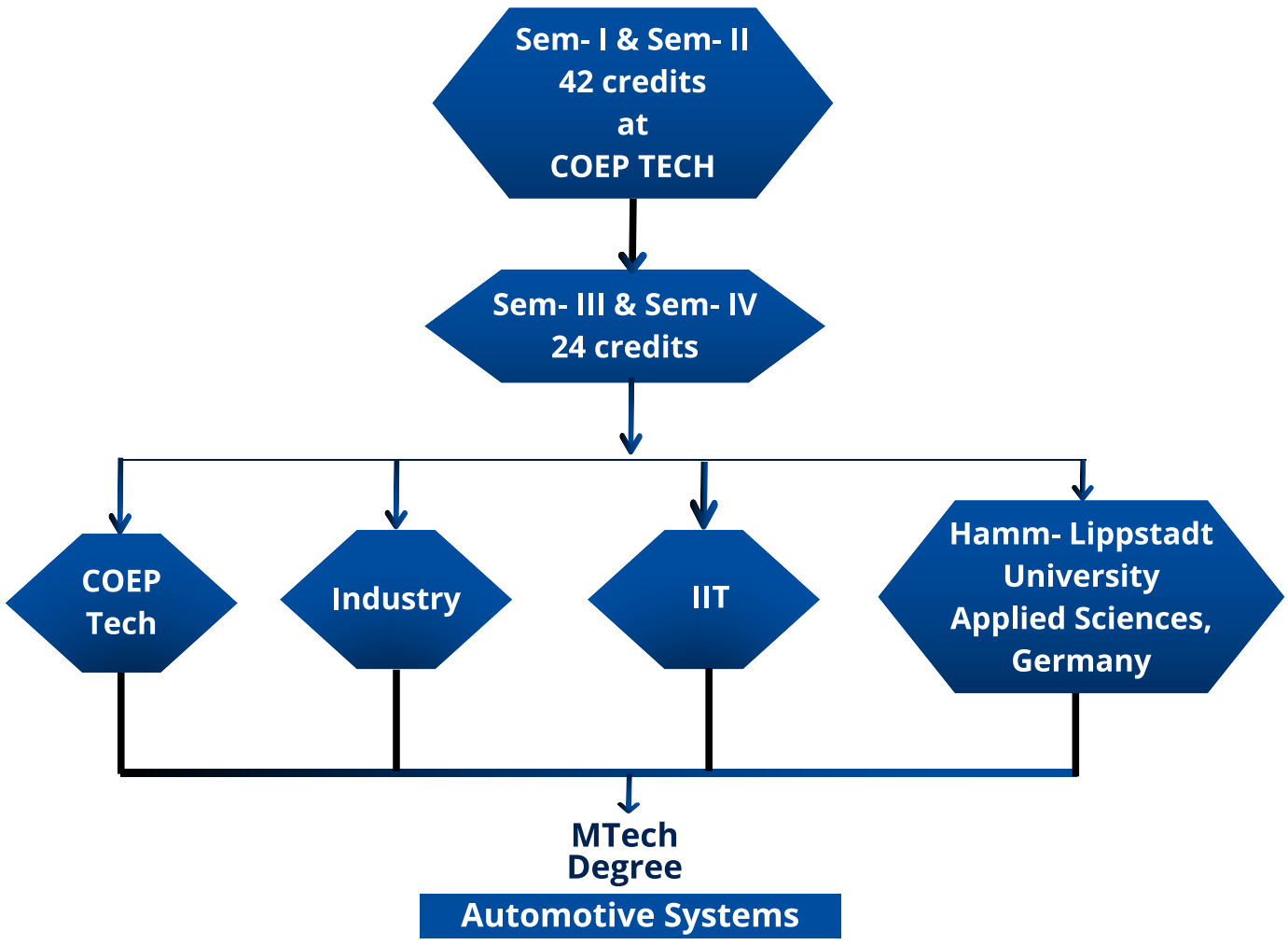


Programme Highlights

- First Two semesters (One Year) at COEP Tech, Pune as course work.
- Final Two semesters at COEP Tech, Automotive Industry or at University of Applied Sciences Hamm- Lippstadt, Germany depending on project requirement and funding.
- Batch Size of 30 students.
- Access to the State-of-the-art laboratory of COEP Tech Pune.
- Regular interaction with Automotive Companies and the experts from Automotive Industries as well as from University of Applied Sciences Hamm- Lippstadt, Germany.
- Opportunity for dissertation Work@ Hamm- Lippstadt University for selected students.
- Fees: ₹3,00,000/ year Total Fees: ₹6,00,000 for the programme.

Learning Track

Engineering Graduates from Electricals, Electronics & Telecommunication, Instrumentation, Mechanical, Production, Automobile Engineering, Computer Engineering.



Key Features

Curriculum jointly designed with industry

Curriculum is designed to prepare you for the latest trends in Electric Vehicle Industry.

Hands ON Laboratory Sessions

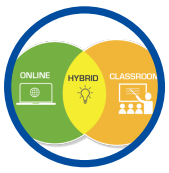
Immerse yourself in hands-on-learning and gain invaluable real-world experience at COEP Tech.

EV Experts

Enhance your knowledge and skills with experts from Industry, IITs, COEP Technological University Pune.

Exclusively for Working Professionals

COEP offers specialized programs designed to enhance your skills and advance your career.



Hybrid Learning

The course offers combined online and offline learning to make it suitable to continue learning along with your work.

Applied Learning

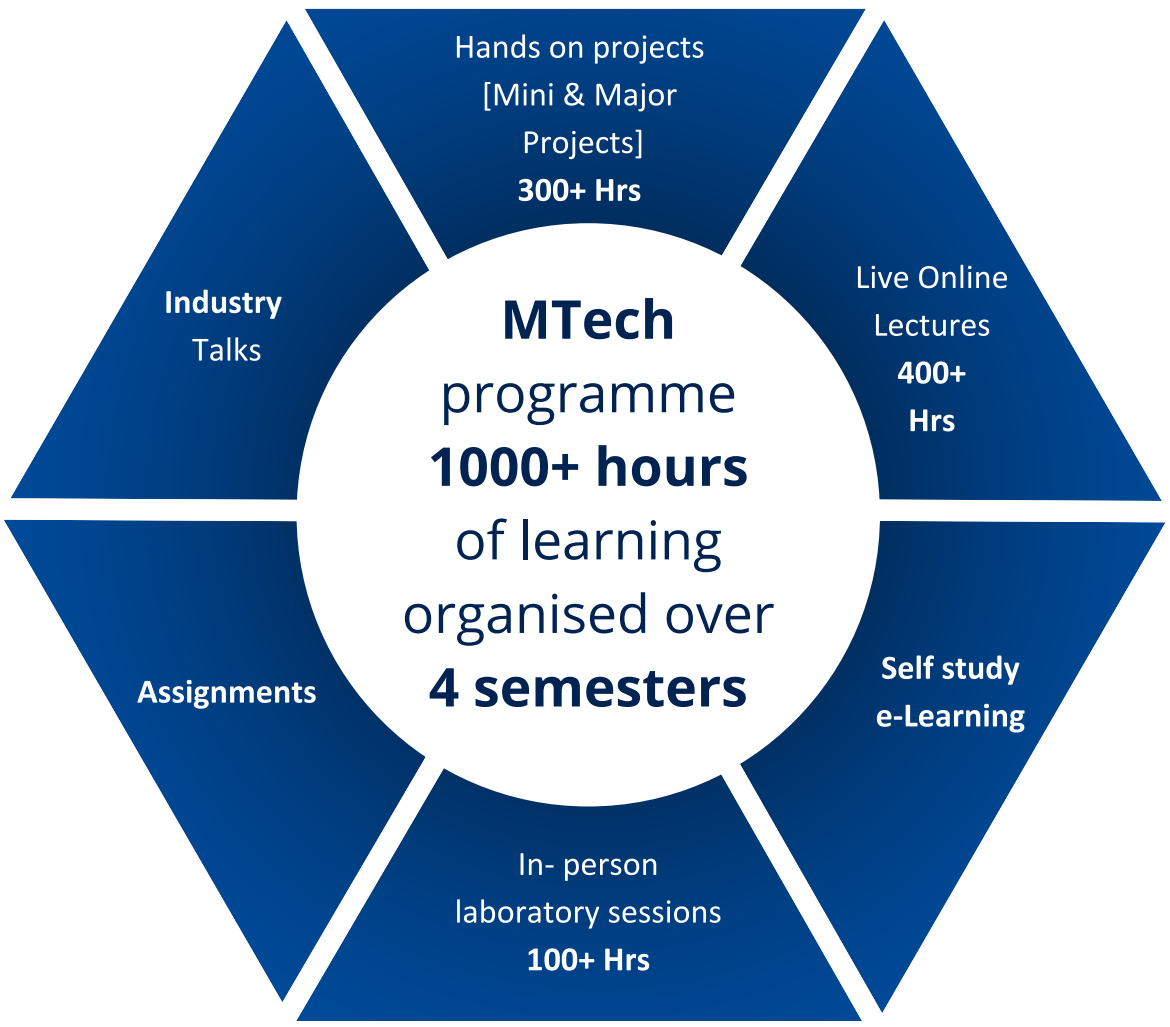
Experience the essence of applied learning at COEP with immersive hands-on labs and projects.

COEP Tech Degree

Unleash your engineering potential at one of India's finest institutions!

Our Pedagogy

Delivery of curriculum for the online MTech in Automotive System is best suited for working professionals. Learning from anywhere while in job.



Faculty Experts

Dr. D. N. Sonawane
Associate Professor & Co- ordinator,
COEP Technological University, Pune

Dr. Naveeen Gautam
Managing Director, FORVIA HELLA
India Automotive Pvt. Ltd

Dr. Mrs. Snehal Unde
Assistant Professor and Co-ordinator,
COEP Technological University, Pune.

Dr. Mangesh Khare
Head – Advanced Engineering
& AI Solutions, FORVIA HELLA
India Automotive Pvt. Ltd.

Dr. Prashant Bartakke
Associate Professor, COEP
Technological University, Pune

Dr. R.T.Ugale
Head of the Department, Electrical
COEP Technological University, Pune

Dr. Suhas Mohite
Professor, COEP
Technological University, Pune.

Dr. Mauritz Teuber
Program Manager Electrification,
Advanced Engineering Projects,
HELLA GmbH & Co. KGaA.

Mr. Vivek Aranake
Professor of Practice, COEP
Technological University, Pune.

Mr. Shubham Deshmukh
Founder & CEO, Evano Mobility Pvt. Ltd

Dr. Sushil Ramdasi
Deputy Director, ARAI.

Dr. Apurva Kulkarni
Mathworks.

Eligibility

Experience:

02 years work experience is mandatory.

Degree:

B. E./ B. Tech. in Computer/IT, Instrumentation,Electrical, Electronics and Telecommunication, Mechanical, Production, Automobile Engineering or related

Courses

COMPUTATIONAL METHODS IN ENGINEERING

- **MATLAB basics, Matrix and vectorization, file handling.**
- **Discretization methods, interpolation, solving ODE's,**
- **Embedded functions, GUI development, HIL Co-Simulation.**
- **Simulation of Mechanical and Electrical Systems.**
- **Fundamental studies of modeling of vehicle dynamics and control.**

AUTOMOTIVE EMBEDDED SYSTEMS

- **Introduction of Embedded System,**
- **Architectural Design Considerations, Programming aspects of Microcontrollers, Embedded C, MISRA standards and MISRA-C fundamentals, programming tools and simulators.**
- **Automotive grade Microcontrollers, architectural features, (STM32 or Renesas RL 78 series),**
- **programming with I/O Ports, on-chip Timers/Counters,**
- **ADC and DAC programming, Interrupt driven programming, I2C and SPI bus programming,**
- **Automotive Communication Protocols, CAN, LIN, FlexRay, Automotive ethernet.**

EFFECTIVE COMMUNICATION SKILLS

- 7 Cs of communication, common errors in English, enriching vocabulary, styles and registers,
- the art of listening, stress and intonation,
- group discussion, oral presentation skills,
- types of reading, effective writing,
- business correspondence, interpretation of technical reports and research papers

EV ARCHITECTURE AND SYSTEMS ENGINEERING

- Basics of EV, Types, Classification,
- EV components
- EV Technologies and Integration aspect,
- Powertrain design, sizing of powertrain,
- Energy management and control,
- System Engineering as applied to EVs & Virtual Model Based Development,

ELECTRICAL MACHINES

- Electric Machines - Basics,
- Classification and Design Considerations,
- Comparison of Electric motors for EV applications,
- Types of Motors: IM, PMSM, SyRM, PMBLDC, SRM,
- torque and speed control, Regenerative braking and energy recovery

BATTERY MANAGEMENT SYSTEM

- Battery modeling, advantages and disadvantages,
- Characteristics of battery cell, Battery sizing,
- Introduction and objective of BMS
- Charging and discharging control,
- Understanding of SOC, Cell balancing, BMS topologies.

POWER ELECTRONICS & ELECTRICAL DRIVES

- Rectifiers, inverters, DC-DC converters, switching devices,
- Configuration and control of DC Motor drives;
- Three-phase Induction Motor drives;
- Brushless motor drives; PMSM drives;
- Switched Reluctance Motor drives;
- Synchronous reluctance motor drives;
- Regenerative Braking Characteristics

EV MODELING AND CONTROL

- System Modelling Basics, Modeling and simulation of electric vehicle using MATLAB Simulink.
- Introduction to EV Control and Design Specifications
- Automotive controller development process - model-based development,
- MiL, SiL, HiL

CONNECTED AND AUTONOMOUS VEHICLE

- Overview of ECU operation,
- Concept of Cyber-Physical Control Systems,
- Wireless Networks and Autonomy,
- ADAS, Driverless Car Technology,
- AI-based functions in autonomous vehicles,
- Vehicle-to-Vehicle Technology and Applications, Vehicle-to-Roadside and Vehicle-to-Infrastructure Applications

ENERGY STORAGE SYSTEM (BATTERY, FUEL CELL, SUPER CAPACITOR, ETC.)

- Energy storage systems overview
- Energy storage in the power and transportation sectors.
- Importance of energy storage systems in electric vehicles, types.
- Fuel Cells, Battery design for transportation,
- State of Charge and State of Health Estimation Over the Battery Lifespan,
- Recycling of Batteries from Electric Vehicles.

CHARGING INFRASTRUCTURE

- Battery Charging methods EV supply equipment (EVSE),
- EV battery chargers components,
- Charging infrastructure challenges,
- Classification based on charging levels (region-wise)
- Standards related to: connectors, communication protocols, supply equipment, Converters used in EV chargers

THERMAL MANAGEMENT IN EV

- Introduction to EV Thermal Management,
- Thermal Considerations in Electric Vehicle Design,
- Thermal Control Systems in Electric Vehicles,
- Maintenance Practices for EV Thermal Systems
- Common Thermal Issues & Troubleshooting,
- Safety Considerations in EV Thermal Management,

EVALUATION STRATEGY

- Theory Courses: Mid Semester Evaluation - 30%, Teachers Assessment -10% and End Semester Evaluation 60%
- Laboratory Courses: Continuous internal evaluation-50% and End Semester Evaluation- 50%

In Association with

FORVIA HELLA | HOCHSCHULE HAMM-LIPPSTADT

Testimonial

Dr. Naveen Gautam
Managing Director
Hella India Automotive Pvt.Ltd., Hella India eMobionics Pvt. Ltd.

FORVIA Hella has taken the initiative to conceptualize and financially support an M.Tech program in collaboration with COEP, exclusively designed for automotive working professionals. This program equips participants with industry-relevant practical knowledge and a solid theoretical foundation through a well-crafted academic curriculum.

The first cohort has been a success story, thanks to the high level of engagement from students who are experienced engineers and faculty who are industry experts and top academicians. The hands-on approach, using real-life examples, has been particularly impactful.

The program focuses on upcoming trends and technologies in the automotive industry, especially e-mobility and Advanced Driver Assistance Systems (ADAS). I strongly encourage all automotive companies in and around Pune to join hands in the upcoming second cohort and support the creation of a mutually beneficial learning ecosystem.

Dr. Mangesh Khare
Industry Co-ordinator for the M.Tech program
Head AI Solutions & Academic Relations – Hella India Automotive Pvt.Ltd.

This Master's program is an outcome of our long association with COEP and a strong desire to create something which is sustainable and truly valuable for the Automotive community in and around Pune. This program brings together Automotive working professionals with diverse engineering background and experience of working with OEMs, Tier 1, Tier 2 and Services companies creating an excellent learning environment. I would urge all the Automotive companies to take advantage of this opportunity to upskill their employees.

Testimonial

Dr. D. N. Sonawane
Coordinator, MTech Automotive Systems
Course instructor – Computational methods in engineering

A uniquely crafted M.Tech programme in Automotive Systems for working professionals, offered by COEP Technological University, Pune – one of India's oldest and most esteemed engineering institutions. This programme is our commitment to empowering today's engineers with tomorrow's automotive technologies. Designed with a deep understanding of industry demands and professional commitments, it offers a dynamic blend of academic excellence and practical relevance.

Dr. Rajaram Ugale,
Head of Department,
COEP Technological University

A forward-looking postgraduate programme (M. Tech in Automotive Systems) meticulously designed by COEP Technological University, Pune, to meet the evolving demands of the automotive industry. In today's fast-changing mobility landscape, the need for engineers who not only understand traditional automotive systems but also have expertise in emerging domains such as electric vehicles, autonomous systems, and intelligent transportation technologies is more critical than ever. This programme is our response to that need.

Dr. P. P. Bartakke
Associate Professor, Electronics Department, COEP Tech University
Course Instructor- Automotive Embedded Systems

As the instructor for the Automotive Embedded Systems course, I've had the privilege of working with a remarkable group of professionals enrolled in this PG program. What sets this program apart is its strong industry relevance and the diversity of its participants—working professionals from the automotive, electronics, and software sectors bring unique insights that enrich every session.professionals who are shaping the future of mobility and intelligent systems.

Testimonial

Mr. Moritz Teuber
Program Manager Electrification, Advanced Engineering Projects,
HELLA GmbH & Co. KGaA
Course Instructor- Energy Storage Systems

"The M.-Tech. program for automotive professionals is a unique chance to deepen your knowledge and experience regarding the biggest change of the automotive landscape of the century – moving from combustion technologies to electrification. "

Dr. Sushil Ramdasi
Deputy Director at ARAI
Course instructor – EV architecture and Systems Engineering

This course breaks boundaries of working only in own domain space and offers exposure to multi engineering disciplines viz Mech, electrical, electronics, control engineering, embedded systems and overall application engineering approach. This transforms the aspirants thought process for working in multi domain environment and to enhance their skill sets which is the need of an hour.

Ms. Tracy Austina Zacreas
AVP & Global Head – Tata Technologies TechVarsity

The collaboration with COEP Technological University has been extremely rewarding in terms of enhanced employee engagement as it is a tangible investment in their learning and career development.

Dr. Snehal Unde
Co-Coordinator, MTech Automotive Systems

Coordinating the MTech Automotive Systems Program has been an incredibly rewarding experience. With a curriculum designed to merge theoretical concepts with hands-on practical applications, we ensure that our graduates are well-prepared to contribute effectively to the dynamic automotive industry. Collaborating with faculty, industry experts, and enthusiastic students has deepened my appreciation for the field and reaffirmed the importance of fostering a learning environment that encourages curiosity, problem-solving, and technological advancement.

Student Testimonial

Mr. Amankumar jha

This is an immersive, interdisciplinary master's course that is truly valuable for engineers of all domains in the automotive industry. The curriculum is industry-oriented, with courses taught by university professors as well as international researchers, senior executives, and company founders. I recommend this course to anyone seeking a complete, system-level understanding of EVs and wishing to tackle deep design challenges in the electrification of future mobility in India.

Mr. Jiteshkumar Dalwala

As a full-time Master's degree program, it includes extensive practical sessions and hands-on training conducted in university laboratories itself. Moreover, the opportunity for international internships adds significant value, making it a unique and comprehensive program for working professionals in automotive."

Ms. Krutika Kadam

This Program has been a transformative journey for me, both personally and professionally.

Glimpses Year 2024-25

Inauguration Ceremony at BHAU Institute, COEP Technological University

Exhibition of products from Forvia Hella and Tata Technologies

Class photos with Dr. Naveen Gautam (Professional Communication Skills and Dr. Moritz Teuber (Energy Storage Systems)

Electrical Machines and Drives laboratory

Class photos with Dr. Vivek Aranake (Power Electronics and Drives) and Dr. Apurva Kulkarni (EV modeling and Control)