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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www.coeptech.ac.in

COEP Technological University Wellesely road, Shivajinagar, Pune.

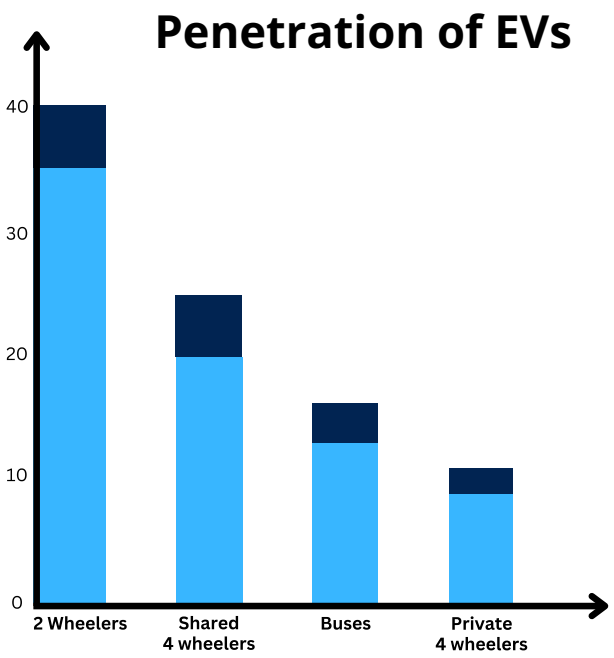
Online Application

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:

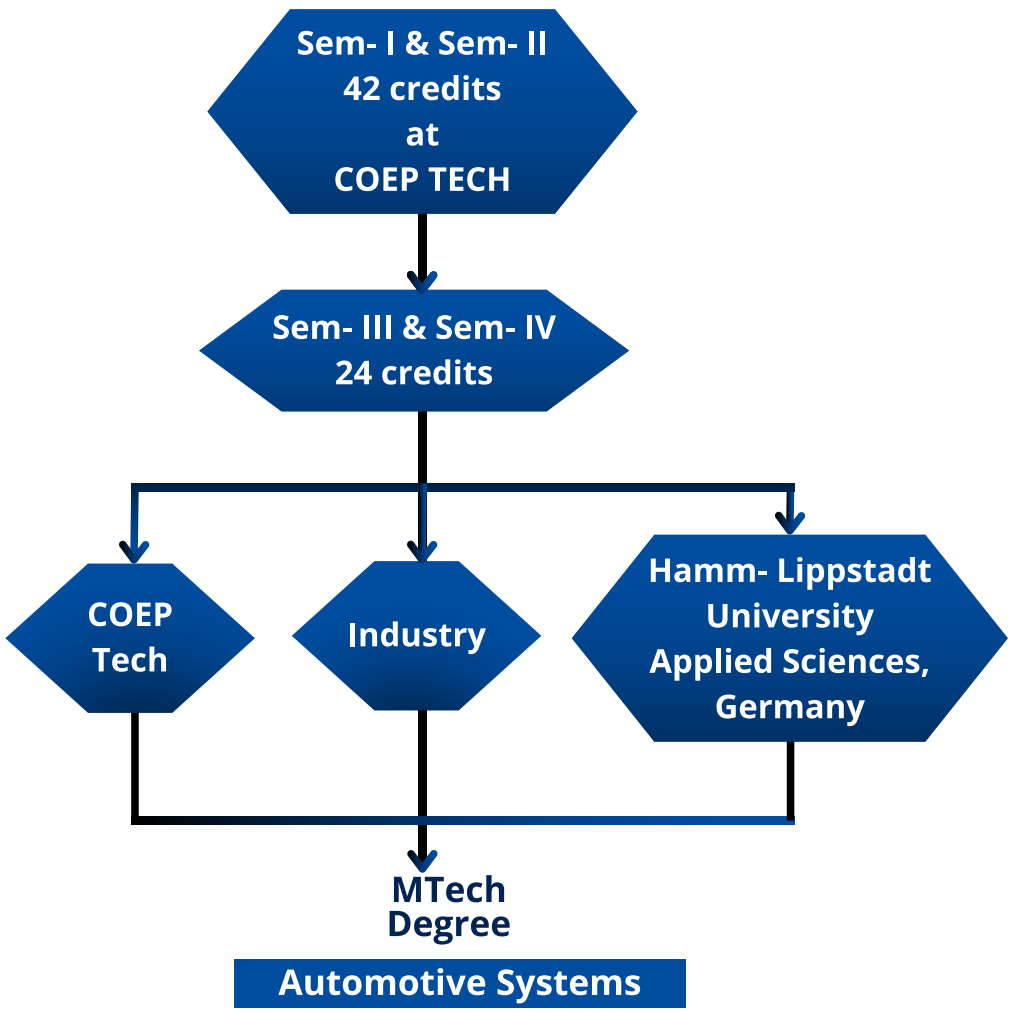


Programme Highlights

- 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

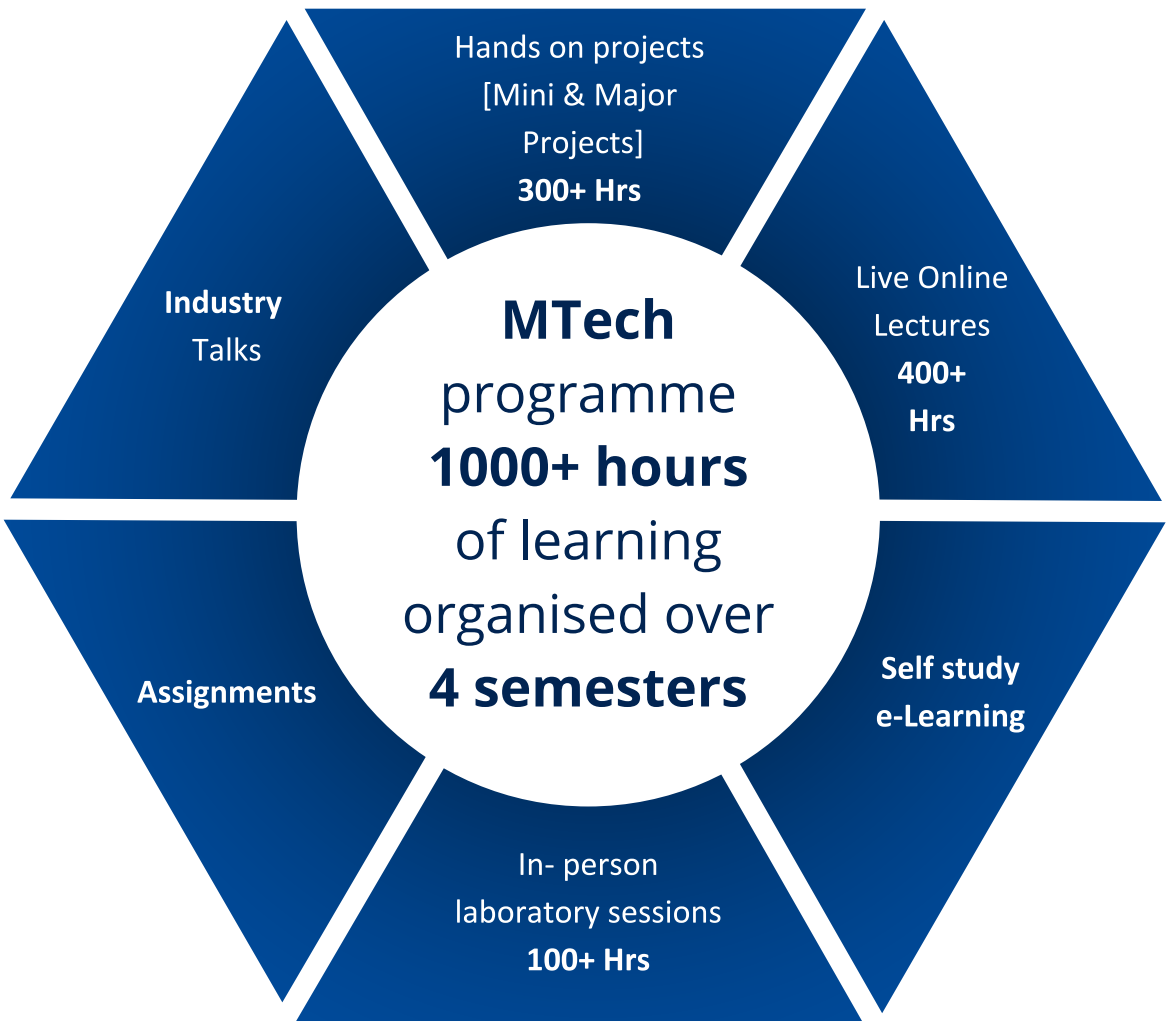
Experience the essence of applied learning at COEP with immersive hands-on labs and projects.

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. R.T.Ugale
Associate Professor & 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. P.D. Shendge
Associate Professor & HoD, COEP
Technological University, Pune

Dr. Mrs. Meera Murali
Associate Professor, COEP
Technological University, Pune.

Dr. Mrs. Snehal Unde
Assistant Professor, COEP
Technological University, Pune.

Faculty from IIT/NIT

Faculty from Automotive Industries

Faculty from Hamm- Lippstadt University, Germany

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