

EV MASTERCLASS

09 September 2024

Course Description

This course jointly offered by BGSW and IEEE is an **introductory-level understanding of electric vehicles (EVs)**, focusing on their key sub-components and essential design factors. Tailored for students with a background in basic power electronics, this course provides a comprehensive overview of the **Product Process Life Cycle**, guiding you through the intricacies of **Sizing your Powertrain** and employing design methodologies for critical components such as **Motors, Inverters, DC-DC Converters, and Chargers**. The course culminates in a capstone project, allowing you to apply your knowledge in a practical, real-world context, bridging theory and practice in the field of electric vehicle design.

Course Contents

SI No	Topic	Outcome	Date^/ Duration
1	Introduction to Electric Vehicles & Product Life Cycle (Use Case)	Components of Electric Vehicle and their functionalities. Current Electric Vehicle Market. V Process Model for Product Development.	23 Sept 2024 / 1.5 Hours
2	Powertrain Dimensioning	Introduction to Backward Calculation. Conversion of performance requirements (Max Acceleration, Range, etc) to Torque and Power Requirements for Motor, Inverter, Transmission and Battery Sizing.	26 Sept 2024 / 1.5 Hours
3	Design of Motors	Electric motor principle, types and overview, requirement Eng, motor selection criteria, analytical and FEM solutions.	30 Sept 2024 / 1.5 Hours

4	Design of Inverters	Introduction to Inverter: Definition and purpose of an inverter. Importance of inverters in electric vehicles Blocks of Inverter specific to electric vehicles: Power electronics components used in inverters, Key functions, and roles of each component, control of inverters, Various design Constraints.	09 September 2024 Page 2 of 2 7 Oct 2024/ 1.5 Hours
5	Design of DC-DC Converters	Introduction to DC – DC converters. Power Converters used in EV's. Mathematical modeling and steady state analysis. Small signal modeling. Control of DC – DC converter	10 Oct 2024/ 1.5 Hours
6	Design of On-Board Chargers	Introduction to Chargers, Classification, Front End PFC converters, Resonant DC-DC converters	14 Oct 2024/ 1.5 Hours
7	Simulink Essentials	Simulink basics and new features in Automotive domain	17 Oct 2024/ 1.5 Hours
8	Workshop	Doubt Clearing Session on Capstone Project	21 Oct 2024/ 1.5 Hours
9	A Day at Bosch*	Presentation of Capstone Projects, Hardware in Loop Lab, Electrification Infrastructure, Award Distribution for Best Capstone Project	7 Dec 2024/ 1.5 Hours

*Only for Top Students *Dates Mentioned are tentative

Capstone Project

For the successful completion of the course, each student is required to submit a capstone project focusing on one of the following topics: Design of Inverters, Design of DC-DC Converters, or Design of On-Board Chargers. The capstone project may be undertaken individually or in teams of up to two members. Projects must be submitted within two weeks following Session 8: Workshop.

Outstanding capstone projects will be shortlisted for a special presentation at Bosch, where selected students will have the opportunity to showcase their work. Feedback will be provided to help refine the projects, with top-performing students receiving guidance on how to enhance their submissions for a chance to win the "Best Capstone Project" award.



Register Here : <https://bit.ly/EVMASTERCLASS>

Yours sincerely,

Organizers of EV Masterclass