

Fundamentals of Electric Vehicles

- 1.1 Course Number: EEV351
- 1.2 Contact Hours: 3-0-0 Credits: 9
- 1.3 Semester-offered: 4th Year-Odd
- 1.4 Prerequisite: Knowledge of Basic Electrical Engineering and Electrical Machine - I
- 1.5 Syllabus Committee Member: Dr. Umakant Dhar Dwivedi, Dr. Vijay Kumar Singh, Dr. Saptarshi Ghosh, and Dr. Saurabh Pandey.

2. Objective: The course is a beginner-level course designed to introduce students to Electric vehicles and give them a brief idea about electric vehicles, and its importance. This course gives some basic technical foundations regarding electric vehicles In-order to help them move on to advanced electric vehicle courses.

3. Course Content:

Overview of Electric Vehicles in national and international; Vehicle Dynamics: Forces Acting on a Rolling Vehicle, Power Required for Rolling Motion; Drive cycle and vehicle control unit; Power train of HEV and EV, efficiency considerations for conventional vehicle, HEV and EV; Energy sources for EVs: Batteries, Solar Photovoltaics, Wind Power, Flywheels, Super Capacitors, Fuel Cells, Hydrogen Supply; Fundamentals of EV Battery Pack design, EV Motors and Controllers: Fundamentals and Design; Vehicle Accessories; Battery Charging and Swapping; Advancements in EVs.

4. Readings

Books:

- i. *James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.*
- ii. *Per Enge, Nick Enge, Stephen Zoepf, Electric Vehicle Engineering, McGraw Hill Professional, 2021.*
- iii. *John G. Hayes, G. Abas Goodarzi, Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles, Wiley, 2018.*
- iv. *Amir Khajepour, Saber Fallah, Avesta Goodarzi, Electric and Hybrid Vehicles Technologies, Modeling And Control, Wiley, 2014.*
- v. *C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University Press Inc., New York 2001*
- vi. *Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.*

5. Outcome of the Course:

To make students aware about the emerging area of Electric Vehicles and helps learn the Basics of Battery driven Electric Vehicle and its Dynamics, Motors, Power Electronics, Batteries, Charging etc.