Course Lesson Plan: Electric Vehicle Technology for Academia

📌 Course Layout

Week 1: Electric Vehicle Components and Architecture

- History of Electric Vehicles
- Automobile Powertrain
- Architecture of Electric Vehicles
- Types of Electric Vehicles
- Breakdown of Key Components in EV

Week 2: Embedded Controllers for EV

- Vehicle Control Unit (VCU)
- Controllers Used in EV
- Automotive Embedded Applications

Week 3: Power Electronics Converters for EV

- Power Semiconductor Devices
- Rectifiers and Their Applications in EVs
- DC-DC Converters and Their Role in EVs
- Inverters in Electric Vehicles
- Bidirectional Chargers for EVs

Week 4: Electrical Motors for EV

- Types of Motors in EVs:
    - Induction Motors
    - Permanent Magnet Brushless DC Motor
    - Switched Reluctance Motor
    - Permanent Magnet Synchronous Motor
- Motor Controllers and Integration with Vehicle Systems
- Regenerative Braking and Its Role in Energy Efficiency

Week 5: Battery Management Systems (BMS) for EV

- Types of Batteries Used in EVs
- Battery Packs: Energy Density and Range Considerations
- Battery Degradation and Lifetime
- Functions of a Battery Management System (BMS)
- State of Charge (SoC) and State of Health (SoH)
- Temperature Management and Cell Balancing
- Charging Control, Sensors, and Communication in BMS

Week 6: Modelling and Simulation of EV

- Vehicle Dynamics Modelling
- Battery Modelling and Performance Analysis
- Motor and Power Electronics Modelling
- Thermal Management Modelling
- Integration and System-Level Simulation

Week 7: Electric Vehicle Charging

- Types of Charging Systems:
    - On-Board Chargers
    - Off-Board Chargers
    - Level 1, Level 2, and DC Fast Charging
- Charging Connectors and Compatibility
- Range and Efficiency Considerations in EV Charging

Week 8: Advanced Driver Assistance Systems (ADAS) and EV Standards

- Driver Monitoring Systems
- Gesture Control and Voice Recognition in EVs
- Automatic Emergency Braking and Lane Change Detection
- Traffic Sign Recognition and Sensor Technologies for ADAS
- Vehicle Safety Standards and Compliance
- Government Incentives and Policies for EV Adoption
