

# **40 hours Introductory Course to Electric Vehicle Maintenance**

This course was developed to expose students to new electric vehicle technology and to pique their interest in the battery electric automotive world. Although it includes many topics, most are not discussed in detail, but rather students are provided a brief explanation of the subject matter. The primary focus of this course is the review of ohms law and safety procedures related to personal protective equipment and the hazards of working with high voltage batteries.

## **Student Learning Outcome's**

- Students will learn proper procedures to maintain personal safety while working on electric Vehicles.
- Students will demonstrate an understanding of Ohm's Law to facilitate testing electric vehicles.
- Students will learn about the different electric motors and their use.

## **Course Outline**

- Introduction
  - What is an EV?
  - Brief History
  - Could electric vehicles (EV) replace the internal combustion engine?
- Current EV Manufacturers
- Future EV Manufacturers
- Electrical Overview
  - Ohm's Law
  - Series Circuit
  - Parallel Circuit
  - Series-Parallel Circuit
  - Voltage Drop Testing
  - Relay Testing
- General Safety
- Specialty Tools

- High Voltage Gloves
  - Shepherd's Hook
  - CAT III DVOM's
  - Insulation Testers
  - Scan Tools
  - Battery Testers
- Low Voltage Battery
  - Testing
- High Voltage Battery
  - Construction/Materials
  - Voltages
  - Testing
- AC/DC Converters
- DC/DC Converters
- Motors
  - Types in Use
    - DC Motor
    - AC Induction Motor
    - Permanent Magnet Synchronous Motor
    - Switched Reluctance Motor
    - Operation of each type
    - Testing
- Single Speed Transmission
- Open Differential
- Regenerative Braking
  - Recapturing Energy
- Environmental Impact
  - Limited rare earth materials
  - Disposal/Recovery