ARIZONA WESTERN COLLEGE
SYLLABUS

EVT 101 INTRODUCTION TO ELECTRIC VEHICLES

Credit Hours: 2 Lec 1.5 Lab 1

PREREQUISITE: None

COURSE DESCRIPTION
Electric vehicles (EVs) are composed of key components such as batteries, powertrains, and charging systems, all of which are introduced in this course. Students will gain foundational knowledge through both theoretical instruction and hands-on exercises, preparing them for further studies in EV technology. Students will learn foundational principles of electricity and circuits through both theoretical study and hands-on laboratory work, while focusing on safety procedures.

1. COURSE GOAL
   - 1.1. Understand Basic Electrical Concepts: Gain a comprehensive understanding of fundamental electrical concepts, including voltage, current, resistance, and power, and how they apply to electric vehicles.
   - 1.2. Master Circuit Analysis: Develop the ability to analyze and solve electrical circuits, including series, parallel, and complex circuits, with a focus on their applications in EV systems.
   - 1.3. Familiarize with EV Components: Learn about the key electronic components used in EV systems, such as batteries, inverters, and motors, and understand their roles within an electric vehicle.
   - 1.4. Apply NEC Standards: Understand and apply relevant sections of the National Electrical Code (NEC) to ensure safe and compliant EV installations.
   - 1.5. Develop Practical Skills: Acquire hands-on experience with EV-specific tools and equipment, including simulators and EV Charging Station Trainers, to prepare for real-world applications.
   - 1.6. Foundation in Electric Vehicles: Provide students with a strong foundational understanding of electric vehicle technology, including key components, systems, and regulatory frameworks.
   - 1.7. Technical Proficiency: Equip students with the ability to perform essential calculations, assessments, and measurements relevant to EV technology.
   - 1.8. Safety and Best Practices: Instill the importance of safety procedures, proper use of equipment, and understanding of electrical safety in EV-related environments.
   - 1.9. Economic and Business Perspectives: Introduce students to the business models and economic considerations involved in the adoption and integration of EVs into society.
   - 1.10. Practical Application: Ensure that students can apply theoretical knowledge to real-world scenarios through lab exercises, projects, and hands-on activities.

2. OUTCOMES
   Upon satisfactory completion of this course, students will be able to:
   - 2.1. Demonstrate Understanding of Electrical Fundamentals: Explain the principles of electricity and how they relate to electric vehicle technology.

2.2. Analyze and Solve Electrical Circuits: Analyze electrical circuits used in EV systems, including calculating voltage, current, and resistance, and solving complex circuit problems.
2.3. Identify and Utilize EV Components: Identify key components in electric vehicles and explain their functions.
2.4. Demonstrate proper usage of these components in both theoretical and practical scenarios.
2.5. Interpret and Apply NEC Standards: Interpret and apply relevant NEC standards to ensure safe and code-compliant EV installations.
2.6. Perform Hands-on EV-related Tasks: Successfully perform hands-on tasks, such as installing and troubleshooting EV components, utilizing industry-standard tools and equipment.
2.7. Differentiate Between EV Types: Identify and explain the differences between Battery Electric Vehicles (BEVs), Hybrid Electric Vehicles (HEVs), and Fuel Cell Electric Vehicles (FCEVs).
2.8. Understand EV Components: Describe the main components of an electric vehicle, including the powertrain, battery, and control systems, and their respective functions.
2.9. Perform Site Assessments: Conduct site assessments for EV charging stations and perform electrical load calculations to support EV installations.
2.10. Calculate MPGe and Analyze Efficiency: Calculate the Miles Per Gallon equivalent (MPGe) for electric vehicles and analyze the efficiency of different types of EVs.
2.11. Explain Battery Technology: Discuss the various types of batteries used in EVs, including their construction, performance characteristics, and life cycles.
2.12. Understand Battery Capacity and Its Impact on Range: Understand how battery kWh capacity affects the range of a vehicle.
2.13. Compare Battery Chemistries and Configurations: Know and compare the various types of battery chemistries and configurations available on the market.
2.14. Compare EV Motor Technologies: Know and compare the various EV motor technologies available on the market.
2.15. Analyze Motor Technologies: Understand the benefits and drawbacks of different motor technologies and generally understand their best use applications.
2.16. Apply Safety Protocols: Demonstrate an understanding of electrical safety principles, including the use of Personal Protective Equipment (PPE), grounding, and safe circuit testing procedures.
2.17. Interpret Schematics and Circuits: Interpret basic electrical schematics, apply Ohm's Law to solve circuit problems, and differentiate between AC and DC circuits.
2.18. Explore Business Models: Analyze the economic aspects of EV adoption and explore different business models related to electric vehicles.

3. METHODS OF INSTRUCTION
3.1 Lecture
3.2 Multi-media Presentations

4. LEARNING ACTIVITIES
4.1 Lectures
4.2 Demonstrations
4.3 Hands-on lab work
4.3 Exams

5. EVALUATION
5.1 Quizzes/Exams
5.2 Assignments
5.3 Participation

6. STUDENT RESPONSIBILITIES

6.1 Under AWC Policy, students are expected to attend every session of class in which they are enrolled.

6.2 Classroom Assignments: Students are responsible for work missed and for completing all work before the next class meeting. Students are responsible for participating in all oral drills and for taking all exams.

6.3 If a student is unable to attend the course or must drop the course for any reason, it will be the responsibility of the student to withdraw from the course. Students who are not attending as of the 45th day of the course may be withdrawn by the instructor. If the student does not withdraw from the course and fails to complete the requirements of the course, the student will receive a failing grade.

6.4 Americans with Disabilities Act Accommodations: Arizona Western College provides academic accommodations to students with disabilities through AccessABILITY Resource Services (ARS). ARS provides reasonable and appropriate accommodations to students who have documented disabilities. It is the responsibility of the student to make the ARS Coordinator aware of the need for accommodations in the classroom prior to the beginning of the semester. Students should follow up with their instructors once the semester begins. To make an appointment call the ARS front desk at (928) 344-7674 or ARS Coordinator at (928) 344-7629, in the College Community Center (3C) building, next to Advising.

6.5 Academic Integrity: Any student participating in acts of academic dishonesty including, but not limited to, copying the work of other students, using unauthorized “crib notes”, plagiarism, stealing tests, or forging an instructor’s signature—will be subject to the procedures and consequences outlined in AWC’s Student Code of Conduct.

6.6 Textbooks and materials: Students are required to bring notebook or looseleaf book, pens, pencils, dictionaries, and purchase textbook required for class.

6.7 Arizona Western College students are expected to attend every class session in which they are enrolled. To comply with Federal Financial Aid regulations (34 CFR 668.21), Arizona Western College (AWC) has established an Attendance Verification process for "No Show" reporting during the first 10 days of each semester.

Students who have enrolled but have never attended class may be issued a “No Show” (NS) grade by the professor or instructor and receive a final grade of “NS” on their official academic record. An NS grade may result in a student losing their federal financial aid.

For online classes, *student attendance in an online class is defined as the following* (FSA Handbook, 2012, 5-90):

- Submitting an academic assignment
- Taking an exam, an interactive tutorial or computer-assisted instruction
- Attending a study group that is assigned by the school
- Participating in an online discussion about academic matters
- Initiating contact with a faculty member to ask a question about the academic subject studied in the course