

ARIZONA WESTERN COLLEGE  
SYLLABUS

## EVT 102 EV CHARGING STATIONS AND POWER ELECTRONICS

Credit Hours: 3 Lec 2 Lab 2

PREREQ or COREQ: EVT 100 and EVT 101

COURSE DESCRIPTION

EV charging stations and electrical systems supporting them are the focus of this course. Students will engage in hands-on labs to learn about the installation, safety, and troubleshooting of AC and DC charging systems.

1. COURSE GOAL

- 1.1. Comprehensive Understanding of EV Charging Systems: Equip students with knowledge of various EV charging levels, power electronics, and the principles of DC and AC circuits.
- 1.2. Technical Proficiency: Develop students' abilities to calculate, analyze, and troubleshoot electrical circuits and charging systems.
- 1.3. Safety and Best Practices: Ensure students understand and can apply safety protocols, proper use of equipment, and industry standards in EV charging systems.
- 1.4. Practical Application: Provide students with hands-on experience using an EV Charging Station Trainer to reinforce theoretical knowledge.
- 1.5. Installation and Troubleshooting: Prepare students to install, troubleshoot, and maintain EV charging systems in various settings, including commercial environments.

2. OUTCOMES

Upon satisfactory completion of this course, students will be able to:

- 2.1. Analyze and Interpret DC Circuits: Describe how voltages are distributed in series and series-parallel circuits, define Kirchhoff's Laws, and calculate voltage drops and power.
- 2.2. Understand AC Circuit Fundamentals: Identify and analyze sine waves, calculate RMS values, and explain the effects of impedance, inductance, and capacitance on AC circuits.
- 2.3. Understand Power Electronics: Define power electronics, differentiate between FETs and BJTs, explain the operation of SCRs, and troubleshoot basic power electronic components.
- 2.4. Differentiate EV Charging Levels: Differentiate between Level 1, Level 2, and Level 3 chargers, and explain key concepts like acceptance rate, power factor correction, and bidirectional charging.
- 2.5. Apply Safe Practices in EV Systems: Apply safe troubleshooting practices, understand the importance of PPE, and follow protocols to ensure safety when working with HV systems and EVSEs.
- 2.6. Install and Troubleshoot EV Charging Systems: Plan and simulate EVSE installations, calculate charging times and costs, and perform advanced troubleshooting on EV charging systems.
- 2.7. Utilize EV Charging Station Trainer: Successfully operate and utilize an EV Charging Station Trainer to conduct practical exercises that reinforce course concepts.

- 2.8. Identify Common EV Wiring Components: Identify commonly used wire plugs and connectors for EV builds.
  - 2.9. Apply Electrical System Calculations: Apply principles of Watt's Law to calculate wattage of an electrical system.
  - 2.10. Implement Safety Measures: Apply principles of Ohm's Law to prevent risks of electrical shock and equipment damage
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