AORSI Instructor Guide

Course Title: Electrical Systems Fundamentals (ELE)

Duration: 5 Hours (lab-based strongly recommended)

Audience: Off-road operators, technicians, and instructors

Course Overview

Students learn the fundamentals of electrical systems in off-road vehicles, including charging systems, wiring, lighting, and safe troubleshooting. This course builds foundational skills for understanding and maintaining vehicle electronics, focusing on both reliability and safety.■158†source■

Learning Objectives (Instructor Notes)

- Identify major electrical system components. (Tip: Demonstrate battery/alternator testing).

- Understand safe wiring and load management. (Tip: Use wiring boards for practice).

- Select proper lighting for visibility and safety. (Tip: Compare spot vs flood beams).

- Diagnose and repair common electrical failures. (Tip: Use multimeters and staged failures).

Module 1: Electrical Basics – Batteries, Alternators, Circuits (1.25 hours)

- Teach batteries, alternators, circuits, and safe practices.

- Course Design Suggestion: Lab building simple circuits with switches, loads, and fuses.

- Exercise: Diagram current flow from battery to headlights.

- Reflection: Why must alternators and batteries be tested together?■158†source■

Module 2: Wiring, Fuses, and Relays (1.25 hours)

- Teach gauge selection, insulation, routing, fuses, and relays.

- Course Design Suggestion: Create a wiring board for practice.

- Exercise: Identify three causes of blown fuses and solutions.

- Reflection: Why is relay use critical when adding auxiliary components?■158†source■

Module 3: Lighting Systems – OEM, Auxiliary, Specialty (1.25 hours)

- Teach OEM vs auxiliary lighting options and safe wiring.
- Course Design Suggestion: Install auxiliary light with fuse protection.
- Exercise: Compare spot beams vs flood beams.
- Reflection: How can poor lighting installs create safety risks?■158†source■

Module 4: Troubleshooting & Safety in the Field (1.25 hours)

- Teach troubleshooting with multimeters, staged failures, and safe practices.
- Course Design Suggestion: Field exercise troubleshooting staged failures.
- Exercise: Create toolkit list for electrical troubleshooting.
- Reflection: Why is safety more critical during improvised repairs?■158†source■

Instructor–Student Alignment Chart

This chart aligns instructor activities with student workbook exercises for easy reference.■158†source■

Module	Instructor Focus	Student Workbook Activity
1: Electrical Basics	Demonstrate battery/alternator testing	Diagram current flow■158†source■
2: Wiring, Fuses, Relays	Show wiring board and safe replacements	Identify causes of blown fuses■158†source■
3: Lighting Systems	Display OEM, auxiliary, and specialty lighting	Compare spot vs flood beam uses■158†source■
4: Troubleshooting	Guide staged troubleshooting with multimeters	Create field toolkit list■158†source■

Final Assessment

Task: Complete wiring troubleshooting exercise where students identify faults and restore function safely. Written exam includes questions on electrical basics, wiring, lighting, and troubleshooting.■158†source■

Instructor Preparation Checklist

- Provide batteries, alternators, and circuits for demonstration.
- Prepare wiring boards with relays and fuses.
- Set up lighting options for installation practice.
- Organize staged troubleshooting exercises with multimeters.

Suggested Timing

- Introduction – 10 min
- Module 1 – 75 min
- Module 2 – 75 min
- Module 3 – 75 min
- Module 4 – 75 min
- Final Assessment – 30 min
- Wrap-up & Questions – 10 min