

AUTO 156: AUTOMOTIVE ELECTRICAL & ELECTRONIC SYSTEMS I

Citrus College Course Outline of Record

Heading	Value
Effective Term:	Fall 2025
Credits:	6.5
Total Contact Hours:	207
Lecture Hours :	72
Lab Hours:	135
Hours Arranged:	0
Outside of Class Hours:	144
Total Student Learning Hours:	351
Prerequisite:	AUTO 101, or AUTO 101A and AUTO 101B.
Strongly Recommended:	MATH 144.
Transferable to CSU:	Yes
Transferable to UC:	No
Grading Method:	Standard Letter

Catalog Course Description

Intended for those seeking a career in the automotive service and repair industry, this ASE Education Foundation certified course is one component of the Toyota Technician Training and Education Network. This class covers essential electrical and electronic systems theory, along with inspection, diagnosis, service & repair of specific electrical systems including the battery, starting systems, charging systems, and accessory systems. Prepares students for ASE Electrical & Electronic Systems (A6) certification. 72 lecture hours, 135 lab hours.

Course Objectives

- Students demonstrate knowledge of electrical system basics, diagnostic procedures, starter and charging system service and repair. Also, students are to complete ninety percent (90%) of Priority 1 (P-1), seventy-five percent (75%) of Priority 2 (P-2) fifty percent (50%) of the Priority 3 (P-3) required ASE Education Foundation objectives for Electrical (A6) that apply to first level electrical. Please see attached ASE Education Foundation Program Standards for Master Automobile Service Technology (MAST) Task List (pages 109-112) or <https://www.aseeducationfoundation.org/> for the most current task list.

Major Course Content

1. Electrical and Electronic Systems Theory
 - a. Electrical Principles
 - i. Ohm's Law
 - ii. Watt's Law
 - iii. Series, Parallel, and Series-Parallel Circuits
 - iv. Switches & Relays
 - v. Electrical Diagnostic Tools (DMMs, test lights, fused jumper wires)

1. DMM Usage and Operation Certification through National Coalition of Certification Centers (NC3)
 - vi. Wiring Diagrams
- b. Electronic Principles
 - i. Semi-Conductors & Doping
 - ii. Diodes & Zener Diodes
 - iii. Transistors
 - iv. Solid-State Voltage Regulators
 - v. Solid-State AC-to-DC Rectification
- c. Automotive Electrical Systems Theory & Diagnosis
 - i. Battery
 - ii. Starting Systems
 - iii. Charging Systems
 - iv. Lighting Systems (headlights, brake & tail lights, turn signals)
 - v. Accessories
 1. Wiper/Washer systems
 2. Power Windows
 3. Power Mirrors
 4. Power Door Locks
 - vi. Instrument Panel Warning Lights
- d. Electrical Systems Service & Repair
 - i. Service Precautions
 - ii. Hybrid Vehicle Safety & General Service
 1. Hybrid vehicle safety certification through ASE xEV Level 1 testing
 - iii. Wiring repair, soldering
 - iv. Starter motor remove and replace/reinstall (R&R)
 - v. Alternator R&R
 - vi. Interior panel R&R and precautions
- e. Electrical Wiring Diagrams & Troubleshooting
 - i. Use of Toyota Information Systems
 - ii. Circuit tracing and analysis
 - iii. Basic electrical troubleshooting using electrical wiring diagrams (EWD)
2. Service Literature
 - a. Repair manuals & wiring diagrams
 - b. Technical Service Bulletins

Lab Content

1. Electrical and Electronic Systems Theory
 - a. Electrical Principles
 - i. Perform Resistance, Voltage and Amperage Measurements
 - ii. Test Switches & Relays
 - iii. Build, analyze, and trouble shoot electrical circuits using ATech training simulator
 1. Series circuits
 2. Parallel circuits
 3. Series-parallel circuits
 - b. Automotive Electrical Systems Theory & Diagnosis
 - i. Test & evaluate batteries
 - ii. Test & evaluate starting systems
 - iii. Test & evaluate charging systems
 - iv. Test & evaluate lighting systems (headlights, brake & tail lights, turn signals)

- v. Test & evaluate accessory systems (wiper/washer, power windows, power mirrors, power door locks)
- c. Electrical Systems Service & Repair
 - i. Perform soldering and build fused jumper wire & short tester
 - ii. R&R starter motor and disassemble/assemble with bench testing
 - iii. R&R alternator and disassemble/assemble with bench testing
 - iv. Disassemble interior paneling to access, inspect, and trouble shoot accessory systems
- 2. On-car Diagnostic Exercises
 - a. Electrical circuits
 - b. Starter circuits
 - c. Charging circuits
 - d. Accessory circuits
- 3. Service Literature
 - a. Use repair manuals & wiring diagrams to support diagnosis & repair
 - b. Use Technical Service Bulletins to supplement repair manuals & wiring diagrams

Suggested Reading Other Than Required Textbook

Industry related periodicals, forums, and approved text Toyota Technician Handbook 623 Electrical Circuit Diagnosis Toyota Technician Handbook 652 Body Electrical Diagnosis

Examples of Required Writing Assignments

Write a summary and evaluation of a recent industry related technology article and/or video using MLA format.

Examples of Outside Assignments

Write a summary and evaluation of a recent industry related technology article and/or video. Complete ASE review/preparation questions.

Instruction Type(s)

Lab, Lecture, Online Education Lecture