AUTO 156: AUTOMOTIVE ELECTRICAL & ELECTRONIC SYSTEMS I

Citrus College Course Outline of Record

Heading	Value
Effective Term:	Fall 2024
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.
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