NC AU146: AUTOMOTIVE ELECTRICAL AND ELECTRONIC SYSTEMS

Citrus College Course Outline of Record

Heading	Value
Effective Term:	Fall 2025
Credits:	0
Total Contact Hours:	108
Lecture Hours :	54
Lab Hours:	54
Hours Arranged:	0
Outside of Class Hours:	108
Total Student Learning Hours:	216
Strongly Recommended:	ENGL C1000; MATH 144; NC AU140, or AUTO 140A or one year of employment as automotive technician.
Transferable to CSU:	No
Transferable to UC:	No
Grading Method:	Non-Credit Course

Catalog Course Description

Intended for the incumbent worker, returning student, or person seeking a career change into the automotive service industry. This course is part of the Automotive Service and Repair curriculum intended for students with availability on the evening. This course covers essential electrical and electronic systems theory, along with inspection, diagnosis, service & repair of specific electrical systems including the battery, starting systems, charging systems, lighting systems, gauges & instrument-panel warning lights, accessories, and computer-controlled systems. Prepares students for ASE Electrical & Electronic Systems (A6) certification. This course is the noncredit equivalent of credit course AUTO 146. 54 lecture hours, 54 lab hours.

Course Objectives

- Inspect battery state of charge and determine corrective action.
- Use wiring diagrams to diagnose starting and charging system operation and determine corrective action.
- Inspect for parasitic draw and determine corrective action.
- Remove and replace batteries, starters and alternators following manufacturer's repair procedures.
- Use wiring diagrams to diagnose lighting system operation and determine corrective action.

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)
        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. Gauges
        vi. Instrument panel warning lights
        vii. Power accessories
    d. Electrical systems service & repair
        i. Service precautions
        ii. Hybrid vehicle safety & general service
        iii. Wiring repair, soldering
        iv. Starter motor R&R
        v. Alternator R&R
        vi. Instrument panel disassembly and inspection
2. Service Literature
    a. Repair manuals & wiring diagrams
    b. Technical Service Bulletins
3. Electronic Systems
    a. Electronic Control Units
    b. Sensors (inputs)
    c. Actuators (outputs)
    d. Network Communication Protocols

Lab Content

1. Electrical and electronic systems theory
    a. Electrical principles
        i. Perform resistance, voltage and amperage measurements
        ii. Test switches & relays
    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 gauges
        vi. Test & evaluate instrument panel warning lights
        vii. Test & evaluate power accessories
    c. Electrical systems service & repair
        i. Perform soldering and build fused jumper wire
2. Service literature
    a. Use repair manuals & wiring diagrams to support diagnosis & repair
    b. Use Technical Service Bulletins to supplement repair manuals & wiring diagrams

3. Electronic Systems
    a. Electronic Control Units
    b. Sensors (inputs)
    c. Actuators (outputs)
    d. Network Communication Protocols

Suggested Reading Other Than Required Textbook

Student will complete instructor selected MyAutomotiveLab e-learning modules that are related to the subject matter.

Examples of Required Writing Assignments

Students will be assigned technical article summaries/evaluations from industry-related periodicals/journals.

Examples of Outside Assignments

ASE review/preparation questions and discovery-learning cognitive labsheets.

Instruction Type(s)

Lab, Lecture, Online Education Lecture