

COURSE SYLLABUS

LAST REVIEW	Fall 2022
COURSE TITLE	Electrical I
COURSE NUMBER	AUTT-0163
DIVISION	Career and Technical Education
DEPARTMENT	AUTT
CIP CODE	47.0604
CREDIT HOURS	3
CONTACT HOURS/WEEK	Class: 1.5 Lab: 3
PREREQUISITES	AUTT-0103
COREQUISITES	None
COURSE PLACEMENT	None

COURSE DESCRIPTION

In this course students will study and perform tasks from the National Automotive Technicians Education Foundation's (NATEF) Maintenance and Light Repair (MLR) Program. Students will complete service work orders; describe the relationship between voltage, ohms and amperage; perform basic electrical circuit repairs; identify electrical system faults; identify basic wiring diagram symbols, components, and legend information; perform basic electrical circuit measurements using a DVOM; describe basic circuit characteristics of series, parallel and series parallel circuits through a variety of classroom and shop learning and assessment activities. All students will successfully complete each element of personal safety training before working in the Automotive Laboratory.

PROGRAM ALIGNMENT

This course is part of a program aligned through the Kansas Board of Regents and Technical Education Authority. For more information, please visit:
https://kansasregents.org/workforce_development/program-alignment

PROGRAM LEARNING OUTCOMES

1. Demonstrate proper safety practices in an automotive shop environment.
2. Demonstrate workplace skills associated with a professional automotive shop.
3. Describe the fundamental elements of automotive technology including service information, tools, equipment, and maintenance procedures.

TEXTBOOKS

<http://kckccbookstore.com/>

METHODS OF INSTRUCTION

A variety of instructional methods may be used depending on content area. These include but are not limited to: lecture, multimedia, cooperative/collaborative learning, labs and demonstrations, projects and presentations, speeches, debates, panels, conferencing, performances, and learning experiences outside the classroom.

Methodology will be selected to best meet student needs.

COURSE OUTLINE

- I. Relationships Between Voltage, Ohms and Amperage
 - A. Diagnosing electrical/electronics using principles of electricity (Ohm's Law)
 1. Series circuits
 2. Parallel circuits
 3. Series-parallel circuits
 - B. Digital Multi-Meter (DMM)
 - C. Electrical circuit problems
 - D. Source voltage, voltage drop, current flow, and resistance
- II. Basic Electrical Circuit Repairs
 - A. Terminal replacement
 - B. Solder repair of electrical wiring
- III. Electrical System Faults
 - A. Electrical/electronic system concerns
 - B. Electrical circuit tests with a test light
 - C. Fused jumper wires
 - D. Fusible links, circuit breakers, and fuses
 - E. Switches, connectors, relays, solid state devices
- IV. Basic Wiring Diagram Symbols, Components, and Legend Information
 - A. Wiring diagrams
 - B. Circuit problems
 - C. Circuit logic
- V. Basic Electrical Circuit Measurements Using a DVOM
 - A. Use of a digital multi-meter (DMM)
 1. Source voltage
 2. Voltage drop
 3. Current flow
 4. Resistance
 - B. Test lights
 - C. Fused jumper wires
 - D. Testing circuit protection
 1. Fusible links
 2. Circuit breakers
 3. Fuses
 - E. Testing components
 1. Switches
 2. Connectors

3. Relays
 4. Solid state devices
 5. Circuit wiring
- VI. Basic Circuit Characteristics of Series, Parallel and Series Parallel Circuits
- A. Identification and interpretation of electrical/electronic system concerns
 - B. Use of Ohm's law to diagnose electrical/electronic integrity
 1. Series circuits
 2. Parallel circuits
 3. Series-parallel circuits
- VII. Perform Battery Diagnosis
- A. Calculating battery state-of-charge values
 1. Understanding the hydrometer
 2. Determining proper static voltage
 - B. Perform battery tests
 1. Capacity test
 2. Sulfation test
 - C. Maintaining electronic memory functions.
 - D. Battery hold-downs
 - E. Inspection
 - F. Battery cables and clamp diagnosis
 1. Visual
 2. Voltage drops
 - G. Determine need of battery charging
 - H. Jumper cables and auxiliary power supplies
 - I. Parasitic draws
- VIII. Perform Battery Service
- A. Establishing a battery service routine
 - B. Inspecting
 - C. Cleaning
 - D. Filling
 - E. Replacing
 1. Battery
 2. Cables
 3. Connectors
 4. Clamps
 5. Hold downs
 - F. Recharging battery
 1. Acid
 2. Glass matt
 3. Starting
 4. Deep cycle
 - G. Methods of jumpstarting
 - H. Parasitic load identification and repair

COURSE LEARNING OUTCOMES AND COMPETENCIES

Upon successful completion of this course, the student will:

- A. Demonstrate knowledge of general automotive electrical theory, diagnostics, and service
 - 1. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
 - 2. Demonstrate knowledge of electrical/electronic series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law).
 - 3. Use wiring diagrams to trace electrical/electronic circuits.
 - 4. Demonstrate knowledge of the causes and effects from shorts, grounds, opens, and resistance problems in electrical/electronic circuits.
 - 5. Check operation of electrical circuits with a test light.
 - 6. Check operation electrical of electrical circuits with fused jumper wires.
 - 7. Measure key-off batter drain (parasitic draw).
 - 8. Inspect and test Fusible links, circuit breakers, and fuses; determine necessary action.
 - 9. Perform solder repair of electrical wiring.
 - 10. Replace electrical connectors and terminal ends. P1-

- B. Demonstrate knowledge of battery operation, diagnostics, and service
 - 11. Perform battery state-of-charge test; determine necessary action.
 - 12. Conform proper batter capacity for vehicle application; perform batter capacity test; determine necessary action.
 - 13. Maintain or restore electronic memory functions.
 - 14. Inspect and clean battery; fill battery cells; check battery cables, connectors, clamps, and hold-downs.
 - 15. Perform slow/fast battery charge according to manufacturer's recommendations.
 - 16. Jump-start vehicle using jumper cables and a booster battery or an auxiliary power supply.

ASSESSMENT OF COURSE LEARNING OUTCOMES AND COMPETENCIES

Student progress is evaluated through both formative and summative assessment methods. Specific details may be found in the instructor's course information document.

COLLEGE POLICIES AND PROCEDURES

Student Handbook

<https://www.kckcc.edu/files/docs/student-resources/student-handbook-and-code-of-conduct.pdf>

College Catalog

<https://www.kckcc.edu/academics/catalog/index.html>

College Policies and Statements

<https://www.kckcc.edu/about/policies-statements/index.html>

Accessibility and Accommodations

<https://www.kckcc.edu/academics/resources/student-accessibility-support-services/index.html>.