SOUTHEAST COMMUNITY COLLEGE
ADVANCED TECHNOLOGIES & SKILLED TRADES DIVISION
AUTOMOTIVE SERVICE EDUCATIONAL PROGRAM (ASEP)
COURSE SYLLABUS
September 10, 2025

I. CATALOG DESCRIPTION

Course Number: ASEP1116
Course Title: Electrical Fundamentals
Prerequisite(s): None

Catalog Description: This course covers vehicle electrical systems and their components. Exercises are performed with basic math skills to understand Ohm's Law for series, parallel, and series parallel circuits. The design, diagnosis and repair methods are discussed for servicing storage batteries, starting and charging systems that are used in various vehicle types. Common vehicle circuits their design, diagnosis and repairs are covered.

Credit Hour: 6.0
Classroom Hours: 53
Lab Hours: 113
Total Contact Hours: 166

II. COURSE OBJECTIVES: *Course will:*

- **A.** Cover electrical theories and principle function
- **B.** Cover electrical laws
- **C.** Cover circuit types and design
- **D.** Cover control devices (switches, relays, modules)
- **E.** Cover magnetism and electromagnetism
- **F.** Cover basic electrical components
- **G.** Teach use of a DVOM Meter
- **H.** Teach how to calculate and measure voltage, resistance and current
- **I.** Cover conductor service and repair
- **J.** Teach understanding and diagnosis of circuit faults
- **K.** Teach theory of operation, service, and testing of batteries
- **L.** Teach theory, design, and operation of the starting system
- **M.** Teach theory, design, and operation of the charging system
- **N.** Cover diagnosis and repair of the starting system
- **O.** Cover diagnosis and repair of the charging system
- **P.** Cover wiring diagram components
- **Q.** Teach testing and repair of wiring systems
- **R.** Teach testing, diagnosis, and repair of electrical systems and components
- **S.** Introduce Oscilloscopes
- **T.** Introduce and identify types of General Motors heating, ventilation and air conditioning systems.
- **U.** Discuss theory, operation, diagnosis and repair of General Motors heating, ventilation and air conditioning systems.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

A. STUDENT LEARNING OUTCOMES: *Student will be able to:*

1. Explain basic electrical/electronic theory as it applies to a vehicle's operating systems.
2. Describe voltage, current, and resistance and their relationship to Ohm's and Kirchhoff's Laws.
3. Identify series, parallel and series-parallel circuits and explain their operation.
4. Demonstrate the ability to calculate values for voltage, current and resistance.
5. Identify the types of control devices used in electrical systems.
6. Identify the types of circuit protection devices used in electrical systems.
7. Identify the use of permanent magnets, electromagnets and the relationships of electricity and electromagnetic induction.
8. Demonstrate the use of a DVOM to measure voltage, current and resistance.
9. Identify opens, shorts and ground connections and demonstrate how faults are diagnosed.
10. Identify electrical components and explain their operation.
11. Solder and repair conductors used in the electrical circuit.
12. Make repairs to terminals and connectors.
13. Test, diagnose and replace automotive storage batteries.
14. Describe the theory of starting system operation, identify and test the major components, and demonstrate correct no-load testing procedures using all designated test equipment.
15. Demonstrate correct testing procedures on complete charging systems and components.
16. Utilize wiring diagrams to troubleshoot electrical circuits.
17. Diagnose the electrical system and its individual components.
18. Explain the function and operation of various automotive sensors and/or outputs.
19. Test and repair the electrical system and its individual components and accessories using industry service equipment.
20. Demonstrate the use of an oscilloscope.

B. GENERAL EDUCATION LEARNING OUTCOMES

GELO #3: Critical Thinking & Problem Solving

Outcomes:

1. Collect, identify, interpret and analyze data.

IV. CONTENT/UNIT OF INSTRUCTION

A. The basic electrical and electronic principles
B. Ohm's Law theory
C. Circuit types
D. Kirchhoff's Laws
E. Switches
F. Calculate and measuring voltage, resistance and current
G. Use of a DVOM Meter and circuit testers
H. Shorts, opens and grounds
I. Magnetism and electromagnetism
J. Conductor service and repair
K. Servicing and testing of batteries
L. Circuit components
M. Charging systems
N. Starting systems
O. Load testing
P. Wiring diagrams

V. INSTRUCTIONAL MATERIALS

The Course Information Document lists the current text(s) required for this class. The list is also available in the campus bookstore. The Course Information Document also lists the tools/equipment or other supplies required for this class.

VI. METHODS OF PRESENTATION / INSTRUCTION

A. Methods of presentation typically include a combination of the following:

1. Lecture
2. Small and large group discussion
3. Video presentation
4. Demonstrations
5. Project boards
6. Handouts
7. Observations
8. Assigned lab projects
9. Online information
10. Field trips

VII. METHODS OF EVALUATION

A. Methods of evaluation typically include a combination of the following:

1. Notebook (if required)
2. Quizzes
3. Tests
4. Lab grades
5. Attendance/class conduct

Letter grades will be based on the SCC Standard Grade Scale Policy. **Note:** See Course Information Document for specific details on how the course grades will be calculated.

VIII. SPECIFIC COURSE REQUIREMENTS

A. Student must:

1. Complete all tests, projects, assignments, and notebook (if required).
2. Earn a final grade of 70% (2.0) or higher to progress in the program.

B. Attendance:

1. Students must follow the Attendance Policy as stated in the college student handbook, automotive lab and classroom policies handbook or course Information Document.

C. Shop safety rules will be followed.

D. Any additional course requirements as stipulated by the Instructor.