

Course Code: AFM 115

Course Title: Basic Automotive Electrical/Electronics

Department: Applied Sciences and Technologies

Effective Date: Summer 2026

PCS Code: 1.2 - Occupational/Technical Instruction

CIP Code: 47.0604

Repeatability: 0

Credit Hours

Catalog Notation: 5-3-6

Credit Hour Distribution:

Lecture: 5

Lab: 3

Clinical: 0

Total: 6

General Course Information

Catalog Description

Theoretical and practical aspects of electricity. Cranking, charging, and accessory systems components and wiring circuits. Basic fundamentals of electronics. Students who successfully complete this course may receive certification from Ford Motor Company in Basic Electrical Diagnosis and Repair.

General Course Objectives

Students will have a basic understanding of electric circuit principles and the various electrical/electronic systems on today's vehicles.

Minimum Placement Levels

English	Reading	Math
Placement into ENG 098	Placement into CCS 098	Placement into MAT 059

Prerequisites

None

Methods of Evaluation

Students will be given a minimum of 5 quizzes, 40 lab exercises, 5 web courses, 1 lab practical exam, 1 mid-term exam, and 5 Automotive Service Excellence (ASE)/Ford Certification exams.

Instructional Materials and Additional Supplies

Automotive Technology, ISBN 9781337794213

Course Content

General Learning Outcomes (GLOs)

- Reasoning and Inquiry: Students will demonstrate the ability to solve problems using deductive reasoning and logic, quantitative reasoning, or the scientific method.
- Technology: Students will demonstrate the ability to evaluate, select, and appropriately use current and emerging tools.

Course Segments and Student Learning Outcomes

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Basic Electricity - Basic Concepts: a. Voltage (Pressure-Force), b. Current (Electron Flow vs. Conventional Flow), c. Resistance (Opposition), d. Wattage (Power)	1. Describe the relationships between voltage, current, and resistance in an electrical circuit.	4	0	0
Basic Electricity - Series Circuits: a. Ohm's Law, b. Voltage Formula, c. Current Formula, d. Resistance Formula, e. Circuit Boards	1. Explain and solve series electrical problems for unknown quantities asked for by the instructor.	4	1	0
Basic Electricity - Parallel Circuits: a. Ohm's Law, b. Voltage Formula, c. Current Formula, d. Resistance Formula, e. Circuit Boards	1. Explain and solve parallel electrical problems for unknown quantities asked for by the instructor.	4	1	0
Basic Electricity - Series-Parallel Circuits: a. Ohm's Law, b. Voltage Formula, c. Current Formula, d. Resistance Formula, e. Circuit boards	1. Explain and solve series-parallel electrical problems for unknown quantities asked for by the instructor.	4	1	0
Basic Electricity - Magnetism: a. Natural Magnets, b. Man-made Magnets, c. Repulsion-Attraction, d. Flux Field, e. Polarity	1. Explain the basic principles of magnetism as applied to electrical circuits and components.	1	0	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Basic Electricity - Electromagnetism: a. Current, b. Flux Fields, c. Number of Windings, d. Magnet Strength, e. Iron Core	1. Explain the basic principles of electromagnetism as applied to electrical circuits and components.	2	0	0
Basic Electricity: a. Amp Meter, b. Volt Meter, c. Ohm Meter, d. Scale Divisions	1. Demonstrate an understanding of the theory behind electrical measuring devices by actually using them on electrical circuits.	1	5	0
Wet Cell Batteries: a. Negative Plates, b. Positive Plates, c. Electrolytes, d. Charge and Discharge Cycles	1. Demonstrate an understanding of the theory behind the wet cell battery by answering questions given by the instructor.	3	0	0
Battery Test: a. Battery Visual Inspection, b. Battery Capacity Test, c. Battery Cell Test, d. Three Minute Battery Charge Test, e. Specific Gravity Test, f. Fast Charge Test, g. Battery Leakage Test	1. Test a battery according to manufacturer specifications with various test equipment.	2	3	0
Starter Motors: a. Motor Action - Armature Circuit, Field Pole Circuit, Commutation, Magnetic Repulsion; b. Motor Windings - Series Wound, High Torque - Low Revolutions Per Minute (RPM), High Current - Low Resistance	1. Demonstrate an understanding of the theory behind cranking motor and starting solenoid systems by answering questions given by the instructor.	3	0	0
Starting Motor Test: a. Starter Motor Current Draw, b. Starting System Insulated Circuit Resistance Test, c. Starting System Ground, d. Starter System Solenoid Switch Circuit Resistance Test	1. Test a starting motor according to manufacturer specifications with various test equipment.	3	4	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Alternators: a. Alternator Action - Rotor, Stator, Slip Rings, Diode Bank; b. Regulating Action - One, Two, and Three Unit Regulation, Field Relay, Voltage Regulator Relay, Indicator Light Relay	1. Demonstrate an understanding of the theory behind alternators and their regulating units by answering questions given by the instructor.	5	2	0
Alternator Testing: a. Alternator Output Test, b. Voltage Regulator Test, c. Charging System Circuit Resistance Test, d. Charging System Insulated Circuit Resistance Test, e. Diode-Stator Test	1. Test an alternator according to manufacturer specifications with various test equipment.	0	4	0
Body/Chassis Electrical Circuitry: a. Troubleshooting, b. Component Checking, c. Circuit Tracing, d. Harness Repair	1. Comprehend that proper repair sequence is needed to find electrical faults.	3	3	0
Circuit Operation: a. Component Location Index, b. Tracing, c. Power Distribution, d. Ground Distribution	1. Appraise a complete circuit before attempting to troubleshoot a malfunction.	5	0	0
Troubleshooting Procedure: a. Body Component Locations, b. Sequence of Steps, c. Using Shop Manuals on CD, DVD, and/or Electronic Format	1. Find faults in automotive wiring using a structural method or plan.	12	11	0
Repair Procedure: a. Wiring, b. Connectors, c. Fusible Links, d. Components	1. Appraise a defect to determine what can be repaired and what must be replaced.	3	1	0

Course Segment	Learning Outcomes	Lecture Hours	Lab Hours	Clinical Hours
Circuitry: a. Power Lock, b. Power Sun Roof, c. Cruise Control, d. Rear Window Defroster, e. Digital Dash, f. Lighting, g. Gauges and Warning Devices, h. Horn, i. Wipers	1. (Sections a through i will be offered on a lecture-lab priority ratio.) Demonstrate an understanding of various circuits that are used in modern vehicles by diagnosing problems in various circuits.	5	3	0
Electronic Processing Modules: a. Inputs, b. Outputs	1. Demonstrate an understanding of input and output devices by means of written exam.	4	0	0
Electronic Signals: a. Digital, b. Analog, c. Pulse Width Modulation	1. Demonstrate an understanding of different signals by proper use of an oscilloscope.	1	1	0
Electronic Circuits and Components: a. Transistors, b. Resistors, c. Phototransistors, d. Hall Effect Sensors, e. Thermistors, f. Potentiometers, g. Photoresistors, h. Variable Reluctance Sensors, i. Piezoelectric sensors, j. Switches	1. Demonstrate an understanding of electronic components by answering questions correctly on written examinations and by proper use of test equipment.	6	5	0

Total Contact Hours

Lecture Hours	Lab Hours	Clinical Hours
75	45	0