SPRINGFIELD TECHNICAL COMMUNITY COLLEGE

ACADEMIC AFFAIRS

Course Number: AUTO 112 Department: Automotive Technology

Course Title: Electrical Systems Semester: Spring Year: 1997

Objectives/Competencies

Course Objective	Competencies
1. Reinforce the importance of using the library of information available for all areas of automotive service.	1. To successfully read and understand electrical schematic and vacuum diagrams. 2. To become familiar and comfortable using the diagnostic routine approach to repair. 3. To follow pinpoint test step diagnostics accurately and efficiently. 4. Define units of measurement and the different symbols. 5. Locate areas in the service literature based upon his/her particular need. 6. Demonstrate the ability to use service literature while working on a vehicle. 7. The students will use a systematic logical, problem-solving approach to complex systems.
2. Identify current, voltage, resistance units of measurement and the different symbols used for the above valves.	1. Measure current flow through a live circuit using an ammeter. 2. Measure voltage source of a live circuit using a voltmeter.

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	3. Measure voltage drop across a load in a live circuit using a voltmeter. 4. Measure resistance across a load. 5. Measure resistance in a circuit using an ohmmeter. 6. Recognize voltage as an electrical pressure measured in volts (v). 7. Recognize current as the flow of electricity measured in amperes (A). 8. Recognize resistance as the opposition to flow measured in ohms ( ).
3. The student should develop an understanding of basic circuit elements including the relationship between current flow and resistance of load.	1. Explain the term closed circuit as opposed to open circuit. 2. Identify the power side of the load as opposed to ground side of the load. 3. Demonstrate electric current will always flow through the path of least resistance. 4. Construct a live electrical circuit using a switch as a circuit control device. 5. Construct a live circuit using a fuse as a protection device. 6. Identify all circuit protection devices used in automotive applications.
4. The student should develop an understanding of how current will flow through series circuit, parallel circuits and series-parallel circuits.	1. Construct a series circuit arranging the loads in correct sequence. 2. Construct a parallel circuit arranging loads in correct sequence. 3. Construct a series-parallel circuit arranging loads in

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	correct sequence. 4. Explain the voltage current and resistance measurement readings received and compare to specifications for each of the above circuits. 5. Identify what factor determines the use of one type circuit as opposed to another type circuit used in an application.
5. Teach the students the types of meters available, what each measures and the value of accurate electrical measurements in diagnostics.	1. Identify an analog as compared to a digital multimeter and list the advantages and disadvantages to each. 2. Select the appropriate scale on each meter for specific results. 3. "Zero" adjust an ohmmeter before using. 4. Explain the purpose of an inductive type ammeter. 5. Determine the purpose of a continuity tester or self-powered test light. 6. Perform diagnostics using specific jumper wires for a specific application.
6. Demonstrate Ohm's law and relate it to measuring voltage, resistance and current.	1. Define the term E-I X R. 2. Explain why if voltage is constant in a circuit: current flow goes up when voltage goes up. 3. Explain why if voltage is constant in a circuit: current flow goes down when resistance goes up. 4. Explain why if current flow is constant: voltage goes up when resistance goes up.

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	5. Determine the relationship between watts, voltage and current.
7. Define the various types of components used and organized in the automotive electrical system.	1. Differentiate cable sizes ranging from zero to 20 gauge. 2. Recognize barrell, blade and fuse link type protection devices and amperage ratings for each. 3. Identify power distribution boxes and fuse blocks. 4. Explain operation of cycling and non-cycling circuit breakers. 5. Recognize the purpose of thermal limiters and specific applications where they are found. 6. Explain the difference between fixed resistors, stepped resistors and variable resistors. 7. Define the operation of the following switches used in automotive applications – hinged pawl, push-pull, single pole single throw, single pole-double throw, double pole-double throw, make before break, break before make, momentary contact, mercury and temperature sensitive switches. 8. Understand the difference between and operation of normally open and normally closed relays. 9. Become familiar with solenoid operation, applications and differences between solenoids and relays. 10. Become familiar with the operation of and applications for flashers, buzzers, diodes, capacitors and coils. 11. Be prepared to identify a sealed component and recognize it as a non-repairable item.

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8. Explain the operation, testing and maintenance of the charging system components.	1. Define three major functions of automotive storage battery. 2. Understand battery charging methods and danger involved with charging. 3. Explain alternator operation including rectification. 4. Differentiate internal alternator regulator (I.A.R.) and external voltage regulator (E.V.R.). 5. Perform diagnostics on bugged IAR equipped vehicles. 6. Perform diagnostics on bugged EVR equipped vehicles. 7. Generate a diagnostic routine which will efficiently and consistently repair any charging difficulties.
9. Identify four basic situations that can generate problems in a circuit.	1. List the four types of problems found in a circuit. 2. Explain what symptom each of the four problems will generate when diagnosing with test equipment. 3. Demonstrate how to isolate a problem in a circuit. 4. Demonstrate a systematic approach to diagnosis and repair.