COURSE NAME: Automotive Electrical  
COURSE NUMBER: AUTO1120

LECTURE HOURS: 3  
LAB HOURS: 2

CONTACT HOURS: 5  
CREDIT HOURS: 4

CATALOG DESCRIPTION: Provides instruction and practicum in the service and repair of all components which comprise an automotive electrical system. Coverage includes 1) drawing circuits; 2) identifying correct formulas for making proper substitutions; 3) using Ohm's Law to compute resistance, voltage, or amperage; 4) finding the total voltage, current, and resistance in a series, parallel, or combined circuit; 5) computing voltage drop and electrical power; and 6) identifying resistors by use of color codes.

PREREQUISITE: None


OTHER: Safety Glasses, basic hand tool set and a calculator.

OPTIONAL: DVOM – Digital Volt Ohmmeter

INSTRUCTIONAL METHODS: Lecture, Lab, Daily Assignments, and Library Assignments. May or may not follow course content outline

EVALUATION METHODS: The final course grade will be composed of:

- Class Participation & Homework = 10%
- Lab Participation = 30%
- Midterm Exam = 30%
- Final Exam = 30%

GRADING SCALE: Final grades will be awarded as follows:

- 90 - 100 = A - Excellent
- 80 - 89 = B - Above Average
- 70 - 79 = C - Average
- 65 - 69 = D - Below Average
- Below 65 = F - Failure
GENERAL ATTENDANCE STATEMENT: Students are expected to follow the attendance policy as described by each instructor.

ATTENDANCE POLICY: The attendance policy for the Technical Education Division is designed to foster student success. Prompt and regular attendance is the responsibility of each student. The student is responsible for all material covered and all assignments made in class. Any time a student is absent from a class, laboratory or other scheduled event, it is the student's responsibility to make satisfactory arrangements for any make-up work permitted by the instructor. An absence is defined as nonattendance for any reason, including illness, emergency or official leave. A student is considered to have accumulated excessive absences when he/she has been absent more than the number of times a class meets in one (1) week. The instructor may define a number of tardies to be equal to an absence. The instructor may impose a penalty for excessive absence from class.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES
In order for the College to make reasonable accommodations for students with disabilities, the student must contact the Center for Students with Disabilities and present a Faculty Accommodation Form to each instructor. Accommodations include, but are not limited to, the following; extended time on tests, alternative test location or format, interpreter services, and note taking services. When possible, students should request accommodations prior to the beginning of each semester. Testing accommodations must be arranged prior to the scheduled test date. No accommodations will be provided without approval from the Center for Students with Disabilities.

CLASSROOM/LABORATORY CONDUCT POLICY
The instructor has the primary responsibility for control over the classroom/laboratory behavior and maintenance of academic integrity and can order the temporary removal or exclusion from the classroom/laboratory of any student engaged in disruptive conduct or conduct violating the general rules and regulations of the College. Extended or permanent exclusion from the classroom/ laboratory or further disciplinary action can be affected only through appropriate procedures of the College. Any electronic communication device such as pagers, cellular phones, etc. must either be turned off or set so it will not interrupt the class.

PLAGIARISM STATEMENT:
Plagiarism, cheating, and other forms of academic dishonesty are prohibited.

STATEMENT OF POLICY REGARDING CHILDREN ON CAMPUS:
Campus policy prohibits bringing children to classrooms or labs.

EMERGENCY EVACUATION STATEMENT:
In case of any building evacuation, students are to proceed under the direction of their instructor to the nearest exit in an orderly manner. The nearest exit for this classroom is located __________________________. To ensure your safety, everyone will move to __________________________. Each instructor is to identify the nearest exit for each classroom and the designated safe area). No one is allowed to re-enter the building until official notification is given.
COURSE OBJECTIVES: Upon satisfactory completion of this course, the student should be able to:

(P1) 1. Measure and diagnose the cause(s) of abnormal key-off battery drain; determine needed repairs.
(P1) 2. Inspect and test fusible links, circuit breakers, and fuses; replace as needed.
(P1) 3. Inspect and test switches, connectors and wire of electrical/electronic circuits; repair or replace as needed.
(P1) 4. Perform starter current draw and circuit voltage drop test; determine needed repairs.
(P2) 5. Inspect and test electrical fan control system and circuits.
(P2) 6. Inspect, test and replace oil temperature and pressure switches and sensors.
(P2) 7. Check operation of brake stop light system; adjust and service as needed.
(P2) 8. Use wiring diagrams during diagnosis of electrical circuit problems.
(P2) 9. Check electrical circuits with a test light; determine needed repairs.
(P2) 10. Check voltage and voltage drops in electrical/electronic circuits using a digital multimeter (DMM); determine needed repairs.
(P2) 11. Check current flow in electrical/electronic circuits and components using an ammeter; determine needed repairs.
(P2) 12. Check electrical circuits using jumper wires; determine needed repairs.
(P2) 13. Find shorts, grounds, opens and high resistance problems in electrical/electronic circuits; determine needed repairs.
(P2) 14. Perform battery capacity (load, high-rate discharge) test; determine needed service.
(P2) 15. Maintain or restore electronic memory functions.
(P2) 16. Inspect, clean, fill or replace battery.
(P2) 17. Perform slow/fast battery charge.
(P2) 18. Inspect and clean battery cables, connectors, clamps and hold-downs; repair or replace as needed.
(P2) 19. Start a vehicle using jumper cables and a battery or auxiliary power supply.
(P2) 20. Inspect and test starter relays and solenoids, replace as needed.
(P2) 21. Remove and replace/reinstall starter.
(P2) 22. Perform starter free-running (bench) tests; determine needed repairs.
(P2) 23. Diagnose charging system problems that cause and undercharge, a no-charge or an overcharge condition.
(P2) 24. Inspect and adjust alternator drive belts; replace as needed.
(P2) 25. Inspect and test voltage regulator, replace as needed.
(P2) 26. Remove, inspect and replace/reinstall alternator.
(P2) 27. Disassemble, clean, inspect, and test alternator components; replace as needed.
(P2) 28. Diagnose the cause of brighter than normal, intermittent, dim or no light operation.
(P2) 29. Inspect, replace and aim highlights and bulbs.
(P2) 30. Inspect, diagnose and test the cause of no turn signal or hazard light operation or lights with no flash on one or both sides; repair or replace as needed.
(P2) 31. Diagnose the cause of intermittent, high, low or no gauge readings.
(P2) 32. Inspect and test gauges and gauge sending units; replace as needed.
(P2) 33. Diagnose the cause of constant, intermittent or no warning light and driver information system operation.
(P2) 34. Diagnose the cause of slow, intermittent or no operation of motor-driven accessory
circuit; repair as needed.

(P2) 35. Diagnose the cause of failures in the electrical controls of heating and A/C systems, determine needed repairs.

(P2) 36. Inspect and test A/C - heater, blower, motors, resistors, switches, relays, wiring, and protection devices; repair or replace as needed.

(P3) 37. Describe how to test gauge voltage regulators (limiters); replace as needed.

(P3) 38. Inspect and test connectors, wires, and printed circuit boards of gauge circuits; replace or replace as needed.

(P3) 39. Diagnose the cause(s) of intermittent, high low or no readings on electronic digital instrument clusters.

(P3) 40. Inspect and test sensors, sending units, connectors, and wires of electronic digital instrument circuits; repair or replace as needed.

(P3) 41. Diagnose the cause of constant; intermittent or no horn(s) operation; repair as needed.

(P3) 42. Diagnose the cause of constant, intermittent or no wiper operation; diagnose the cause of wiper speed control and park problems; repair as needed.

(P3) 43. Diagnose the cause of constant, intermittent or no windshield washer operation; repair as needed.

(P3) 44. Diagnose the cause of constant, intermittent or no wiper operation; diagnose the cause of wiper speed control and park problems; repair as needed.

(P3) 45. Diagnose the cause of constant, intermittent or no windshield washer operation; repair as needed.

(P3) 46. Diagnose the cause of poor, intermittent or no heated glass operation; repair as needed.

(P3) 47. Diagnose the cause of poor, intermittent or no electric door and hatch/trunk lock operation, repair as needed.

(P3) 48. Diagnose the cause of unregulated intermittent or no operation of cruise control systems; repair as needed.

(P3) 49. Test A/C compressor load cut-off systems; determine needed repairs.

(P1) 50. Calculate voltage when current and resistance is known.

(P1) 51. Calculate resistance when voltage and current is known.

(P1) 52. Calculate current when resistance and voltage is known.

(P1) 53. Measure and calculate voltage drop in a starter motor circuit.

(P1) 54. Measure and calculate voltage drop in a basic automotive charging system.

(P1) 55. Measure and calculate voltage drop in a basic automotive lighting system.
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ADDENDUM TO COURSE SYLLABUS

AUTO1120

ENTRY LEVEL SKILLS: The student should have the math, reading, and writing skills of a high school graduate.

RATIONALE: This course will enable the student to solve circuit problems, use electrical test equipment, and service contemporary automotive electrical systems. The ability to diagnose and service electrical systems separates the mechanic from the service technician.

ABSENCES: Class and lab attendance are essential. Students are responsible for making-up time missed. A daily grade of "0" will be given for absences not made up. Four (4) tardies may be counted as an absence. (Tardy is defined as 10 or more minutes late for class).

TEST & MAKE-UP POLICY: Make-up test scores will be reduced by 10 points, unless arrangements are made with the instructor prior to the test.

SAFETY POLICY: Any person behaving in an unsafe manner will be asked to leave the shop (lab). NO ONE shall operate any piece of equipment before passing a safety test on it. Safety glasses are required of all students.

REVISED Fall 2003
1. Define and explain the relationship among voltage, amperage, wattage, and resistance.

2. Take readings with multi-meters, digital multi-meters, and oscilloscopes.

3. Calculate current, resistance, voltage, and power in a parallel circuit.

4. Explain electron flow in semiconductors and electronic sensors.

5. Explain basic battery operation and safely test, charge, and boost batteries.

6. Troubleshoot and repair the vehicle starting system.

7. Troubleshoot and repair the vehicle charging system.

8. Explain ignition system operation.

9. Use TAC/DWELL meters, timing lights, and oscilloscopes to troubleshoot the ignition system.

10. Diagnose and repair basic automotive accessories.