

SYLLABUS

DIVISION: Business & Engineering Technologies REVISED: Spring 2012

CURRICULA IN WHICH COURSE IS TAUGHT: Automotive Analysis and Repair

COURSE NUMBER/TITLE: AUT 241 Automotive Electricity I

CREDIT HOURS: 4 HOURS/WEEK LECTURE: 3 HOURS WEEK LAB: 3

LEC/LAB COMB: 6

I. CATALOG DESCRIPTION:

Introduces electricity and magnetism, symbols, circuitry and use of meters as applied to the automotive electrical system.

II. RELATIONSHIP OF THE COURSE TO CURRICULA OBJECTIVES IN WHICH IT IS TAUGHT:

Students will:

- I. Demonstrate technical competencies and skills in automotive electrical systems.
- II. Demonstrate punctuality and reliability acceptable to the automotive repair industry.
- III. Demonstrate an understanding of the economic costs of automobile vehicle repair.
- IV. Use safety equipment procedures required for the operations being performed.
- V. Read and interpret technical information required for projects and assignments.
- VI. Demonstrate and maintain a clean, orderly, safe and attractive work place and maintain a personal appearance that will enhance the work place.

III. REQUIRED BACKGROUND:

No previous courses required

Course textbook must be available for use and study

A basic hand tool set must be available to complete assigned lab projects

A digital multi meter is desirable

IV. COURSE CONTENT:

Electrical units and theory

Ohm's Law

Basic electrical circuits

Magnetism theory and application

Electronic components and symbols

Battery design, chemistry, construction, and failures

Electrical meter design, construction and use

Electrical testing devices

Introduction to wiring diagrams

Battery service and testing

Basic electrical tests and circuit problems

Students will work to show competency in the performance of the following tasks:

ASE Task List

Electrical/Electronic Systems

<i>Tasksheet</i>	<i>ASE Priority</i>	<i>ASE Task Number</i>	<i>CourseReference</i>
C285 Identify and interpret electrical/electronic system concern; determine necessary action.	P1	6A01	AUT-241 AUT-242
C286 Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.	P1	6A02	AUT-241 AUT-242
C287 Locate and interpret vehicle and major component identification numbers (VIN, vehicle certification labels, and calibration decals).	P1	6A03	AUT-241 AUT-242
C288 Diagnose electrical/electronic integrity for series, parallel and series-parallel circuits using principles of electricity (Ohm's Law).	P1	6A04	AUT-241 AUT-242
C289 Use wiring diagrams during diagnosis of electrical circuit problems.			AUT-242
C290 Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems.	P1	6A05	AUT-241 AUT-242
C291 Check electrical circuits with a test light; determine necessary action.	P1	6A06	AUT-241 AUT-242
C292 Measure source voltage and perform voltage drop tests in electrical/electronic circuits using a voltmeter; determine necessary action.	P2	6A07	AUT-241 AUT-242
C293 Measure current flow in electrical/electronic circuits and components using an ammeter; determine necessary action.	P1	6A08	AUT-241 AUT-242
C294 Check continuity and measure resistance in electrical/electronic circuits and components using an ohmmeter; determine necessary action.	P1	6A09	AUT-241 AUT-242
C295 Check electrical circuits using fused jumper wires; determine necessary action.	P1	6A10	AUT-241 AUT-242
C296 Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.	P2	6A11	AUT-241 AUT-242
C297 Measure and diagnose the cause(s) of excessive key-	P1	6A12	AUT-241 AUT-242
		6A13	AUT-241

off battery drain (parasitic draw); determine necessary action.

AUT-242

C298 Inspect and test fusible links, circuit breakers, and P1 6A14 **AUT-241**

	fuses; determine necessary action.			AUT-242
C299	Inspect and test switches, connectors, relays, solid state devices, and wires of electrical/electronic circuits; perform necessary action.	P1	6A15	AUT-241 AUT-242
C300	Repair wiring harnesses and connectors.	P1	6A16	AUT-241 AUT-242
C301	Perform solder repair of electrical wiring.	P1	6A17	AUT-241 AUT-242
C302	Perform battery state-of-charge test; determine necessary action.	P1	6B01	AUT-241 AUT-242
C303	Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action.	P1	6B02	AUT-241 AUT-242
C304	Maintain or restore electronic memory functions.	P1	6B03	AUT-241 AUT-242
C305	Inspect, clean, fill, and replace battery.	P2	6B04	AUT-241 AUT-242
C306	Perform slow/fast battery charge.	P2	6B05	AUT-241 AUT-242
C307	Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.	P1	6B06	AUT-241 AUT-242
C308	Start a vehicle using jumper cables and a battery or auxiliary power supply.	P1	6B07	AUT-241 AUT-242
C309	Perform starter current draw tests; determine necessary action.	P1	6C01	AUT-241 AUT-242
C310	Perform starter circuit voltage drop tests; determine necessary action.	P1	6C02	AUT-241 AUT-242
C311	Inspect and test starter relays and solenoids; determine necessary action.	P2	6C03	AUT-241 AUT-242
C312	Remove and install starter in a vehicle.	P1	6C04	AUT-241 AUT-242
C313	Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.			drive belts, pulleys, and tensioners; check pulley and belt alignment.
C314	Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.			
C315	Perform charging system output test; determine necessary action.			
C316	Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.			
C317	Inspect, adjust, or replace generator (alternator)			

P2	6C05	AUT-241 AUT-242	P1	6D02	AUT-241
P2	6C06	AUT-241 AUT-242			AUT-242
P1	6D01	AUT-241 AUT-242	P2	6D03	AUT-241
					AUT-242
		C318 Remove, inspect, and install generator (alternator).	P1	6D04	AUT-241

			AUT-242
C319 Perform charging circuit voltage drop tests; determine necessary action.	P1	6D05	AUT-241
			AUT-242
C320 Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.	P1	6.00E+01	AUT-241
			AUT-242
C321 Inspect, replace, and aim headlights and bulbs.	P2	6.00E+02	AUT-241
			AUT-242
C322 Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action	P2	6.00E+03	AUT-241
			AUT-242
C323 Inspect and test gauges and gauge sending units for cause of intermittent, high, low, or no gauge readings; determine necessary action.	P1	6F01	AUT-241
			AUT-242
C324 Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.	P3	6F02	AUT-241
			AUT-242
C325 Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.	P1	6F03	AUT-241
			AUT-242
C326 Inspect and test sensors, connectors, and wires of electronic instrument circuits; determine necessary action.	P2	6F04	AUT-241
			AUT-242
C327 Diagnose incorrect horn operation; perform necessary action.	P2	6G01	AUT-241
			AUT-242
C328 Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.	P2	6G02	AUT-241
			AUT-242
C329 Diagnose incorrect washer operation; perform necessary action.	P2	6G03	AUT-241
			AUT-242
C330 Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action.	P2	6H01	AUT-241
			AUT-242
C331 Diagnose incorrect heated glass operation; determine necessary action.	P3	6H02	AUT-241
			AUT-242
C332 Diagnose incorrect electric lock operation; determine necessary action.	P2	6H03	AUT-241
			AUT-242
C333 Diagnose incorrect operation of cruise control systems; determine necessary action.	P3	6H04	AUT-241
			AUT-242
C334 Diagnose supplemental restraint system (SRS) concerns; determine necessary action. (Note: Follow manufacturer's safety procedures to prevent accidental deployment.)	P2	6H05	AUT-241
			AUT-242
C335 Disarm and enable the airbag system for vehicle service.	P1	6H06	AUT-241
			AUT-242

C336 Diagnose radio static and weak, intermittent, or no P3 6H07 **AUT-241**

radio reception; determine necessary action.			AUT-242
C337 Remove and reinstall door panel.	P1	6H08	AUT-241 AUT-242
C338 Diagnose body electronic system circuits using a scan tool; determine necessary action.	P2	6H09	AUT-241 AUT-242
C339 Check for module communication errors using a scan tool.	P3	6H10	AUT-241 AUT-242
C340 Diagnose the cause of false, intermittent, or no operation of anti-theft system.	P2	6H11	AUT-241 AUT-242

V. LEARNER OUTCOMES:

1. Identify the units of electrical measurement.
2. Solve problems using Ohm's Law.
3. Diagnose basic electrical diagrams.
4. Demonstrate the operation of a typical relay
5. Diagram basic electronic symbols.
6. List battery chemistry and applications.
7. Identify battery construction and failure problems.
8. List battery service, measurement, and testing procedures.
9. Identify methods of extending battery life.
10. Identify meter construction, design, and use.
11. Identify different types of circuits.
12. Identify basic circuit troubleshooting procedures.

VI. Evaluation:

EVALUATED BY WRITTEN TESTS (Problem Solving, diagramming, T or F, short answer)

BY SHOP PRACTICES (Shop instructor observation)

1. Use test meters to measure values of electrical circuits.
2. Use test equipment to test batteries and discharging problems.
3. Replace batteries and connecting wiring.
4. Test cranking motors and electrical circuits.
5. Use wiring diagrams to trace circuits.
6. Use digital multi meters to obtain volt, amp, and ohm readings.
7. Use basic troubleshooting simulating equipment and tools to evaluate circuit problems.
8. Construct jumper leads and test lights.
9. 75% of students will be able to complete these assignments

VII. The Following General Education Objectives Will Be Addressed in This Course:

Communication

Learning Skills

Critical Thinking

Interpersonal Skills and Human Relations

Understanding Science and Technology