

**JEFFERSON COLLEGE**  
**COURSE SYLLABUS**

**AUT201**  
**BASIC ELECTRICAL/ELECTRONIC SYSTEMS**  
4 Credit Hours

Prepared by: Gary Boyher  
Date: February 10, 2014

Revised by: Brad Berrey  
Date: September, 26 2016

Chris DeGeare, M.Ed., Division Chair, Business and Technical Education  
Dena McCaffrey, Ed.D., Dean, Career & Technical Education

## AUT201 Basic Electrical/Electronic Systems

### I. CATALOGUE DESCRIPTION

- A. Pre-requisite: AUT161, Introduction to Engine Performance with a Grade of “C” or Better  
 AUT162, Introduction to Engine Performance Lab with a Grade of “C” or Better  
 Reading Proficiency Requirement  
 Co-requisite: AUT 202, Basic Electrical Systems Lab
- B. 4 Credit Hours
- C. This course includes basic electrical theory and basic electrical circuits and circuit diagnosis. The proper use of a volt/ohm meter is covered. The use of a jumper wire, and test light for circuit diagnosis are covered. Checking and interpreting electrical/electronic waveforms are included. Locating electrical faults and malfunctioning devices will be covered. It will cover the battery, starting, charging system functions, and theory. Reading wiring diagrams and the need for proper routing of wires is covered. Completion of this course will prepare the student to take the A-6, A-8, and L-1 ASE certification test. (F)

### II. EXPECTED LEARNING OUTCOMES/CORRESPONDING ASSESSMENT MEASURES

<b>A. General Electrical System Diagnosis</b>		
Demonstrate understanding of how to complete a work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of identifying and interpreting electrical/electronic system concern; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of researching applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

Demonstrate understanding of locating and interpreting vehicle and major component identification numbers	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of diagnosis of electrical/electronic integrity of series, parallel and series-parallel circuits using principles of electricity (Ohm's Law)	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of wiring diagrams during diagnosis of electrical circuit problems	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of the proper use of a digital multimeter (DMM) during Diagnosis of electrical circuit problems, including: source voltage, voltage drop, current flow, and resistance	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of checking electrical circuits with a test light; determine necessary action	P-2	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate checking electrical/electronic circuit waveforms; interpret readings and determine needed repairs	P-2	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of checking electrical circuits using fused jumper wires; determine necessary action	P-2	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of locating shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

Demonstrate understanding of measuring and diagnosis of the cause(s) of excessive parasitic draw; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of inspection and testing fusible links, circuit breakers, and fuses; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of inspecting and testing switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate removal and replacement of terminal ends from connectors; replace connectors and terminal ends	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of performing solder repair of electrical wiring	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

<b>B. Battery Diagnosis and Service</b>		
Demonstrate understanding of performing battery state-of-charge test; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of performing battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

Demonstrate understanding of maintaining or restoring electronic memory functions	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of inspecting, cleaning, filling, and/or replacing battery, battery cables, connectors, clamps, and hold-downs	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of performing slow and fast battery charge	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of starting a vehicle using jumper cables or an auxiliary power supply	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding identifying high voltage circuits of electric or hybrid electric vehicle and related safety precautions	P-3	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of identifying electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate how to identify hybrid vehicle auxiliary (12v) battery service, repair, and test procedures.	P-3	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

### **C. Starting System Diagnosis and Repair**

Demonstrate understanding of performing starter current draw tests; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
--	-----	--

Demonstrate understanding of performing starter circuit voltage drop tests; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of inspection and testing starter relays and solenoids; determine necessary action	P-2	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of removal and installation of a starter in a vehicle	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of inspection and testing of switches, connectors, and wires of starter control circuits; perform necessary action	P-2	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of how to differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition	P-2	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

**D. Charging System Diagnosis and Repair**

Demonstrate understanding of performing charging system output test; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of diagnosis of a charging system for the cause of undercharge, no-charge, and overcharge conditions	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

Demonstrate understanding of inspection, adjustment, or replacement of generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of removal, inspection, and installation of a/an generator (alternator)	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests
Demonstrate understanding of performing charging circuit voltage drop tests; determine necessary action	P-1	Classroom Discussions Lectures Classroom Exercises Reading Assignments Written Tests

### III. OUTLINE OF TOPICS

- A. Properly Fill Out a Work Order
- B. Diagnose Electrical Circuits
  - 1. Locate electrical faults using proper equipment and procedures
  - 2. Apply Ohm's law to electrical circuits
  - 3. Perform wiring repair using industry accepted procedures
- C. Test Battery, Starting, Charging Systems
  - 1. Perform a battery test
  - 2. Test a starter
  - 3. Test and alternator
  - 4. Perform routine repairs/maintenance on the battery, starting, charging system
- D. Miscellaneous Diagnosis and Repair
  - 1. Locate high voltage devices on a hybrid
  - 2. Identify electronic modules, security systems, and radios. Reinitialize each one

IV. METHOD(S) OF INSTRUCTION

- A. Lectures
- B. Classroom Exercises
- C. Electude/Argo Online Curriculum
- D. Classroom Discussions

V. REQUIRED TEXTBOOK(S)

Al Santini, *Automotive Electricity & Electronics*, (Current Edition). Delmar

VI. REQUIRED MATERIALS

- A. Jefferson College Automotive Technology or Approved Sponsoring Shop Workshirt
- B. Safety Glasses
- C. Work Boots

VII. SUPPLEMENTAL REFERENCES

None

VIII. METHODS OF EVALUATION

- A. Tests 33 1/3%
- B. Student Participation 33 1/3%
- C. Class Assignments 33 1/3%

IX. ADA AA STATEMENT

Any student requiring special accommodations should inform the instructor and the Coordinator of Disability Support Services (Technology Center 101; phone 636-481-3169).

X. ACADEMIC HONESTY STATEMENT

All students are responsible for complying with campus policies as stated in the Student Handbook (see College Website <http://www.jeffco.edu>).

## XI. ATTENDANCE STATEMENT

Regular and punctual attendance is expected of all students. Any one of these four options may result in the student being removed from the class and an administrative withdrawal being processed: (1) Student fails to begin class; (2) Student ceases participation for at least two consecutive weeks; (3) Student misses 15 percent or more of the coursework; and/or (4) Student misses 15 percent or more of the course as defined by the instructor. Students earn their financial aid by regularly attending and actively participating in their coursework. If a student does not actively participate, he/she may have to return financial aid funds. Consult the College Catalog or a Student Financial Services representative for more details.

## XII. OUTSIDE OF CLASS ACADEMICALLY RELATED ACTIVITIES

The U.S. Department of Education mandates that students be made aware of expectations regarding coursework to be completed outside the classroom. Students are expected to spend substantial time outside of class meetings engaging in academically related activities such as reading, studying, and completing assignments. Specifically, time spent on academically related activities outside of class combined with time spent in class meetings is expected to be a minimum of 37.5 hours over the duration of the term for each credit hour.