



# CENTRAL PIEDMONT COMMUNITY COLLEGE

## Course Syllabus

### Basic Electrical

Fall 2009

AUT-161

(CURRICULUM)

Course Description  
Course Objective  
Weekly Subject Outline  
Evaluation Procedure  
Student Guidelines / Expectations  
Student Dress Code  
Safety Regulations

Time Requirement:

16 Weeks

3 Class Hours/Week

4 Lab Hours/Week

5 credit hour

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## **AUT-161**

### **ELECTRICAL SYSTEMS**

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**Prerequisites:** None

***Course Description:***

This course covers basic electrical theory, and diagnosis/repair/replacement of batteries, starter, alternators, and basic electrical accessories. Topics include diagnosis and repair of battery, starting, charging, lighting, and use of compliment testing equipment. Upon completion, students should be able to diagnose, test, and repair the basic electrical components of an automobile.

## AUT 161 COURSE OBJECTIVES

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Upon completion of this course, student should be able to:

1. Describe basic electrical theory.
2. Describe the use of wiring diagrams in diagnosis & repair of batteries, starters and alternators problems.
3. Describe the purpose of voltage drop testing in electrical/electronic circuits.
4. Describe the use of a digital multi-meter (DMM).
5. Check voltage drop in electrical/electronic circuits using a digital multimeter (DMM); determine and describe needed repairs.
6. Describe symptoms, causes, diagnosis and repair of abnormal key-off battery drain.
7. Measure and diagnose abnormal key-off battery drain.
8. Describe & perform battery state-of-charge test; determine & describe needed repairs.
9. Perform slow/fast battery charge.
10. Describe and perform battery capacity (load, high-rate discharge) testing; determine and describe needed service.
11. Describe automotive accessories and components that contain electronic memory functions; perform maintenance and restoration of electronic memory functions.
12. Perform inspection, cleaning, refilling and replacement of battery.
13. Perform inspection, cleaning & replacement of battery cables, clamps & hold-downs.
14. Describe safe procedures for starting a vehicle with an auxiliary power supply.
15. Demonstrate safe procedures for starting a vehicle with jumper cables and a battery.
16. Describe and perform starter circuit draw and circuit voltage drop testing; determine and describe needed repairs.
17. Describe and perform inspection and testing of starter relays and solenoids; determine and describe needed repairs.
18. Demonstrate proper removal and replacement of starter.
19. Describe and perform starter bench tests; determine and describe needed repairs.
20. Describe and demonstrate inspection, testing, repair or replacement of switches, connectors, and wires of starter control circuits.
21. Disassemble, clean, inspect and test starter components; replace as needed.
22. Describe and demonstrate diagnosis of charging system problems that cause undercharge, no charge and overcharge conditions.
23. Demonstrate inspection, replacement and proper adjustment of alternator drive belts.
24. Describe and demonstrate inspection and testing of voltage regulators.
25. Demonstrate proper removal and replacement of alternator.
26. Disassemble, clean inspect and test alternator components; replace as needed.
27. Describe & demonstrate charging circuit voltage drop tests; determine needed repairs.
28. Perform charging system output test; determine necessary action.

# WEEKLY OUTLINE

AUT 161

## ELECTRICAL SYSTEMS

### CURRICULUM PROGRAM

**Required Text :** *Today's Technician, Automotive Electricity & Electronics  
5<sup>th</sup> Edition – Classroom-Shop Manual Set*

**By:** BARRY HOLLEMBEAK

Lab Book: GM Stage 1 Booklet by GM

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- WEEK 1** Safety  
Reading Assign: Chapter 1  
Basic Electrical Theory  
Reading Assign: Text: Chapter 2, Stage 1 Lab Exercises
- WEEK 2** Basic Electrical Theory  
Reading Assign: Text: Chapter 2,  
Stage 1 Lab Exercises  
Ohms Law & Series Circuit  
DVOM's Worksheets: 5 & 6 & 7
- WEEK 3&4** Basic Electrical Theory (continued)  
Reading Assign: Text: Chapter 2, 6  
Stage 1 Lab Exercises  
Ohm's Law & Parallel Circuit
- WEEK 5&6** Basic Electrical Theory (continued)  
Reading Assign: Chapter 2,  
Worksheets: 3 & 4  
Stage 1 Lab Exercises  
Ohm's Law & Series-Parallel Circuit (continued)
- WEEK 7** Principles of Magnetism  
Reading Assign: Chapter 2,  
Workbook: pgs. 53-58  
Magnetism Booklet and Test
- WEEK 8** Mid-Term Test-Hands-On- Circuit Board –Series and Parallel Circuits  
Mid-Term Test Written –Basic Electrical Booklet
- WEEK 9** Electrical Components and Wiring  
Reading Assign: Chapter 3,  
Lab Exercises: Worksheet # 17  
Wire Repair
- WEEK 10 & 11** Automotive Batteries & Service  
Reading Assign: Chapter 5  
Workbook: Chapter 5

ASE questions due at end of week 11  
VAT 40 & VAT 45 Battery Testing  
TEST: Batteries

**WEEK 12 & 13** Direct DC Motors & Starters & Service  
Reading Assign: Chapter 6: Text:  
Workbook: Chapter 6  
Questions due at end of week 13  
Worksheets: 21 & 22 & 23  
VAT 40 & VAT 45 Starter Testing  
A-TECH Starter Simulator  
TEST: Starters

**WEEK 14&15** Charging Systems & Service  
Reading Assign: Text: Chapter 7  
Workbook: Chapter  
Questions due at end of week 15  
VAT 40 and VAT 45 Starter Testing  
A-TECH Alternator Simulator  
TEST: Alternators

**WEEK 16** **Final Exam Written**  
**Hands On Exam = VAT 40 & VAT 45**

# Automotive Systems Technology Program

## Student Evaluation

### Student Grade Point Average

Students are graded according to the following grade point system:

<u>Grade</u>	<u>Point Value</u>	<u>Description</u>
A	4	Excellent
B	3	Very Good
C	2	Satisfactory
D	1	Poor
F	0	Failing

The following grades will not be used in computing the grade point average:

I	Incomplete
W	Withdrawal
S	Satisfactory
U	Unsatisfactory
AUD	Audit
N	Never Attended
X	Credit by Examination

Since this course is preparatory to entering the automotive service industry, **job attitude, neatness, promptness and care of equipment** will be considered part of the final grade. The final grade on these items will be determined by the instructor and based upon accepted industry standards.

### Grading

For a grade of "A";

Complete all written tests with an average of 93% to 100%.

Attend 90% of all scheduled Class/lab hours.

Complete all lab/shop work in a manner as would be determined in an actual repair shop. **EXCELLENT**

For a grade of "B";

Complete all written tests with an average of 85% to 92%.

Attend 85% of all scheduled Class/lab hours.

Complete all lab/shop work in a manner as would be determined in an actual repair shop. **VERY GOOD**

For a grade of "C";

Complete all written tests with an average of 77% to 84%.

Attend 80% of all scheduled Class/lab hours.

Complete all lab/shop work in a manner as would be determined in an actual repair shop. **SATISFACTORY**

For a grade of "D";

Complete all written tests with an average of 70% to 76%.

Attend 80% of all scheduled Class/lab hours.

Complete all lab/shop work in a manner as would be determined in an actual repair shop. **POOR**

## **Central Piedmont Community College** **Automotive Department Student Guidelines / Expectations**

No Tobacco products usage is allowed inside any college building at any time

Eating or drinking in classrooms is only with permission of instructor only  
There will be no eating or drinking in shop or lab or lab areas.

Students are expected to be in class on time and will be held responsible for any information covered by instructor, even if late or absent. Tests missed may be made up only with instructor permission.

Missed or late assignments will affect student's course grade.

Tardiness is a problem; any student who is over 15 minutes late for a class will be counted as absent. CPCC attendance policy is in the on line student handbook.

Students are expected to conduct themselves in a mature manner at all times. Students caught cheating, fighting, stealing, spinning tires, vandalizing or intentionally damaging a vehicle or equipment will be **EXPULSED** from the automotive program. Care should be shown to college vehicles and property.

Leaving class or shop / lab early without instructor permission will not be tolerated

Students are expected to come prepared for class. This means with paper, textbook, pens, pencils or other required material.

Cell phones and pagers must be turned off or in vibrate mode during all class or lab times. Cell phone use is restricted to outside the automotive buildings. Cell phones, which ring during class, will be subject to forfeiture or student loss of privilege.

The area in front of the main lab is not a parking area for students. The driveway must remain open for emergency vehicles. Vehicles inappropriately parked will be ticketed and towed. No parking means, No parking.

All students are expected to clean up and put away all tools and equipment used during class or lab before leaving. Housekeeping is very important it will be part of your grade.

Whenever you are unsure about anything ask your instructor! It is your responsibility to make sure that no physical damage occurs to any vehicle that you are working on or driving. Students are responsible for their actions!!

Safety glasses and student tools are mandatory in all shop / lab areas, no exceptions.

All vehicles brought into the main lab will have a CPCC work order filled out and visible on windshield.

**Central Piedmont Community College  
Automotive Department  
Student dress code**

**Effective January 2004**

All automotive students will have and wear safety glasses at all times in shop or lab areas.

Failure to adhere to safety glasses rules may result in disciplinary action.

Students can wear tennis shoes, work shoes or boots. No open toe shoes of any kind will be allowed in shop areas.

For safety reasons large ear, nose, lip and eyebrow rings need to be removed while student is in class or shop areas.

Long hair will be tied up for safety.

Chains, which may damage vehicle finishes, will not be allowed.

No short pants or sleeveless shirts are allowed

Pants will be worn around hips and secured with belt if needed.

Failure to adhere to dress code may result in expulsion from automotive program.

Students will bring tools required for class with them at class time. No tools, no lab credit.

Remember how you act and present yourself will reflect on the department and to prospective employers.





# CENTRAL PIEDMONT COMMUNITY COLLEGE

s m a r t   f o r   l i f e

## **AUTOMOTIVE SYSTEMS TECHNOLOGY SAFETY REGULATIONS**

1. An instructor must be present any time lab or class is in session.
2. Use of safety glasses is required in all labs.
3. Any safety hazard should be reported to the instructor immediately.
4. Floor must be kept clear of any liquid spills or tripping hazards.
5. Students should not operated equipment until they receive instruction on proper, safe operation of that equipment.
6. Vehicle lifts must be mechanically secured prior to under-vehicle work.
7. Use of jack stands is required when using floor jack to raise vehicle.
8. Use of brake asbestos dust vacuum or brake asbestos wash down system is required any time work is done which could lead to asbestos exposure.
9. Floor exhaust removal system must be on any time an engine is operating in a lab.
10. Open-type shoes (sandals) are not permitted in any lab.
11. Any loose-fitting clothing or jewelry must be secured so that it is not a hazard.
12. No shorts or sleeveless shirts are permitted in labs.
13. Use of tobacco is not permitted in any lab or classroom.
14. Use of audio equipment (radios-tapes) is not permitted during class/lab hours.
15. Students and faculty must follow OSHA rules concerning exposure to blood borne diseases.
16. Proper disposal of automotive waste products, including hazardous wastes, is required.