

Course Syllabus

AUT 120

Automotive Electrical Principles

Instructor: Neil Black

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Office Hours: MTRF 10:30-12:00 p.m.

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Classroom: Demo Lab 2 **Lab:** Service Lab 2

Class meeting time: MTRF 1-4:50 p.m.

COURSE DESCRIPTION

A course of study in the design and theory of automotive electrical circuits. Particular emphasis placed on the study of how electricity behaves in series and parallel DC circuits, general application of these theories to automotive electrical systems, and the proper use of typical electronic and electrical circuit diagnostic equipment. Also emphasizes the understanding of automotive wiring diagrams, and relay and solenoid operation. Co-requisite: AUT 170. Restricted to major. Lab fee: \$36.

COURSE OBJECTIVES:

Knowledge & Comprehension Based

1. Understand the basic principles of Direct Current (DC) electronics.
 - a. Electrons, Protons, Neutrons
 - b. Voltage, Current, Resistance,
 - c. Watts, Volts, Amps, Ohms
 - d. Insulators, Conductors, Semiconductors
 - e. Ohm's Law & Watt's Law
2. Understand automotive electrical and electronic circuits.
 - a. Loads, Power Sources, Switches, Circuit Protectors, Insulated Path
 - b. Series, Parallel, and Series-Parallel Circuits
3. Understand the fundamentals of Magnetism, Electromagnetism, & Induction.
 - a. Characteristics of a Magnet
 - b. Characteristics of an Electromagnet
 - c. Relay
 - d. Automotive Applications
4. Explain the principles of Capacitance
 - a. Construction and Factors
 - b. Automotive Applications

Performance & Analysis Based

1. Diagnose circuit operation with diagnostic equipment.
 - a. Identify and interpret electrical/electronic system concern; determine necessary action VI. 2
 - b. Diagnose electrical/electronic integrity of a series, parallel, and series-parallel circuits using principles of electricity (Ohm's Law). VI. 5
 - c. Demonstrate the proper use of a digital multimeter (DMM) during diagnosis of electrical circuit problems, including: source voltage, voltage drop, current flow, and resistance. VI. 7
 - d. Check electrical circuits with a test light; determine necessary action. VI. 8
 - e. Check electrical circuits using fused jumper wires; determine necessary action. VI. 10
 - f. Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action. VI. 11
 - g. Inspect and test fusible links, circuit breakers, and fuses; determine necessary action. VI. 13
 - h. Inspect and test switches, connectors, relays, solenoid, solid state devices, and wires of electrical/electronic circuits; perform necessary action. VI. 1
2. Interpret technical service information.
 - a. Use wiring diagrams during diagnosis of electrical circuits problems. VI. 6
 - b. Research applicable vehicle and service information. VI. 3
 - c. Draw wiring schematics and symbols

* Some objectives are not listed. See master syllabus for more details.

TEACHING PHYLOSOPHY

It is the **Student's** full responsibility to **Learn** and the Instructors full responsibility to guide the **Student** through the **Learning Process**.

TEXT:

Diagnosis and Troubleshooting of Automotive Electrical, Electronic, and Computer Systems, 6th Edition, James D. Halderman, Prentice Hall ISBN-10:0132551551 ISBN-13: 978-0132551557

Additional materials:

Manufacturer service manuals

Class handouts

Policies and Standards

This school is focused on preparing students for their future career in the Automotive Industry. To prepare them for the future, students must be taught about proper work ethics and work efficacy. Proper work ethics and work efficacy is vital to the success of an employee. Thus several policies and standards are expected of the students. These policies and standards are created to help the students learn how to be punctual, prepared, effective, and efficient. Furthermore, these policies and standards are what the instructor uses to determine the students performance in the class. **Students are responsible with reading and understanding the class syllabus and SIUC Automotive Technology Student Policies.**

1. Attendance:

- Three days of being late is considered one day of absence.
- 2.5% points will be deducted from your total grade for each day of absence.
- Excused absences must be discussed with the instructor.

2. Quiz:

Each quiz is worth 20 points and students can retake one quiz if they were not absent on the day of the initial quiz. There will be ten quizzes. Quizzes can be made up within a week of the initial quiz if the absence was excused.

There will be Two Extra Quizzes provided during the semester to give you the opportunity to attain a better grade. However, these Extra Quizzes are graded different from a normal quiz. Each correctly answered question awards a point, but each wrongly answered question will deduct a point. Example: 10 correct/10 wrong = 0 Points, or 11 correct/9wrong = 2 Points, or 9 correct/11 wrong= -2 Points

3. Exams:

Exams can be made up within a week of the initial quiz if the absence was excused.

T1: Paper Test=50 points + Lab Practical= 50 points= Total: 100 Points

T2: Paper Test=60 points + Lap Practical= 40 points= Total: 100 Points

4. Lab Activity Sheets:

The lab sheets are worth 25 points and will be collected and graded at the end of the semester.

5. Homework:

Chapter quizzes from the book will be assigned and must be turned in through black board. Each homework quiz is worth 5 points.

6. Participation points:

1 point will be deducted for the following:

- Sleeping in Class or Texting
- Not using Safety Glasses: **1 Warning**
- Not having the proper equipment
- Not having the textbook
- Improper behavior: not participating in class, not providing input in discussion.

7. Grading:

At the end of the term, all accumulated points are added together and divided by the total class points to come up with a percentage score. The SIUC Automotive Department maintains the following grading scale:

| | |
|-----------------|-----------------|
| A = 93-100% | B = 85- 92% |
| C = 77- 84% | D = 70- 76% |
| F = 69% or less | INC= Incomplete |

Points Chart

| Dates | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | T1 | T2 | HW | LW | PP | Total |
|------------|----|----|----|----|----|----|----|----|----|-----|-----|-----|----|----|----|-------|
| Max points | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 100 | 100 | 50 | 30 | 20 | 500 |
| Score | | | | | | | | | | | | | | | | |

Desire 2 Learn

<https://online.siu.edu/>

WHAT SHOULD I EXPECT?

1. **Introduction:** The instructor will take attendance and inform the students of any announcements for 10 minutes.
2. **Lecture:** The instructor will lecture for about 1 hour.
3. **Lab:** The students will be given sufficient time to finish the lab sheets. Lecture and lab will be intertwined.
4. **Clean Up and Review:** Each student is given a task to fulfill.

TOOL & SUPPLIES (Mandatory)

Basic tool set (as specified by the Automotive Technology Department)

Selection of jumper leads (kits available at the Parts Store) *Must be purchased within the first week of school*

4 small jumper leads with alligator ends

* Small T-Pins (with round head)

12 volt test light

Digital multimeter

Calculator

Pink Highlighter

Green Highlighter

Three Ring Binder

Emergency Procedures:

Southern Illinois University Carbondale is committed to providing a safe and healthy environment for study and work. Because some health and safety circumstances are beyond our control, we ask that you become familiar with the SIUC Emergency Response Plan and Building Emergency Response Team (BERT) program. Emergency response information is available on posters in buildings on campus, available on the BERT's website at www.bert.siu.edu, Department of Public Safety's website www.dps.siu.edu (disaster drop down) and in the Emergency Response Guidelines pamphlet. Know how to respond to each type of emergency.

Instructors will provide guidance and direction to students in the classroom in the event of an emergency affecting your location. **It is important that you follow these instructions and stay with your instructor during an evacuation or sheltering emergency.** The Building Emergency Response Team will provide assistance to your instructor in evacuating the building or sheltering within the facility.

>> Safety Glasses Must Be Worn at All Times in Lab <<

Use of laptops, PDA's or cell phones is strictly prohibited during any exams or tests.

Note: All Student Policies for the Automotive Technology department apply in this class and can be found on the website.

<http://siuautomotive.com/documents.html>

Students are responsible to know and follow these policies at all times.

Tentative Schedule

Subject to change

| Date | Day | Main Topic | HW | Quiz | Lab |
|------|-----------|---|--|------|-----------------|
| 1/13 | 1 | Introduction, Basic Electrical Principles, Basic Circuits | Chapter 3 & 4 , Student Info Sheet, Goals and Expectations, Mandatory tools and supplies, LS 2 | | 1,2, |
| 1/14 | 2 | Meter Usage | Chapter 6 , Ohms Law Problems, Read Meter Manual. | | 3,4 |
| 1/16 | 3 | Series Circuit | Start Chapter 5 , Ohm's Law Problems w/ Watts, | 1 | 5, 6 |
| 1/17 | 4 | Series Circuit | Chapter 9 , Finish Lab Sheets, Ohm's Law Problems Series III & IV, Design a dome light circuit with the correct bulb wattage and fuse rating. | 2 | 10,11,12 |
| 1/20 | | Martin Luther King Jr. Day | | | |
| 1/21 | 5 | Working on the Vehicle | Chapter 8 , Wiring Schematics: follow with a highlighter. | | 7 |
| 1/22 | 6 | Series on the vehicle | Ohm's Law Problems | 3 | 8,9 |
| 1/23 | 7 | Series Diagnostics Part I | Write diagnostic chart 3 times each | | 16,17,18 |
| 1/24 | 8 | Series Diagnostics Part I on the vehicle | Sign up for lab practical | 4 | 19,20,21 |
| 1/27 | 9 | Series Diagnostics Part II | Study for Midterm | | 22,23,24 |
| 1/28 | 10 | Mid Term | Parallel Ohm's Law Sheet I | | |
| 1/30 | 11 | Parallel Circuit | Parallel Ohm's Law Sheet II & III, Chapter 13 | | 25,26 |
| 1/31 | 12 | Parallel on the vehicle | Design a brake lamp circuit with the proper Fuse rating and Wattage rating, | 5 | 27,28,29 |
| 2/3 | 13 | Parallel Diagnostics | Honda Cooling Fans: use markers and indicate Volts Amps and Watts, Chapter 7 | | 30,31,34 |
| 2/4 | 14 | Series Parallel | S/P Ohm's Law sheet, Chapter 5 | 6 | 32,33,35 |
| 2/6 | 15 | Magnetism, Electro-Magnetism, Relay | Relay Schematic: use a marker to show the voltages with the switch ON and OFF | 7 | 36,37, 39 |
| 2/7 | 16 | Relayed Circuit, Induction, Capacitance | Draw 2 relayed circuits in the ON and OFF position, | 8 | 38,40, 41,42 |
| 2/10 | 17 | Relayed Circuit Diagnostics | Make a Chart for Relay Circuit diagnostics, | 9 | 43,44, 45,46 |
| 2/11 | 18 | Relayed Circuit Diagnostics on the Vehicle | Chapter 23 | 10 | 47,48 |
| 2/13 | 19 | Relayed Circuit Diagnostics on the Vehicle/ Review of Diagnostics | Study for the Final, Complete Lab Sheets | | 49,50 |
| 2/14 | 20 | Final: Last Scheduled Class | Chapter 14 | | |

*****This is just a tentative schedule and could be subjected to changes*****