

Course Syllabus

AUT 170

Automotive Powertrain Electronics

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

Course includes design and operation of solid state devices, wiring, batteries, starting and charging systems, and basic powertrain control systems. Lectures emphasize the operation of these systems and their individual components. Emphasis placed on system diagnosis. Laboratories allow the study of digital multimeters, battery/starting/charging system test equipment and scan tools. Co-requisite: AUT 120. Restricted to major. Lab fee: \$72.

TEACHING PHILOSOPHY

It is the Student's full responsibility to Learn and the Instructors full responsibility to help the Student Learn.

COURSE OBJECTIVES:

Will provide the student an opportunity to:

1. Study the principles of engine electrical systems and their designs.
2. Analyze operational characteristics of engine electrical systems.
3. Study diagnostic testing of engine powertrain and electrical systems.

I. SOLID STATE DEVICES

- a. Concepts and Principals of Automotive Electrical and Electronic Circuits
- b. Operation and Application of Automotive Semiconductors
- c. Diagnostic Testing of Electrical and Electronic Circuits

II. INTRODUCTION TO ELECTRONIC POWERTRAIN SENSORS

- a. Basic Computer Inputs and Outputs
- b. Operational Characteristics of Powertrain Sensors
- c. Communication Networks
- d. Scan Tool Diagnostics

III. AUTOMOTIVE BATTERIES

- a. Environmental and Safety Factors of Automotive Batteries
- b. Designs and Construction of Automotive Batteries
- c. Battery Testing Diagnosis

IV. AUTOMOTIVE STARTING SYSTEMS

- a. Designs and Principles of Operation
- b. Application of Diagnostic Techniques
- c. Starting System Testing and Diagnosis

V. AUTOMOTIVE CHARGING SYSTEMS

- a. Principles of AC Generator Operation and Design
- b. Application of Diagnostic Techniques
- c. Charging System Testing Diagnosis

VI. IGNITION SYSTEMS

- a. System operation
- b. Parts
- c. Ignition Timing

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
Electronic lab workbook
Class handouts

TOOL REQUIREMENTS

- Basic tool set (as specified by the Automotive Technology Department)
- Selection of jumper leads (kits available at the Parts Store)
- 12 volt test light
- Digital multimeter
- Calculator
- Safety Glasses

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. These are just some of the important attributes that will come out of following these policies and standards. 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:

As stated in the student policies, 2.5% points per day absent will be taken out of the total grade. Every three times of being tardy, it is considered one day of absence. Excused absences must be discussed with the instructor. This includes doctor's appointments, deaths in the family, sickness, and court orders.

2. Participation points

Ten points are earned by participating in class and lab. However, sleeping in class, not having proper tools and attire will reduce a students participation points. Students must come to class prepared to participate with asking and answering questions. Students are expected to respect their instructor and their fellow classmates. Sleeping in class, texting or having side conversations is not acceptable. Any of these violations could lead to the student being sent home.

3. Quiz:

There are ten quizzes given in this class. Each quiz is 20 points each. The quizzes will be based on current subject matter in lecture, wiring schematics, textbook or other class information. Quizzes can only be made up with an excused absence within a week of the test. The instructor has full authority to allow students to retake a quiz.

There will be three 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/9 wrong = 2 Points, or 9 correct/11 wrong = -2 Points

4. Lab Activity Sheets and Presentations:

Lab activities must be completed in a timely manner in conjunction with classroom activities. Students are responsible for keeping track of the lab sheets and lab performance will be used to assess the students' performance. Dressed professionally, each student will present four topics, each lasting at least five minutes with a minimum of five slides. A student can earn 30 points based on their performance.

5. Exams:

This class consists of two tests and one final exam: T1 (100), T2 (100), and a Comprehensive final worth 100 points. The final is 50% lab practical. The paper final exam will be held on the last day of class and the lab practical will be held during the last week of class.

Grading Standards:

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	F	LW	RP	PP	Total
Max points	20	20	20	20	20	20	20	20	20	20	100	100	100	30	40	30	600
Score																	

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 Main Lab <<

Note: All Student Policies for the Automotive Technology department apply in this class. Students are responsible to know and follow these policies at all times.

Tentative Schedule: *Subject to Change*

Date	Day	Main Topics	Class	Lab
2/17	1	Solid State Devices	Intro, Diodes, Zener Diode	1
2/18	2	Q1	<i>Transistors NPN, PNP</i>	4, 2, 3
2/19	3	Computers	ECT	
2/20	4	ECT Q2		
2/24	5	T1 Battery	Automotive Batteries Voltage Drop Test	Battery System WS
2/25	6			
2/27	7		Parasitic Drain	Drain WS
2/28	8		Battery, Service V 40,	Battery Load WS
3/3	9	Bug Week I Q3	Battery Presentations	Bugs
3/4	10			Bugs
3/6	11			Bugs
3/7	12	Q4		Bugs
3/10-14		SPRING BREAK	SPRING BREAK	SPRING BREAK
3/17	13	Starting Systems	Intro, Starting System	Starter WS
3/18	14		Schematics	System WS
3/20	15			
3/21	16	Q 5	Starter Testing V 40	Starter V40 WS
3/24	17	Bug Week II	Starting System Presentation	Bugs
3/25	18			Bugs
2/27	19	Q6		Bugs
3/28	20			Bugs
3/31	21	T2		Bugs
4/1	22			Bugs
4/3	23	Charging System	Intro, System Parts	
4/4	24		Regulators Rectification	Rectification
4/7	25	Q7	Alternator Testing V 40	Alternator V 40 WS
4/8	26			
4/10	27	Bug Week III	Charging System Presentation	Bugs
4/11	28			Bugs
4/14	29			Bugs
4/15	30	Q8		Bugs
4/17	31			Bugs
4/18	32			Bugs
4/21	33	Ignition Systems	Intro, Distributor System	Testing Cable, Coil
4/22	34	Q9	Distributor Less System	Testing Triggers
4/24	35			
4/25	36	Q10		
4/28	37	Final Review	Bug Practice Group 1	
4/29	38	Final Review	Bug Practice Group 2	
4/30	39	Lab Practical	Group 1	
5/1	40.1	Lab Practical	Group 2	
5/2	40.2	Paper Exam		