

## Course Syllabus

AUT 250-302 Fall 2014

On Board Diagnostics & Emissions

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**Instructor:** Omar Trinidad

**Office Phone Number:** 453-9140

**Office Number:** 0160D

**Office Hours:** T W R 9 a.m.-12 p.m.

**Email:** omar@siu.edu

**Classroom:** Demo Lab 3 (TEC 154) **Lab:** Service Lab 2 (TEC 157)

**Class meeting time:** M T R F 1:00 p.m. - 4:50 p.m.

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### Course Description

The specialized study of automotive fuels, electronic fuel injection systems, and related emission control systems. Lectures focus on the operational and diagnosis of electronic fuel injection systems and emission control systems. Laboratory experience provides the opportunity to study the use of electronic diagnostic tools, specialized equipment, and diagnostic systems. Co-requisite: AUT 240. Restricted to major. Special approval needed from the advisor.

### PREREQUISITES:

AUT 120, AUT 150, and AUT 170, AUT 240, consent of department.

### Course Objectives:

This course will provide the student with an opportunity to:

1. Understand the theory of operation of engine management systems.
2. Perform diagnostic, inspection and maintenance activities required on electronic fuel injection systems and emission control systems.
3. Acquire and develop skills in the use of approved electronic diagnostic tools, inspection/maintenance procedures, and computerized diagnostic systems.
4. Evaluate the operation of automotive computer controlled emission systems and electronic fuel injection systems.

### Topical Outline:

### Percentage

I. Course Introduction and Laboratory Safety

5%

- A. Course overview and grading
- B. Laboratory safety
- C. Emergency procedures

II. On Board Diagnostics

40%

- A. Theory of operation
  1. Trouble Code Identification
  2. Enabling Conditions
  3. Trip Counters

B. OBD II Major Monitors

1. Rationality and Functionality
2. Comprehensive Component
3. Fuel Control

4. HO2S Heater
  5. Catalyst
  6. Misfire
  7. Evaporative Emissions
  8. Exhaust Recirculation
  9. Secondary Air Systems
- C. OBD II Diagnostic Procedures
- III. Emission Control Inspection and Maintenance 30%
- A. Crankcase Ventilation Systems
  - B. Pre-Combustion Controls
  - C. Post-Combustion Controls
  - D. Evaporative Emission Controls
- IV. Exhaust Gases 25 %
- A. Combustion Process and Exhaust Gases
  - B. Exhaust Gases and Their Relationships
  - C. Stoichiometric Air-Fuel Relationships
  - D. Emission Failure Diagnostics

## Teaching Philosophy

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*, 6<sup>th</sup> 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 (180):

Each quiz is worth 20 points. There will be twelve (12) quizzes. Quizzes can be made up within a week of the initial quiz if the absence was excused.

### 3. Exams (200):

There will be one test mid semester and one comprehensive final at the end of the semester. These will be done in the computer lab.

#### 4. Homework (20):

Homework will be assigned in the classroom and must be turned in on time.

#### 5. Presentations (50):

After gathering data and information from the lab, each group of two or three students will develop a PowerPoint presentation. Each presentation is worth 5 points based on eye contact (2), knowledge of subject (2), and professionalism (1). Items covered in the presentations can be added to assessments. The presentation has to meet the following guidelines:

- Minimum of 5 slides
- Less than 6 bullets per slide
- Less than 7 words per bullet
- Must include images and wiring schematic
- Save the file as last name.first name. sensor or system
  - trinidad.omar.ECT.pptx
- Student is required to wear the program uniform, clean pants, and shoes.

#### 6. Lab Activity Sheets (40):

The lab sheets are worth 40 points and will be evaluated and graded periodically. Five points will be deducted each time a student is not working during lab time.

#### 7. Participation points (10):

1 point will be deducted for the following:

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

### 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

	Q1	Q2	Q3	Q4	Q5	Q6	T1	Final	HW	P	LW	PP	Total
Max points	30	30	30	30	30	30	100	100	20	50	40	10	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.

### Tools & 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

### References:

1. Aaron, J.E. (2006). *The Little, Brown compact handbook*, (6<sup>th</sup> ed.). New York: Addison-Wesley.

- American Psychological Association. (2001). *Publications manual of the American Psychological Association*, (5<sup>th</sup> ed.). Washington, D.C.: Author.

**Note:** Both of the above references represent the University's and the College's standards for written academic works. The Little, Brown Compact Handbook is a writing and grammar reference. If a student has other appropriate references to accomplish the same task, purchase of this text is not required. If the appropriateness is in question, please ask your instructor.

The American Psychological Association (APA) manual is an editorial style manual that consists of rules or guidelines to help the writer develop a clear and consistent document through common use of punctuation, abbreviations, tables, headings, citations, and many other elements.

The APA editorial style is widely accepted for academia writing. However, the focus of this class is to prepare individuals for the automotive business environment. For that reason, all writings in this class will follow normally accepted business style guidelines that the instructor will share with the students in class

The use of the APA system of citations in written text and any accompanying reference list will however be followed. There are numerous online resources available to assist the student in the proper application of APA citation such as:

<http://owl.english.purdue.edu/owl/resource/560/01/>

<http://www.apastyle.org/>

[http://www.indiana.edu/~wts/pamphlets/apa\\_style.shtml](http://www.indiana.edu/~wts/pamphlets/apa_style.shtml)

If a student has other appropriate references to accomplish the task, purchase of this text is not required. If the appropriateness is in question, please ask your instructor.

### **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](http://www.bert.siu.edu), Department of Public Safety's website [www.dps.siu.edu](http://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.

## Tentative Schedule

*Subject to change*

<b>Date</b>	<b>Day</b>	<b>Main Topic</b>	<b>HW</b>	<b>Quiz</b>
10/ 27	<b>1</b>	<b>Intro, Syllabus, Schedule, Emission Standards</b>		
10/28	<b>2</b>	<b>Analyzing 5 Gasses</b>		1
10/30	<b>3</b>	<b>Catalytic Converters</b>		
10/31	<b>4</b>	<b>PVC and Secondary Air Injection</b>		
11/3	<b>5</b>	<b>Evaporative Emissions Control</b>		
11/4	<b>6</b>	<b>EVAP Diagnostics</b>		2
11/6	<b>7</b>			
11/7	<b>8</b>	<b>Exhaust Gas Recirculation</b>		3
11/13	<b>9</b>	<b>EGR Diagnostics</b>		
11/14	<b>10</b>			T1
11/17	<b>11</b>	<b>Scantool Modes</b>		
11/18	<b>12</b>	<b>Continuous Monitors (CM): Misfire</b>		4
11/20	<b>13</b>	<b>CM: Comprehensive</b>		
11/21	<b>14</b>	<b>CM: Fuel Trim</b>		
11/24	<b>15</b>	<b>Non-Continuous Monitors (NCM): Oxygen Sensor, O<sub>2</sub> Heater</b>		
11/25	<b>16</b>	<b>NCM: Catalyst/Heated Catalyst</b>		5
12/1	<b>17</b>	<b>NCM: EGR System</b>		
12/2	<b>18</b>	<b>NCM: EVAP System</b>		6
12/4	<b>19</b>	<b>NCM: Secondary Air System</b>		
12/5	<b>20</b>	<b>Final Exam</b>		

>> 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.