# *IMPERIAL VALLEY COLLEGE*

**INDUSTRIAL TECHNOLOGY DIVISION**

**AUTOMOTIVE DEPARTMENT**

**COURSE TITLE:** Emmision Control & Computer System (AUT 230)

**Instructors:** Jose Perez / David Martinez

**Classroom:** 1102 and 1103

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**Phone:** 760 355-6362 or 760 404-9533

**Class begins:** August 26, 2012

**Class ends:** Sep 22, 2012

**Time:** M-S 5:30-9:30 pm

**Textbook:** Modern Automobile Technology by James E. Duffy

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**Course Description:**

Upon successful completion of this course, the student will be able to describe the operation of all emission control devices and ignition systems. Eg. Catalyc converter, 02 sensor, MAF sensor, MAP sensor, TPS sensor, etc. The student will also demonstrate the use of proper diagnosis techniques to solve drivability problems and demonstrate the ability to successfully use scan tools and electronic service information to solve electronic related emission problems.

**Course Goal & Objectives:**

Upon successful completion of this course students will be able to:

1. Give examples of emission control failures and service required
2. Diagnose the causes of emissions or driveability concerns resulting from failure of computerized engine controls with stored diagnostic trouble codes.

3. Inspect and test computerized engine control systems, sensors, power train control modules (ECM), actuators, and circuits.
4. Access and use electronic service information (ESI)
5. Examine the differences between OBDI and OBDII
6. Explain how carbon monoxide (Co), Hydrocarbons (HC) and oxides of nitrogen (NOx) are formed during the combustion process.
7. Describe oxygen (O2) emissions in relation to air-full ratio

**Institutional Student Learning Outcomes (ISLO):**

Student learning outcomes are written statements that represent faculty and departmental learning goals for students. After successful completion of the program or degree at IVC, students are expected to have measurable improvement in the following areas:

- ISLO 1: Communication Skills
- ISLO 2: Critical Thinking Skills
- ISLO 3: Personal Responsibility
- ISLO 4: Information Literacy
- ISLO 5: Global Awareness

Aut-230 Emission Control & Computer System will provide students with learning opportunities to improve in five of the institutional learning outcomes: (ISLO 1) Communication Skills, (ISLO 2) Critical Thinking Skills, (ISLO 3) Personal Responsibility, (ISLO 4) Information Literacy, (ISLO 5) Global Awareness.

**Students with Disabilities:**

Any student with a documented disability who may need educational accommodations should notify his/her instructor to the Disabled Student Program and Services (DSPS) office as soon as possible. The DSPS is located in building 2117, Health Services Building, or you may contact them at 760-355-6312.

**Student Responsibilities:**

Each student is required to comply with the schedule established by IVC and the automotive program. Student should attend class each day classis in session. If for any reason a student is absent she/he is responsible for making up any missed work. It is recommended that students call the office to inform the instructor if he/she is ill or bring a doctor's release note. It is also recommended for each student to bring a classroom and shop manual along with pencil and paper.

**Basic Rules and Shop Safety:**

1. No music allowed in the auto shop
2. No smoking in the shop area
3. No work should be redone without the instructors permission
4. No parking inside the shop during lecture time
5. No tolerance for sexual harassment
6. No long breaks (10 minutes per class hour)
7. Every student is required to wear safety glasses

**Assignments and Activities consist of:**

Reviews, videos, laboratory activities, service manuals, and hands-on each section

**Grading System:**

There will be a mid-term and a final exam. Each will be worth 25% of your grade. Quizzes will make up 25% of your grade. The last 25% of your grade will be on projects assigned as part of the lab section of the class.

**Mid-term:** Aug 9th

**Final Exam:** Aug 25th

| *Percentage* | *Scores* | *Letter Grade* |
|---|---|---|
| 25% Completed assignments | 90-100% | A |
| 25% Quizzes | 80-90% | B |
| 25% Midterm exam | 70-79% | C |
| 25% Final Exam | 60-69% | D |
| | Less than 60% | F |

# Course Instructional Schedule and learning Activities

| Week # | Topics | Class Activities | Homework/Exam |
|---|---|---|---|
| 1 | Ch 5<br>Class orientation<br>Safety procedure<br>Auto shop layout<br>Outside work area<br>How to use the tool room | Safety video<br>Safety test | Workbook<br>Section 1<br>Page 27 |
| 1 | Ch 48<br>Engine mechanical problems<br>Symptoms of mechanical problems<br>Evaluating engine mechanical problems<br>Decide what type of engine repair is needed | Review questions<br>Page 927<br>ASE questions<br>Pages 927-929 | Workbook<br>Section 9<br>Page 259 |
| 1 | Ch 47<br>Engine Tune-up<br>General tune up rules<br>Tune-up safety rules<br>Typical tune-up<br>Diesel engine tune-up (maintenance)intervals | Review questions<br>Page 910<br>ASE questions<br>Pages 910-911 | Workbook<br>Section 8<br>Page 251 |
| 1 | Ch 46<br>Advance diagnostics<br>Vacuum and pressure gauge assets<br>Advance scan tool test<br>Scan tool Data stream values<br>Checking computer terminal values<br>Using oscilloscope<br>Scope sweep rate<br>Ignition system patterns | Review questions<br>Pages 897-898<br>ASE questions<br>Pages 898-899 | Workbook<br>Section 8<br>Page 243 |
| 2 | OBD I and OBD II<br>What is OBD I<br>What is OBD II<br>Codes (DTC's)<br>Monitors<br>Troubleshooting OBD II | Hand outs | ASE questions |
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|---|---|---|---|
| 2 | Analysis and operations of emission related sensors (using VOM scope and scan tool)<br>Oxygen sensor (02)<br>Mass air flow sensor (MAF)<br>MAP manifold absolute pressure sensor (MAP)<br>Engine coolant temperature sensor (ECT)<br>Throttle position sensor (TPS)<br>Intake Air temperature sensor (IAT)<br>Indirect testing of catalytic converter | Handout | ASE questions |
| 2 | Introduction to of the gas analyzer<br>Gas analysis<br>HC<br>CO<br>NOx<br>O2<br>CO2 | Handouts | ASE questions |
| 2 | Scan tool emission test<br>Monitors<br>Continuous monitors<br>Non-continuous monitor<br>Trip<br>Drive cycle<br>Generic drive cycle<br>Running monitors | Handout | ASE questions |
| 3 | What is EVAP<br>EVAP test strategies<br>EVAP evolution<br>EVAC vacuum test simplified<br>Vacuum Leak detection principles | Power Point | Study Handout |
| 4 | Testing purge flow<br>Interpreting pressure readings<br>Vacuum, temperature, and pressure<br>Running the OBDII EVAP monitor | Power Point | Study Handout<br>Final Test |