

**Clackamas Community College**

## Online Course/Outline Submission System

---

 Show changes since last approval in red**Section #1 General Course Information****Department:** Automotive Technology: Auto Mechanics**Submitter**

First Name: Rick

Last Name: Lockwood

Phone: 3053

Email: rickl

---

**Course Prefix and Number:** AM - 243

---

**# Credits:** 7**Contact hours**

Lecture (# of hours):

Lec/lab (# of hours): 154

Lab (# of hours):

Total course hours: 154

For each credit, the student will be expected to spend, on average, 3 hours per week in combination of in-class and out-of-class activity.

---

**Course Title:** Fuel & Emission Control Systems**Course Description:**

Covers service of fuel storage and delivery systems: fuel injection, emission controls, and other electronic engine controls. Includes DSO use and exhaust gas analysis.

---

**Type of Course:** Career Technical Preparatory

Is this class challengeable?

**Yes**

Can this course be repeated for credit in a degree?

**No**

Is general education certification being sought at this time?

**No**

Does this course map to any general education outcome(s)?

**No**

Is this course part of an AAS or related certificate of completion?

**Yes**

**Name of degree(s) and/or certificate(s):** Automotive Technology AAS

Are there prerequisites to this course?

**Yes**

**Pre-reqs:** Pass AM-129 with a C or better

**Have you consulted with the appropriate chair if the pre-req is in another program?**

**No**

Are there corequisites to this course?

**No**

Are there any requirements or recommendations for students taken this course?

**No**

Are there similar courses existing in other programs or disciplines at CCC?

**No**

Will this class use library resources?

**No**

Is there any other potential impact on another department?

**No**

Does this course belong on the Related Instruction list?

**No**

**GRADING METHOD:**

A-F or Pass/No Pass

**Audit: Yes**

When do you plan to offer this course?

**✓ Winter**

Is this course equivalent to another?

If yes, they must have the same description and outcomes.

**No**

Will this course appear in the college catalog?

**Yes**

Will this course appear in the schedule?

**Yes**

**Student Learning Outcomes:**

Upon successful completion of this course, students should be able to:

1. demonstrate how to service and repair fuel storage and delivery systems,
2. demonstrate how to service and repair mechanical and electronic fuel injection and emission control systems,
3. diagnose and repair emissions related problems,
4. demonstrate proper diagnostic thought process procedures.

---

***This course does not include assessable General Education outcomes.***

---

**Major Topic Outline:**

1. Introduction to Fuel Systems and Emission Control.
  - a. Gasoline.
    - a1. Heat Value (BTU).
    - a2. Volatility.
    - a3. Octane Rating.
  - b. Emissions.
    - b1. Hydrocarbons (HC).
    - b2. Carbon Monoxide (CO).
    - b3. Oxides of Nitrogen (NO<sub>x</sub>).
    - b4. Carbon Dioxide (CO<sub>2</sub>).
    - b5. Sulfur Oxides.
    - b6. Smog.
  - c. Air – Fuel.
    - c1. Ratios.
    - c2. Stoichiometric.
    - c3. Volumetric efficiency.
2. Emission and Fuel Economy Regulations.
  - a. Clean Air Act.
  - b. Environmental Protection Agency (EPA).
  - c. Corporate Average Fuel Economy (CAFE).
3. The Fuel System.
  - a. Storage Systems.
    - a1. Tanks, lines, filters, evaporative emission controls.
    - b. Delivery Systems.
  - c. Electric and Mechanical Fuel Pumps.
4. Emission Control Systems.

- a. Positive Crankcase Ventilation (PCV).
  - b. Early Fuel Evaporation (EFE).
  - c. Evaporative Emission Control (EEC).
  - d. Air Injection (AIR).
  - e. Exhaust Gas Recirculation (EGR).
  - f. Catalytic Converters.
  - g. Computer Controlled Emission Control Systems.
5. Digital Storage Oscilloscopes.
- a. Analog.
  - b. Digital.
  - b1. Time.
  - b2. Voltage.
  - b3. Amplitude.
  - b4. Frequency.
  - b5. Shape.
  - b6. Pulse width.
  - b7. Pattern.
6. Computer Sensor Testing and Diagnosis.
- a. Engine Coolant Temperature sensor.
  - b. Exhaust Gas Recirculation.
  - c. Oxygen sensor.
  - d. Manifold Absolute Pressure sensor.
  - e. Manifold Vacuum sensor.
  - f. Throttle Position sensor.
  - g. Idle Air Control.
  - h. Fuel Injection.
  - h1. Port Fuel Injection.
  - h2. Throttle Body Injection.
7. OBD II.
- a. Drive Cycle.
  - b. Monitor status.

Does the content of this class relate to job skills in any of the following areas:

- |                                      |            |
|--------------------------------------|------------|
| 1. Increased energy efficiency       | <b>Yes</b> |
| 2. Produce renewable energy          | <b>No</b>  |
| 3. Prevent environmental degradation | <b>Yes</b> |
| 4. Clean up natural environment      | <b>No</b>  |
| 5. Supports green services           | <b>Yes</b> |

Percent of course: **35%**

First term to be offered:

**Next available term after approval**

:

---