

**Western Technical College**

**32404334 Engine Performance 1**

**Course Outcome Summary**

**Course Information**

<b>Description</b>	Provides skills and technical knowledge in the use of diagnostic equipment, as well as emissions control devices. Includes computerized engine control systems, input sensors, output devices and exhaust system service.
<b>Career Cluster</b>	Transportation, Distribution and Logistics
<b>Instructional Level</b>	Technical Diploma Courses
<b>Total Credits</b>	3
<b>Total Hours</b>	108

**Textbooks**

*Fundamentals of Automotive Technology*. 2nd Edition. Copyright 2018. CDX Automotive. Publisher: Jones & Bartlett Publishers. **ISBN-13:** 978-1-2842-0995-5. Required.

**Learner Supplies**

Safety glasses with side eye protection that meet Z87 OSHA guidelines. **Vendor:** To be discussed in class. Required.

Six inch ankle high, quality leather work shoes - \$75.00-100.00. **Vendor:** To be discussed in class. Required.

Pocket knife, six inch metal pocket ruler (English/metric measurement), small pocket flashlight, and pocket flat head screwdriver - \$20.00. **Vendor:** To be discussed in class. Required.

**Success Abilities**

1. Cultivate Passion: Enhance Personal Connections
2. Cultivate Passion: Expand a Growth-Mindset
3. Cultivate Passion: Increase Self-Awareness
4. Live Responsibly: Develop Resilience
5. Live Responsibly: Embrace Sustainability
6. Refine Professionalism: Act Ethically
7. Refine Professionalism: Improve Critical Thinking

8. Refine Professionalism: Participate Collaboratively
9. Refine Professionalism: Practice Effective Communication

## Program Outcomes

1. Demonstrate professionalism appropriate for the auto service industry.
2. Perform diagnosis, service, and repair of automotive internal combustion engines.
3. Perform diagnosis, service, and repair of automotive electrical and electronic systems.
4. Perform diagnosis, service, and repair of automotive engine performance systems.

## Course Competencies

### 1. Determine engine mechanical condition.

#### Assessment Strategies

- 1.1. Written Product
- 1.2. Skill Demonstration

#### Criteria

*You will know you are successful when:*

- 1.1. You verify engine performance concerns.
- 1.2. You research engine information including ,repair history, service cautions and technical bulletins.
- 1.3. You perform engine tests including, manifold pressure, compression, power balance, cylinder leakage, electrical, ignition, fuel, and operating temperature.

#### Learning Objectives

- 1.a. Identify and interpret engine performance concerns; determine needed action.
- 1.b. Research applicable vehicle and service information, vehicle service history, service precautions, and technical service bulletins.
- 1.c. Perform engine absolute manifold pressure tests (vacuum/boost); determine needed action.
- 1.d. Perform cylinder power balance test; determine needed action.
- 1.e. Perform cylinder cranking and running compression tests; determine needed action.
- 1.f. Perform cylinder leakage test; determine needed action.
- 1.g. Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.
- 1.h. Verify engine operating temperature; determine needed action.

### 2. Diagnose computerized engine controls.

#### Assessment Strategies

- 2.1. Skill Demonstration
- 2.2. Written Product

#### Criteria

*You will know you are successful when:*

- 2.1. You access vehicle OBD systems to retrieve all diagnosis information and clear history information as needed.
- 2.2. You perform flow chart diagnostic trouble shooting per service information.
- 2.3. You perform all necessary active tests with scan tool and preform repair verification.

#### Learning Objectives

- 2.a. Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.
- 2.b. Access and use service information to perform step-by-step (troubleshooting) diagnosis.
- 2.c. Perform active tests of actuators using a scan tool; determine needed action.
- 2.d. Describe the use of OBD monitors for repair verification.

### 3. Repair fuel, air induction, and exhaust systems.

### **Assessment Strategies**

- 3.1. Written Product
- 3.2. Skill Demonstration

### **Criteria**

*You will know you are successful when:*

- 3.1. You inspect, repair or replace exhaust system. Including, manifolds, exhaust pipes, mufflers, catalytic converters, resonators, heat shields, hangers, clamps, and tail pipes.
- 3.2. You diagnoses exhaust systems performance back pressure concerns.
- 3.3. You inspect, repair or replace air intake system. Including, air filters, filter housing, and intake duct system.
- 3.4. You inspect, repair or replace fuel system. Including, fuel pressure, pressure filter and lines.

### **Learning Objectives**

- 3.a. Replace fuel filter(s) where applicable.
- 3.b. Inspect integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shields; perform needed action.
- 3.c. Inspect condition of exhaust system hangers, brackets, clamps, and heat shields; determine needed action.
- 3.d. Perform exhaust system back-pressure test; determine needed action.
- 3.e. Inspect, service, or replace air filters, filter housings, and intake duct work.

## **4. Diagnose emissions control systems.**

### **Assessment Strategies**

- 4.1. Skill Demonstration
- 4.2. Written Product

### **Criteria**

*You will know you are successful when*

- 4.1. you diagnose concerns caused by the positive crankcase ventilation system
- 4.2. you inspect, test or replace positive crankcase ventilation system components

### **Learning Objectives**

- 4.a. Diagnose oil leaks, emissions, and driveability concerns caused by the positive crankcase ventilation (PCV) system; determine needed action.
- 4.b. Inspect, test, service, and/or replace positive crankcase ventilation (PCV) filter/breather, valve, tubes, orifices, and hoses; perform needed action.

## **5. Repair emissions control systems.**

### **Assessment Strategies**

- 5.1. Skill Demonstration
- 5.2. Written Product

### **Criteria**

*You will know you are successful when*

- 5.1. you inspect, test or replace emission systems control components related to the positive crankcase ventilation system
- 5.2. you diagnose driveability concerns caused by emission control systems and components

### **Learning Objectives**

- 5.a. Inspect, test, and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.
- 5.b. Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.
- 5.c. Diagnose emissions and drive-ability concerns caused by the exhaust gas re-circulation (EGR) system; inspect, test, service and/or replace electrical/electronic sensors, controls, wiring, tubing, exhaust passages, vacuum/pressure controls, filters, and hoses of exhaust gas re-circulation (EGR) systems; determine needed action.

## **6. Inspect ignition systems.**

**Assessment Strategies**

- 6.1. Skill Demonstration
- 6.2. Written Product

**Criteria**

*You will know you are successful when*

- 6.1. you test, inspect or replace ignition system sensors
- 6.2. you test, inspect and replace ignition system secondary ignition components

**Learning Objectives**

- 6.a. Inspect and test crankshaft and camshaft position sensor(s); determine needed action.
- 6.b. Remove and replace spark plugs; inspect secondary ignition components for wear and damage.