

# Des Moines Area Community College

## COURSE INFORMATION

Acronym/Number DISL 407

Title DIESEL FUEL SYSTEMS

Credit breakout 6                      1                      10                      0                      0  
(credit                      lecture                      lab                      practicum                      work experience)

**PREREQUISITE(S):** DISL 402

### **COURSE DESCRIPTION:**

The student will be introduced to basic fuel system principles, operational theory and fundamentals of electronic systems of some commonly used fuel systems as well as general repair and diagnostic procedures, with exposure to several different electronically controlled engines and their diagnostic tools.

### **COURSE COMPETENCIES:**

*During this course, the student will be expected to:*

1. Explain the basic principles involved in a diesel fuel system.
  - 1.1 List the five operations any fuel system must perform.
  - 1.2 Explain the operation of port and helix metering.
  - 1.3 Compare the operation of sleeve metering.
  - 1.4 Describe the operation of pressure-time metering.
  - 1.5 Compare the operation of inlet metering.
  - 1.6 Distinguish an injection pump from a fuel pump.
  - 1.7 Distinguish an injector from a nozzle.
  - 1.8 Explain the basic operation of a mechanical governor.
  
2. Investigate the fundamentals of the standard nozzle.
  - 2.1 Identify the components of a standard nozzle.
  - 2.2 Inspect the parts of a standard nozzle.
  - 2.3 Describe the fuel flow of a standard nozzle.
  - 2.4 Explain the operation of a standard nozzle.
  - 2.5 Test a standard nozzle.
  - 2.6 Adjust a standard nozzle.
  
3. Analyze the fundamentals of the pencil nozzle.
  - 3.1 Identify the components of a pencil nozzle.
  - 3.2 Inspect the parts of a pencil nozzle.

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- 3.3 Describe the fuel flow of a pencil nozzle.
  - 3.4 Explain the operation of a pencil nozzle.
  - 3.5 Test a pencil nozzle.
  - 3.6 Adjust a pencil nozzle.
4. Examine the principles of the capped nozzle.
    - 4.1 Identify the components of a capped nozzle.
    - 4.2 Inspect the parts of a capped nozzle.
    - 4.3 Describe the fuel flow of a capped nozzle.
    - 4.4 Explain the operation of a capped nozzle.
    - 4.5 Test a capped nozzle.
    - 4.6 Adjust a capped nozzle.
5. Investigate the fundamentals of the Detroit fuel system.
    - 5.1 Identify the components of a Detroit unit injector.
    - 5.2 Inspect the parts of a Detroit unit injector.
    - 5.3 Describe the fuel flow of a Detroit unit injector.
    - 5.4 Explain the operation of a Detroit unit injector.
    - 5.5 Test a Detroit unit injector.
    - 5.6 Describe the fuel flow of the entire Detroit system.
6. Explore the fundamentals of the Detroit Series 60 DDEC fuel system.
    - 6.1 Identify the components of a Series 60 DDEC fuel system.
    - 6.2 Describe the fuel flow of a Series 60 DDEC fuel system.
    - 6.3 Adjust the injectors and valves on a Series 60 engine.
    - 6.4 Inspect the parameters of the Series 60 DDEC fuel system using a diagnostic reader.
    - 6.5 Examine the status of the Series 60 DDEC fuel system using a diagnostic reader.
    - 6.6 Identify the fault codes of the Series 60 DDEC fuel system using a diagnostic reader.
7. Explore the principles of the Robert Bosch fuel system.
    - 7.1 Identify the components of a Robert Bosch injection pump.
    - 7.2 Inspect the parts of a Robert Bosch injection pump.
    - 7.3 Describe the fuel flow of a Robert Bosch injection pump.
    - 7.4 Explain the operation of a Robert Bosch injection pump.
    - 7.5 Adjust a Robert Bosch injection pump.
    - 7.6 Name the components of a Robert Bosch governor.
    - 7.7 Explain the operation of a Robert Bosch governor.
    - 7.8 Adjust a Robert Bosch governor.
8. Examine basic principles involved with Caterpillar fuel systems.
    - 8.1 Identify the components of a V pump.
    - 8.2 Inspect the parts of a V pump.
    - 8.3 Describe the fuel flow of a V pump.
    - 8.4 Explain the operation of a V pump.
    - 8.5 Adjust a V pump.
    - 8.6 Identify the components of a scroll pump.
    - 8.7 Inspect the parts of a scroll pump.

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- 8.8 Describe the fuel flow of a scroll pump.
  - 8.9 Explain the operation of a scroll pump.
  - 8.10 Explain the operation of a scroll pump advance unit.
  - 8.11 Inspect plunger assembly installation on a scroll pump.
9. Analyze the fundamentals of the Caterpillar electronic fuel systems.
- 9.1 Identify the components of a PEEC fuel system.
  - 9.2 Describe the fuel flow of a PEEC fuel system.
  - 9.3 Adjust the sensors of a PEEC fuel system.
  - 9.4 Identify the components of a 3176 fuel system.
  - 9.5 Describe the fuel flow of a 3176 fuel system.
  - 9.6 Adjust the injectors and valves on a 3176 engine.
  - 9.7 Identify the components of a 3406E fuel system.
  - 9.8 Describe the fuel flow of a 3406E fuel system.
  - 9.9 Adjust the injectors and valves on a 3406E engine.
  - 9.10 Inspect the parameters of the Caterpillar electronic fuel systems using an ECAP.
  - 9.11 Examine the status of the Caterpillar electronic fuel systems using an ECAP.
  - 9.12 Identify the fault codes of the Caterpillar electronic fuel systems using an ECAP.
10. Examine the fundamentals of the Cummins fuel system.
- 10.1 Identify the components of a PTD injector.
  - 10.2 Inspect the parts of a PTD injector.
  - 10.3 Describe the fuel flow of a PTD injector.
  - 10.4 Adjust a PTD injector.
  - 10.5 Adjust a PTD top-stop injector.
  - 10.6 Identify the components of a PTG-AFC fuel pump.
  - 10.7 Inspect the parts of a PTG-AFC fuel pump.
  - 10.8 Describe the fuel flow of a PTG-AFC fuel pump.
  - 10.9 Explain the operation of a PTG-AFC fuel pump.
  - 10.10 Adjust a PTG-AFC fuel pump.
  - 10.11 Describe the fuel flow of the entire Cummins system.
11. Examine the fundamentals of the Cummins Celect fuel system.
- 11.1 Identify the components of a Cummins N 14 Celect fuel system.
  - 11.2 Describe the fuel flow of a Cummins N 14 Celect fuel system.
  - 11.3 Adjust the injectors and valves on a Cummins N 14 Celect engine.
  - 11.4 Inspect the parameters of the Cummins N 14 Celect fuel system using an ECHECK.
  - 11.5 Examine the status of the Cummins N 14 Celect fuel system using an ECHECK.
  - 11.6 Identify the fault codes of the Cummins N 14 Celect fuel system using an ECHECK.
12. Troubleshoot mechanically and electronically controlled engine problems.
- 12.1 Test mechanical engine components.
  - 12.2 Diagnose mechanical engine problems.
  - 12.3 Repair faults, where necessary, on a mechanical engine.
  - 12.4 Test electronic engine components.
  - 12.5 Diagnose electronic engine problems.
  - 12.6 Repair faults, where necessary, on an electronic engine.

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13. Investigate the fundamentals of the Stanadyne fuel system.
  - 13.1 Identify the components of a Stanadyne injection pump.
  - 13.2 Inspect the parts of a Stanadyne injection pump.
  - 13.3 Describe the fuel flow of a Stanadyne injection pump.
  - 13.4 Explain the operation of a Stanadyne injection pump.
  - 13.5 Adjust a Stanadyne injection pump.

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**INSTRUCTIONAL MATERIALS:**

**Textbook(s):** For each text used in this course, identify the minimum chapters to be covered in this course.

Bennett, Sean. Medium/Heavy Duty Truck Engines, Fuel & Computerized management Systems.

**Study guide**

**Transparencies**

**Test banks**

**Computer hardware/software**

**Other (example: Laboratory equipment for biology/chemistry class)**

Preparation 5/99  
Effective date: June, 2005  
by: Lon Moffitt  
Campus: A B C U N W OC  
extension: 6571  
Revision(s): \_\_\_\_\_

Competencies are reviewed annually