BROWARD COMMUNITY COLLEGE
COURSE OUTLINE

LAST REVIEW: 2008-2009 *(i.e. 2003-2004)* **NEXT REVIEW:** 2013-2014 *(i.e. 2008-2009)* **STATUS: A** *(A, I, D)*

COURSE TITLE: Fuel Metering Systems

COMMON COURSE NUMBER: AMT 0451

CREDIT HOURS: 2

CLOCK HOURS: 63
(Voc. Course ONLY)

CONTACT HOUR BREAKDOWN
(per 16 week term)

Lecture: **26.5** Lab: **36.5**

Clinic: Other:

PREREQISITE(S): None

COREQUISITE(S): None

PRE/COREQUISITE(S): None

COURSE DESCRIPTION *(750 characters, maximum)*: This course provides the student with the necessary information and practice necessary to inspect, check, service, troubleshoot, and repair reciprocating and turbine fuel metering systems. The theory and practical application of carburetion, fuel injection systems, and water injection systems are also learned. Fuel pumps, fitters strainers are discussed and practical experience is gained in these areas. Student fee charged.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s): Area
General Education Requirements – Associate in Science Degree (AS), meets Area(s): Area
General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s): Area

UNIT TITLES

1. Water Injection Systems
2. Carburetors
3. Fuel Metering System Components
4. Reciprocating and Turbine Engine Fuel Metering Systems

ASSESSMENT:

Please provide a brief description (250 characters maximum) that details how students will be assessed on the course outcomes.

1. **Quizzes, Test, and/or Final Exam (cumulative/comprehensive);**
2. **Selected faculty may assess homework, projects, class participation/attendance, and/or extra credit projects.**

Upon successful completion of this course, the students should be able to inspect, check, service, troubleshoot and repair reciprocating and turbine fuel metering systems.

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UNITS

Unit 1 Water Injection Systems

General Outcome:

1.0 The student shall: The students should be able to inspect, check and service water injection systems.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

1.1 Describe the purpose and effect of injecting water or water-alcohol during periods of high engine power output.

1.2 Describe the means used to prevent the freezing of the water or ADI liquid.

1.3 Explain the effect of atmospheric humidity on engine power when using water injection.

1.4 Explain the effect of exhausting the water supply during takeoff operations utilizing water injection.

1.5 Describe the purpose and effect of the derichment valve in the water-alcohol injection system.

1.6 Describe the results of detonation within an engine.

1.7 Describe the procedure to follow when detonation occurs.

1.8 Explain the factor that determines the amount of water flow during ADI operation.

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1.9 Describe the method for preventing corrosion of lines and fittings used in ADI systems.

1.10 Describe the purpose of the oil-pressure-operated valve in the ADI system.

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Unit 2 Carburetors

General Outcome:

2.0 The student shall: The students should be able to overhaul carburetor.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

2.1 Discuss the fuel metering forces of a conventional float-type carburetor and a pressure-type carburetor.

2.2 Describe the relationship between carburetor venturi size and engine displacement volume.

2.3 Discuss the fuel-air mixture requirements of an engine during idling and during high power settings.

2.4 Describe the operation of the idling system of a float-type carburetor and a pressure-type carburetor.

2.5 Describe the effect of a clogged main air bleed in a float-type carburetor on engine operation.

2.6 Check and adjust the float level of a float-type carburetor.

2.7 Explain the effect of an incorrectly adjusted float level on engine operation.

2.8 Explain the effect of a worn or grooved needle valve and seat assembly in a float-type carburetor on engine operation.

2.9 Describe the operating principles of a back-suction-type mixture control.

2.10 Describe the operating principles of an automatic mixture control.

2.11 Describe the operating principles of economizer systems in float-type carburetor on engine operation.

2.12 Explain the effect of a ruptured diaphragm in a pressure-type carburetor on engine operation.

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2.13 Explain the basic function of a manual mixture control in an aircraft carburetor.

2.14 Describe the location and operating principles of discharge nozzles used with pressure carburetors.

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Unit 3 Fuel Metering System Components

General Outcome:

3.0 The student shall: The students should be able to repair engine fuel metering system components.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

3.1 Describe the operating principles of piston-type and single and double-diaphragm acceleration pumps.

3.2 Describe the operating principles of direct fuel injection systems.

3.3 Explain the purpose and operation of a venturi.

3.4 Explain the function of a metering jet.

3.5 Explain the purpose of an air bleed in a carburetor.

3.6 Describe the purpose of an economizer valve in a carburetor.

3.7 Clean carburetor parts.

3.8 Repair a leaking float.

3.9 Describe the adjustments that may be made on a pressure-injection carburetor.

3.10 Describe the effect of clogged impact tubes on engine operation.

3.11 Describe the function of the synchronizer bar on fuel injection equipped engines.

3.12 Describe the function and operation of the main and idling air bleed systems in a float-type carburetor.

Unit 4 Reciprocating and Turbine Engine Fuel Metering Systems

General Outcome:

4.0 The student shall: The students should be able to inspect, check, service, troubleshoot and repair reciprocating and turbine engine fuel metering systems.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

4.1 Adjust idling speed and mixture.

4.2 Explain the principles of operation of an automatic fuel control unit used on a turbojet engine.

4.3 Trim turbojet engine fuel control system.

4.4 Describe the effect of increased altitude on engine fuel-air mixture.

4.5 Explain the relative burning rates of various fuel-air mixtures.

4.6 Describe the fuel-air mixture requirement of a reciprocating engine at various power settings.

4.7 Describe the operating characteristics of engines with direct cylinder fuel injection systems.

4.8 Install, remove and adjust direct cylinder fuel injection system components.

4.9 Explain the difference between a fuel injection system and a fuel injection carburetor.

4.10 Describe the cause of lean mixtures in a conventional carburetor system.

4.11 Explain the effect an inoperative vapor vent in a pressure-type carburetor has on engine operation.

4.12 Describe the factors that affect the density of the air entering the carburetor.