



# 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: Hydraulic and Pneumatic Systems**

**COMMON COURSE NUMBER: AMT 0210**

**CREDIT HOURS: 2**

**CONTACT HOUR BREAKDOWN**

*(per 16 week term)*

**CLOCK HOURS: 75**

*(Voc. Course ONLY)*

**Lecture: 35**

**Lab: 40**

**Clinic:**

**Other:**

**PREREQUISITE(S): None**

**COREQUISITE(S): None**

**PRE/COREQUISITE(S): None**

**COURSE DESCRIPTION** *(750 characters, maximum):* Students will have knowledge of fluid theory and applied physics which relates to aircraft hydraulics. The student will study the theory of operation, maintenance requirements, and adjustments of various hydraulics components and systems. The student will demonstrate the ability to test, inspect, troubleshoot, and service hydraulic systems and overhaul malfunctioning components according to manufacturer and federal aviation specifications. The course will provide the student with the knowledge of pneumatics as used in aircraft operation. The course covers fluid flow, identifies the various actuating units, types of seals, pumps and differences between hydraulics and pneumatics. The inspection, maintenance and repair of the various components is also covered in accordance with applicable specifications. 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. Hydraulic and Pneumatic Power System Components
2. Hydraulic Fluids
3. Hydraulic and Pneumatic Power Systems



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## 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 test, inspect, troubleshoot, and service hydraulic systems and overhaul malfunctioning components according to manufacturer and federal aviation specifications and demonstrate knowledge of pneumatics as used in aircraft operation.

\*\*\* Complete the following only if course is seeking general education status \*\*\*

## GENERAL EDUCATION Competencies and Skills\*:

Please highlight in green font all Competencies/Skills from the list below that apply to this course. In the box to the right of the Competency/Skill, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 5.12) that apply.

1. Read with critical comprehension	
2. Speak and listen effectively	
3. Speak and listen effectively	
4. Think creatively, logically, critically, and reflectively (analyze, synthesize, apply, and evaluate)	
5. Demonstrate and apply literacy in its various forms: (highlight in green ALL that apply) (1. technological, 2. informational, 3. mathematical, 4. scientific, 5. cultural, 6. historical, 7. aesthetic and/or 8. environmental)	
6. Apply problem solving techniques to real-world experiences	
7. Apply methods of scientific inquiry	
8. Demonstrate an understanding of the physical and biological environment and how it is impacted by human beings	
9. Demonstrate an understanding of and appreciation for human diversities and commonalities	
10. Collaborate with others to achieve common goals.	
11. Research, synthesize and produce original work	
12. Practice ethical behavior	
13. Demonstrate self-direction and self motivation	
14. Assume responsibility for and understand the impact of personal behaviors on self and society	
15. Contribute to the welfare of the community	



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## UNITS

### Unit 1 Hydraulic and Pneumatic Power System Components

#### General Outcome:

- 1.0 **The student shall:** The students should be able to repair hydraulic and pneumatic power system components.

#### Specific Measurable Learning Outcomes:

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

- 1.1 Install packing seals and rings on hydraulic components.
- 1.2 Determine the correct seal type to use with ester-base, petroleum-base, and vegetable-base fluids.
- 1.3 Remove and install hydraulic selector valves.
- 1.4 Remove and install a spool-type or balanced-type pressure regulator.
- 1.5 Determine the cause of excessive oil in an aircraft pneumatic power system.
- 1.6 Explain the operating principles of a pneumatic power system multi-stage reciprocating compressor.
- 1.7 Identify hydraulic seals and packings.
- 1.8 Protect packing rings or seals against thread damage during installation.



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## Unit 2 Hydraulic Fluids

### General Outcome:

- 2.0 **The student shall:** The students should be able to identify and select hydraulic fluids.

### Specific Measurable Learning Outcomes:

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

- 2.1 Determine the fluid type for use in a specified aircraft hydraulic system.
- 2.2 Describe the method of measuring the viscosity of a liquid.
- 2.3 Identify ester-base, petroleum-base, and vegetable-base fluids.



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### Unit 3 Hydraulic and Pneumatic Power Systems

#### General Outcome:

- 3.0 The student shall:** The students should be able to inspect, check, service, troubleshoot, and repair hydraulic and pneumatic power systems.

#### Specific Measurable Learning Outcomes:

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

- 3.1 Determine the air pressure in a hydraulic accumulator.
- 3.2 Describe the location and use of quick-disconnect fittings in hydraulic and pneumatic systems.
- 3.3 Describe the mounting position of diaphragm and bladder-type hydraulic accumulators.
- 3.4 Service hydraulic reservoirs.
- 3.5 Determine the causes of incorrect system pressure.
- 3.6 Service porous paper and micronic filtering elements.
- 3.7 Adjust the pressure setting of the main system relief valve.
- 3.8 Purge air from a hydraulic system.
- 3.9 Define the term used to indicate force per unit area.
- 3.10 Identify the types of hydraulic power systems.
- 3.11 Describe the purpose, location, and operation of a hydraulic fuse.
- 3.12 Protect a hydraulic system against contamination during a component replacement.
- 3.13 Inspect a hydraulic system for water and metal contamination.
- 3.14 Service a pneumatic system moisture separator.
- 3.15 Describe the purpose, location, and operation of an orifice check valve in the wing flap actuating system.



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- 3.16 Describe the purpose, location, and operation of a wing flap overload valve.
- 3.17 Describe the purpose, location, and operation of a hydraulic system pressure regulator.
- 3.18 Describe the purpose, location, and operation of a sequence valve.
- 3.19 Describe the purpose, location, and operation of a crossflow valve.
- 3.20 Describe the purpose, location, and operation of a hydraulic system pressure accumulator.
- 3.21 Describe the purpose, location, and operation of a shuttle valve.
- 3.22 Describe the purpose, location, and operation of a check valve.
- 3.23 Install and remove engine-driven hydraulic pumps.
- 3.24 Describe the indications of a worn or damaged hydraulic pump shaft.
- 3.25 Describe the operating principles of hydraulic hand pumps.
- 3.26 Explain the cause of hydraulic pump chatter during operation.
- 3.27 Describe the operating principles of a constant-displacement hydraulic pump.

Describe the operating principles of a variable-displacement