



Broward Community College

Course Outline

STATUS: A

COMMON COURSE NUMBER: ASC 1610

COURSE TITLE: Aircraft Engines, Structures, And Systems

CREDIT HOURS: 3

CONTACT HOURS BREAKDOWN:

Lecture/Discussion 48

Lab

Other

Contact Hours/Week 3

CATALOG COURSE DESCRIPTION:

Prerequisite: ATT1100 and ASC1100

Corequisite: None

Aircraft engine types and theory of operation, aircraft structures, operations of hydraulic, electrical, fuel, pressurization, anti-icing, heating and instrument systems. Prerequisite: Private pilot's license, or instructor's permission.

General Education Requirements - Associate of Arts Degree, meets Area(s):
 General Education Requirements - Associate in Science Degree, meets Area(s):

UNIT TITLES:

1. Engine Operating Principles and Theory
2. Carburetion, Ignition, and Lubrication
3. Aircraft Propellers
4. Hydraulic Systems
5. Aircraft Electrical Components and Engine Instrument
6. Supercharger/Turbocharger
7. Aircraft Structures/Pressurization

I. Course Overview:

Upon successful completion of this course, the students should be familiar with engine operation and their related systems.

II. Units:

Unit 1. Engine Operating Principles and Theory

General Outcome:

1.0 The students should be able to demonstrate an understanding of the theory and operation of aircraft engines.

Specific Learning Outcomes:

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

- 1.1 Describe the operation of the internal parts of an aircraft reciprocating engine.
- 1.2 Explain the theory of a four stroke cycle engine.
- 1.3 Explain the relationship of work, power and horsepower.
- 1.4 Explain factors affecting power (thermal, mechanical, volumetric efficiencies and compression ratio).
- 1.5 Describe the distribution of power developed by a reciprocating engine.
- 1.6 Describe turbine and turboprop engine theory and operation.

Unit 2. Carburetion, Ignition and Lubrication

General Outcome:

2.0 The students should be able to demonstrate an understanding of the theory and operation of the above systems.

Specific Learning Outcomes:

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

- 2.1 Explain operation of a float type carburetor.
- 2.2 Explain operation of a pressure type carburetor.
- 2.3 Explain operation of a full injection system.
- 2.4 Discuss advantages/disadvantages of each.
- 2.5 Describe the principle and operation of a magneto.
- 2.6 Describe the construction/operation of ignition harness and spark plugs.
- 2.7 Explain operation of ignition switch (magneto check).
- 2.8 Describe the different types of lubrication systems.
- 2.9 Describe the operations of the lubrication components.
- 2.10 Identify different types of oil and why used.

Unit 3. Aircraft Propellers

General Outcome:

3.0 The students should be able to understand the theory of operation of various types of propellers and their components.

Specific Learning Outcomes:

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

- 3.1 Explain propeller design (pitch, twist and stresses).
- 3.2 Describe propeller aerodynamic factors.
- 3.3 Describe the different types of propellers and their systems.
- 3.4 Describe the operation of a governor.
- 3.5 Explain feathering and reversing.

Unit 4. Hydraulic Systems

General Outcome:

4.0 The students should be able to describe the theory and operation of a hydraulic system.

Specific Learning Outcomes:

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

- 4.1 Identify types of hydraulic fluids.
- 4.2 Explain the reason for hydraulic power.
- 4.3 Explain Pascal's Law.
- 4.4 Explain operation of systems components (pumps, actuators, accumulators and reservoirs).

Unit 5. Aircraft Electrical Components and Engine Instruments

General Outcome:

5.0 The students should be able to understand the theory and operation of certain electrical and instrument components

Specific Learning Outcomes:

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

- 5.1 Describe the terms of electricity (volt, amp, ohm).
- 5.2 Describe the sources of electricity.
- 5.3 Explain the components of an electrical system.
- 5.4 Explain operation of a tachometer.
- 5.5 Explain operation of a manifold pressure gauge.
- 5.6 Explain operation of an oil pressure/temperature gauge.
- 5.7 Explain operation of a fuel pressure gauge.
- 5.8 Explain operation of thermocouple gauges.

Unit 6. Supercharger/Turbocharger

General Outcome:

6.0 The students should be able to understand the theory and operation of superchargers and turbochargers.

Specific Learning Outcomes:

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

6.1 Explain function of supercharger/turbocharger.

6.2 Describe the construction and operation of both.

6.3 Explain the automatic boost control system.

Unit 7. Aircraft structures/pressurization

General Outcome:

7.0 The students should be able to: 1) understand the major stresses on an aircraft structure and identify the different designs of a fuselage; 2) explain how an aircraft pressurization system operates.

Specific Learning Outcomes:

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

- 7.1 Describe major structural stresses.
- 7.2 Describe fuselage, wing, empennage structure.
- 7.3 Describe operation of control surfaces.
- 7.4 Describe the basic requirements of a pressurization system.