

Aircraft Systems

Academic Year: (2023 / 2024)

Review date: 27-04-2023

Department assigned to the subject: Aerospace Engineering Department

Coordinating teacher: RAIOLA , MARCO

Type: Compulsory ECTS Credits : 3.0

Year : 3 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Fluid Mechanics

OBJECTIVES

The students are expected to achieve a basic knowledge of the principal aircraft systems, of the main design guidelines, and to perform preliminary design of the main components of the aircraft systems.

DESCRIPTION OF CONTENTS: PROGRAMME

Hydraulic systems

- Basic hydraulics for aircraft systems design
 - Head losses in ducts;
 - Piping networks.
- Hydraulic systems components
 - Design guidelines;
 - Hydraulic pumps;
 - Valves and pressure regulation;
 - Hydraulic reservoirs
 - Actuators
 - Hydraulic accumulators.

Flight control systems

- Flight control surfaces
- Direct mechanical control
- Hydraulic actuation
- Fly-by-wire

Engine control systems

- Design criteria
- Engine control
- Engine starting
- Reverse thrust

Fuel systems

- Fuel systems components
- Fuel systems operating modes
- Fuel level measurement systems

Pneumatic systems

- Bleed-air control
- Bleed-air systems users

Environmental control systems

- The need for a controlled environment
- Environmental control system design
- Cooling systems
- Humidity control
- Cabin pressurization

Weather protection systems

- Ice formation

- Anti-icing and de-icing systems
- Lightning protection

Electrical systems

- Power generation
- Power distribution
- Power conversion and energy storage
- Emergency power generation

Emergency systems

- Warning systems
- Fire detection and suppression
- Emergency power sources, oxygen, etc.
- The auxiliary power unit
- Emergency landing

LEARNING ACTIVITIES AND METHODOLOGY

Theory sessions.

Problem sessions working individually and in groups.

Lab-sessions.

ASSESSMENT SYSTEM

The following requirements have to be met in order to pass the subject:

- 1) to have a MINIMUM mark of 4.0/10 in the end-of-term exam;
- 2) to have a minimum overall mark of 5.0/10 (weighing 40% the mark of the continuous evaluation and 60% the end-of-term exam mark).

The continuous evaluation includes 1 partial exam (16% of the final mark) and reports of laboratory practices (24% of the final mark).

% end-of-term-examination:	60
-----------------------------------	----

% of continuous assessment (assignments, laboratory, practicals...):	40
---	----

BASIC BIBLIOGRAPHY

- Moir Ian, Seabridge Allan Aircraft Systems - Mechanical, Electrical and Avionics Subsystems Integration, John Wiley & Sons Inc, 2008

ADDITIONAL BIBLIOGRAPHY

- Currey Norman S Aircraft Landing Gear Design: principles and practices, AIAA Education Series - Przemieniecki J.S. Series Editor-in-Chief, 1988
- Langton R., Clark C, Hewitt M., Richards L. Aircraft Fuel System, John Wiley & Sons Inc., 2009