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Academic Year: ( 2022 / 2023 )

Review date: 08-09-2022

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Department assigned to the subject: Aerospace Engineering Department

Coordinating teacher: RAIOLA , MARCO

Type: Compulsory ECTS Credits : 3.0

Year : 3 Semester : 1

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## 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

<b>% end-of-term-examination:</b>	60
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	40

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).

### 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