

Academic Year: (2017 / 2018)

Review date: 05-09-2017

Department assigned to the subject: Department of Bioengineering and Aerospace Engineering

Coordinating teacher: DISCETTI , STEFANO

Type: Compulsory ECTS Credits : 3.0

Year : 4 Semester : 1

STUDENTS ARE EXPECTED TO HAVE COMPLETED

Control of Aerospace Systems

Fluid Mechanics

Aerospace Design I

Aerospace propulsion

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

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

Landing systems

General layout

Extraction and retraction of the landing carriage

Tires

Brakes

Shock absorbers

Preliminary stroke estimation

Non-conventional landing systems

Pneumatic systems

Bleed-air control

Bleed-air systems users

Environmental control systems

- The need of 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 60% the end-of-term exam mark and 40% the mark of the continuous evaluation).

% 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