

Aircraft Systems

Academic Year: (2017 / 2018)

Review date: 05-09-2017

Department assigned to the subject: Bioengineering and Aerospace Engineering Department

Coordinating teacher: DISCETTI , STEFANO

Type: Compulsory ECTS Credits : 3.0

Year : 4 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Control of Aerospace Systems
Fluid Mechanics
Aerospace Design I
Aerospace propulsion

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

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