

Academic Year: (2017 / 2018)

Review date: 27-07-2017

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

Coordinating teacher: IANIRO , ANDREA

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 1

STUDENTS ARE EXPECTED TO HAVE COMPLETED

Fluid Mechanics
 Thermal Engineering
 Aerodynamics
 Aerospace Propulsion

COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS.

The goal of this course is that the student acquires a basic knowledge of aircraft propellers, reciprocating engines, turbo-prop engines and rotordynamics.

DESCRIPTION OF CONTENTS: PROGRAMME

Introduction to propulsion systems
 -Some selected aircraft engines

The Propeller
 -Geometry and characteristics of propellers
 -Momentum and blade element theory
 -Propeller propulsive efficiency
 -Propeller noise
 -Propeller testing
 -Design of optimum propellers

Reciprocating Engines
 -Spark-Ignition engines
 -Compression-Ignition engines
 -Rotary engines
 -Turbocharging
 -Combustion in Reciprocating Engines
 -Engine balance
 -Design of Reciprocating Engines

Turboprop and Turboshaft Engines
 -Cycle analysis of conventional-free-turbine turboprop engine
 -Installation issues
 -The impact on regional aviation
 -The Unducted Fan

Rotordynamics
 -Forced Vibration
 -Self-Excited Vibration
 -Analytical prediction of rotordynamic response
 -Rotor balancing
 - Disk Design

LEARNING ACTIVITIES AND METHODOLOGY

Theory sessions.
 Problem sessions working individually and in groups.
 Computer sessions.
 Lab-sessions.

ASSESSMENT SYSTEM

In order to pass the subject, two requirements need to be met:

- 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 25% the end-of-term exam mark and 75% the mark of the continuous evaluation).

% end-of-term-examination: 25

% of continuous assessment (assignments, laboratory, practicals...): 75

BASIC BIBLIOGRAPHY

- C.F. Taylor The internal combustion engine in theory and practice, MIT Press, 1985
- D.R. Greatrix Powered Flight, The engineering of Aerospace Propulsion, Springer, 2012
- F.F. Ehrich Handbook of rotordynamics, Krieger Publishing Co., 1999
- R. Von Mises Theory of flight, Courier Dover Publications, 2012