

Academic Year: (2023 / 2024)

Review date: 29-03-2023

Department assigned to the subject: null

Coordinating teacher: IANIRO , ANDREA

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Fluid Mechanics
Thermal Engineering
Aerodynamics
Aerospace Propulsion

OBJECTIVES

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
-Turbosupercharging
-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