Course guide
220371 - 220371 - Fundamentals of Propulsion

Last modified: 10/07/2024

Unit in charge: Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 220 - ETSEIAT - Terrassa School of Industrial and Aeronautical Engineering.

Degree: MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject).

Academic year: 2024 **ECTS Credits:** 3.0 **Languages:** Catalan

LECTURER

Coordinating lecturer: Miró Jané, Arnau

Others: Miró Jané, Arnau

REQUIREMENTS

IMPORTANT: These subjects are complementary to the compulsory training received at the degree level by non-GreTA students. Therefore, students from GrETA have already taken them in their study plan and will not be able to take them as general electives.

TEACHING METHODOLOGY

The teaching methodology is divided into three parts:
- In person sessions of theoretical explanation.
- In person sessions of laboratory work and carrying out exercises and activities supervised by the teacher.
- Independent study work and carrying out exercises and activities.

The classes will have a participatory format. In the theoretical sessions, the teaching staff will introduce the basics of the subject, concepts, methods and results illustrating them with convenient examples, carrying out small exercises in order to facilitate understanding.

In the laboratory work sessions, the teaching staff will guide the students in the practical application of the theoretical concepts presented in class, underpinning critical reasoning at all times. Activities will be proposed to be solved both inside and outside the classroom. The students, autonomously, must work on the material provided by the teachers and the result of the work-problem sessions in order to assimilate and fix the concepts.

LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course the student must have achieved the concepts of propulsion leveling. They consist of a review of basic thermodynamics and the ability to calculate a parametric cycle of a real jet engine.

STUDY LOAD

Type	Hours	Percentage
Self study	48,0	64.00
Hours large group	27,0	36.00

Total learning time: 75 h

CONTENTS

Module 1. On-design jet engine analysis

Description:
Topic 1.1: Review of basic thermodynamics
Topic 1.2: On-design engine analysis
Topic 1.3: Introduction to engine design

Specific objectives:
The aim of this module is to provide students with the necessary knowledge to achieve propulsion leveling for non-GRETA courses. Students must be able to perform a calculation in the design of both turbojet and turbofan engines.

Full-or-part-time: 56h 15m
Theory classes: 20h 15m
Self study : 36h

Module 2. Static components

Description:
Topic 2.1: Inlets and subsonic nozzles
Topic 2.2: Combustion with air

Specific objectives:
The aim of this module is to complement the knowledge of propulsion leveling with a basic knowledge of static engine components. Students must be able to understand and calculate an air intake or a subsonic nozzle as well as understand and perform combustion calculations with air.

Full-or-part-time: 18h 45m
Theory classes: 6h 45m
Self study : 12h

GRADING SYSTEM

N = 0.2 D1 + 0.2 D2 + 0.2 D3 + 0.4 P

D1, D2, D3: Deliverables to be completed during the course.
P: Project

Students with a grade below 5.0 will be able to do an additional exercise to compensate for poor results.

The new grade will replace the original only if it is higher. The maximum grade that can be obtained with this evaluation supplement is 5.0.

BIBLIOGRAPHY

Basic:
- Mattingly, Jack D. Elements of gas turbine propulsion. New York: American Institute of Aeronautics and Astronautics, cop. 2005. ISBN 1563477785.

RESOURCES

Hyperlink:
- HGS Chemical Equation Solver (MATLAB). https://www.mathworks.com/matlabcentral/fileexchange/40862-hgs-chemical-equation-solver- HGS Chemical Equation Solver (Python). https://pypi.org/project/HGSpy/