

Course guide 220375 - 220375 - Resistant Elements in Aeronautics

Last modified: 02/04/2024

Unit in charge: Teaching unit:	Terrassa School of Industrial, Aerospace and Audiovisual Engineering 748 - FIS - Department of Physics.		
Degree:	MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject).		
Academic year: 2024	ECTS Credits: 3.0	Languages: English	

LECTURER

Coordinating lecturer: Roberto Flores

Others:

TEACHING METHODOLOGY

The program of the course is structured around three different kinds of activities:

- 1. Theoretical lectures.
- 2. Application lectures.
- 3. Examination sessions

During the theory lessons the students shall be introduced to the fundamentals of the subject under consideration.

During the application lessons the students will solve, with help from the teacher, problems illustrating the application of the concepts taught during the theoretical lectures.

During the exams the students shall solve, on their own, application problems as a means of assessing their understanding of the subject.

LEARNING OBJECTIVES OF THE SUBJECT

- Introduce the students to the areas of classical mechanics and strength of materials in order to gain a basic understanding of the loads experienced by aerospace vehicles.

- Describe the main characteristics and behavior of semi-monocoque structures.

STUDY LOAD

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

Total learning time: 75 h



CONTENTS

Fundamentals of classical mechanics.

Description:

- Force and moment equilibrium
- Fundamentals of particle kinematics and dynamics. Conservation laws for momentum and angular momentum.
- Rigid body dynamics. Free body diagrams.
- Relative motion. Principle of equivalence and inertial loads.

Related activities:

- Theory lessons (Activity 1) where the basic concepts are laid out.
- Application lectures (Activity 2) where problems are solved allowing the student to assess his progress.
- Mid-term exam (Activity 3).

Full-or-part-time: 35h

Theory classes: 13h

Self study : 22h

Introduction to strength of materials

Description:

- Concept of stress and strain.
- Stress and strain tensors. Principal stresses and strains.
- Linear elastic materials.
- Equations of internal equilibrium.
- Statically determinate and indeterminate structures.
- Trusses and beams. Axial force, shear force, bending moment and torsion moment.
- Generalized cross-sectional force diagrams for isostatic beams.

Related activities:

- Theory lessons (Activity 1) where the basic concepts are laid out.
- Application lectures (Activity 2) where problems are solved allowing the student to assess his progress.
- Final exam (Activity 4).

Full-or-part-time: 29h

Theory classes: 10h Self study : 19h

Introduction to the characteristics of aerospace structures

Description:

- Introduction to the elastic instability of slender structures.
- Morphology of semi-monocoque structures.

Related activities:

- Theory lessons (Activity 1) where the basic concepts are laid out.
- Final exam (Activity 4).

Full-or-part-time: 11h

Theory classes: 7h Self study : 4h



GRADING SYSTEM

The course grade will be computed averaging the grades of the two exams:

? Mid-term exam (50%)

? Final exam (50%)