Last update: 21-11-2018

220375 - Resistant Elements in Aeronautics

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering
Teaching unit: 737 - RMEE - Department of Strength of Materials and Structural Engineering
Academic year: 2018
Degree: MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Teaching unit Optional)
ECTS credits: 3 Teaching languages: English

Teaching staff

Coordinator: Roberto Flores

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

Total learning time: 75h	Hours large group:	27h	36.00%
	Self study:	48h	64.00%

Last update: 21-11-2018

220375 - Resistant Elements in Aeronautics

Content

Fundamentals of classical mechanics.

Learning time: 35h

Theory classes: 13h
Self study : 22h

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).

Introduction to strength of materials

Learning time: 29h

Theory classes: 10h
Self study : 19h

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).

Introduction to the characteristics of aerospace structures

Learning time: 11h

Theory classes: 7h
Self study : 4h

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).

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Qualification system

The course grade will be computed averaging the grades of the two exams:
? Mid-term exam (50%)
? Final exam (50%)

Bibliography