Lightweight Structures

Academic Year: (2022 / 2023) **Review date: 20/01/2023 14:12:43**

Department assigned to the subject: Continuum Mechanics and Structural Analysis Department

Coordinating teacher: ARTERO GUERRERO, JOSE ALFONSO

Type: Electives ECTS Credits : 3.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Mechanics of Structures
Elasticity
Strength of Materials

OBJECTIVES

By the end of this course, students will be able to have:
1. A systematic understanding of the key concepts and aspects for the calculation and design of lightweight structures.
2. An adequate knowledge of calculation and design of lightweight structures that includes leading knowledge in this field in mechanical engineering, such as the design and calculation of composite structures.
3. The ability to apply their knowledge and understanding to identify, formulate and solve problems of lightweight structures using established methods.
4. The ability to choose and apply analytical and modeling methods to solve lightweight structure problems.
5. An understanding of the different calculation methods that are used for the analysis of lightweight structures.
6. The ability to combine theory and practice to solve lightweight structure problems.
7. An understanding of the different applicable methods and techniques and their limitations for the analysis of the lightweight structures.
8. An awareness of the implications of engineering practice in the design and calculation of lightweight structures.

DESCRIPTION OF CONTENTS: PROGRAMME

Chapter 1. Bending of thin-walled beams

Chapter 2. Torsion of thin-walled shafts

Chapter 3. Introduction to composites laminated beams and sandwich beams

Chapter 4. Introduction to the theory of elastic plates

Chapter 5. Introduction to the theory of elastic shells

LEARNING ACTIVITIES AND METHODOLOGY

Lecture sessions (master class) and practical sessions will be taught. The first is geared to the acquisition of theoretical knowledge, and the second to the acquisition of practical skills related to theoretical concepts. In addition to this sessions one laboratory practical session in reduced groups (maximum 20 students) will be impart.

Additionally, tutorial sessions in group may be taught.

ASSESSMENT SYSTEM

% end-of-term-examination/test:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

Final exam (mandatory): 40%
Continuum evaluation: 60%
- Laboratory: 30%
- Evaluation controls: 30%

In order to pass the course, attendance and successful completion of the laboratory practices foreseen in the weekly planning are mandatory. The weighting of the laboratory practice mark in the continuous assessment corresponds to what it is established in the course, in accordance with the regulations of the university. In the Lightweight Structures course, the weighting of the laboratory practices takes the value of 30% of the continuous assessment grade.

BASIC BIBLIOGRAPHY

- Megson, T.H.G. Aircraft structures for engineering students, Elsevier, 2007

- Timoshenko, S.P. Teoría de placas y láminas, Urmo, 1975

ADDITIONAL BIBLIOGRAPHY

- Ugural, A. C. Stresses in beams, plates, and shells, Taylor & Francis, 2009

- Vinson, J. R. The Behavior of thin walled structures: beams, plates, and shells, Kluwer Academic Publishers, 1989