

Academic Year: (2022 / 2023)

Review date: 09-05-2022

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

Coordinating teacher: BARBERO POZUELO, ENRIQUE

Type: Compulsory ECTS Credits : 4.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Students should have knowledge of Elasticity and Strength of Materials of isotropic materials.

Basic knowledge of mechanics of composite materials are recommended.

OBJECTIVES

Ability to carry out a preliminary design of a mechanical component or structural element made with composite or sandwich materials

Compression of the failure mechanisms of composite structures.

Results

Once the subject is passed the student is expected to be able to:

- Understand the basic concepts of composite structures.
- Analyze the response of lightweight composite structures subjected to different types of loads.
- Carry out preliminary design of structural components
- Analyze the failure of lightweight structures

DESCRIPTION OF CONTENTS: PROGRAMME

Chapter 1. Introduction to composite laminates and sandwich structures

- 1.1 Basic concepts
- 1.2 Laminate characteristics
- 1.3 Tipologies
- 1.4 Structural applications

Chapter 2. Analysis of composites laminates

- 2.1 Introduction to anisotropic elasticity
- 2.2 Ply mechanics
- 2.3 Ply Failure Criteria
- 2.4 Classical laminated plate theory
- 2.5 First-order laminated plate theory
- 2.6 Laminate design

Chapter 3. Design of composite structures

- 3.1 Introduction to laminate beams
- 3.2 Thins walled-laminate beams
- 3.3 Sándwich beams
- 3.4 Shells

LEARNING ACTIVITIES AND METHODOLOGY

Lecture 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 these sessions, students will have the possibility of individual tutorials.

ASSESSMENT SYSTEM

Final exam: 50%

Continuum evaluation: 50%

% end-of-term-examination:	50
% of continuous assessment (assignments, laboratory, practicals...):	50

BASIC BIBLIOGRAPHY

- Antonio Miravate y otros MATERIALES COMPUESTOS (dos tomos), Antonio Miravate, 2000
- Ever J Barbero INTRODUCTION TO COMPOSITE MATERIALS DESIGN, Taylor and Francis, 1999
- I.M. Daniels y O. Ishai ENGINEERING MECHANICS OF COMPOSITE MATERIALS, Oxford University Press, 1994
- M. C. Y. Niu COMPOSITE AIRFRAME STRUCTURES, Conmilit Press LTD, 1992

ADDITIONAL BIBLIOGRAPHY

- D. Hull MATERIALES COMPUESTOS, Reverte, 1987
- M. W. Hyler STRESS ANALYSIS OF FIBER-REINFORCED COMPOSITE MATERIALS, McGraw Hill, 1998
- S. Abrate IMPACT ON COMPOSITE MATERIALS, Cambridge University Press, 1998