

28816 - Elasticity and Resistance of Materials

Información del Plan Docente

Academic Year	2016/17
Academic center	175 - Escuela Universitaria Politécnica de La Almunia
Degree	424 - Bachelor's Degree in Mechatronic Engineering
ECTS	6.0
Course	2
Period	Second semester
Subject Type	Compulsory
Module	---

1.Basic info

1.1.Recommendations to take this course

1.2.Activities and key dates for the course

2.Initiation

2.1.Learning outcomes that define the subject

2.2.Introduction

3.Context and competences

3.1.Goals

3.2.Context and meaning of the subject in the degree

3.3.Competences

3.4.Importance of learning outcomes

4.Evaluation

5.Activities and resources

5.1.General methodological presentation

Strong interaction between the teacher/student. This interaction is brought into being through a division of work and responsibilities between the students and the teacher. Nevertheless, it must be taken into account that, to a certain degree, students can set their learning pace based on their own needs and availability, following the guidelines set by the teacher.

The current subject (Elasticity and Strength of Materials) is conceived as a stand-alone combination of contents, yet

28816 - Elasticity and Resistance of Materials

organized into three fundamental and complementary forms, which are: the theoretical concepts of each teaching unit, the solving of problems or resolution of questions and laboratory work, at the same time supported by other activities

The organization of teaching will be carried out using the following steps:

— **Theory Classes** : Theoretical activities carried out mainly through exposition by the teacher, where the theoretical supports of the subject are displayed, highlighting the fundamental, structuring them in topics and or sections, interrelating them.

— **Practical Classes** : The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.

— **Laboratory Workshop** : Practical activities will be implemented in the computer room 1.1 simulation software structures (Wineva 7.0 and Abaqus.cae) with the presence and teacher mentoring .

— **Individual Tutorials** : Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online.

5.2.Learning activities

The programme offered to the student to help them achieve their target results is made up of the following activities...

Involves the active participation of the student, in a way that the results achieved in the learning process are developed, not taking away from those already set out, the activities are the following:

Programmed learning activities

— **Face-to-face generic activities** :

— **Theory Classes** : The theoretical concepts of the subject are explained and illustrative examples are developed as support to the theory when necessary.

— **Practical Classes** : Problems and practical cases are carried out, complementary to the theoretical concepts studied.

28816 - Elasticity and Resistance of Materials

• **Laboratory Workshop** : This work is tutored by a teacher, in groups of no more than 20 students.

• **Generic non-class activities** :

• Study and understanding of the theory taught in the lectures.

• Understanding and assimilation of the problems and practical cases solved in the practical classes.

• Preparation of seminars, solutions to proposed problems, etc.

• Preparation of laboratory workshops, preparation of summaries and reports.

• Preparation of the written tests for continuous assessment and final exams.

The subject has 6 ECTS credits, which represents 150 hours of student work in the subject during the trimester, in other words, 10 hours per week for 15 weeks of class.

A summary of a weekly timetable guide can be seen in the following table. These figures are obtained from the subject file in the Accreditation Report of the degree, taking into account the level of experimentation considered for the said subject is moderate.

Activity

Weekly school hours

Lectures

3

28816 - Elasticity and Resistance of Materials

Laboratory Workshop	1
Other Activities	6

5.3.Program

Chapter 1: Introduction to Strength of Materials * Types of Structures, links and loads * Balance and GDH a Structure * Definition and types of internal efforts * Calculation and Representation Efforts diagrams **Chapter 2: Structure Design Rigid Knots** * Laminating criteria: voltage Von- Mises. * Normal stress distribution in a section * Distribution of shear stress one section * Bending and Twisting problems in structures **Chapter 3: Structure Design Articulated Knots** * Method for calculating knots structures * PTV method to calculate displacements * Buckling phenomenon * Calculation of the truss structure **Chapter 4: Calculation of displacements in structures.** * Theorems Mohr (Gyre y Displacements) * Virtual work (Gyre y Displacements) * Flexibility Method for Structural Analysis Hyperstatic **Chapter 5: Deformable Solid Mechanics: Stress- Strain** * Deformable Solid Mechanics * Kinematics of Solid Deformable * Dynamics of Deformable Solid * Ratio behavior * Thermo- elastic behavior

5.4.Planning and scheduling

weeks	WEEKLY PLANNING SEMESTER	
1 ^a	Topic 1	Exercise No. 1 Continuous Assessment
2 ^a		
3 ^a		Exercise No. 2 Continuous Assessment
4 ^a	Topic 2	1st Practice with Wineva software (Topic 1 and 2)
5 ^a		
6 ^a		1st Written Test (Topic 1 and 2)
7 ^a		Exercise No. 3 Continuous Assessment

28816 - Elasticity and Resistance of Materials

8 ^a		2nd Practice with software Wineva (Topic 3)
	Topic 3	
9 ^a		2nd Written Test (Topic 3)
		Exercise No. 4 Continuous Assessment
10 ^a		
11 ^a		3rd practice with software Wineva (Topic 4)
12 ^a	Topic 4	
		3rd Written Test (Topic 4)
		Exercise No. 5 Continuous Assessment
13 ^a		
14 ^a	Topic 5	4th Practice with Abaqus software (Topic 5)
15 ^a		4th Written Test (Topic 5)

5.5. Bibliography and recommended resources

- Calvo Calzada, Begoña. Ejercicios de resistencia de materiales / Begoña Calvo Calzada, Jesús Zurita Gabasa. - 2 ed Zaragoza : Prensas Universitarias de Zaragoza, 2008
- Perez Benedicto, J.A; Remacha Andrés, Mónica; Salesa Bordonaba, Angel.. Resistencia de Materiales. Problemas Resueltos/ J.A.Pérez Benedicto, Mónica Remacha Andres, Angel Salesa Bordonaba.. - 1^a edic Zaragoza: Copycenter, 2011.
- García Cabrera, Juan. Elasticidad y resistencia de materiales : cuestiones y problemas / Juan García Cabrera San Vicente (Alicante) : Club Universitario, D.L. 2006
- Argüelles Amado, Antonio. Formulario técnico de elasticidad y resistencia de materiales con problemas resueltos / por Antonio Argüelles Amado, Isabel Viña Olay Madrid : Bellisco, 2004
- Martín García, Raúl. Apuntes de elasticidad y resistencia de materiales para ingenieros técnicos / Raúl Martín García, Antonio Illana Martos [Cádiz] : Universidad de Cádiz, Servicio de Publicaciones , D.L. 2003

Material

Format

28816 - Elasticity and Resistance of Materials

Topic theory notes

Paper/repository

Topic problems

Topic theory notes

Digital/Moodle

Topic presentations

E-Mail

Topic problems

Related links

Educational software Wineva.7.0

Web page:
wineva.upc.edu/esp/Download.php