

28918 - Strength of materials and structural analysis

Información del Plan Docente

Academic Year	2017/18
Faculty / School	201 - Escuela Politécnica Superior
Degree	437 - Degree in Rural and Agri-Food Engineering
ECTS	6.0
Year	2
Semester	Second semester
Subject Type	Compulsory
Module	---

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The learning process designed for this course is based on the following methodologies: Theoretical sessions, Problem-solving Sessions, Computer lab sessions and Practical sessions.

5.2.Learning tasks

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The program that the student is offered to achieve the expected results includes the following activities:

- Theoretical sessions. The teacher explains the theoretical content of each session. One of the objectives of this activity will be the promoting of the participation of the students and the cooperative learning.
- Problem-solving sessions. Students, working individually or in groups, gain knowledge and skills by working to respond problems and questions. A report of the problems resolved by students will be required.
- Computer lab sessions. Students use specific structural calculation software.
- Practical sessions. Students, working in groups, gain knowledge about the testing of materials and the analysis of deformations of structural elements under different load cases.

5.3.Syllabus

Theory

MODULE 0. PRESENTATION OF THE SUBJECT

0. Presentation, methodology and system of evaluation.

MODULE 1. INTRODUCTION TO MATERIAL STRENGTHS AND CALCULATION OF STRUCTURES

1. Basic concepts of statics

MODULE 2. MATERIAL STRENGTHS

2. Simple traction and compression below the elastic limit.

3. Coplanar tensions. Principal tensions.

4. Bending: cutting forces (V) and bending moments (M)

5. Bending: normal tensions due to bending moment

6. Bending: cutting tensions due to the cutting force V

7. Bending: deformations caused by the bending moment

8. Bending: static indetermination in bending. Continuous beams

9. Diverted bending and compound bending

10. Flexo-compression or bulging

11. Torsion and combined forces.

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MODULE 3. CALCULATION OF STRUCTURES OF BARS

12. Methods of calculation for articulated plane systems. Trusses.

13. Methods of calculating statically indeterminate bar structures

Practicals

PRACTICAL 1. DEFORMATION IN BEAMS BY SIMPLE BENDING

- a) Deformation in bi-supported beams, beams of two materials.
- b) Deformation in supported/ built-in beams, beams of two materials.
- c) Deformation in built-in beams, beams of two materials.

PRACTICAL 2. DEFORMATION IN DEMAND BEAMS BY DIVERTED BENDING

- a) Deformation in a beam built into a ledge

PRACTICAL 3. DEFORMATION IN PLANE PORTICOS

Arrow in the middle of a girder and rotation on the head of a bi-supported portico, situations of point load in the middle of a girder and horizontal point load on the head of the pillar.

Arrow in the middle of a girder and rotation on the head of a built-in portico, situations of point load in the middle of a girder and horizontal point load on the head of the pillar.

5.4.Course planning and calendar

Type Activity/week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Presentia activity																					
Theory	2	2	2	2	2	2	2	1		2	2	2	1	2	2	2	1				
Problems		2	2	2	2	2	2			2											
Laboratory sessions											2	2	2	2	2	2					

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Team work																				
Field practice																				
Evaluation																			4	
Non presential work																				
Individual work	4	4	5	4	3	4	5	6	7	4	5	4	4	3	3	3	4	8	4	
Team work														2	2	2				
TOTAL	8	9	8	7	8	9	7	7	8	9	8	7	9	9	9	5	8	8		

5.5. Bibliography and recommended resources

BB-Basic bibliography / CB Complementary bibliography

- BB Riley, William F.. Ingeniería mecánica : estática / William F. Riley, Leroy D. Sturges Barcelona [etc.] : Reverté, cop.1995
- BB Rodríguez-Avial Azcunaga, Fernando. Problemas resueltos de resistencia de materiales / Fernando Rodríguez-Avial Azcunaga . - 3a. ed. Madrid : Librería Editorial Bellisco, 1989
- BB Vázquez Fernández, Manuel. Resistencia de materiales / Manuel Vázquez . - 3a. ed. Madrid : Noela, 1994
- CB Garrido Garcia, José Antonio. Resistencia de materiales / José A. Garrido García, Antonio Foces Mediavilla Valladolid : Secretariado de Publicaciones, Universidad de valladolid, 1994
- CB Mecánica vectorial para ingenieros. Estática / Ferdinand P. Beer, E. Russell Johnston, jr., Elliot R. Eisenberg, George H. Staab ; traducción, María de los Ángeles Izquierdo Castañeda ; revisión técnica, Jesús Manuel Dorador González, Bertha Franco Rojas, José Vilardell . - 7a. ed. México [etc.] : McGraw-Hill, 2005
- CB Ortíz Berrocal, Luis. Resistencia de materiales / Luis Ortíz Berrocal . - 2a ed. Madrid [etc.] : McGraw-Hill, D.L. 2002
- CB Rodriguez-Avial Azcunaga, Fernando. Resistencia de materiales / Fernando Rodriguez-Avial Azcunaga . - 2a. ed., corr. y amp. Madrid : Bellisco, 1993
- CB Timoshenko, Stephen P.. Resistencia de materiales. Parte 1, Teoría elemental y problemas / S. Timoshenko . - 16a. ed Madrid : Espasa-Calpe, 1989
- BC Rodriguez-Avial Azcunaga, Fernando. Resistencia de materiales / Fernando Rodriguez-Avial Azcunaga . - 4a. ed. Madrid : Bellisco, 1990

English-Friendly

- Hibbeler, Russell C.. Statics and mechanics of materials / R.C. Hibbeler . New York : Macmillan Publishing Company; Toronto : Collier Macmillan Canada ; New York [etc.] : Maxwell Macmillan International, cop. 1993

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The updated recommended bibliography can be consulted in: <http://psfunizar7.unizar.es/br13/egAsignaturas.php?id=8080>