28918 - Strength of materials and structural analysis

Información del Plan Docente

Academic Year	2016/17
Academic center	201 - Escuela Politécnica Superior
Degree	437 - Degree in Rural and Agri-Food 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

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 activities

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.Program

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.

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. Planning and scheduling

2nd semester	Theoretical sessions		Problem-solving sessions		Computer lab sessions		Reports		Evaluation	Modules
	FF h	IW h	FF h	IW h	FF h	IW h	FF h	IW h		
1st week 6 hours	0.5 2.5 1	2								0 1 2	
2nd week 10	1 1	2	1 1	2 2						2 3	

hours											
3rd week 9 hours	1 1	3	2	2						3 4	
4th week 9 hours	1 1	3	2	2						4 5	
5th week 11 hours	1 1	3	1 1	2 2						5 6	
6th week 10 hours	2	3	2	2				1		7	
7th week 10 hours	2	3	2	2				1		8	
8th week 10 hours	2	2	2	3				1		9	
9th week 10 hours	2 1 1	3 2						1		10 11 12	

10th week 8 hours	2		2	3				1		12	
11th week 13 hours	2 2	2	1 1	3 2						12 13	
12th week 13 hours	2	6	2	3						13	
13th week 6 hours					2	2		2 2		7 13	
14th week 11 hours		2			4	2				4 to 8, 12, 13	
15th week 10.5 hours					4	1		4		4 a 8, 12, 13	
TOTAL HOURS **150 hours**	30	38	20	30	10	5		13	4		
6 ECTS	1.2	1.52	0.8	1.2	0.4	0.2	0.0	0.52	0.16		

FF h : hours of face to face sessions.

IW h: hours of individual work.

5.5.Bibliography and recomended 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 : Libreria 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
- BCB Rodriguez-Avial Azcunaga, Fernando. Resistencia de materiales / Fernando Rodriguez-Avial Azcunaga . - 4a. ed. Madrid : Bellisco, 1990