UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: BUILDING STRUCTURES I
Code: 59314
Type: CORE COURSE
ECTS credits: 9
Degree: 315 - UNDERGRADUATE DEGREE IN BUILDING ENGINEERING
Academic year: 2021-22
Center: 308 - SCHOOL POLYTECHNIC OF CUENCA
Group(s): 30
Year: 2
Duration: AN
Main language: Spanish
Second language:
Use of additional languages:
English Friendly: Y
Web site:
Bilingual: N

Lecturer: **FRANCISCO JAVIER CASTILLA PASCUAL** - Group(s): **30**

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Lecturer: **JESUS GONZALEZ ARTEAGA** - Group(s): **30**

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2. Pre-Requisites

Previous knowledge of:

- physics-mechanics.
- vectorial systems.
- rigid solid and applied static.
- graphostatic drawing.
- maths.

To have studied the subjects:

- Construction II

- Physics I and II

- Mathematics I and II

- Construction materials I

3. Justification in the curriculum, relation to other subjects and to the profession

A specific training subject that complies with one of the basic guidelines of the degree.

The subject is based on basic subjects such as mathematical and physics fundamentals, it is interrelated with other specific subjects of the degree such as Construction, Construction Materials, Building Services, Pathology and Restoration, being of direct application in the subject of Technical Projects and End of Degree Project.

This subject constitutes an important professional activity of the Building Engineer, covering some essential competences for the development of activities of calculation of structures, writing of projects, technical reports, technical directions ...

4. Degree competences achieved in this course

Course competences

Code	Description
E21	Ability to apply technical regulations to the building process, and generate documents of technical specification of building procedures and construction methods.
E23	Aptitude for the pre-mesure, design, calculation and verification of structures and to direct their material execution.
G01	Ability for analysis and synthesis
G02	Organization and planning ability
G04	Problem resolution
G05	Decision making
G06	Critical thinking
G12	Autonomous learning
G21	Command of Information and Communication Technologies (ICT)

5. Objectives or Learning Outcomes

Course learning outcomes

Description

Learn what Structural Safety is.

Idealization of the object to be calculated, obtaining diagrams.

Apply practical conclusions that constitute the object of the research carried out

Apply the above to the calculation of wooden, metal, reinforced concrete and prestressed structures.

Learn the concept of the Resistance of Materials.

Know how to interpret the results of computer programs.

6. Units / Contents

Unit 1: Review of Solid Rigid and Static Issues

- **Unit 1.1** Review of Solid Rigid and Static Issues
- **Unit 1.2** Actions in building

Unit 2: Materials Resistance

- **Unit 2.1** Efforts, deformation. Hooke's Law
- **Unit 2.2** Compression, tension
- **Unit 2.3** Normal stresses and tangential stresses. Mohr`s circle
- **Unit 2.4** Bending
- **Unit 2.5** Shear
- **Unit 2.6** Moments, shears and axials diagrams
- **Unit 2.7** Bending-Deformation.
- **Unit 2.8** Compound Flexion
- **Unit 2.9** Buckling
- **Unit 2.10** Torsion

Unit 3: Hyperstatic structures calculation

- **Unit 3.1** Hyperstatic elements
- **Unit 3.2** Calculation in continuity

Unit 4: Structural Forms - Organization, design and calculation. Elasticity and plasticity

- **Unit 4.1** Calculation parameters
- **Unit 4.2** Elasticity and plasticity
- **Unit 4.3** Concepts and methodology of work with software for structures calculation

Unit 5: Application of regulations to structures calculation

- **Unit 5.1** Regulations for structures calculations, general characteristics
- **Unit 5.2** Steel structures calculation
- **Unit 5.3** Timber structures calculation
- **Unit 5.4** Wall structures calculation
- **Unit 5.5** Application to computer calculation-
- **Unit 5.6** Introduction to the working methodology of structures in BIM

ADDITIONAL COMMENTS, REMARKS

The concept of collaborative work is dealt with in the context of the BIM methodology, and other collaborative work tools are enabled/fostered through which it is possible to collect/filter/use the advances/incidents proposed by both the teaching staff and the students, which are related to the development of the subject and the work proposed in it.

7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	E21 E23 G01 G02 G05 G06	1	25	N	-	
Computer room practice [ON-SITE]	Project/Problem Based Learning (PBL)	E21 E23 G01 G02 G04 G05 G06	0.8	20	N	-	Developing practical examples using structural analysis software
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	E21 E23 G01 G02 G04 G05 G06	1.6	40	N	-	Practical exercises will be developed for the application of theoretical knowledge
Study and Exam Preparation [OFF-SITE]	Self-study	E21 E23 G01 G02 G04 G05 G06 G12 G21	3.8	95	N	-	
Final test [ON-SITE]	Assessment tests	E21 E23 G01 G02 G04 G05 G06	0.2	5	Y	Y	partial testing exams can be scheduled with posible retaking
Writing of reports or projects [OFF-SITE]	Project/Problem Based Learning (PBL)	E21 E23 G04 G05 G21	1.6	40	Y	Y	The cases studied or presented as PBL in computer room practice will be completed autonomously. The advanced use of structural calculation software and collaborative work typical of the BIM methodology are encouraged.
		Total:	**9**	**225**			
		Total credits of in-class work: 3.6					**Total class time hours: 90**
		Total credits of out of class work: 5.4					**Total hours of out of class work: 135**

As: Assessable training activity

Com: Training activity of compulsory overcoming (It will be essential to overcome both continuous and non-continuous assessment).

8. Evaluation criteria and Grading System

Evaluation System	Continuous assessment	Non-continuous evaluation*	Description
Final test	60.00%	60.00%	It shall consist of two parts: - 1st part, topics 1.2 and 3 (30% assessment on the total of the subject). - 2nd part, topics 4 and 5 (30% assessment on the total of the subject). In order to be able to weigh with the rest of the grades of the subject it will be necessary to reach a minimum score of 4 points out of 10. It could be replaced by several partial tests, in that case, the minimun score will be 3 out of 10 in eeach part.
Other methods of assessment	40.00%	40.00%	implementation of the PBL. Problems and methodology will be exposed in class. The approach will be delivered at the end of the class and reports of its resolution will be prepared in a autonomous manner. In order to be able to weigh with the rest of the grades of the subject it will be necessary to reach a minimum score of 4 points out of 10
Total:	**100.00%**	**100.00%**	

According to art. 6 of the UCLM Student Evaluation Regulations, it must be provided to students who cannot regularly attend face-to-face training activities the passing of the subject, having the right (art. 13.2) to be globally graded, in 2 annual calls per subject , an ordinary and an extraordinary one (evaluating 100% of the competences).

Evaluation criteria for the final exam:

Continuous assessment:

The pass is compulsory to obtain 5 points out of 10, as the weighted average of the final test grade (or partial tests) and that obtained by other evaluation systems.

Non-continuous evaluation:

The pass is compulsory to obtain 5 points out of 10, as the weighted average of the final test grade (or partial tests) and that obtained by other evaluation systems.

Specifications for the resit/retake exam:

The pass is compulsory to obtain 5 points out of 10, as the weighted average of the final test grade (or partial tests) and that obtained by other evaluation systems.The grades obtained in each part of the evaluation for the final exam will be maintained during the retake exam.

Specifications for the second resit / retake exam:

The pass the subject is compulsory to obtain 5 points out of 10 in a single practical and theorical test.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents

Hours	**hours**

Unit 1 (de 5): Review of Solid Rigid and Static Issues	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	8.1

Unit 2 (de 5): Materials Resistance	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	11
Computer room practice [PRESENCIAL][Project/Problem Based Learning (PBL)]	3
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	12
Study and Exam Preparation [AUTÓNOMA][Self-study]	40.35
Final test [PRESENCIAL][Assessment tests]	1.5
Writing of reports or projects [AUTÓNOMA][Project/Problem Based Learning (PBL)]	10

Unit 3 (de 5): Hyperstatic structures calculation	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	4.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	9.15
Final test [PRESENCIAL][Assessment tests]	.5

Unit 4 (de 5): Structural Forms - Organization, design and calculation. Elasticity and plasticity	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Computer room practice [PRESENCIAL][Project/Problem Based Learning (PBL)]	4
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	2.5
Study and Exam Preparation [AUTÓNOMA][Self-study]	8.1
Final test [PRESENCIAL][Assessment tests]	.5
Writing of reports or projects [AUTÓNOMA][Project/Problem Based Learning (PBL)]	8

Unit 5 (de 5): Application of regulations to structures calculation	
Activities	**Hours**
Class Attendance (theory) [PRESENCIAL][Lectures]	8
Computer room practice [PRESENCIAL][Project/Problem Based Learning (PBL)]	12
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	20

Study and Exam Preparation [AUTÓNOMA][Self-study]	29.8
Final test [PRESENCIAL][Assessment tests]	2
Writing of reports or projects [AUTÓNOMA][Project/Problem Based Learning (PBL)]	22

Global activity	
Activities	**hours**
Computer room practice [PRESENCIAL][Project/Problem Based Learning (PBL)]	19
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	41
Final test [PRESENCIAL][Assessment tests]	4.5
Writing of reports or projects [AUTÓNOMA][Project/Problem Based Learning (PBL)]	40
Study and Exam Preparation [AUTÓNOMA][Self-study]	95.5
Class Attendance (theory) [PRESENCIAL][Lectures]	25
Total horas:	225

10. Bibliography and Sources

Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
CYPE Ingenieros	Manuales y documentación de los programas http://www.manuales.cype.es/					básica
Gordon, J. E.John E.	Estructuras: o por qué las cosas no se caen	Calamar		84-96235-06-8	2004	básica
Hispalyt	Aplicación del CTE DB SE-F a una estructura con muros de carga de ladrillo http://www.hispalyt.es/publicaciones.asp?id_cat=891					básica
Ministerio de Fomento	Código Técnico de la Edificación http://www.codigotecnico.org/		Madrid			básica
Ministerio de Fomento	EHE 08, Instrucción de hormigón estructural		MADRID		2008	
Ortiz Berrocal, Luis.	Apuntes de resistencia de materiales /	Universidad Politécnica de Madrid. Escuela Técnica		84-7484-023-6	1982	básica
Ramírez Chasco, Francisco de Asís	Cálculo de estructuras	Universidad Pública de NavarraNafarroako Unibertsi		84-95075-49-0	2001	
Salvadori, Mario	Estructuras para arquitectos	CP67		950-9575-14-3	1987	
TIMOSHENKO S.	RESISTENCIA DE MATERIALES	ESPASA CALPE, S.A.	MADRID		1976	básica
Torroja, Eduardo (1899-1961)	Razón y ser de los tipos estructurales / Eduardo Torroja Mir	Consejo Superior de Investigaciones Científicas, 2		978-84-00-08612-1	2010	
VÁZQUEZ FERNÁNDEZ, M.	RESISTENCIA DE MATERIALES					
	Números gordos en el proyecto de estructuras	Cintra Divulgación Técnica		84-932270-0-5	2008	
Mario Salvadori	Why buildings stand up : the strength of architecture	Norton & Company, 1990	New York ; London	0-393-30676-3.	1990	
Sergio Muñoz Tejada	Colección: Apuntes de estructuras. Enchiridion Structurae	Sergio Mute		978-84-617-1687-6	2019	