



## 1. General information

Course: METALLIC AND CONCRETE STRUCTURES: DESIGN AND CALCULUS  
Type: CORE COURSE  
Degree: 419 - UNDERGRADUATE DEGREE PROG. IN MECHANICAL ENGINEERING  
Center: 106 - SCHOOL OF MINING AND INDUSTRIAL ENGINEERING  
Year: 3

Main language: Spanish

Use of additional languages:  
Web site:

Code: 56320  
ECTS credits: 6  
Academic year: 2023-24  
Group(s): 56  
Duration: C2  
Second language:  
English Friendly: Y  
Bilingual: N

Lecturer: JOSE TEJERO MANZANARES - Group(s): 56

Building/Office	Department	Phone number	Email	Office hours
ElHuyar/2.05	MECÁNICA ADA. E ING. PROYECTOS	926052320	jose.tejero@uclm.es	The tutorial schedule will be published at the beginning of each semester on the bulletin board of the center.

## 2. Pre-Requisites

In order to take this subject to the maximum advantage, it is recommended that the student has achieved skills related to resolution of mechanical engineering problems, knowledge and use of the principles of strength of materials, elastic behavior of three-dimension

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

This subject prepares the student to design the steel and concrete elements of an industrial construction (or building).

## 4. Degree competences achieved in this course

## Course competences

Code	Description
CB01	Prove that they have acquired and understood knowledge in a subject area that derives from general secondary education and is appropriate to a level based on advanced course books, and includes updated and cutting-edge aspects of their field of knowledge.
CB02	Apply their knowledge to their job or vocation in a professional manner and show that they have the competences to construct and justify arguments and solve problems within their subject area.
CB03	Be able to gather and process relevant information (usually within their subject area) to give opinions, including reflections on relevant social, scientific or ethical issues.
CB04	Transmit information, ideas, problems and solutions for both specialist and non-specialist audiences.
CB05	Have developed the necessary learning abilities to carry on studying autonomously
CEM05	Knowledge and capacity to calculate and design industrial structures and constructions.
CG03	Knowledge of basic and technological subjects to facilitate learning of new methods and theories, and provide versatility to adapt to new situations.
CG04	Ability to solve problems with initiative, decision-making, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of industrial engineering.
CG06	Ability to handle specifications, regulations and mandatory standards.
CG11	Knowledge, understanding and ability to apply the necessary legislation necessary when working as an Industrial technical engineer.
CT01	Knowledge of a second language.
CT02	Knowledge and application of information and communication technology.
CT03	Ability to communicate correctly in both spoken and written form.
CT04	Knowledge of ethical commitment and professional ethics.

## 5. Objectives or Learning Outcomes

## Course learning outcomes

Description

Knowledge of the fundamentals of metal and concrete structures. How these structures work and how they are dimensioned in accordance with current legal regulations.

## 6. Units / Contents

Unit 1: Steel. The material.  
Unit 2: Ultimate Limit States of exhaustion and instability.  
Unit 3: Service Limit State.  
Unit 4: Unions.  
Unit 5: Concrete. The material.  
Unit 6: Ultimate limit states.  
Unit 7: Structural elements.

## ADDITIONAL COMMENTS, REMARKS

(P.1). Design of metal truss bars.  
(P.2). Design of pillars of different types.  
(P.3). Design of full web and alveolate beams.  
(P.4). Pillar base design.  
(P.5). Design of surface foundation elements.

## 7. Activities, Units/Modules and Methodology

Training Activity	Methodology	Related Competences (only degrees before RD 822/2021)	ECTS	Hours	As	Com	Description
Class Attendance (theory) [ON-SITE]	Lectures	CB01 CB02 CB03 CB04 CB05 CEM05 CG03 CG04 CG06 CG11 CT01 CT02 CT03 CT04	1.36	34	N		Expository method / lecture, Resolution of exercises and problems
Problem solving and/or case studies [ON-SITE]	Problem solving and exercises	CB01 CB02 CB03 CB04 CB05 CEM05 CG03 CG04 CG06 CG11 CT01 CT02 CT03 CT04	0.24	6	Y	Y	Resolution of practical cases.
Class Attendance (practical) [ON-SITE]	Practical or hands-on activities	CB01 CB02 CB03 CB04 CB05 CEM05 CG03 CG04 CG06 CG11 CT01 CT02 CT03 CT04	0.6	15	Y	Y	They will consist of the design of structural elements of industrial buildings in the lab using software specialized. The students individually prepare a memory of the practices carried out at the laboratory.
Study and Exam Preparation [OFF-SITE]	Self-study	CB01 CB02 CB03 CB04 CB05 CEM05 CG03 CG04 CG06 CG11 CT01 CT02 CT03 CT04	3.6	90	N		Project-based learning. Autonomous personal study of the student and project work supervised.
Formative Assessment [ON-SITE]	Assessment tests	CB01 CB02 CB03 CB04 CB05 CEM05 CG03 CG04 CG06 CG11 CT01 CT02 CT03 CT04	0.2	5	Y	Y	Presentation and defense of works.
Total:			6	150			
Total credits of in-class work: 2.4							Total class time hours: 60
Total credits of out of class work: 3.6							Total hours of out of class work: 90

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	70.00%	70.00%	Global individual work consisting of the resolution of type problems, design of elements of a industrial construction.
Projects	15.00%	15.00%	Elaboration of group theme and its presentation and defense.
Laboratory sessions	15.00%	15.00%	Elaboration of memory of individual practices. It will be valued work done by the student both during the performance of practices such as memory quality presented according to the script that will be provided for each practice. As it is a mandatory activity, it is a condition. It is necessary to attend the laboratory practices to be able to pass the subject. Otherwise, the rating will appear in the minutes will be FAILURE (4). Recoverable activity, that is, in the case of not attending the internships, the student may take an examination of practices. Once the practices have been approved, they will be considered as approved during two academic years. If after that time the student had not passed the subject, he must practice again.
Total:	100.00%	100.00%	

According to art. 4 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. 12.2) 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 course is designed to follow in person the lectures, the presentations of the projects, the practical sessions in the computer room, problem work sessions, etc. Attendance at 80% of the training activities is recommended.

To pass each evaluation system, you must obtain 5 points out of 10, although it is possible to compensate between the qualifications of the different systems as long as you have a minimum score of 4 points out of 10 in the part not passed.

In the event that there are special circumstances that may affect assistance, such as long-term illnesses, circumstances exceptional work or personal, etc., it is recommended to let the teaching staff know, as soon as possible, to study a personalized work plan of the subject.

**Non-continuous evaluation:**

The course is designed to follow in person the lectures, the presentations of the projects, the practical sessions in the computer room, problem work sessions, etc. Attendance at 80% of the training activities is recommended.

To pass each evaluation system, you must obtain 5 points out of 10, although it is possible to compensate between the qualifications of the different systems as long as you have a minimum score of 4 points out of 10 in the part not passed.

In the event that there are special circumstances that may affect assistance, such as long-term illnesses, circumstances exceptional work or personal, etc., it is recommended to let the teaching staff know, as soon as possible, to study a personalized work plan of the subject.

**Specifications for the resit/retake exam:**

In the extraordinary call, the same criteria indicated for the ordinary call will be followed.

**Specifications for the second resit / retake exam:**

In the extraordinary call, the same criteria indicated for the ordinary call will be followed.

9. Assignments, course calendar and important dates	
Not related to the syllabus/contents	
<b>Hours</b>	<b>hours</b>
Class Attendance (theory) [PRESENCIAL][Lectures]	34
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	6
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Formative Assessment [PRESENCIAL][Assessment tests]	5
Global activity	
<b>Activities</b>	<b>hours</b>
Class Attendance (practical) [PRESENCIAL][Practical or hands-on activities]	15
Class Attendance (theory) [PRESENCIAL][Lectures]	34
Study and Exam Preparation [AUTÓNOMA][Self-study]	90
Problem solving and/or case studies [PRESENCIAL][Problem solving and exercises]	6
Formative Assessment [PRESENCIAL][Assessment tests]	5
Total horas: 150	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
Argüelles Álvarez, R., Argüelles Bustillo, J.M., Arriaga, F., Afienza,J.R.	Estructuras de Acero, Tomo 2: Uniones y Sistemas estructurales	Bellisco	Madrid		2005	
Ministerio de Fomento	Código Técnico de la Edificación	Ministerio de Fomento			2010	
Ministerio de Fomento	Instrucción EAE	Ministerio de Fomento			2010	
Ministerio de Fomento	Estructural EHE	Ministerio de Fomento			2008	
Argüelles Álvarez, R.	Cálculo de Estructuras, Tomo II	Escuela Superior de Ingenieros de Montes	Madrid	84-600-2412-1	2015	
Calavera Ruiz, J. M.	Cálculo de Estructuras de Cimentación	INTEMAC	Madrid	84-88764-09-X	2000	
Juan Tomás Celigüeta	Curso de Análisis Estructural	EUNSA	Pamplona	84-313-1612-8	1998	
Argüelles Álvarez, R.	Cálculo de Estructuras, Tomo I	Escuela Superior de Ingenieros de Montes	Madrid	84-600-2411-3	2015	
Argüelles Álvarez, R.	La Estructura Metálica Hoy	Bellisco	Madrid	84-600-5672-4	2010	
Monfort Leonart , José	Estructuras Metálicas para Edificación	Universidad Politécnica de Valencia	Valencia	84-8363-021-4	2006	
Montoya, Messeguer y Morán	Hormigón Armado	Gustavo Gili	Barcelona	978-84-252-2307-5	2009	
Argüelles Álvarez, R.	Análisis de Estructuras	Fundación del Conde del Valle de Salazar	Madrid	84-86793-37-8	1996	
Argüelles Álvarez, R.	Cálculo de Estructuras, Tomo III	Escuela Superior de Ingenieros de Montes		84-600-4189-1	2015	
Argüelles Álvarez, R., Argüelles Bustillo, J.M., Arriaga, F., Afienza,J.R.	Estructuras de Acero, Tomo 1: Cálculo	Bellisco	Madrid		2005	
Ministerio de Transportes, Movilidad y Agenda Urbana	Código Estructural	Ministerio de Transportes, Movilidad y Agenda Urbana			2021	