

**1. General information****Course:** BRIDGE DESIGN**Type:** CORE COURSE**Degree:** 2343 - MASTERS DEGREE PROGRAMME IN ENGINEERING OF ROADS, CANALS AND PORTS**Center:** 603 - E.T.S. CIVIL ENGINEERS OF CR**Year:** 1**Main language:** Spanish**Use of additional languages:****Web site:****Code:** 310803**ECTS credits:** 4.5**Academic year:** 2021-22**Group(s):** 20**Duration:** C2**Second language:** English**English Friendly:** Y**Bilingual:** N**Lecturer:** JOSE ANTONIO LOZANO GALANT - Group(s): 20

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2. Pre-Requisites

A basic knowledge of the following topics is advised: (1) Concrete and Steel structures, (2) Materials strength, (3) Calculation of structures.

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

This subject provides the student the knowledge required to face a bridge design and construction.

4. Degree competences achieved in this course**Course competences**

Code	Description
CB07	Apply the achieved knowledge and ability to solve problems in new or unfamiliar environments within broader (or multidisciplinary) contexts related to the area of study
G04	Knowledge of the history of civil engineering and ability to analyse and assess public works in particular and the construction industry in general.
G11	Capacity for the design, execution and inspection of structures (bridges, buildings, etc.), foundation works and underground civil works (tunnels, car parks), and the assessment of their integrity.
G27	Ability to communicate in a second language.
TE02	Knowledge and capacity for structural analysis through the application of methods and programmes for the design and advanced calculation of structures, based on the knowledge and understanding of loads and their application to structural typologies in civil engineering. Ability to perform structural integrity assessments.

5. Objectives or Learning Outcomes**Course learning outcomes****Description**

Students can define the construction procedures for each of the types of bridges and building structures according to their design and materials.

Students determine the actions to be considered in the design of railroad bridges and highways, as well as in the design of building structures.

Students apply the most suitable calculation and structural analysis methods to obtain the integral response of the structure, as well as the different elements that compose it, for both static and dynamic actions applied.

6. Units / Contents**Unit 1: History of Bridges****Unit 2: Actions in bridges****Unit 3: Straight bridges****Unit 4: Box girder decks****Unit 5: Construction processes of bridges****Unit 6: Arch and frame bridges****Unit 7: Other bridge typologies****Unit 8: Technical vocabulary**

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	CB07 G04 G11 G27 TE02	1	25	N	-	
Problem solving and/or case studies [ON-SITE]	Project/Problem Based Learning (PBL)	CB07 G11 G27 TE02	0.23	5.75	Y	N	
Study and Exam Preparation [OFF-SITE]	Self-study	CB07 G04 G11 G27 TE02	0.51	12.75	N	-	
Writing of reports or projects [OFF-SITE]	Project/Problem Based Learning (PBL)	CB07 G11 G27 TE02	2.64	66	Y	N	Recoverable.
Final test [ON-SITE]	Assessment tests		0.12	3	Y	Y	Recoverable.
Total:			4.5	112.5			
Total credits of in-class work: 1.35			Total class time hours: 33.75				
Total credits of out of class work: 3.15			Total hours of out of class work: 78.75				

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
Practicum and practical activities reports assessment	30.00%	0.00%	Assignment in groups
Theoretical exam	70.00%	100.00%	The exams will preferably be done in person but if necessary virtual exams are also possible.
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:

- 1- Assignments in groups (TP)
 - 2- Exams (E). The exams will preferably be done in person but if necessary virtual exams are also possible.
- Grade: TPx0,3 + Ex0,7

Non-continuous evaluation:

Unless stated otherwise, continuous evaluation criteria will be applied to all students.

Anyone choosing non-continuous assessment must notify it to the lecturer within the class period of the subject. The option is only available if the student's participation in evaluation activities (from the continuous assessment) has not reached 50% of the total evaluation for the subject.

For the retake exam, the assessment type used for the final exam will remain valid.

The evaluation will consist of one final exam (100% grade).

Specifications for the resit/retake exam:

- 1- Assignments in groups (TP)
 - 2- Exams (E). The exams will preferably be done in person but if necessary virtual exams are also possible.
- Grade: TPx0,3 + Ex0,7.
- The passed exam or assignment in the continuous assessment are considered in this evaluation.

The passed assignments will be considered for the following course.

Specifications for the second resit / retake exam:

The same criteria of the non-continuous evaluation is applied.

9. Assignments, course calendar and important dates

Not related to the syllabus/contents	
Hours	hours
Final test [PRESENCIAL][Assessment tests]	3
Unit 1 (de 8): History of Bridges	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Study and Exam Preparation [AUTÓNOMA][Self-study]	1
Unit 2 (de 8): Actions in bridges	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	2
Writing of reports or projects [AUTÓNOMA][Project/Problem Based Learning (PBL)]	13
Unit 3 (de 8): Straight bridges	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	4
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	2

Writing of reports or projects [AUTÓNOMA][Project/Problem Based Learning (PBL)]	12
Unit 4 (de 8): Box girder decks	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	2
Writing of reports or projects [AUTÓNOMA][Project/Problem Based Learning (PBL)]	10
Unit 5 (de 8): Construction processes of bridges	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	3
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	1.75
Study and Exam Preparation [AUTÓNOMA][Self-study]	1.75
Writing of reports or projects [AUTÓNOMA][Project/Problem Based Learning (PBL)]	10
Unit 6 (de 8): Arch and frame bridges	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	2
Study and Exam Preparation [AUTÓNOMA][Self-study]	1
Writing of reports or projects [AUTÓNOMA][Project/Problem Based Learning (PBL)]	5
Unit 7 (de 8): Other bridge typologies	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	5
Study and Exam Preparation [AUTÓNOMA][Self-study]	2
Writing of reports or projects [AUTÓNOMA][Project/Problem Based Learning (PBL)]	13
Unit 8 (de 8): Technical vocabulary	
Activities	Hours
Class Attendance (theory) [PRESENCIAL][Lectures]	1
Study and Exam Preparation [AUTÓNOMA][Self-study]	1
Writing of reports or projects [AUTÓNOMA][Project/Problem Based Learning (PBL)]	3
Global activity	
Activities	hours
Class Attendance (theory) [PRESENCIAL][Lectures]	25
Problem solving and/or case studies [PRESENCIAL][Project/Problem Based Learning (PBL)]	5.75
Study and Exam Preparation [AUTÓNOMA][Self-study]	12.75
Writing of reports or projects [AUTÓNOMA][Project/Problem Based Learning (PBL)]	66
Final test [PRESENCIAL][Assessment tests]	3
Total horas: 112.5	

10. Bibliography and Sources						
Author(s)	Title/Link	Publishing house	Citv	ISBN	Year	Description
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Strasky, J.	DESIGNING AND CONSTRUCTING PRESTRESSED BRIDGES			9780727763853	2021	
ARENAS, J.J.; APARICIO, A.C.	Estribos de puentes de tramo recto				1984	
APARICIO, A.C.; CASAS, J.R.	Curso de Puentes				2000	
España. Dirección General de Carreteras	IAP : Instrucción sobre las acciones a considerar en el proy	Ministerio de Fomento		84-498-0348-9	2003	
HAMBLY, E	Bridge Deck Behaviour	Chapman and Hall	London	0-419-17260-2	1991	
LEONHARDT, F	Bridges. Aesthetics and Design	Deutsche Verlags-Anstalt	Stuttgart		1982	
MANTEROLA, J	Puentes					
MATHIVAT, J	he Cantilever Construction of Prestressed Concrete Bridges	John Wiley and Sons Ltd			1983	
MENN, C.	Prestressed concrete bridges	Birkhäuser Verlag		3-7643-241	1990	
WALTHER, R	Cable Styed Bridges	Thomas Thelford		0727727737	1999	
WITTFOHT, HANS	Building bridge : history, technology, construction	Dusselfort : Beton-verlag		3-7640- 0176-3	1984	
	Ejemplos de aplicación de la IAPF-07	ACHE, Asociación Científico-Técnica del Hormigó		978-84-89670-65-5	2009	
	NCSE	ACHE, Asociación Científico-Técnica del Hormigó		978-84-89670-65-5	2009	