



UNIVERSIDAD DE CASTILLA - LA MANCHA

GUÍA DOCENTE

1. General information

Course: BUILDING AND PREFABRICATION

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: English

Use of additional languages:

Web site:

Code: 310802

ECTS credits: 4.5

Academic year: 2019-20

Group(s): 20

Duration: First quarter

Second language: Spanish

English Friendly: N

Bilingual: N

Lecturer: JOSE ANTONIO LOZANO GALANT - Group(s): 20

| Building/Office | Department | Phone number | Email | Office hours |
|---------------------------|--------------------------------------|--------------|----------------------------|---|
| Edificio Politécnica/A-62 | INGENIERÍA CIVIL Y DE LA EDIFICACIÓN | 3277 | joseantonio.lozano@uclm.es | Se concretará con los alumnos al principio del curso. |

2. Pre-Requisites

A basic knowlegde of the following topics is advised: (1) Concrete and Steel structures, (2) Geotechnical Engineering, (3) Materials strength, (4) Calculation of structures.

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

In this holistic and skills focused course students will gain the skills to work in an architectural practice or building design company. Students will learn how to design and calculate the main structural typologies in buildings (such as beams, trusses, frames, cables or arches). To do so, firstly they will draw sketches and perform hand calculations to address the structural behavior of the main building elements (columns, slabs, beams, pads, piles...). This information will be used to check the calculations obtained by Building Information Modelling (BIM) simulation software.

4. Degree competences achieved in this course

Course competences

| Code | Description |
|------|---|
| CB06 | Possess and understand knowledge that provides a basis or opportunity to be original in the development and / or application of ideas, often in a research context. |
| 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 |
| CB08 | Be able to integrate knowledge and face the complexity of making judgments based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities linked to the application of knowledge and judgments |
| CB09 | Know how to communicate the conclusions and their supported knowledge and ultimate reasons to specialized and non-specialized audiences in a clear and unambiguous way |
| CB10 | Have the learning skills which allow to continue studying in a self-directed or autonomous way |
| G01 | Scientific-technical and methodological capacity for the continuous recycling of knowledge and the exercise of the professional functions of consultancy, analysis, design, calculation, project, planning, leadership, management, construction, maintenance, conservation and exploitation in the fields of civil engineering. |
| G02 | Understanding of the multiple technical, legal and property constraints that arise in the design of a public work, and the capacity to establish different valid alternatives, to choose the optimum one and to express it adequately, anticipating the problems of its construction, and using the most suitable methods and technologies, both traditional and innovative, with the aim of achieving the greatest efficiency and promoting the progress and development of a sustainable and respectful society with the environment. |
| G03 | Knowledge, understanding and ability to apply the necessary legislation in the exercise of the profession of Civil Engineer. |
| G04 | Knowledge of the history of civil engineering and ability to analyse and assess public works in particular and the construction industry in general. |
| G05 | Knowledge of the Civil Engineering profession and the activities that can be carried out in the field of civil engineering. |
| 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. |
| G19 | Knowledge of the latest developments and applications of technology to civil engineering in all its fields, as well as its new challenges. |
| G20 | Ability to choose between construction alternatives and public works management, anticipating the effects derived from the option assumed. |
| G25 | Ability to identify, measure, enunciate, analyse, diagnose and scientifically and technically describe a civil engineering problem |
| G27 | Ability to communicate in a second language. |
| G28 | Ability to work in an international context. |
| 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. |
| TE03 | Knowledge of all types of structures and their materials, and ability to design, project, execute and maintain civil engineering structures and buildings. |

5. Objectives or Learning Outcomes

Course learning outcomes

Description

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.

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.

6. Units / Contents

Unit 1: Actions in buildings

Unit 2: Structural systems for vertical loads

Unit 3: Structural systems for horizontal loads

Unit 4: Building Information Modelling

Unit 5: Design and Calculation of building elements

Unit 6: Construction of buildings

7. Activities, Units/Modules and Methodology

| Training Activity | Methodology | Related Competences | ECTS | Hours | As | Com | R | Description |
|---|--|--|---|--------------|----|-----|---|-------------|
| Class Attendance (theory) [ON-SITE] | Cooperative / Collaborative Learning | CB06 CB08 CB10 G01 G02 G03 G04 G05 G11 G19 G20 G27 G28 TE02 TE03 | 0.64 | 16 | N | - | - | |
| Class Attendance (practical) [ON-SITE] | Project/Problem Based Learning (PBL) | CB07 CB08 CB09 CB10 G01 G03 G11 G25 G27 G28 TE02 TE03 | 0.44 | 11 | N | - | - | |
| Writing of reports or projects [OFF-SITE] | Problem solving and exercises | CB07 CB08 CB09 CB10 G01 G02 G03 G04 G05 G11 G25 G27 G28 TE02 TE03 | 1.52 | 38 | Y | Y | Y | |
| Computer room practice [ON-SITE] | Work with simulators | CB07 CB09 CB10 G11 G25 G27 G28 TE02 TE03 | 0.08 | 2 | Y | Y | N | |
| Scientific paper reading and review [OFF-SITE] | Reading and Analysis of Reviews and Articles | CB06 CB07 CB08 CB09 CB10 G01 G02 G04 G05 G11 G19 G20 G27 G28 TE02 TE03 | 0.08 | 2 | Y | N | N | |
| In-class Debates and forums [ON-SITE] | Cooperative / Collaborative Learning | CB06 CB08 CB09 G05 G20 TE02 TE03 | 0.06 | 1.5 | Y | N | Y | |
| Study and Exam Preparation [OFF-SITE] | Self-study | CB06 CB07 CB08 CB09 CB10 G01 G02 G03 G04 G05 G11 G19 G20 G25 G27 G28 TE02 TE03 | 1.56 | 39 | Y | N | Y | |
| Progress test [ON-SITE] | Assessment tests | CB06 CB07 CB08 CB09 CB10 G01 G02 G03 G04 G05 G11 G19 G20 G25 G27 G28 TE02 TE03 | 0.04 | 1 | Y | N | Y | |
| Final test [ON-SITE] | Assessment tests | CB06 CB07 CB08 CB09 CB10 G01 G02 G03 G04 G05 G11 G19 G20 G25 G27 G28 TE02 TE03 | 0.08 | 2 | Y | N | Y | |
| Total: | | | 4.5 | 112.5 | | | | |
| Total credits of in-class work: 1.34 | | | Total class time hours: 33.5 | | | | | |
| Total credits of out of class work: 3.16 | | | Total hours of out of class work: 79 | | | | | |

As: Assessable training activity

Com: Training activity of compulsory overcoming

R: Rescheduling training activity

8. Evaluation criteria and Grading System

| Evaluation System | Grading System | | Description |
|---|----------------|--------------------|-------------|
| | Face-to-Face | Self-Study Student | |
| Practicum and practical activities reports assessment | 60.00% | 0.00% | |
| Test | 40.00% | 0.00% | |
| Total: | 100.00% | 0.00% | |

Evaluation criteria for the final exam:

Assignments: 60%

Exams: 40%

Class participation: +10% (minimum grade=5.0)

Specifications for the resit/retake exam:

Assignments: 60%

Exams: 40%

| 9. Assignments, course calendar and important dates | |
|--|--------------|
| Not related to the syllabus/contents | |
| Hours | hours |
| Progress test [PRESENCIAL][Assessment tests] | 1 |
| Final test [PRESENCIAL][Assessment tests] | 2 |
| Unit 1 (de 6): Actions in buildings | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Cooperative / Collaborative Learning] | 2 |
| Class Attendance (practical) [PRESENCIAL][Project/Problem Based Learning (PBL)] | 1 |
| Writing of reports or projects [AUTÓNOMA][Problem solving and exercises] | 5 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 5 |
| Unit 2 (de 6): Structural systems for vertical loads | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Cooperative / Collaborative Learning] | 3.5 |
| Class Attendance (practical) [PRESENCIAL][Project/Problem Based Learning (PBL)] | 2 |
| Writing of reports or projects [AUTÓNOMA][Problem solving and exercises] | 10 |
| Scientific paper reading and review [AUTÓNOMA][Reading and Analysis of Reviews and Articles] | 1 |
| In-class Debates and forums [PRESENCIAL][Cooperative / Collaborative Learning] | 1 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 8 |
| Unit 3 (de 6): Structural systems for horizontal loads | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Cooperative / Collaborative Learning] | 2 |
| Class Attendance (practical) [PRESENCIAL][Project/Problem Based Learning (PBL)] | 1 |
| Writing of reports or projects [AUTÓNOMA][Problem solving and exercises] | 8 |
| Scientific paper reading and review [AUTÓNOMA][Reading and Analysis of Reviews and Articles] | 1 |
| In-class Debates and forums [PRESENCIAL][Cooperative / Collaborative Learning] | .5 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 6 |
| Unit 4 (de 6): Building Information Modelling | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Cooperative / Collaborative Learning] | 1.5 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 3 |
| Unit 5 (de 6): Design and Calculation of building elements | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Cooperative / Collaborative Learning] | 5.5 |
| Class Attendance (practical) [PRESENCIAL][Project/Problem Based Learning (PBL)] | 7 |
| Writing of reports or projects [AUTÓNOMA][Problem solving and exercises] | 15 |
| Computer room practice [PRESENCIAL][Work with simulators] | 2 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 14 |
| Unit 6 (de 6): Construction of buildings | |
| Activities | Hours |
| Class Attendance (theory) [PRESENCIAL][Cooperative / Collaborative Learning] | 1.5 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 3 |
| Global activity | |
| Activities | hours |
| Class Attendance (practical) [PRESENCIAL][Project/Problem Based Learning (PBL)] | 11 |
| Writing of reports or projects [AUTÓNOMA][Problem solving and exercises] | 38 |
| Computer room practice [PRESENCIAL][Work with simulators] | 2 |
| Scientific paper reading and review [AUTÓNOMA][Reading and Analysis of Reviews and Articles] | 2 |
| In-class Debates and forums [PRESENCIAL][Cooperative / Collaborative Learning] | 1.5 |
| Class Attendance (theory) [PRESENCIAL][Cooperative / Collaborative Learning] | 16 |
| Study and Exam Preparation [AUTÓNOMA][Self-study] | 39 |
| Progress test [PRESENCIAL][Assessment tests] | 1 |
| Final test [PRESENCIAL][Assessment tests] | 2 |
| Total horas: 112.5 | |

| 10. Bibliography and Sources | | | | | | |
|------------------------------|--|---------------------|------|------|------|-------------|
| Author(s) | Title/Link | Publishing house | Citv | ISBN | Year | Description |
| C.H. Goodchild | Economic Concrete Frame Elements to Eurocode 2 | Reinforced Concrete | | | 2009 | |
| C.H. Goodchild | Economic Frame Elements | Reinforced Concrete | | | 2000 | |
| CALAVERA, J. | Cálculo de estructuras de cimentación | INTEMAC | | | 1991 | |
| CALAVERA, J. | Cálculo, construcción y patología de forjados de edificación | INTEMAC | | | 1998 | |
| CALAVERA, J. | Muros de contención y muros de sótano | INTEMAC | | | 1990 | |
| CALAVERA, J. | Proyecto y cálculo de estructuras de hormigón. Tomos I y II | INTEMAC | | | 1999 | |

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|-------------------------------------|--|------------------------------------|------|
| JIMÉNEZ MONTOYA, MASAGUER, MORÁN | Hormigón armado | Gustavo Gil | 2000 |
| MURCIA, A. AGUADO, A. MARÍ | Hormigón armado y pretensado | Ediciones UPC/Serie Politext | 1993 |
| Eastman, C, et al, | Código Técnico de la Edificación. Ministerio de la Vivienda, Madrid. Eurocódigo 1. Acciones en estructuras. AENOR, Madrid Eurocódigo 2. Proyecto de estructuras de hormigón. Parte 1: Reglas generales y para edificación AENOR, Madrid. BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors Instrucción EHE de Hormigón Estructural. Ministerio de Fomento, Servicio de publicaciones, Madrid NCSE. Norma de construcción Sismorresistente. Parte general y de edificación | | 2015 |