

**Información del Plan Docente**

<b>Academic Year</b>	2017/18
<b>Faculty / School</b>	110 - Escuela de Ingeniería y Arquitectura
<b>Degree</b>	434 - Bachelor's Degree in Mechanical Engineering
<b>ECTS</b>	6.0
<b>Year</b>	4
<b>Semester</b>	Second semester
<b>Subject Type</b>	Optional
<b>Module</b>	---

**1.General information****1.1.Introduction****1.2.Recommendations to take this course****1.3.Context and importance of this course in the degree****1.4.Activities and key dates****2.Learning goals****2.1.Learning goals****2.2.Importance of learning goals****3.Aims of the course and competences****3.1.Aims of the course****3.2.Competences****4.Assessment (1st and 2nd call)****4.1.Assessment tasks (description of tasks, marking system and assessment criteria)****5.Methodology, learning tasks, syllabus and resources****5.1.Methodological overview**

The methodology followed in this course is oriented towards achievement of the learning objectives. It is based on participation and the active role of the student favors the development of communication and decision-making skills. A wide range of teaching and learning tasks are implemented, such as lectures, guided assignments, laboratory sessions, autonomous work, and tutorials.

Students are expected to participate actively in the class throughout the semester.

## 29741 - Concrete Structures

Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

Further information regarding the course will be provided on the first day of class.

### 5.2.Learning tasks

The course includes 6 ECTS organized according to:

- Lectures (1.2 ECTS): 30 hours.
- Laboratory sessions (1.2 ECTS): 30 hours.
- Guided assignments (0.8 ECTS): 20 hours.
- Autonomous work (2.6 ECTS): 65 hours.
- Tutorials (0.2 ECTS): 5 hours.

Lectures: the professor will explain the theoretical contents of the course and solve illustrative applied problems. These problems and exercises can be found in the problem set provided at the beginning of the semester. Lectures run for 3 weekly hours. Although it is not a mandatory activity, regular attendance is highly recommended.

Laboratory sessions: sessions will take place every 2 weeks (6 sessions in total) and last 2.5 hours each. Students will work together in groups actively doing tasks such as practical demonstrations, measurements, calculations, and the use of graphical and analytical methods.

Guided assignments: students will complete assignments, problems and exercises related to concepts seen in laboratory sessions and lectures. They will be submitted at the beginning of every laboratory sessions to be discussed and analyzed. If assignments are submitted later, students will not be able to take the assessment test.

Autonomous work: students are expected to spend about 65 hours to study theory, solve problems, prepare lab sessions, and take exams.

Tutorials: the professor's office hours will be posted on Moodle and the degree website to assist students with questions and doubts. It is beneficial for the student to come with clear and specific questions.

### 5.3.Syllabus

1. Introduction to reinforced concrete
2. Components of concrete
3. Properties of concrete
4. Basis for calculation. Structural safety
5. Ultimate limit states under axial forces and bending moments
6. Instability due to compression
7. Ultimate limit states under shear forces and torsional moments
8. Detailing of reinforcement

9. Serviceability limit states
10. Retaining wall
11. Structural walls
12. Concrete plates and slabs
13. Concrete shells

### 5.4.Course planning and calendar

For further details concerning the timetable, classroom and further information regarding this course please refer to the "Escuela de Ingeniería y Arquitectura " website (<https://eina.unizar.es/>)

### 5.5.Bibliography and recommended resources

[BB: Basic Bibliography / BC: Additional Bibliography]

- [BB] 1. Jimenez Montoya, Pedro. Hormigón armado / Pedro Jiménez Montoya, Álvaro García Meseguer, Francisco Morán Cabré . - 14ª ed., 4ª tirada Barcelona : Gustavo Gili, 2007
- [BB] 2. Gracia Villa, Luis. Estructuras de hormigón armado Luis Gracia Villa, Elena Ibarz Montaner . [S.l.] [s.n.] D.L. 2011
- [BB] 3. España. Ministerio de la Vivienda. Código Técnico de la Edificación (CTE) : Real Decreto 314 /2006, de 17 de marzo por el que se aprueba el Código Técnico de la Edificación / Ministerio de Vivienda. - 1ª ed. Madrid : Boletín Oficial del Estado : Ministerio de Vivienda, 2006
- [BB] 4. CTE-SE : seguridad estructural, acciones en la edificación : aplicación a edificios de uso residencial vivienda-DAV [Madrid] : Consejo Superior de los Colegios de Arquitectos de España, D.L. 2006
- [BB] 6. Eurocódigo 1: Bases de proyecto y acciones en estructuras. Parte 3, Acciones del tráfico en puentes / AENOR Madrid : AENOR, D.L. 1998
- [BB] 7. Eurocódigo 2: Proyecto de estructuras de hormigón. Parte 1 1, Reglas generales y reglas para edificación / AENOR Madrid : AENOR, D.L. 1993
- [BB] España. Ministerio de Fomento. : EHE-08 : Instrucción de hormigón estructural : Real Decreto 1247/2008 de 18 de julio. 1ª ed., 1ª imp. Madrid : Garceta, D. L. 2009
- [BB] España. Ministerio de Fomento. EHE-08 : Instrucción de hormigón estructural : Con comentarios de los miembros de la Comisión Permanente del Hormigón / Ministerio de Fomento. 3ª ed. Madrid : Ministerio de Fomento, Secretaría General Técnica, 2009

URL list

- Documento Básico SE-AE. Seguridad Estructural. Acciones en la Edificación  
[[http://www.codigotecnico.org/cte/export/sites/default/web/galerias/archivos/DB\\_SE-AE\\_abril\\_2009.pdf](http://www.codigotecnico.org/cte/export/sites/default/web/galerias/archivos/DB_SE-AE_abril_2009.pdf)]
- Documento Básico SE. Seguridad Estructural (2009)  
[[http://www.codigotecnico.org/cte/export/sites/default/web/galerias/archivos/DB\\_SE\\_abril\\_2009.pdf](http://www.codigotecnico.org/cte/export/sites/default/web/galerias/archivos/DB_SE_abril_2009.pdf)]