



Universitat de Lleida

DEGREE CURRICULUM **STRUCTURES 3**

Coordination: CASTRO CHICOT, JOSE RAMON

Academic year 2017-18

Subject's general information

Subject name	STRUCTURES 3			
Code	101418			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Typology	Modality
	Bachelor's Degree in Architectural Technology	3	COMPULSORY	Attendance-based
	Bachelor's Degree in Building Engineering	3	COMPULSORY	Attendance-based
ECTS credits	6			
Groups	1GG			
Theoretical credits	4.8			
Practical credits	1.2			
Coordination	CASTRO CHICOT, JOSE RAMON			
Department	ENGINYERIA AGROFORESTAL			
Teaching load distribution between lectures and independent student work	60 hours of attendance class plus 90 hours of autonomous work.			
Important information on data processing	Consult this link for more information.			
Language	Català			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
CASTRO CHICOT, JOSE RAMON	jrcastro@eagrof.udl.cat	6	Monday 15-16h. Office 1.09. CREA Building.

Subject's extra information

The course includes the abstract problem of behavior of nodes and bars that define a portal building and their realization by supports, beams, floors, basement walls...in short, a reinforced concrete structure that can be calculated to be built.

Subject to be taken in the 1st semester of the 3rd year of teaching. It belongs to the module "Specific training", specifically in the field "Structure and facilities of the building."

Learning objectives

- Explain the most important chapters of the current instruction in mass, reinforced and prestressed concrete EHE08: Combinations load, ELU and ELS.
- Calculate and verify a composed bending and cutting a column of reinforced concrete.
- Calculate and verify a simple bending a beam of reinforced concrete.
- Calculate and verify a shear a beam of reinforced concrete.
- Calculate and verify a slab of reinforced concrete (unidirectional)
- Calculate and verify a slab of reinforced concrete (unidirectional, beams prestressed)
- Reinforce and drawing steel bars that form a frame of reinforced concrete.

Competences

Strategic competences of the University of Lleida

- **UdL 3.** Mastering TIC

Degree-transversal competences

- **EP S7.** Ability to plan and organise the personal work.
- **EP S8.** Ability to work in situations where information is lacking or you are under pressure.

Degree-specific competences

- **GEE21.** Ability to apply the technical rules to the building process and generate documents of technical specifications of the construction procedures and methods of the buildings.
- **GEE22.** Aptitude for the predimensioning, design, calculation and checking of structures and for the direction of their material execution.
- **GEE23.** Ability to constructively develop the installations of a building, control and plan their execution and verify the service and reception trials as well as those regarding maintainance.

Subject contents

T1.-Introduction to EHE08.

T2.-The mechanical properties of concrete and reinforcing steel.

T3.-The durability of the structure. ELU of durability.

T4.-Actions and combinations of actions in the building according to CTE-DB-AE and EHE08.

T5.-Introduction to structural safety according to CTE-DB-SE and EHE08.

T6.-Predimensioning of reinforced concrete frames.

T7.-Formwork in the building. The critical phase of the structure.

T8.-Calculus and vertical reinforced concrete structural elements according to EHE08: columns.

T9.-Calculus and horizontal reinforced concrete structural elements according to EHE08: beams and prestressed one-way slabs (unidirectional frameworks).

T10.-Instantaneous and delayed deflection in building. ELS.

T11.-Surface-foundation. Centered and eccentric footing. Centering beams.

T12.-Containment elements. Actions, analysis, dimensioning and assembly of reinforced concrete walls and basement cantilever according CTE-DB-C and EHE08.

Methodology

Master Class. PowerPoint presentations and blackboard work to introduce matter of course.

Exercices. Planning and problem solving during the practice sessions. Labor board.

Workgroup - practice. Once explained the necessary material, students will form groups of two people, to develop their work. This work will be supervised by the teacher.

Development plan

Week	Methodology	Temary	Classroom hours	Individual work hours
1	Master class	T1.- Introduction to EHE08. T2.- The mechanical properties of concrete and reinforcing steel.	2 2	6
2	Master class	T2.- The mechanical properties of concrete and reinforcing steel. T3.- The durability of the structure. ELU of durability.	2 2	6

3	Master class	T4.- Actions and combinations of actions in the building according to CTE-DB-AE and EHE08.	2	6
	Exercises	T4.- Actions and combinations of actions in the building according to CTE-DB-AE and EHE08.	2	
4	Master class	T5.- Introduction to structural safety according to CTE-DB-SE and EHE08.	4	6
5	Master class	T6.- Predimensioning of reinforced concrete frames.	2	6
	Exercises	T6.- Predimensioning of reinforced concrete frames.	2	
6	Master class	T7.- -Formwork in the building. The critical phase of the structure.	2	6
	Master class	T8.- Calculus and vertical reinforced concrete structural elements according to EHE08: columns.	2	
7	Exercises	T8.- Calculus and vertical reinforced concrete structural elements according to EHE08: columns.	4	6
8	Master class	T9.- Calculus and horizontal reinforced concrete structural elements according to EHE08: beams and prestressed one-way slabs (unidirectional frameworks).	4	6
9	PA1. Written exam			
10	Exercises	T9.- Calculus and horizontal reinforced concrete structural elements according to EHE08: beams and prestessed one-way slabs (unidirectional frameworks).	4	6
11	Exercises	T9.- Calculus and horizontal reinforced concrete structural elements according to EHE08: beams and prestessed one-way slabs (unidirectional frameworks).	2	6
	Master class	T10.- Instantaneous and delayed deflection in building. ELS.	2	
12	Exercises	T10.- Instantaneous and delayed deflection in building. ELS.	4	6
13	Master class	T11.- Surface-foundation. Centered and eccentric footing. Centering beams.	4	6

14	Exercises	T11. - Surface-foundation. Centered and eccentric footing. Centering beams.	2	6
	Master class	T12. - Containment elements. Actions, analysis, dimensioning and assembly of reinforced concrete walls and basement cantilever according CTE-DB-C and EHE08.	2	
15	Master class	T12. - Containment elements. Actions, analysis, dimensioning and assembly of reinforced concrete walls and basement cantilever according CTE-DB-C and EHE08.	2	6
	Exercises	T12. - Containment elements. Actions, analysis, dimensioning and assembly of reinforced concrete walls and basement cantilever according CTE-DB-C and EHE08.	2	

Evaluation

Evaluation activities	%	Dates
PA 1. Evaluation 1	41	Week 9
PA 2. Evaluation 2	41	Weeks 16 and 17
Practice nº1	6	Along the course
Practice nº2	6	Along the course
Practice nº3	6	Along the course
Examination recovery	50	Week19

Guidelines for the evaluation of the course.

- The course is overcome with final 5.

Note exams:

- In weeks 9 and 16 / 17a evaluation tests programmed are realized (written examinations) PA1 and PA2. The test PA1 has a weight of 41% and the second test PA2 has a weight of 41% of the final mark the subject.
- The evaluations do not eliminate material covered.
- Following the guidelines of the Framework Academic Degrees of EPS in the 19th week can be recovered subject. The recovery will be through a written exam on the whole subject. The maximum score is 5. This evaluation recovery, notes practices are not taken into account.

Note exercises:

- Practices Nº1, Nº2 and Nº3 will be done in groups of two people.They have a weight of 18% of the final mark.
- The practices can not be recovered.

- The realization of all the practices by the student is mandatory. The student must solve practices delivered in paper format. Failure of a practice or the delivery out of time, involved note 0 in the practice concerned.

Bibliography

Theoretical foundations:

- Garcia Meseguer, A; Moran Cabre, F; Arroyo, JC; Jiménez Montoya. Hormigón Armado. 15ª edición. Gustavo Gili. Barcelona 2010.
- Rodriguez Val, J; Estructuras de la edificación. Hormigón Estructural. Editorial Club Universitario. Alicante 2010.
- Garcia Meseguer, A; Hormigón Armado. 3 vols. Uned. Madrid 2001.

Codes and instructions:

- CTE. Ministerio de Fomento. 2006.
- Instrucción de Hormigón Estructural EHE08. Ministerio de Fomento. 2008.

Exercises solved:

- Agullo, L; Aguado, A; Mari, A; Martinez F; Cobo, D; Hormigón armado y pretensado.Ejercicios. Edicions UPC. Politex 75. 1999.
- Bonet Senach, J.L; Castro Bugallo, M^aC; Fernández Prada, M.A; Martí Vargas, J.R; Miguel Sosa, P; Navarro Gregori, J; Pallares Rubio, L; Cálculo de secciones y elementos estructurales de hormigón. 2 vols. Editorial Universitat Politècnica de València. 2011.
- Martinez Sierra, E; Liébana Carrasco, O; Martin Escudero, A; Cálculo y dimensionado de elementos de hormigón: Aplicación de EHE08. CEU Ediciones. Madrid 2010.

Control and execution of work:

- Montero Fernández, E; Puesta en obra del hormigón. Consejo General de Arquitectura Técnica de España. 2006.
- Medina Sánchez, E; Construcción de estructuras de hormigón armado en edificación. Bellisco.Madrid. 2009.