Universitat de Lleida

DEGREE CURRICULUM

STRUCTURES 3

Academic year 2015-16

2015-16

Subject's general information

Subject name	Structures 3
Code	101418
Semester	1r Q Avaluació Continuada
Typology	Obligatòria
ECTS credits	6
Theoretical credits	4.8
Practical credits	1.2
Department	Enginyeria Agroforestal
Modality	Presencial
Important information on data processing	Consult this link for more information.
Language	Català
Degree	Degree in Architectural Technology
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Subject's extra information

Building structures need solid foundations -resistance materials, structures theory- and design. Currently, we can see a certain distance between structural design and intuition. Necessarily, 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.

Learning objectives

-That the student can perform a calculation of a reinforced concrete structure building with security, that doesn't mean accuracy. The structures of real work must be safe; never exact.

-That the student understand that this departure work -about 30% - it is crucial for the formal setting of the architectural project. The structure is the support of architectural form: its reason d'être.

-That the student to understand that a structure is not only a problem of numerical calculation. Actually it's a question of know how to build it. Therefore, it's a technical issue, not a scientific problem, especially if the structure is built with reinforced concrete.

Competences

University of Lleida strategic competences

- Master Information and Communication Technologies.

Degree-specific competences

- Ability to apply the technical rules to the building process and generate documents of tecnhical specifications of the construction procedures and methods of the buildings.
- Aptitude for the predimentioning, design, calculation and checking of structures and for the direction of their material execution.
- 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.
- Aptitude to apply the specific rules about installations to the building process.

Degree-transversal competences

- Ability to pan and organise the personal work.
- Ability to work in situations where information is lacking or you are under pressure.

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 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 prestessed 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

See Development plan

Development plan

September. Class 1

- Presentation of the subject.
- Properties of concrete and steel.

September. Class 2

- The durability of the concrete structure.

September. Class 3

- Introduction to structural safety.

October. Class 4

- Predimensionat bar reinforced concrete building that formalized a frame.

October. Class 5

- The formwork construction.

October. Class 6

- Introduction to calculation in ELU.

October. Class 7

- Deformation domains.

October. Class 8

- Deformation domains.

October. Class 9

- Concrete Columns.Translational and intraslacionals structures

October. Class 10

- Concrete Columns. Buckling. Reinforcement and disposal.

October. Class 11

- Concrete Columns. Biased bending.

November. Class 12

- Beams.Simple bending.

November. Class 13

- Beams. Reinforcement and disposal.

Evaluation 1

November.Class 14

- Beams. Shearing stress.
- Practice 1.

Novembre. Class 15

- Beams. Shearing stress.

Novembre. Class 16

- Isolated footing.
- Practice 2.

Novembre. Class 17

- Deformations in horizontal elements. ELS.

Desembre. Class 18

- The prestressed concrete slabs in the building.

Desembre. Class 19

- Moment bending positive in a prestressed beam
- Practice 3.

Desembre. Class 20

- Moment bending positive in a prestressed plate

Desember. Class 21

- Calculation of structural floor prestressed according EHE 08
- Calculation of structural plate prestressed according EHE 08

Desember. Class 22

- Earth retaining structures. Concrete walls in situ.
- Earth pressure.

January. Class 23

- Calculation on a cantilever wall according EHE08.
- Calculation of a basement wall according EHE08.

Evaluation

Evaluation activities	%	Dates
AV 1. Evaluation 1	40	Week 9
AV 2. Evaluation 2	45	Weeks 16 and 17
Practice nº1	5	See development plan
Practice nº2	5	See development plant
Practice nº3	5	See development plan
Examination recovery	55	Week19

Guidelines for the evaluation of the course.

- The course is overcome with final 5.

Note exams:

- In weeks 9 and 16 / 17a performed evaluation tests programmed (written exams AV1, AV2). The test AV1 has a weight 40% and test AV 2 has a weight 45% on the mark end of the course.
- Practices No.1, No.2 and No.3 are obligatory and they have a weight 15% of the final mark for the course.
- Evaluations don't eliminate material covered.
- Following the guidelines of the Framework Academic Degrees of EPS in the 19th week can be recovered subject.For exam-show recovery is required meet the following points:a) Have presented the three practices and have approved. b) Have achieved a grade equal to or greater than 3, through continuous evaluation. c) The recovery will be through a written examination of the whole subject. The maximum score is 5,5. d) This evaluation recovery notes practices are not taken into account.

Bibliography

Recommended 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.

- Calavera Ruiz, J; Proyecto y càlculo de estructuras de hormigón en masa, armado y pretensado. Intemac SA. Madrid 2008.

- Garcia Meseguer, A; Hormigón Armado. 3 volums. Uned. Madrid 2001.

- Murcia Vela, J; Aguado A; Mari, A; Hormigón armado y pretensado I, II. Edicions UPC.Politex 14, 15. Barcelona 1991.

- Paez, A; Hormigón Armado. Reverté. 1986.

Codes and instructions:

- CTE. Ministerio de Fomento. 2006.

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

- Documento de aplicación de la EHE08 a edificación. Consejo Superior de Colegios de Arquitectos de España. 2009.

Exercises solved:

- Serrano Lopez; M.A.; Lopez Castrillo, M.A; Diseño de elementos de hormigón armado. Problemas resueltos de acuerdo con EHE. Bellisco Editorial. Madrid 2002.

- Agullo, L; Aguado, A; Mari, A; Martinez F; Cobo, D; Hormigón armado y pretensado.Ejercicios. Edicions UPC. Politex 75. 1999.

- ACHE. Manual de ejemplos de aplicación de la EHE a la edificación. Monografia M4. ACHE 2001.

-Bonet Senach, J.L; Castro Bugallo, MªC; 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 volums. 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.