

Course guide

310714 - 310714 - Construction of Structures

Last modified: 08/02/2024

Unit in charge: Barcelona School of Building Construction
Teaching unit: 753 - TA - Department of Architectural Technology.

Degree: BACHELOR'S DEGREE IN ARCHITECTURAL TECHNOLOGY AND BUILDING CONSTRUCTION (Syllabus 2019).
(Compulsory subject).

Academic year: 2023 **ECTS Credits:** 4.5 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: Ruiz Gandullo, Javier

Others: Capella Llovera, Joaquim
Anguera de Carlos, Enric

PRIOR SKILLS

Construction basics (equipment and processes)
Material mechanical properties knowledge (masonry, wood, steel shapes and plates, concrete and reinforcement)
Basic knowledge of statistics, physics, mechanics and structural analysis and design

REQUIREMENTS

Knowledge in construction. construction equipment and construction procedures
General knowledge materials properties (masonry, wood, steel, concrete and reinforcement)
Basic knowledge of structure analysis and design
Interpretation and knowledge of construction codes

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. FE-5 Ability to adapt the construction materials to the typology and use of the building, manage and run the receipt and quality control of the materials, its implementation in the construction, the control of execution of the construction units and the realization of trials and final tests.
2. FE-7 Ability to identify the constructive elements and systems, define its function and compatibility, and its implementation to construction in the construction process. Plan and solve constructive details.
3. FE-8 Knowledge of specific procedures for the material execution control of the construction.

Transversal:

4. TEAMWORK - Level 2. Contributing to the consolidation of a team by planning targets and working efficiently to favor communication, task assignment and cohesion.

TEACHING METHODOLOGY

The face-to-face, directed and autonomous methods will be combined. With the combination of the three methods, the levels of knowledge, comprehension, application, analysis, synthesis and evaluation required for professional practice should be achieved.

In the classroom method, special attention will be paid to the aspects of clarity, precision and order by the teaching staff. They will be done with the whole group (large group), and the teacher will develop the topics of the course in the classroom and the students will have been advanced the necessary documentation in ATENEA to prepare the class and get better monitoring of the explanations.

Practical exercises will also be proposed in classroom and will be completely solved individually or small group. Once the exercise is over, professor will solve main exercise aspects. Students will complete it individually or in groups with a compulsory solution delivery by ATENEA for grading.

The PUZZLE (medium group) practice will be developed in classroom. In addition to achieving specific objectives, they will also develop cooperative learning techniques in the classroom.

There will also be two theoretical / practical examinations that will be solved individually.

LEARNING OBJECTIVES OF THE SUBJECT

Upon course completion, student should be able to:

- Determine purpose and function of structural elements.
- Explain structural elements construction process and phases.
- Link structural elements with the optimal materials for their construction.
- Incorporate formwork and construction equipment.
- Incorporate sustainability in construction.
- Define and know properties of structural elements.
- Identify different construction systems and subsystems of different structures.
- Appropriate use construction lexic. Be aware of the responsibility of the technicians in sustainability and respect of the environment

STUDY LOAD

Type	Hours	Percentage
Hours medium group	18,0	16.00
Hours large group	27,0	24.00
Self study	67,5	60.00

Total learning time: 112.5 h

CONTENTS

C1 MASONRY STRUCTURES

Description:

Contents:

- . Introduction to masonry structures and definitions
- . Material properties and construction processes.
- . Structural typologies
- . Masonry structures constructive design
- . Construction and quality control
- . Maintenance, durability and sustainability.

Related activities:

Activity 1 in small groups, which corresponds to autonomous learning and / or small group activity.
Activity 7 corresponding to the group sessions in the classroom.
Activity 8 individual, which corresponds to autonomous learning.
Activity 9 individual, which corresponds to autonomous learning.

Full-or-part-time: 12h

Theory classes: 3h

Practical classes: 3h

Self study : 6h

C2 TIMBER/WOOD STRUCTURES

Description:

Contents:

- . Introduction to timber and wood structures.
- . Prefabricated and industrial wood products and elements
- . Durability and protection
- . Structural typologies in wood
- . Constructive design of wooden structures. Joints and details
- . Construction procedures
- . Sustainability

Related activities:

Activity 2 in a small group, which corresponds to autonomous learning and/or activity in a small group.
Activity 7 which corresponds to the group sessions in the classroom.
Activity 8, which corresponds to autonomous learning.
Activity 10, which corresponds to autonomous learning.

Full-or-part-time: 15h

Theory classes: 4h

Practical classes: 3h

Self study : 8h

C3 STEEL STRUCTURES

Description:

Contents:

- . Introduction to steel structures.
- . Structural steels. Products
- . Main steel structure typologies
- . Constructive design of steel structures.
- . Auxiliary structures.
- . Supports. Welded and composite profiles
- . Welded and bolted joints. Detailed engineering design
- . Construction equipment.
- . Protection systems
- . Sustainability and durability

Related activities:

Activity 1 is carried out individually, which corresponds to autonomous learning.

Activity 2 is carried out individually, which corresponds to autonomous learning.

Activity 4 is carried out in group, which corresponds to the medium or small group sessions in the classroom.

Activity 5 is carried out individually, which corresponds to autonomous learning.

Full-or-part-time: 18h

Theory classes: 5h

Practical classes: 3h

Self study : 10h

C4 REINFORCED CONCRETE STRUCTURES (I)

Description:

Contents:

- . Introduction to reinforced concrete structures.
- . Beams, pillars and joints
- . Rebar and detailed engineering design
- . Unidirectional slabs. Detailed engineering design
- . Constructive design of reinforced concrete structures (pillars, beams and unidirectional slabs).
- . Formwork.
- . Construction equipment.
- . Sustainability.

Related activities:

Activity 4 in small groups, which corresponds to autonomous learning and / or small group activity.

Activity 7 corresponding to the group sessions in the classroom.

Activity 9, which corresponds to autonomous learning.

Activity 10, which corresponds to autonomous learning.

Full-or-part-time: 30h

Theory classes: 9h

Practical classes: 6h

Self study : 15h

C5 REINFORCED CONCRETE STRUCTURES (II)

Description:

Contents:

- . Two-way spanning waffle slabs.
- . Solid reinforced two-way slabs.
- . Shear walls
- . Constructive design of two-way reinforced slabs.
- . Formworks.
- . Construction equipment.
- . Sustainability.

Related activities:

Activity 5 in small groups, which corresponds to autonomous learning and / or small group activity.

Activity 7 corresponding to the group sessions in the classroom.

Activity 9, which corresponds to autonomous learning.

Activity 10, which corresponds to autonomous learning

Full-or-part-time: 25h

Theory classes: 8h

Practical classes: 3h

Self study : 14h

C6 PRESTRESSED AND POSTSTRESSED STRUCTURES

Description:

Contents:

- . Introduction to posttensioned structures.
- . Prestressing effects
- . Pre and post tensioning techniques
- . Constructive design of prestressing and post-tensioning structures.
- . Post tensioned two-way slabs
- . Formwork special requirements.
- . Construction equipment.
- . Sustainability.

Related activities:

Activity 6 in small groups, which corresponds to autonomous learning and / or small group activity.

Activity 7 corresponding to the group sessions in the classroom.

Activity 10, which corresponds to autonomous learning.

Full-or-part-time: 12h 30m

Theory classes: 3h 30m

Practical classes: 3h

Self study : 6h

GRADING SYSTEM

The practices carried out in small groups (graphic and written format, corresponding to activities 1 to 6 with an individual weight of 5%) will be evaluated. In total, these deliveries account for 30% of final grade.

In the puzzle group practice the group will be graded globally. Weight is 8%, (activity 7).

The continuous assessment consists of doing different activities, both individual and in group, of a summative and formative nature, carried out during the course (in the classroom).

The assessment will be individual in the form of a graphic and written test. Midterm exams will weigh 16% each and correspond to activities 8 and 9

Final examination will be evaluated individually based on graphic and written question and practical problems. The total weight of the final grade will be 30%. This activity will be performed on the day assigned for final exam (activity 10).

Individual exams will consist of a part with questions about concepts associated with the learning objectives of the subject in terms of knowledge or understanding, and a set of application exercises. It takes about 2/3 hours to do it.

All grades are between 0 and 10

Reassessment

The student who has obtained a final grade of fail with a numerical mark between 3.5 and 4.9 will have the option of taking a single re-assessment test, which will include all the Contents and will be carried out in the period established. If you pass this test, the final grade of the subject will be passed (5.0) The student who meets one of the following conditions will not be able to take the re-assessment test:

- i) has already passed the subject.
- ii) its final grade is below 3.5 (includes the NP case, which is 0 NP).

EXAMINATION RULES.

If any continuous assessment activity is not carried out, it will be graded with a 0.

Individual tests may not be reassessed or modified on dates other than those scheduled except for force majeure causes included in UPC and EPSEB regulations and upon presentation of a valid justificative document. Absence to any examination out of these assumptions will be qualified with 0 NP

BIBLIOGRAPHY

Basic:

- Código Técnico de la Edificación (CTE). 2a ed. Madrid: Boletín Oficial del Estado, 2008. ISBN ISBN: 8428330301 ISBN-13: 9788428330305.
- González, J.L.; Casals, A.; Falcones, A. Claves del construir arquitectónico. 2a ed. Barcelona: Gustavo Gili, 2008. ISBN ISBN: 9788425218668.
- Fullana, M. Diccionari de l'art i dels oficis de la construcció : il·lustrat amb més de 700 dibuixos a ploma del mateix autor. 8a ed. Palma de Mallorca: Ed. Moll, 2005. ISBN ISBN- 8427307438 9788427307438.
- UE. EUROCODES 2,3,5 y 6 [on line]. Available on: <https://law.resource.org/pub/eu/eurocode.html>.
- MITMA. CODIGO ESTRUCTURAL [on line]. BOE 21/08/2021, 2021 Available on: <https://www.mitma.gob.es/organos-colegiados/comision-permanente-de-estructuras-de-acero/cpa/codigo-estructural>.

Complementary:

- Paricio Ansuategui, I. La Construcció de l'arquitectura. 3a ed. Barcelona: ITEC, 1995-1996. ISBN ISBN-10: 8478531440 ISBN-13: 978-8478531448.
- Alcalde Pecero, Francisco. Banco de detalles arquitectónicos 2002. Sevilla: Francisco Alcalde Pecero : Marsay, 2002. ISBN ISBN: 9788460738602.

RESOURCES

Audiovisual material:

- Guia Virtual



- Diccionario visual de la construcción
- La gestión de los Residuos

Hyperlink:

- Biblioteca
- . <http://bibliotecnica.upc.es/>- Diapoteca. <http://bibliotecnia.upc.es/diapoteca/>

Other resources:

Files of the topics presented in class and posted on the Virtual Campus.
Web Link