UNIVERSITAT POLITÈCNICA DE CATALUNYA BARCELONATECH

# Course guides
# 310017 - 310017 - Construction III

**Last modified:** 02/04/2020

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

**Degree:** BACHELOR'S DEGREE IN BUILDING CONSTRUCTION SCIENCE AND TECHNOLOGY (Syllabus 2009). (Compulsory subject).
BACHELOR'S DEGREE IN ARCHITECTURAL TECHNOLOGY AND BUILDING CONSTRUCTION (Syllabus 2015). (Compulsory subject).

**Academic year:** 2020 **ECTS Credits:** 6.0 **Languages:** Catalan, English, Spanish

## LECTURER

**Coordinating lecturer:** Capellà Llovera, Joaquin

**Others:** Anguera De Carlos, Enric
Agustiño Otero, Manuel

## 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. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.
5. 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 in-person, directed and autonomous methods will be combined. With the combination of the three methods, the students must achieve the knowledge, comprehension, application, synthesis and evaluation levels.

In the in-person method special attention will be made in the clarity, precision and order aspects by the faculty. These classes will be done by the whole group (big group), and the professor will develop the course topics at class. The students will find all the required documentation in PDF format in ATENEA.

In-person (medium group) the students will do practices at class which will be solved individually. Once finished the practice, the professor will solve the exercise. The delivery will be compulsory and will be graded.

As a group work and in-person there will be done the PUZZLE practice (medium group). Besides achieving the specific objectives of the contents there also will be developed cooperative learning techniques at class.

The autonomous self-learning works in group will be done in maximum 4 members groups. There also will be developed cooperative learning techniques in this case out of class.

## LEARNING OBJECTIVES OF THE SUBJECT

At the end of the course, the students should be able to:

. To define the meaning of the construction structural components.
. To explain the process and the stages of construction of the structural components.
. To connect the structural components with the ideal materials for its construction.
. To define the properties of the structural components.
. To identify the different construction systems and subsystems of the different structures.
. To use the construction lexical and the awareness of the responsibility of the technicians in the sustainability and environmental respect aspects.

## STUDY LOAD

| Type | Hours | Percentage |
|---|---|---|
| Guided activities | 15,0 | 10.00 |
| Hours large group | 36,0 | 24.00 |
| Hours medium group | 9,0 | 6.00 |
| Self study | 90,0 | 60.00 |

**Total learning time:** 150 h

## CONTENTS

### (ENG) C1 MASONRY STRUCTURES

**Description:**
In this content the students work:
. Introdution to the masonry and brickwork structures.
. Masonry and brickwork.
. Construction design of masonry and brickwork structures.

**Related activities:**
Activity 5 individually, corresponding to the autonomous self-learning.
Activity 8 in group, corresponding to the medium or small group sessions at class.
Activity 9 individually, corresponding to the autonomous self-learning.

**Full-or-part-time:** 12h 30m
Theory classes: 3h
Guided activities: 1h
Self study : 8h 30m

## C2 WOOD STRUCTURES

**Description:**
In this content the students work:
. Introduction to the wood structures.
. Wood.
. Construction design of wood structures.

**Related activities:**
Activity 5 individually, corresponding to the autonomous self-learning.
Activity 8 in group, corresponding to the autonomous self-learning.
Activity 9 individually, corresponding to the autonomous self-learning.

**Full-or-part-time:** 12h 30m
Theory classes: 3h
Guided activities: 1h
Self study : 8h 30m

## C3 REINFORCED CONCRETE STRUCTURES ( I )

**Description:**
In this content the students work:
. Introduction to the reinforced concrete structures.
. Columns and beams.
. One-way spanning slab.
. Construction design of reinforced concrete structures (columns, beams and one-way spanning slabs).

**Related activities:**
Activity 2 individually, corresponding to the autonomous self-learning.
Activity 3 individually, corresponding to the autonomous self-learning.
Activity 8 in group, corresponding to the autonomous self-learning.
Activity 9 individually, corresponding to the autonomous self-learning.

**Full-or-part-time:** 35h 30m
Theory classes: 9h
Practical classes: 2h
Laboratory classes: 1h
Guided activities: 1h 30m
Self study : 22h

## C4 REINFORCED CONCRETE STRUCTURES ( II )

**Description:**
In this content the students work:
. Two-way spanning slabs.
. Reinforced slabs.
. Construction design of reinforced concrete structures (two-way spanning slabs and reinforced slabs).

**Related activities:**
Activity 3 individually, corresponding to the autonomous self-learning.
Activity 8 in group, corresponding to the autonomous self-learning.
Activity 9 individually, corresponding to the autonomous self-learning.

**Full-or-part-time:** 28h
Theory classes: 6h
Practical classes: 1h
Laboratory classes: 2h
Guided activities: 5h
Self study : 14h

## C5 PRESTRESSED AND POSTSTRESSED STRUCTURES

**Description:**
In this content the students work:
. Introduction to the prestressed and poststressed structures.
. Pre-tensioning.
. Post-tensioning.
. Construction design of prestressed and poststressed structures.

**Related activities:**
Activity 6 individually, corresponding to the autonomous self-learning.
Activity 8 in group, corresponding to the medium or small group sessions at class.
Activity 9 individually, corresponding to the autonomous self-learning.

**Full-or-part-time:** 25h 30m
Theory classes: 6h
Practical classes: 1h
Laboratory classes: 2h
Guided activities: 1h 30m
Self study : 15h

### C6 METALLIC STRUCTURES

**Description:**
In this content the students work:
. Introduction to the metallic structures.
. Structural steels.
. Construction design of the metallic structures.

**Related activities:**
Activity 6 individually, corresponding to the autonomous self-learning.
Activity 8 in group, corresponding to the medium or small group sessions at class.
Activity 9 individually, corresponding to the autonomous self-learning.

**Full-or-part-time:** 36h
Theory classes: 9h
Practical classes: 2h
Laboratory classes: 1h
Guided activities: 2h
Self study : 22h

## ACTIVITIES

### A1 INDIVIDUAL WORK IN AUTONOMOUS LEARNING: WOOD CONFERENCE (C2)

**Description:**
Individually the students will attend the wood lecture.

**Specific objectives:**
At the end of the activity, the students should be able to:
- Identify the properties of the structural components of the content 2.
- Define the components which form a structure of the content 2.
- To draw construction details of the structure of the content 2.
- Solve construction details depending on the specific needs.

**Material:**
Material given during the lecture.

**Delivery:**
It represents a part of the continous evaluation (1% corresponding to the lecture attendance).

**Full-or-part-time:** 3h
Guided activities: 1h
Self study: 2h

### A2 INDIVIDUAL WORK IN CLASSROOM: PRACTICE (CONTENTS 3)

**Description:**
Individually the students will do a practice at class of the contents 3 which will contain specific learning objectives of the content, with questions related with the topic. Individual development at class.

**Specific objectives:**
At the end of the activity, the students should be able to:
- Identify the properties of the reinforced concrete structural components..
- Define the components which form a reinforced concrete structure.
- To draw construction details of a reinforced concrete structure.
- Solve construction details depending on the specific needs

**Material:**
Notes of the content available in ATENEA

**Delivery:**
It will be deliveried at the end of the practice. It represents a part of the continous evaluation (11%).

**Full-or-part-time:** 3h
Theory classes: 1h
Practical classes: 1h
Self study: 1h

### A3 INDIVIDUAL WORK IN CLASSROOM: PRACTICE (CONTENTS 3 I 4)

**Description:**
Individually the students will do a practice at class of the contents 3 and 4 which will contain specific learning objectives of the content, with questions related with the topic. Individual development at class.

**Specific objectives:**
At the end of the activity, the students should be able to:
- Identify the properties of the reinforced concrete structural components..
- Define the components which form a reinforced concrete structure.
- To draw construction details of a reinforced concrete structure.
- Solve construction details depending on the specific needs.

**Material:**
Notes of the content available in ATENEA.

**Delivery:**
It will be deliveried at the end of the practice. It represents a part of the continous evaluation (30%).

**Full-or-part-time:** 55h
Theory classes: 14h
Practical classes: 3h
Guided activities: 5h
Self study: 33h

### A4 INDIVIDUAL WORK IN AUTONOMOUS LEARNING: SILICONES CONFERENCE

**Description:**
Individually the students will attend the wood lecture.

**Specific objectives:**
At the end of the practice the students should be able to:
- Identify and use with examples the correct terminology of the elements, materials and related techniques.
- Visually interpreting of the contents learned at class by the bibliography.
- Use the given information in new specific situations.
- Distinguish between the good and the bad execution of the reinforced concrete structures.
- Propose solutions for a bad execution.

**Material:**
Material given during the lecture.

**Delivery:**
It represents a part of the continous evaluation (1% corresponding to the lecture attendance).

**Full-or-part-time:** 4h
Theory classes: 1h 20m
Practical classes: 0h 40m
Guided activities: 0h 40m
Self study: 1h 20m

### A5 INDIVIDUAL WORK IN CLASSROOM: PRACTICE (CONTENTS 1 AND 2)

**Description:**
Individually the students will do a practice at class of the contents 1 and 2 which will contain specific learning objectives of the content, with questions related with the topic. Individual development at class.

**Specific objectives:**
At the end of the activity, the students should be able to:
- Identify the properties.
- Define the components.
- To draw construction details.
- Solve construction details depending on the specific nconcrete structureeeds

**Material:**
Notes of the content available in ATENEA

**Delivery:**
It will be deliveried at the end of the practice. It represents a part of the continous evaluation (11%).

**Full-or-part-time:** 3h
Theory classes: 1h
Practical classes: 1h
Self study: 1h

### A6 INDIVIDUAL WORK IN CLASSROOM: PRACTICE (CONTENTS 5 I 6)

**Description:**
Individually the students will do a practice at class of the contents 5 and 6 which will contain specific learning objectives of the content, with questions related with the topic. Individual development at class.

**Specific objectives:**
At the end of the activity, the students should be able to:
- Identify the properties.
- Define the components.
- To draw construction details.
- Solve construction details depending on the specific nconcrete structureeeds

**Material:**
Notes of the content available in ATENEA

**Delivery:**
It will be deliveried at the end of the practice. It represents a part of the continous evaluation (11%).

**Full-or-part-time:** 3h
Theory classes: 1h
Practical classes: 1h
Self study: 1h

### A7 INDIVIDUAL WORK IN AUTONOMOUS LEARNING: FORMWORK CONFERENCE (CONTENT 3 A 6)

**Description:**
Individually the students will attend the formwork conference.

**Specific objectives:**
At the end of the activity, the students should be able to:
- Identify the properties of the structural components of the contents 3 to 6.
- Define the components which form a structure of the contents 3 to 6.
- To draw construction details of the structure of the contents 3 to 6.
- Solve construction details depending on the specific needs.

**Material:**
Material given during the conference.

**Delivery:**
It represents a part of the continous evaluation (1% corresponding to the lecture attendance).

**Full-or-part-time:** 4h
Guided activities: 1h
Self study: 3h

### A8 GROUP WORK AT CLASSROOM: MAKING PUZZLE (ICE) (CONTENT 1 A 6)

**Description:**
In groups of 2 students.
The groups will work together for making specific details of the contents 1 to 6, which will be explained at class.

**Specific objectives:**
At the end of the practice the students should be able to:
- Identify the properties of the structural components.
- Define the components which form the structure.
- Interpret construction details of the structure.
- Solve construction details depending on the specific needs.
- Distinguish the construction components of a structure.
- Identify and use with examples the right terminology of the components, materials and techniques related with the structures.
- Propose solutions for a bad execution.
- Prove a construction detail from the used criteria.
- Defend the activity done.

**Material:**
Notes of the content available in ATENEA.

**Delivery:**
The attendace is compulsory.
At the end of the practice the professor will explain the solution.
It represents a part of the continous evaluation (4%).

**Full-or-part-time:** 5h 20m
Theory classes: 0h 40m
Practical classes: 1h 20m
Self study: 3h 20m

### A9 EVALUABLE TEST (CONTENT 1 A 6)

**Description:**
Individually the students will do an evaluable exam at class of the contents 1 to 6 which will contain specific learning objectives of the content, with questions related with the topics. Individual realization at class. THIRD LANGUAGE EVALUATION INCLUDED.

**Specific objectives:**
At the end of the practice the students should be able to:
- Identify the properties of the structural components.
- Define the components which form the structure.
- Interpret construction details of the structure.
- Solve construction details depending on the specific needs.
- Distinguish the construction components of a structure.
- Identify and use with examples the right terminology of the components, materials and techniques related with the structures.
- Propose solutions for a bad execution.
- Prove a construction detail from the used criteria.
- Defend the activity done.

**Material:**
Notes of the content available in ATENEA.

**Delivery:**
It will be deliveried at the end of the exam. It represents a part of the continous evalution (30%).

**Full-or-part-time:** 70h
Theory classes: 19h
Practical classes: 3h
Guided activities: 6h
Self study: 42h

## GRADING SYSTEM

Individual practice regarding the wood lecture. The practice worths the 1% corresponding to the attendance to the wood lecture of the content 2 (activity 1).

The students will be evaluated individually by a graphic and written exam. This exam worths the 11% in the contents 3 (activity 2).

The students will be evaluated individually by a graphic and written exam. This exam worths the 30% in the contents 3 and 4 (activity 3).

Individual practice regarding the silicones lecture. The practice worths the 1% corresponding to the attendance to the silicones lecture of the content 2 (activity 4).

The students will be evaluated individually by a graphic and written exam. This exam worths the 11% in the contents 1 and 2 (activity 5).

The students will be evaluated individually by a graphic and written exam. This exam worths the 11% in the contents 5 and 6 (activity 6).

Individual practice regarding the formwork lecture. The practice worths the 1% corresponding to the attendance to the formwork lecture of the contents 3 to 6 (activity 7).

The group practice at class will be evaluated by its presentation. The practice worths the 4%, divided into the contents 1 to 6 (activity 6).

It will be evaluated individually a graphic and written exam which will be a general application of the subject and will worth the 30%. This evaluable exam will be done the last day of class (activity 9). In this exam it will be evaluated the third language in a section of it.

The evaluable exam consist on the one hand in questions about associated concepts to the learning objectives of the subject regarding to the knowledge or the comprehension, and a group of application exercises. The students have approximately 2 hours for solving the exam. The continous evaluation consist on doing different activities, both individual and in group, with accumulative and educational nature, done during the course (in and out of class).

Reevaluación
El estudiante que haya obtenido una calificación final de suspenso con una nota numérica comprendida entre 3.5 i 4.9 tendrá la opción de presentarse a una prueba única de revaluación, que incluirá la totalidad de los Contenidos y se realizará en el periodo establecido al efecto. Si supera esta prueba, la calificación final de la asignatura pasará a ser aprobado (5.0) No podrá realizar la prueba de reevaluación el estudiante que cumpla alguna de las siguientes condiciones:
i) ya ha aprobado la asignatura.
ii) su calificación final está por debajo de 3.5 (incluye el caso NP, que és 0 NP).

## EXAMINATION RULES.

. If some of the continous evaluation activities is not done, it will be considered as non-marked.

## BIBLIOGRAPHY

**Basic:**
- Código Técnico de la Edificación (CTE). 2a ed. Madrid: Boletín Oficial del Estado, 2008.
- Espanya. Ministerio de Fomento. EHE-08 : instrucción de Hormigón Estructural : con comentarios de los miembros de la Comisión Permanente del Hormigón. 2a ed. Madrid: Ministerio de Fomento, 2009.
- González, J.L.; Casals, A.; Falcones, A. Claves del construir arquitectónico. 2a ed. Barcelona: Gustavo Gili, 2008.
- 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.

**Complementary:**
- Paricio Ansuategui, I. La Construcció de l'arquitectura. 3a ed. Barcelona: ITEC, 1995-1996.

- Alcalde Pecero, Francisco. Banco de detalles arquitectónicos 2002. Sevilla: Francisco Alcalde Pecero : Marsay, 2002.

## 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