Course guide
310714 - 310714 - Structures Construction

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: 2022 ECTS Credits: 4.5 Languages: Catalan, Spanish, English

LECTURER

Coordinating lecturer: Ruiz Gandullo, Javier
Others: Capella L lovera, 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

Classroom sessions, tutored activities and autonomous methods will be combined. With the combination of the three methods, competence levels of knowledge, comprehension, application, analysis, synthesis and evaluation required for professional practice must be achieved.

In classroom sessions, special attention will be focused to conceptual clarity, precision and order. They will be done with the whole group (complete group); professors will develop and clarify main course contents and topics to students will have been provided with the necessary documentation in ATENEA to be able to prepare the class and get and optimal follow-up of sessions.

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

PUZZLE (medium group) practice will be developed in classroom. In addition to achieving specific topics, they also develop cooperative learning techniques in the classroom. There will also be two individual 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.
·  Relate structural elements with the optimal materials for their construction.
·  Incorporate formwork and construction equipment.
·  Incorporate sustainability and durability in construction.
·  Define and know properties of structural elements.
·  Identify different construction systems and subsystems of different structures.
·  Appropriate use construction lexicon and consider engineers responsibility in sustainability and environment.

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Hours medium group</td>
<td>18,0</td>
<td>16.00</td>
</tr>
<tr>
<td>Self study</td>
<td>67,5</td>
<td>60.00</td>
</tr>
<tr>
<td>Hours large group</td>
<td>27,0</td>
<td>24.00</td>
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</tbody>
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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 and detailed engineering
- 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 10, 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 detailed engineering
- 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 that 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 structures 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 3 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, which corresponds to autonomous learning
Activity 10, 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.
  · Beam 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.
- Prestress 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**

Practices carried out in small groups are graphic and written format and 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 classroom puzzle group practice presentation and group will be graded globally. Weight is 8%, (activity 7).

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

It will be assessed individually in the form of a graphic and written assessable 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 problemss. Total weight in final grade is 30% This activity will be performed on the day assigned for final exam (activity 10).

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 in the ‘effect. 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 grading scheduled activity is carried out, it will be considered with 0 qualification.

Individual tests may not be retrieved 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:**
- UE. EUROCODES 2,3,5 y 6 [on line]. Available on: https://law.resource.org/pub/eu/eurocode.html

**Complementary:**

**RESOURCES**

**Audiovisual material:**
- Guia Virtual
- Diccionario visual de la construcción
- La gestión de los Residuos

**Hyperlink:**
- Biblioteca
  - http://bibliotecnia.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