Course guides
250728 - 250728 - Foundation Structures

Unit in charge: Barcelona School of Civil Engineering
Teaching unit: 751 - DECA - Department of Civil and Environmental Engineering.
Degree: MASTER'S DEGREE IN STRUCTURAL AND CONSTRUCTION ENGINEERING (Syllabus 2015). (Optional subject).
Academic year: 2020  ECTS Credits: 5.0  Languages: Catalan, Spanish, English

LECTURER

Coordinating lecturer: LUCA PELA
Others: JESÚS MIGUEL BAIRÁN GARCÍA, CLIMENT MOLINS BORRELL, LUCA PELA, PEDRO ROCA FABREGAT, MIQUEL RODRIGUEZ NIEDENFÜHR

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
13364. To conceive and design civil and building structures that are safe, durable, functional and integrated into its surroundings.
13365. Designing and building using traditional materials (reinforced concrete, prestressed concrete, structural steel, masonry, wood) and new materials (composites, stainless steel, aluminum, shape memory alloys?).
13366. To evaluate, maintain, repair and strengthen existing structures, including the historic and artistic heritage.
13368. Mathematically modelling structural engineering problems.
13369. To apply methods and advanced design software and structural calculations, based on knowledge and understanding of forces and their application to the structural types of civil engineering.

General:
13360. To conceive, design, analyze and manage structures or structural elements of civil engineering or building, encouraging innovation and the advance of knowledge.
13361. To develop, improve and use conventional materials and new construction techniques to ensure the safety requirements, functionality, durability and sustainability.

TEACHING METHODOLOGY

The course consists of 1.5 hours per week of classroom activity (large size group) and 0.8 hours weekly with half the students (medium size group).

The 1.5 hours in the large size groups are devoted to theoretical lectures, in which the teacher presents the basic concepts and topics of the subject, shows examples and solves exercises.

The 0.8 hours in the medium size groups is devoted to solving practical problems with greater interaction with the students. The objective of these practical exercises is to consolidate the general and specific learning objectives.

The rest of weekly hours devoted to laboratory practice.

Support material in the form of a detailed teaching plan is provided using the virtual campus ATENEA: content, program of learning and assessment activities conducted and literature.
LEARNING OBJECTIVES OF THE SUBJECT

Specialization subject in conceptual and detailed design of foundations, retaining structures, and special foundations.

Specialization skills to design foundations of building structures, bridges, retaining walls and special structures, as well as their strengthening in case of existing structures.


STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>9,8</td>
<td>7.83</td>
</tr>
<tr>
<td>Hours large group</td>
<td>19,5</td>
<td>15.59</td>
</tr>
<tr>
<td>Self study</td>
<td>80,0</td>
<td>63.95</td>
</tr>
<tr>
<td>Hours medium group</td>
<td>9,8</td>
<td>7.83</td>
</tr>
<tr>
<td>Guided activities</td>
<td>6,0</td>
<td>4.80</td>
</tr>
</tbody>
</table>

Total learning time: 125.1 h

CONTENTS

Introduction to foundation structures

Description:
Performance requirements, standards for design
Mechanical parameters, testing and in-situ measurements, lateral earth pressure

Full-or-part-time: 14h 23m
Theory classes: 6h
Self study: 8h 23m

Shallow foundations

Description:
Design of footings and special footings
Design of beams and mat foundations

Full-or-part-time: 14h 23m
Theory classes: 3h
Practical classes: 3h
Self study: 8h 23m
### Retaining walls

**Description:**
Design of basement walls, gravity walls, cantilever walls, reinforced earth walls
Diaphragm walls, anchored walls

**Full-or-part-time:** 14h 23m
Practical classes: 6h
Self study : 8h 23m

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### Pile foundations

**Description:**
Pile caps, single piles, micro-piles, groups of piles

**Full-or-part-time:** 7h 11m
Practical classes: 3h
Self study : 4h 11m

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### Computer-aided design of foundations

**Description:**
Design of mat foundation by engineering software

**Full-or-part-time:** 7h 11m
Laboratory classes: 3h
Self study : 4h 11m

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### Special foundations

**Description:**
Foundations of wind towers and vibrating machines
Seabed foundations

**Full-or-part-time:** 14h 23m
Theory classes: 6h
Self study : 8h 23m

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### Strengthening of foundations

**Description:**
Examples of strengthening of foundations

**Full-or-part-time:** 7h 11m
Laboratory classes: 3h
Self study : 4h 11m

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### Exams

**Full-or-part-time:** 14h 23m
Laboratory classes: 6h
Self study : 8h 23m
GRADING SYSTEM

The mark of the course is obtained from the ratings of continuous assessment and their corresponding laboratories and/or classroom computers.

Continuous assessment consist in several activities, both individually and in group, of additive and training characteristics, carried out during the year (both in and out of the classroom).

The teachings of the laboratory grade is the average in such activities.

The evaluation tests consist of a part with questions about concepts associated with the learning objectives of the course with regard to knowledge or understanding, and a part with a set of application exercises.

EXAMINATION RULES.

Failure to perform a laboratory or continuous assessment activity in the scheduled period will result in a mark of zero in that activity.

BIBLIOGRAPHY

Basic:

Complementary: