

Course guide

250728 - 250728 - Foundation Structures

Last modified: 28/03/2024

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: 2023	ECTS Credits: 5.0	Languages: English

LECTURER

Coordinating lecturer:	LUCA PELA
Others:	JESÚS MIGUEL BAIRÁN GARCÍA, ANASTASIOS DROUGKAS, LARISA GARCIA-RAMONDA ESTEVEZ, CLIMENT MOLINS BORRELL, LUCA PELA, PEDRO ROCA FABREGAT, MIQUEL RODRIGUEZ NIEDENFÜHR

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.

Although most of the sessions will be given in the language indicated, sessions supported by other occasional guest experts may be held in other languages.

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.

Conceptual design of foundations. Geotechnical parameters. Shallow foundations. Deep foundations. Retaining walls and diaphragm walls. Seismic design of foundations. Strengthening of foundations.

Specialization subject in conception and project of foundation structures, containment and special foundations.

Specialized knowledge to design foundations for building structures, bridges, retaining walls and special structures, as well as their reinforcement in the case of existing structures.

Conceptual design of foundations. Geotechnical parameters. Superficial foundations. Deep foundations. Retaining walls. Seismic design of foundations. Reinforcement of foundations.

STUDY LOAD

Type	Hours	Percentage
Hours small group	9,8	7.83
Self study	80,0	63.95
Hours medium group	9,8	7.83
Hours large group	25,5	20.38

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: 28h 47m

Theory classes: 12h

Self study : 16h 47m

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

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



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

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

Strengthening of foundations

Description:

Examples of strengthening of foundations

Full-or-part-time: 7h 11m

Laboratory classes: 3h

Self study : 4h 11m

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.

Calculation of the final grade of the course:

10% design of a shallow foundation (individual work)

10% design of a deep foundation (individual work)

10% design of a retaining wall (individual work)

15% design of a foundation slab with the computer (teamwork)

30% first partial exam

25% second partial exam

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:

- Bowles, J.E. Foundation analysis and design. 3rd ed. New York: McGraw Hill, 1982. ISBN 0070067708.
- Calavera, J. Cálculo de estructuras de cimentación. 5a ed. Madrid: INTEMAC, 2000. ISBN 9788488764263.
- CEN. EN 1997-1 Eurocode 7: Geotechnical design - Part 1: General rules [on line]. Brussels: European Committee for Standarization, 2004 [Consultation: 29/04/2020]. Available on: https://www.ngm2016.com/uploads/2/1/7/9/21790806/eurocode_7_-_geotechnical_designen.1997.1.2004.pdf.

Complementary:

- Lancellotta, R. Geotechnical engineering. 2nd ed. Oon: Taylor & Francis, 2008. ISBN 9780415420044.
- CEN. EN 1997-2 Eurocode 7: Geotechnical design - Part 2: Ground Investigation and Testing [on line]. Brussels: European Committee for Standarization, 2007 [Consultation: 17/04/2023]. Available on: <https://www.phd.eng.br/wp-content/uploads/2015/02/en.1997.2.2007-1.pdf>.