

Foundation Structures (250728)

General Information

School	ETSECCPB
Departments	Departament d'Enginyeria Civil i Ambiental (DECA)
Credits	5.0 ECTS
Programs	MÀSTER UNIVERSITARI EN ENGINYERIA ESTRUCTURAL I DE LA CONSTRUCCIÓ (pla 2015)
Course	2024/25

Main teaching language at each group

- Group 10EN1 English (Q1)

Faculty

Responsible Faculty: Luca Pela

Faculty: Jesús Miguel Bairán García, Anastasios Drougkas, Larisa Garcia-ramonda Estevez, Climent Molins Borrell, Luca Pela, Pedro Roca Fabregat, Miquel Rodríguez Niedenfürh

Objectives of Education

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.

Total hours of student work

		Hours	Percentage
Supervised Learning	Large group	25.5 h	56.67 %
	Medium group	9.75 h	21.67 %
	Laboratory classes	9.75 h	21.67 %
	Guided Activities	0.0 h	0.00 %
Self Study		80.0 h	

Contents

Introduction to foundation structures

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

Shallow foundations

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

Retaining walls

Design of basement walls, gravity walls, cantilever walls, reinforced earth walls
Diaphragm walls, anchored walls

Pile foundations

Pile caps, single piles, micro-piles, groups of piles

Computer-aided design of foundations

Design of mat foundation by engineering software

Special foundations

Foundations of wind towers and vibrating machines
Seabed foundations

Strengthening of foundations

Examples of strengthening of foundations

Exams

Teaching Methodology

The subject consists of 3 hours a week of face-to-face classes in the classroom.

They spend about 2 hours a week on theoretical classes on average and the other hour is dedicated to solving problems with greater interaction with the students or to practicals. Practical exercises are carried out in order to consolidate the general and specific learning objectives.

Support material is used in the form of a detailed teaching plan through the ATENEA virtual campus: contents, schedule of assessment and directed learning activities and bibliography.

Although the majority of sessions will be held in the language indicated in the guide, sessions supported by other guest experts from time to time may be held in another language.

Grading Rules

(The evaluation calendar and grading rules will be approved before the start of the course.*

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

Test Rules

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

Office Hours

Please email the lecturers of the course.

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. Brussels: European Committee for Standardization, 2004.

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. Brussels: European Committee for Standardization, 2007.