

## Course guide

### 2500056 - GECCONGEOT - Geotechnical Constructions

**Last modified:** 01/10/2023

**Unit in charge:** Barcelona School of Civil Engineering  
**Teaching unit:** 751 - DECA - Department of Civil and Environmental Engineering.

**Degree:** BACHELOR'S DEGREE IN CIVIL ENGINEERING (Syllabus 2020). (Optional subject).

**Academic year:** 2023    **ECTS Credits:** 4.5    **Languages:** English

#### LECTURER

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**Coordinating lecturer:** JEAN VAUNAT

**Others:** ALESSANDRA DI MARIANO SIMONCINI, SEBASTIAN OLIVELLA PASTALLE, IVAN PUIG DAMIANS, JEAN VAUNAT

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Generical:**

14380. Scientific-technical training for the exercise of the profession of Technical Engineer of Public Works and knowledge of the functions of advice, analysis, design, calculation, project, construction, maintenance, conservation and exploitation.

14383. Ability to project, inspect and direct works, in their field.

14386. Capacity for maintenance, conservation and exploitation of infrastructure, in its field.

14389. Knowledge of the history of civil engineering and training to analyze and assess public works in particular and construction in general.

14390. Identify, formulate and solve engineering problems. Pose and solve construction engineering problems with initiative, decision-making skills and creativity. Develop a systematic and creative method of analysis and problem solving. (Additional school competition).

14391. Conceive, project, manage and maintain systems in the field of construction engineering. Cover the entire life cycle of an infrastructure or system or service in the field of construction engineering. (Additional school competition).

#### TEACHING METHODOLOGY

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The course consists of 1.5 hours per week of classroom activity (large size group) and 1.5 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 1.5 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.

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

Earth structures. Compaction. Stress distribution and displacements. Strength, compressibility and permeability of embankments, ground dams and waterproofing structures for environmental protection. Design, specifications and construction of filters and other auxiliary elements. Excavation and stability of embankments. Behavior against static and dynamic actions. Great displacements.

1. Ability to design and analyze land outlets. 2) Capacitat to analyze problems of slope stability in linear works. 3) Ability to apply concepts on soil improvement.

- Behavior of dams, embankments and, in general, geotechnical structures that involve construction with the soil. Auxiliary Systems in Geotechnical Engineering for waterproofing and / or soil improvement. Geomembranes and Geotextiles. - Design of waterproofing systems for the protection of the environment. Design, specifications and construction of filters and other auxiliary elements.

## STUDY LOAD

Type	Hours	Percentage
Hours large group	22,5	20.00
Hours medium group	22,5	20.00
Self study	63,0	56.00
Guided activities	4,5	4.00

**Total learning time:** 112.5 h

## CONTENTS

### 1. Introduction

#### Description:

Subject presentation

**Full-or-part-time:** 2h 24m

Theory classes: 1h

Self study : 1h 24m

### 2. Geotechnics in hydraulic infrastructures

#### Description:

Embankments to build chanel and aqueducts.

Methodology discussion

Landings. Behavior during construction and operation

Methodology discussion

Urban underground conduits and canalizations

Methodology discussion

Singular underground aqueduct

Settlements in big infrastructures

Methodology discussion

**Full-or-part-time:** 33h 36m

Theory classes: 10h

Practical classes: 4h

Self study : 19h 36m

### 3. Tools for analysis

**Description:**

Programs for calculating foundations and walls  
Practical aspects

**Full-or-part-time:** 9h 36m

Theory classes: 2h

Practical classes: 2h

Self study : 5h 36m

### 4. Geotechnics in transportation infrastructures

**Description:**

Foundations for especial structures on roads  
Methodology discussion  
Reinforcement of slopes in railway works  
Methodology discussion  
Infiltration ponds, interaction with transportation infrastructures  
Methodology discussion  
Reinforced soil walls  
Methodology discussion

**Full-or-part-time:** 28h 47m

Theory classes: 8h

Practical classes: 4h

Self study : 16h 47m

### 5. Geotechnics in other infrastructures

**Description:**

Engineering barriers for waste isolation  
Methodology discussion

**Full-or-part-time:** 9h 36m

Theory classes: 2h

Practical classes: 2h

Self study : 5h 36m

### 6. Evaluation

**Description:**

Coursework, presentation in class  
Course assignment, development

**Full-or-part-time:** 24h

Practical classes: 4h

Laboratory classes: 6h

Self study : 14h

## GRADING SYSTEM

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The evaluation of the subject will be carried out by means of exercises of continuous evaluation to carry out related with the theoretical sessions and assignments individual or in group. The final mark will be the arithmetic average of the marks of the assignments.

Criteria for re-evaluation qualification and eligibility: students that failed the ordinary evaluation and have regularly attended all evaluation tests will have the opportunity of carrying out a re-evaluation test during the period specified in the academic calendar. Students who have already passed the test or were qualified as non-attending will not be admitted to the re-evaluation test. The maximum mark for the re-evaluation exam will be five over ten (5.0). The non-attendance of a student to the re-evaluation test, in the date specified will not grant access to further re-evaluation tests. Students unable to attend any of the continuous assessment tests due to certifiable force majeure will be ensured extraordinary evaluation periods.

These tests must be authorized by the corresponding Head of Studies, at the request of the professor responsible for the course, and will be carried out within the corresponding academic period.

## EXAMINATION RULES.

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A work performed individually or in group will be evaluated for each of the topics 1 to 5 of the course. Each work will count for 20% of the total mark.

## BIBLIOGRAPHY

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### Basic:

- Jiménez Salas, J.A.; Justo Alpañés, J.L. Geotecnia y cimientos II. Mecánica del suelo y de las rocas. 2a ed. Madrid: Rueda, 1981. ISBN 84-7207-021-2 (V.2).
- Jiménez Salas, J.A.; Justo Alpañés, J.L. Geotecnia y cimientos: v. III: cimentaciones, excavaciones y aplicaciones de la geotecnia. Partes 1 y 2. Madrid: Rueda, 1980. ISBN 84-7207-017-4.
- Suriol, J., Lloret, A. y Josa, A. Reconocimiento geotécnico del terreno [on line]. Barcelona: Edicions UPC, 2007 [Consultation: 29/04/2020]. Available on: <http://hdl.handle.net/2099.3/36268>. ISBN 9788483019429.
- Rico, A.; del Castillo, H. La ingeniería de suelos en las vías terrestres: carreteras, ferrocarriles y aeropistas. México: Limusa, 1974-1977. ISBN 9681800540.
- Dirección General de Carreteras. Guía de cimentaciones en obras de carretera. 2a ed. rev. Madrid: Ministerio de Fomento, 2004. ISBN 8449807131.