

Course	Master Civil Constructions			Academic year	2021-2022		
Subject	Geotechnical Design			ECTS	6		
Type of course	Compulsory						
Year	2nd	Semester	1st	Student Workload:			
Professor(s)	Carlos Rodrigues			Total	168	Contact	52,5
Area disciplinary Coordinator	José Carlos Almeida						

Planned

1. LEARNING OBJECTIVES

Goals:

- Introduce design principles and stability analysis, contained in Eurocode-7.
- Principles relating to the construction of retaining structures. Stability analysis methods. Constructive recommendations.
- Transmit theoretical and practical knowledge in the field of developing geotechnical design for shallow and deep foundations.

Skills:

- Knowledge of the main concepts related to the behaviour of retaining structures.
- Knowledge of the main concepts related to design of shallow and deep foundations.
- Understanding the phenomena related to the mobilization of limit states.
- Ability to define characteristic values to be proposed for geotechnical properties, actions and resistances.
- Application of stability analysis methodologies proposed by Eurocode-7 to the geotechnical design.

2. PROGRAMME

- Eurocode-7; General principles.
- Limit States: Ultimate Limit State (ELU) and Serviceability Limit State (ELUt).
- Characteristic values of actions, materials and geometric data.
- Partial coefficients of the safety factor.
- Geotechnical investigations – geotechnical categories.
- Aspects of the behaviour and problems of the design.
- Geotechnical prospecting for the project: objectives, phases, operations involved, costs. In situ and laboratory tests to be carried out.
- Application of Eurocode-7 principles to the geotechnical project of:
 - Slopes
 - Spread foundations
 - Pile foundations
 - Settlement evaluation

3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

The established content allows the student to develop skills in terms of understanding the behaviour of retaining structures and excavations in the light of Eurocode-7. The introduction of different subjects allows the student to have the bases to carry out the design of retaining structures and be able to establish excavation programs. The presentation of practical problems and work cases allows the student to come into contact with reality.

The established content allows the student to develop skills in terms of understanding the behaviour of slopes and retaining structures in the light of Eurocode-7. The introduction of different subjects allows the student to have the bases to carry out the geotechnical design of shallow and deep foundations and to be able to establish stability analysis and slope design programs. The presentation of practical problems and work cases allow the student to come into contact with reality.

4. MAIN BIBLIOGRAPHY

Compulsory:

EUROCÓDIGO 7 - Parte 1 (1994). Projecto Geotécnico. Regras Gerais., Comissão Europeia de Normalizações, Bruxelas.

Fernandes, M.M. (2011). "Mecânica dos Solos: Introdução à Engenharia Geotécnica – Vol. 2.º, Edições FEUP. ISBN: 978-972-752-136-4.

Fernando Schnaid (2000). "Ensaio de Campo e suas aplicações à Engenharia de Fundações". Oficina de Textos, Brasil, 2000. ISBN: 624.150723 (CDD).

Recommended:

Braja, M. Das (1998). "Principles of Geotechnical Engineering". 4th Ed, PWS Publishing Company, Boston.

Ian Smith (2006). "Smith's Elements of Soil Mechanics". Wiley-Blackwell, ISBN 978-1-4051-3370-8.

Bowles, J. E. (1996). "Foundation Analysis and Design". 5th ed. McGraw-Hill. New York.

5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

Theoretical-practical teaching: exposure of topic programs, whenever possible using active learning methods, illustrated by cases, examples and problems.

Practical teaching: answering questions about the solution of problems and proposed applied works.

Tutorials: personal guidance sessions in small groups in the classroom to conduct the learning process, including guiding of the individual work of the student and clarify doubts.

Practical teaching: answering questions about problem solving and proposed applied work.

Presentation of real cases for contact with the reality of the design and dimensioning of slopes and foundations. Preparation of a homework on slope stability analysis.

Evaluation:

Development of an individual geotechnical design, related to the design of the piles of an industrial structure, founded on a sedimentary massif. The design should be based on the results of boreholes

with SPT tests, developed in the field. The work integrates the geotechnical parameterization of the geotechnical units defined for the implantation site.

6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

The established content allows the student to develop skills in terms of understanding the behaviour of slopes and foundation in the light of Eurocode-7. The introduction of different subjects allows the student to have the bases to carry out the design of shallow and deep foundations and to be able to establish stability analysis and slope design. The presentation of practical problems and work cases allow the student to come into contact with reality.

7. ATTENDANCE

Without any restrictions.

8. CONTACTS AND OFFICE HOURS

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Subject area coordinator
Civil Engineering
(José Carlos Almeida)

Teacher
(Carlos Rodrigues)