Course guides
250831 - 250831 - Geophysical Prospection

Last modified: 07/10/2020

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

Degree: MASTER'S DEGREE IN GEOTECHNICAL ENGINEERING (Syllabus 2015). (Optional subject).

Academic year: 2020 **ECTS Credits:** 5.0 **Languages:** Catalan, Spanish, English

LECTURER

Coordinating lecturer: JOSE ORIOL CASELLES MAGALLON

Others: JOSE ORIOL CASELLES MAGALLON

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:
13310. To interpret laboratory tests and field observations so as to identify the mechanisms responsible for soil response. To propose laboratory testing programmes.

Generical:
13300. To apply advanced knowledge in sciences and technology to the profesional or research practice.
13301. To lead, coordinate and develop integrated projects in Geo-Engineering.
13302. To identify and design solutions for geo-engineering problems within ethical, social and legislative frameworks.
13303. To evaluate the impact of Geo-engineering on environment, sustainable social development and the significance of working within reliable and consciensous profesional environment.
13304. To incorporate new techncologies and advanced tools in Geo-engineering into profesional and research activities.
13305. To conceive Geo-engineering as a multi-disciplinary field that includes relevant aspects from geology, sismology, hydrogeology, geotechnical and earthquake engineering, geomechanics, physics of porous media, geophysics, geomatics, natural hazard, energy and climate interactions.
13306. To promote innovation for the development of methodology, analyses and solutions in Geo-engineering
13307. To tackle and solve advanced mathematical problems in engineering from the drafting of the problem to the development of formulation and further implementation in computer programs. Particularly, to formulate, code and apply analytical and numerical advanced computational tools to project calculations in order to plan and manage them as well as to interpret results in the context of Geo-engineering and Mining engineering.

TEACHING METHODOLOGY

The course consists of 1,7 hours per week of classroom activity (large size group) and 0,7 hours weekly with half the students (medium size group).

The 1,7 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 0,7 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

To conceive soils and rocks as porous media governed by Solid and Fluid Mechanics.
To characterize the geological environment and its interaction with civil works.
To interpret laboratory tests and field observations so as to identify the mechanisms responsible for soil response. To propose testing programmes.
To analyze, discriminate and integrate geological and geotechnical information in studies and projects.
To apply the knowledge on soil and rock mechanics to the development of the study, design, construction and exploitation of foundations, excavations, embankments, tunnels and other constructions on or through the soils, regardless of their nature and state or the finality of the works under study (Specific competence of the specialties in Geotechnical Engineering and Earthquake Engineering and Geophysics).
To assess seismic risks. To plan and dimension risk reduction measures. (Specific competence of the specialization in Earthquake Engineering and Geophysics).
To identify all types of structures and materials. To design, plan, implement and maintain structures and buildings in civil works. (Specific competence of the specialization in Earthquake Engineering and Geophysics).
To analyze the structures, by applying advanced methods, design software and structural calculations, from the knowledge and understanding of the forces and their application to the structural typologies used of civil engineering. To perform structural integrity assessment. (Specific competence of the specialization in Earthquake Engineering and Geophysics).
To perform studies of seismic hazard. (Specific competence of the specialization in Earthquake Engineering and Geophysics).

* To understand, speaking of advanced use, the theoretical and practical concepts in seismology.
* To know and be able to deal with the different seismic wave recording procedures at a global, regional and local level, as well as the tools used in the near and far field and the instrumentation of buildings and structures.
* To know the risk assessment methods and techniques and to be able to develop estudies applied to seismic risk.
* To know and apply soil surveying techniques using non-destructive geophysical tools and techniques.
* To have a global vision on how to address the main problems falling to seismology for engineering and earthquake engineering.

- Geophysical Prospection. Application to civil engineering.
- Non-destructive methods and techniques.
- Seismic Prospection.
- Electrical prospection.
- Gravity and magnetic methods.
- The ground radar or georadar (GPR).
- Geophysical characterization of soils.
- Case studies.

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STUDY LOAD

Type	Hours	Percentage
Hours small group	9,8	7.83
Hours large group	19,5	15.59
Hours medium group	9,8	7.83
Guided activities	6,0	4.80
Self study	80,0	63.95

Total learning time: 125.1 h

CONTENTS

merodes seismic and electrical georradar

Description:
Theory
electric prospecting
Prospecting by subsoil radar
other types of prospecting
issues
lab

Full-or-part-time: 93h 36m
Theory classes: 27h
Practical classes: 5h
Laboratory classes: 7h
Self study : 54h 36m

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:
- Telford, W.M.; Geldart, L.P.; Sheriff, R.E. Applied geophysics. 2nd ed. Cambridge: Cambridge University Press, 1990. ISBN 0521339383.
- Sheriff, R.E.; Geldart, L.P. Exploración sismológica. México DF: Limusa, 1991. ISBN 9681833669.

Complementary:
- Daniels, D.J. Surface penetrating radar. London, England: The Institution of Electrical Engineering, 1996. ISBN 9780852968628.