Universidad Zaragoza

Academic Year/course: 2022/23

26436 - Engineering Geology

Syllabus Information

Academic Year: 2022/23
Subject: 26436 - Engineering Geology
Faculty / School: 100 - Facultad de Ciencias
Degree: 296 - Degree in Geology
588 - Degree in Geology
ECTS: 5.0
Year: 4
Semester: Second semester
Subject Type: Optional
Module:

1. General information

1.1. Aims of the course

In this course the main objectives are that the prospective student acquires a series of professional competencies in the field of engineering geology, with appreciation of the importance of geology in civil engineering, whilst embracing the ethical compromise of a fully fledged professional geologist.

These approaches and objectives are aligned with the following Sustainable Development Goals (SDGs) of The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, (https://sdgs.un.org/goals), in such a way that the acquisition of the results of learning provides training and competence to contribute to some extent to their achievement:

SDG 6: Clean water and sanitation.

SDG 9: Industry, innovation and infrastructure.

1.2. Context and importance of this course in the degree

This course is usually undertaken in the fourth year of the degree. Therefore, the students are expected to already have wide geological knowledge, and to be skilled at using the necessary tools -both physical and conceptual- usually fielded in geology.

1.3. Recommendations to take this course

This course is among the courses devoted to those applied aspects of Geology. It requires some familiarity with solving numerical problems, as usual in Physics or Mathematics, and the ability to integrate the studied topics within the wider scope of matters learned in other courses. It is recommended to have successfully passed courses on physics and structural geology in previous years. It is recommended, as well, to assist to all lectures and the rest of activities, to keep a daily routine of work in order to fulfil the deadlines for papers and questionaries, and to make use of tutorial times.

2. Learning goals

2.1. Competences

Upon completion of this course, students will be able to:

- plan basic geological surveying according the to the engineering goal.
- interpret results from a variety of tests.
- perform basic calculations on surface and underground hydrology for civil engineering.

2.2. Learning goals

To successfully pass this course the student will achieve to?

? know concepts and basic terminology on this discipline

? know geomechanical parameters and usual geomechanical classifications of rock masses

? know the fundamental on geology surveying for civil engineering works

? know the methodology on surface and underground hydrology for engineering applications

2.3. Importance of learning goals

This course seeks not only to introduce students to the concepts and methods of this discipline, but also to instill a procedural style in problem solving in such a way that it increases their ability to provide solutions to geological problems in applied geology and engineering, knowing the usual nature of these problems and identifying the most appropriate procedures to solve them.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

1. Assessment activities

Continuous assessment

1. *Questionaries* (running test): at the end of each lecture the student must answer one or more questions related to the topic at hand.

2. *Practicals*: At the end of each practical session the student will either present the results, or answer on a or more questions about it.

3. *Written test*. Near the end of the term there will be a test (about 4h long) with question and/or problems to evaluate the understanding of the course. The student may consult books, course notes, etc.

Global Assessment

Students that failed to follow the course, and those that wish to, have the right to a global evaluation test. It consist on a *written test*, alike the previously described, and an it may include *additional test* where the student will show his/her skills with geophysical instruments.

2. Assessment criteria or Course Grade Distribution

Continous evaluation mode

Thematic blocks 1 and 2:

Partial score: Questionaries 10%, Problems 25%, Field report 1st day 35%, field report 2nd day 30%

Thematic block 3:

Partial score: grade=(test x 0.7)+(continous ev. x 0.3), where ?continuous ev.? referees to (classroom questions + additional problems) x 0.5

Final score: (Partial 1 x 0,65) +(Partial 2 x0,35)

Global test

grade=(written test x 0.7)+(additional test x 0.3)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, laboratory sessions, tutorials, seminars and fieldwork.

4.2. Learning tasks

This course is organized as follows:

- **Lectures** (1.5 ECTS). Learning of concepts, descriptions and calculations bases.
- **Tutorials and seminars** (0.3 ECTS)
- **Laboratory sessions** (1.2 ECTS). Problems will be solved.
- **Fieldwork** (1.5 ECTS) Learning of procedures is the focus of study in fieldwork.

Teaching and assessment activities will be carried out on site for as long and as much as possible. This scenario could change if safety regulations related to the covid19 crisis recommended online activities.

4.3. Syllabus

This course will address the following topics:

Lectures

- Topic 1. Basic rock mechanics
- Topic 2. Rock mass characterisation and classification.
- Topic 2. Rock slope stability.
- Topic 3. Surface hydrology in civil engineering.
- Topic 4. Monitoring slopes.
- Topic 5. Tunnels.
- Topic 6. Dams.
- Topic 7. Roads.
- Topic 8. Special terrains.

Fieldwork

1. Characterization of rock mass (1 day of field). Surroundings of Alpartir (Zaragoza), fractured paleozoic massif.
2. Special visits to works and cases (2 days of field). The visit places will take shape taking care of the existing availabilities at the time of accomplishment of the exit of field.

Laboratory sessions

- Session 1: Workhop on non linear failure criteria.
- Session 2. Rock slope stability: kinematic analysis.
- Session 3. Rock slope stability: dynamic analysis.
- Session 4. Wedges on tunnels, estimation of the maximun volume.
- Session 5. 2D hydraulic modelling.
- Session 6. Tests and methods of analysis on special terrains.

The program is grouped in three thematic blocks:

1. Basis of rock masses behaviour (Theory 1, 2; practicals 1; field 1st day)

2. Basis of engineering geology (Theory 4, 5, 6 and 7; practicals 2, 3, and 4, field 2ºnd day)

3. Water and especial terrains (Theory 3 and 8; practicals 5 and 6, field 3rd day)

4.4. Course planning and calendar

Lectures will start on the first academic week and laboratory sessions in the following week.

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Sciences and Earth Sciences Department websites (https://ciencias.unizar.es, https://cienciastierra.unizar.es) and Moodle.

4.5. Bibliography and recommended resources

http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=26436