Università degli Studi della Basilicata
Scuola di Ingegneria

COURSE: Engineering Geology II			
ACADEMIC YEAR: 2016/2017			
TYPE OF EDUCATIONAL ACTIVITY: Characterizing			
TEACHER: Francesco Sdao			
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Language: Italian			
ECTS: 6	n. of hours: 54 (34 hours: lessons 20 hours: tutorials/practice)	Campus: Potenza School: Engineering Program: Civil Engineering	Semester: I

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES

The main formative objective of the course is to provide students the specialist knowledge and the main tools and methods of the applied geology and geomorphology useful for: geological-technical and geomechanical study of rock masses in order to define the geological and applicative problems in the design of civil engineering works (roads, dams, galleries); the study, the monitoring and the assessment of landslide hazard and risk.

The main provided knowledges will be:

1. Principal methods for geological-technical characterization and geomechanical classifications of rock masses (classifications of Beniawsky, Barton, Geological Strength Index);
2. Principal tools and methods of study of geological-technical problems in the design of civil engineering / roads, dams, galleries);
3. Criteria, methods and tools for the landslides study in an area;
4. Methods and techniques for monitoring of slope instability;
5. Principal methods of landslides hazard and risk assessment;
6. Methods of Artificial Intelligence applied to the assessment of landslide risk.

The main skills to be acquired are listed below:

1. To analyze and interpret the results of geological -technical surveys of rock masses;
2. To classify the geomechanical state of a rock mass;
3. To define and to assess the main geological-technical issues related to the design and construction of civil works / roads, dams, galleries);
4. To investigate, to analyze and to define the landslides of an area;
5. To design, to set up and to manage a monitoring plan of the slope instability;
6. To apply the assessment methods of landslide hazard and risk, with particular reference to those referred to Artificial Intelligence.

PRE-REQUIREMENTS

It is necessary to have acquired and assimilated the basic knowledge provided by the Applied Geology course.

SYLLABUS

1. Geological-technical study of rock masses. Geological-technical characteristics of intact and fissured rocks.Recognition, measurement and interpretation of geological and technical parameters of the structural discontinuities. Analysis and interpretation of data: stereographic projections (Schmidt and Wulff patterns). Geomechanical and lithotechnical classifications of rock masses. The classifications RMR of Bieniawsky and Q system of Barton, Geological Strength Index (GSI) system. Applications to the case studies. (18 hours)
2. The geology applied to great works of civil engineering (tunnels, dams, routes): studies, survey, monitoring and tests in various stages of planning. Geological, geomorphological and hydrogeological surveys, in situ geognostic tests for the planning and realization of the tunnels. Geological problems of tunnels. The Dams: studies, surveys and monitoring techniques for the realization and for the resolution of geological problems. 812 hours)

3. Mass movements: types of landslides and relative geomorphological and morpho-evolutive features. Main landslide classifications. Character and definition of landslide activity. The rock falls: falls, topples and rock slides. Methods of kinematic analysis for rock slope instability assessment: plane failure, wedge failure and toppling failure. Study of the landslide prone area: types of reliefs, in situ surveys. Criteria and methods of definition of the slope instability. Methods and techniques for monitoring the slope instability. Principles, aim and operation of a monitoring system. Methods and tools for the estimation of surface movements of a landslide body. Methods and tools for estimating the deep movements of landslide. The inclinometers. Innovative techniques of remote sensing in monitoring of the slope instability: GPS techniques, SAR interferometry, Permanent Scatters. The landslide hazard and risk. Main methods for landslide hazard and risk assessment. Heuristic, statistical, deterministic methods. Artificial intelligence methods applied to evaluation of landslide hazard: fuzzy logic, neuro-fuzzy logic and artificial neural networks methods. (24 hours)

TEACHING METHODS

The course includes 54 hours of lessons and exercises in classroom and in laboratory.

In particular 40 hours of lessons and 20 hours of guided exercises in classroom and in laboratory are planned. At the end of the course a technical excursion is scheduled.

The students will have free access to the laboratory for further individual exercises.

EVALUATION METHODS

The aim of the exam test is to verify the level of attainment of previously mentioned training objectives.

The exam consists of a written test with 5 or 6 open questions concerning all the topics dealt in the course.

The duration of the test is scheduled in three hours.

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

1. Notes provided by the teacher during the lessons and available on the site.
2. Textbooks:

- L. Scesi, M. Papini, P. Gattinoni (2001) – Geologia Applicata: Applicazione ai progetti di ingegneria civile (vol. 2). Casa Ed Ambrosiana Milano
- L. Scesi, M. Papini, P. Gattinoni, L. Longoni (2015): Geologia Tecnica. Casa Ed Ambrosiana Milano

INTERACTION WITH STUDENTS

At the beginning, after illustrating the course program, the training objectives and the profit testing methods, the teacher provides students the didactic material of the lessons (pdf documents). Simultaneously, he collects a list of students who intend to register for the course, together with name, surname, registration number and e-mail.

Timetable of reception: Wednesday from 15:00 to 17:00 and Thursday from 8:30 to 10.30 in the professor office.

In addition to weekly reception, the professor is available at all times for a contact with the students by e-mail.

EXAMINATION SESSIONS (FORECAST)[1]

8 febbraio 2107, 27 febbraio 2017, 13 aprile 2017, 15 giugno 2017, 13 luglio 2017, 27 luglio 2017, 14 settembre 2017, 12 ottobre 2017, 16 novembre 2017, 14 dicembre 2017.

SEMINARS BY EXTERNAL EXPERTS YES X NO □

FURTHER INFORMATION

[1] Subject to possible changes: check the web site of the Teacher or the Department/School for updates.