



# UNIVERSITÀ DI PAVIA

Anno Accademico 2020/2021

| APPLIED GEOLOGY     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
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| Enrollment year     | 2018/2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Academic year       | 2020/2021                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Regulations         | DM270                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Academic discipline | GEO/05 (APPLIED GEOLOGY)                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Department          | DEPARTMENT OF EARTH AND ENVIRONMENTAL SCIENCES                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Course              | GEOLOGICAL SCIENCES                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Curriculum          | PERCORSO COMUNE                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Year of study       | 3°                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Period              | 1st semester (05/10/2020 - 15/01/2021)                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| ECTS                | 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Lesson hours        | 83 lesson hours                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Language            | Italian                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Activity type       | WRITTEN TEST                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Teacher             | MEISINA CLAUDIA (titolare) - 2 ECTS<br>BORDONI MASSIMILIANO - 1 ECTS<br>GIARRATANA VINCENZO - 3 ECTS<br>PILLA GIORGIO - 3 ECTS                                                                                                                                                                                                                                                                                                                                                        |
| Prerequisites       | The course is part of the basic training in Geological Sciences. To better follow the course the student has to have acquired the basic knowledge of Geomorphology and Geology.                                                                                                                                                                                                                                                                                                       |
| Learning outcomes   | The following skills will be provided to the student: ability to describe and classify the geological issues in a engineering geology viewpoint; ability to analyze the territory for the research and the exploitation of natural resources; knowledge of the basic principles of water dynamics (surface and hypogean waters); ability to deal with some simple problems regarding territorial protection; understanding and processing of fundamental data collected on the field. |

Whenever possible, specific reference is made to the Sustainable Development Goals (SDG) defined by the United Nations in the 2030 Agenda

#### Course contents

Module 1. Hydrogeological water balance: the rainfall inflow, the evapotranspiration, the run-off, the water influx. Surface water: hydrogeological parameters and processes, run-off coefficient, fluvial hydraulics outlines, water level and discharge gauging surveys (current meter, tracers), river flood and minimum flow, hydrographs, recurrence interval. Groundwater: aquifers, groundwater flow, groundwaters, determination of hydrogeological parameters, thematic mapping, aquifers withdrawal (springs and wells), coastal aquifers. Physico-mechanical properties of soils and rocks.

Module 2. Engineering geology definition. Engineering geology problems. Engineering geological model. The geological materials: earth, rock, rock mass and structurally complex formations. Physics, indices and mechanical properties. Consistency limits and interactions between earth liquid and solid phases. Classification systems of soil and rock. Problematic soil.

Laboratory practical activities: laboratory tests for the measure of physical and mechanical properties of soils. Measure of water content, bulk density. Grain size analysis. Atterberg limit tests.

Module 3. Underground prospecting, direct and indirect site investigation surveys, aims and using. Drilling techniques: drilling logs, sampling procedure, technical description and quality rating of sampling. Test and measures for soils: cone penetration test, vane test, flat dilatometer test, pressurometer, static plat load test. Test and measures for rock.

The course content covers some Goals defined by the United Nations in the 2030 Agenda: Goal 2) end hunger, achieve food security and improved nutrition and promote sustainable agriculture; Goal 6) ensure availability and sustainable management of water and sanitation for all; Goal 13) take urgent action to combat climate change and its impacts).

#### Teaching methods

The course is composed by three modules: 1) hydrogeology, 2) engineering geology, 3) direct and indirect surveys. The class compounds of lectures,. In the module 2 the lectures are integrated with laboratory works, which aim to put into practice the techniques for the soil characterization. In the module 3 the lectures are integrated with field excursions.

#### Recommended or required readings

- L. Scesi, M. Papini, P. Gattinoni Principi di Geologia Applicata - Ed. CEA Milano.
- Luis Gonzalez de Vallejo, Mercedes Ferrer (2011). Geological Engineering. CRC Press, ISBN 9781439892213
- Castany G. - Idrogeologia. Principi e metodi. Flaccovio Editore.
- Cestari F. Prove geotecniche in sito. Ed Geograph
- Course notes, scientific articles and other material will be provided during the course.

#### Assessment methods

At the end of each module, the student will incur a written exam. The

final grade will be the average grade of the three exams.

**Further information**

At the end of each module, the student will incur a written exam. The final grade will be the average grade of the three exams.

**Sustainable development  
goals - Agenda 2030**

[\\$lbl\\_legenda\\_sviluppo\\_sostenibile](#)