



# *Dipartimento di Scienze e Tecnologie*

ANNO ACCADEMICO 2017/2018

**CORSO di STUDIO in Scienze Geologiche**  
**INSEGNAMENTO in Elementi di Geologia Tecnica e Applicata (Applied Geology)**

**DOCENTE Prof. Francesco Fiorillo**

Introduction: Definition; fields of application; means and methods; relationships with other disciplines. Organization of the course. Exam Mode.

Panorama of applied geology problems: hazard and geological risk; environmental protection; realization of works of engineering; land planning; earth resources; protection of cultural heritage; exploration of the subsoil. The rocks from the geological-technical point of view: soils and rocks.

Physical, mechanical and technical properties of rocks. Compactness, porosity, imbibition, saturation. Elastic and plastic behavior of rocks, main constants of rocks. Compression strength, shear strength, traction strength, hardness and impact resistance, durability and gelability. Main human uses of rocks for construction purposes, and requirements required.

Main physical properties and technical classifications of soils. Particle and aggregate properties. Classifications of soils. The constipation of soils. Analysis of soils in a geotechnical laboratory.

Elements of hydrogeology and hydrology: basics of hydraulics and hydrological cycle; aquifer, aquiclude, water distribution in the soil. Groundwater flow: definitions, Reynolds number, Bernoulli's theorem, Darcy's law, Laplace equation for bidimensional filtration model and flow network. Capillary phenomena and negative pore pressure.

Geostatic stress: the principle of effective stress. Effect on effective stress: critical hydraulic gradient and erosion phenomena associated with water filtration. Geostatic tensions and tension history.

Introduction to soil mechanics: defining friction angle and cohesion, shear strength. Examples of Mohr's strength theory and Mohr-Coulomb's failure criterion.

Main underground exploration techniques. Direct investigations: geognostic surveys, penetrometric tests (dynamic and static), vane tests, pressiometric tests, plate loading tests, compaction tests.

Indirect Investigations: refraction seismic survey, seismic tests in borehole; geoelectrical survey. Main roles of geotechnical surveys.

Landslides. Main typologies and slope instability processes, with relative classifications. Main triggering factors. In situ surveys, landslide hazard, and landslide mapping features. Monitoring techniques and main reclamation works of landslide areas.

Quarries: main geo-technical aspects related to the opening, operation and disposal of excavation areas of quarry materials.



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Landfills: Main geo-technical aspects related to localization, operation and disposal of areas dedicated to the store of urban solid waste, special and toxic-harmful.

Dams: Main geo-technical aspects related to localization, construction and operation of earth dams and concrete dams.

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