



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Fundamentals of Hydrogeology

2122-1-F7401Q094

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#### Aims

To provide advanced knowledge and modelling techniques for: the identification and characterization of aquifers in consolidated and unconsolidated materials, the laws that govern groundwater flow, the relationships between superficial water and groundwater, the design and construction of water wells and spring water collection, characterization of water wells and aquifers by pumping tests in steady and transient conditions.

#### Contents

Students will learn basic knowledge on hydrogeology, applied and contaminant hydrogeology, treatment of contaminated sites

#### Detailed program

##### Fundamentals of hydrogeology

Hydrologic cycle and water circulation in different geological systems. Hydrogeological balance: rainfall, temperature, real and potential evapotranspiration. Porosity definitions and use. Fluid flow in saturated and unsaturated soil, porous rocks or jointed rocks. Reconstruction and interpretation of piezometric surfaces and flow nets. Classification and analysis of springs, spring discharge regime, evaluation of spring discharge dynamics using recession curves, Hydrochemistry: physical chemical properties of groundwaters, TDS, dissolved elements their origin and their effects, data representation, plotting and analysis. . Well design and installation, drilling and construction techniques, purging, maintenance, materials. Monitoring and interpretation of well hydraulic testing and pumping tests under steady state and transient conditions. Well sampling techniques and problems, methods and materials, sampling campaigns. Applying site characterization to model development.

Risk analysis for soil and water contamination. Reference legislation: regional, national and european laws for superficial and subsurface water.

Lab exercises: Flow net construction, simple solution of water flow in porous media, interpretation of well tests.

### **Prerequisites**

A base-level knowledge in engineering geology, site investigation, physics and mathematics is required

### **Teaching form**

- Lessons
- Laboratory experiences and problem solving

### **Textbook and teaching resource**

All the lectures are downloadable form the elearning website

### **Semester**

1st and second semenster

### **Assessment method**

Oral

### **Office hours**

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