



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## SYLLABUS DEL CORSO

### Introduzione alla Petrografia

1920-1-E3401Q039-E3401Q046M

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#### Aims

Aim of the “*Introduction to Petrography*” class is to give a general understanding of the main geological processes that occurred during the Earth evolution, with emphasis on rock petrogenesis. During the practical activity (Rock Lab), students will acquire the basic skills and the ability to identify and classify the most representative lithologies.

#### Contents

##### LECTURES (4 CFU)

Origin and composition of the Solar System. The Earth. Principles of Mineralogy and some basic concepts of magma crystallization. Earth internal structure and a brief introduction to seismology. The lithospheric plates. Plate boundaries and magma genesis. Subduction zones. Volcanoes. The sedimentary rocks. The metamorphism.

##### ROCK LAB – Practical activity (2 CFU)

The main rock-forming minerals. Rock textures and classification.

#### Detailed program

##### LECTURES (4 CFU)

Origin and composition of the Solar System: abundance and distribution of elements in the Solar System, in the

Meteorites and in the Earth's Crust. The Earth: the birth of the Earth and its evolution; primordial and present-day Earth's atmosphere; the Archean Eon; cratons. Principles of Mineralogy and some basic concepts of magma crystallization: the Periodic Table; chemical-physical properties of elements; rock-forming minerals; silicate structures and classification; polymorphism; isomorphism; solid solutions; the plagioclase phase diagram; some elementary notes on magma crystallization processes. Earth's internal structure and a brief introduction to seismology: properties of seismic waves; types of seismic waves; seismic waves and the Earth's interior; the core; the mantle; the continental crust; the oceanic crust; the lithosphere; the asthenosphere. The lithospheric plates: brief history of plate tectonics; the lithospheric plates; the continental lithosphere; the oceanic lithosphere; the plate boundaries; divergent, convergent and transform boundaries. Plate boundaries and magma genesis: magma definition and meaning; chemical-physical properties of magma; chemical classification of magma; basic concepts of partial melting of the mantle and the crust; modal and chemical classification of igneous rocks; intraplate magmatism; the mid-ocean ridge magmatism. Subduction zones: landform and structure of the subduction zones; thermal structure and partial melting; igneous products; island arcs; continental arcs. Volcanoes: nomenclature of igneous bodies; volcanic rocks; volcanic landforms and type of volcanoes; lavas and pyroclastic rocks; volcanic hazard. The sedimentary rocks: weathering and erosion; transport mechanisms; deposition; diagenetic processes; sedimentary depositional environments; sedimentary structures; clastic rocks; carbonate rocks. The metamorphism: definition and conditions of metamorphism; factors controlling metamorphism; metamorphic grade; metamorphic facies and index minerals; contact and regional metamorphisms; metamorphic rocks.

#### ROCK LAB – Practical activity (2 CFU)

The main rock-forming minerals: mineral characteristics; quartz, plagioclase, K-feldspars, sanidine; leucite; biotite, amphibole, pyroxene; olivine; muscovite; garnet; staurolite. Igneous rocks: texture, structure and nomenclature; Streckeisen diagram; detailed description of granite, granodiorite, tonalite, syentite, monzonite, gabbro, diorite, rhyolite, trachyte, andesite, basalt, tephrite, phonolite. Sedimentary rocks: texture, structure and nomenclature; detailed description of conglomerate, breccia, sandstone, grainstone, wackestone, mudstone, dolomite, travertine, gypsum. Metamorphic rocks: texture, structure and nomenclature; metamorphic conditions, structure and index mineral; detailed description of slate, phyllite, micaschist, orthogneiss, amphibolite, granulite, eclogite.

### **Prerequisites**

None

### **Teaching form**

The “*Introduction to Petrography*” class consists of a combined learning approach based on *Lectures* (32 hours in total) and *Practical Activity* (Rock Lab, 24 hours in total). Lectures usually run between October and mid-November, whereas the practical activity lasts the entire first semester (from October to January). Attendance at the lectures is not mandatory, but highly recommended. Attendance at the Rock Lab is required for 75% of total (students have to sign in).

Additional educational material is available on the e-learning platform: 1) a multiple-choice test in order to self-evaluate the exam preparation; 2) a concept map in order to understand how develop a long essay question on a broad subject; 3) examination tests.

Any doubts on lectures and practical activity, as well as on available e-material, can be clarified during the tutoring.

## Textbook and teaching resource

All teaching material is available on the e-learning platform (<http://elearning.unimib.it/>)

"Understanding Earth"

John Grotzinger; Thomas H. Jordan; Frank Press; Raymond Siever

Further reading:

"Principles of Igneous and Metamorphic Petrology"

2nd Edition - [Anthony Philpott](#); [Jay Ague](#)

## Semester

First semester (October - January)

## Assessment method

Seven exam sessions of the *Principles of Geology* course are scheduled at the beginning of the Academic Year. Students are evaluated on three tests in this course. Each test has an evaluation in thirtieths. A positive assessment of each test is required to sit for the next one. The three tests have to take as follows:

1. **Cartography Test** (2 CFU) - written examination, related to the module of "Introduction to Geology". The student will have to: draw a topographic profile, a drainage basin and the intersection of a geological surface with the topography; calculate the coordinates of a point on the map, draw a geological section (from a simplified geological map) and answer 9 questions about cartography. This examination will take place approximately one week before the oral examination on Rock Recognition and of the written examination related to the Theoretical Part. The dates will be communicated from the professor to all students by e-mail. A rating  $\geq 18/30$  is valid for all subsequent dates of examination.

2. **Rock Lab Test** (2 CFU) – oral examination about the Practical Activity of "*Introduction to Petrography*". Students have to identify the main rock-forming minerals, to describe with correct terminology rock textures and structures, and to classify two rocks among those analyzed. This oral examination has to be taken on the same day of the Final Test. If students do not pass the Final Test, a grade  $\geq 25/30$  in Rock Lab test shall be considered valid only for the next exam session.

3. **Final Test** (4 + 4 CFU) – written examination about both classes of "*Introduction to Geology*" and "*Introduction to Petrography*". This test consists of five questions: two long and three short essay questions. The long essay questions require that students are able to neatly and clearly describe with correct terminology the key-concepts relevant to the topic, as well as all related minor issues. The short essay questions require a clear and concise response focused on the subjects.

The final grade of the *Principles of Geology* exam is calculated on the weighted average of the three tests.

No Mid-semester examinations are expected.

## **Office hours**

Every day by appointment. Contact the teacher ([nadia.malaspina@unimib.it](mailto:nadia.malaspina@unimib.it) ) by the student e-mail address (.....@campus.unimib.it).

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