UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Introduction To Geology

2627-1-E3402Q006-E3402Q00601

Aims

The purpose of the “Introduction to Geology” class is to give a general understanding of the main tectonic processes that control Earth's evolution, its surface and deep structure, with special emphasis on rock deformations, the genesis and meaning of the main tectonic structures, on earthquakes and their effects. Principles of stratigraphy including the definition of stratigraphic units, geological chronology and an introduction to geological maps complete this general introduction to the basic concepts of Geology.

During the practical activities (Cartography Lab, INTERACTIVE TEACHING), students acquire the basic skills and the ability to: recognize the structures/topography relationship, reading of geological maps, making of geological cross-sections.

In particular, the learning objectives of this introductory course fall into two categories, as outlined in the academic regulations:
a.1) Knowledge and Understanding
Describe the structure, composition, and dynamics of the Earth system, placing them within the context of geological time and the evolution of the biosphere as documented by the fossil record.

b.1) Applying Knowledge and Understanding
Apply direct observation techniques for the identification and preliminary classification of minerals and rocks; use basic cartographic tools to represent rock bodies. Translate theoretical concepts into practical measurements and develop initial skills in field surveying and direct observation within the natural environment.

Contents

DELIVERED DIDACTICS (3.5 CFU) – Plate tectonics, plates and their margins, historical origins, geological evidence of continental drift, structure of oceanic basins, convection and its origin. Earth paleomagnetism and its role in the formulation of the theory of Plate Tectonics. Stratigraphy, general principles, relative and absolute

chronology; introduction to geological maps. Brittle (faults and joints) and ductile deformations (folds). Earthquakes, tsunamis and Italian seismicity.

INTERACTIVE TEACHING (2 CFU) - Reading of topographic maps and interpretation of the topography/geology relationships, reading and interpretation of geological maps, production of geological cross-sections.

INTERACTIVE TEACHING (0.5 CFU) One day field excursion in the to show some basic aspects of Geology (stratigraphy, structure, recent evolution, etc.).

Detailed program

Plate tectonics. Compositional and rheological structure of the Earth. Plate margins, their features and evolution. Paleomagnetism and the structure of the ocean floor. The orogenic process, collisional orogenic (Alps and Himalayas) and non-collisional belts (Andes). Evolution and structure of the continents.

Brittle and ductile deformation and related structures generali principles and examples. Joints, faults and their regional associations. Folds and their classification. Earthquakes and seismic waves, Prediction and prevention of earthquakes, seimic hazard and risk in the World and in Italy.

Relative and absolute chronology. General principles of stratigraphy, stratigraphic units and stratigraphic discontinuities. Introduction to the general principles of radiometric dating. General principles of geological mapping and reading of geological maps.

Elements of geological maps: tracing geologic boundaries on a topographic map starting from attitudes; graphic rendering of stratimetric exercises; interpretation of geological structures on simplified geological maps; realization of geological cross-sections.

Prerequisites

CORSO DI SICUREZZA SUL TERRENO (status "Approved")

Teaching form

The “Introduction to Geology” class consists of a combined learning approach based on *Lectures* (28 hours in total; 14 two-hour lectures, in person, Delivered Didactics), Practical Activity (Rock Lab, 24 hours in total; 12 two-hours lab activities, in person, Interactive Teaching) and one field trip of 1 day 1 six-hour field activity, in person, Interactive Teaching). Lectures usually run between mid-April and May, whereas the practical activity lasts the entire second semester (from March to June). Attendance at the lectures is not mandatory, but strictly recommended. Attendance at the Rock Lab and field activities is required for 75% of total (students have to sign in).

The following are available on the e-learning platform: 1) a multiple-choice self-assessment test so students can test their preparation; 2) all slides shown in class and exercises with additional videos; 3) sample exam papers (in the handouts); and materials for the end-of-course field trip.
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/)

F. Press, R. Siever, Capire la Terra, Zanichelli, 2007.

J.P. Grotzinger, T.H. Jordan, Capire la Terra, Zanichelli, 2016

P. Casati, Scienze della Terra, Volume 1, Elementi di Geologia Generale, Ed. Città Studi, Milano, 1996

Semester

Second semester (March-June)

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 the intersection of a geological surface with the topography starting from values of attitude of a surface, draw a geological cross section (from a simplified geological map) and answer to questions about geological maps. 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 ? 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 three rocks among those analyzed. This oral examination has to be taken on the same day of the Final Test.

3. **Final Test** (3.5 + 3.5 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 rock lab test and the final test take place on the same day coinciding with the exam session.

The final rating of the *Principles of Geology* exam is calculated on the weighted average of the three tests, including a short oral report (0.5 FCU) on field activities during the rock lab test or a check of the fieldbook at the end of the activities, including the use of the geological compass.

No Mid-semester examinations are expected.

Office hours

On Mondays between 14.30 and 16.30. Otherwise, please contact the teacher ([andrea.zanchi@unimib.it] using the student e-mail address (.....@campus.unimib.it).

Sustainable Development Goals

QUALITY EDUCATION | AFFORDABLE AND CLEAN ENERGY | LIFE BELOW WATER | LIFE ON LAND