SCHEDA INSEGNAMENTO: Geologia
DOCENTE: Massimo Moretti
A.A. 2019-2020

Degree Course in Environmental Sciences A.A. 2017/2018

Course	Geology
SSD	GEO/02
Year	2019-2020
Code of Teaching	007900
Semester	II
Lecturer	Massimo Moretti
CFU	8 (6 lessons + 1 laboratory + 1 field activity)
Semester	from March 1st to June 15th
Prerequisites	Physical Geography
Prerequisites	The achievement of the training objectives requires the previous knowledge of i) topics of the first year of lessons (essentially Physical Geography) and ii) generic skills in scientific subjects. Workers and non-attending students possess these prerequisites in a way that is similar to those who attend.
Formative objectives	***Knowledge and understanding skills*** The expected results are essentially related with the knowledge of the dynamics of the Earth Planet. The tools of the scientific method applied to the understanding of endogenous and exogenous processes are provided. The course is divided into theoretical lessons, laboratory and field trips in order to increase the student's ability to understand scale and magnitude of the physical processes of our planet. ***Ability to apply knowledge and understanding*** Students acquire skills related to the application of theoretical concepts to the temporal and spatial evolution of geological processes. This expected capacity must be the result of practical experiences and exercises in the lab and in the excursion: after these activities the students must prepare descriptive and interpretative texts. ***Judgment autonomy*** Acquiring the ability to identify procedures that are methodologically adequate to describe, interpret and discuss complex interactions between different geological processes. Group and then individual corrections of the tests are aimed at improving the autonomy of the student. ***Communicative Skills*** It is expected that the student will acquire the ability to discuss the basic concepts of Geology in a clear and exhaustive manner, using an appropriate scientific language. Attaining this goal, the discussions take place during the theoretical lessons and the tests. ***Learning ability***

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Coordinatore: Prof. Massimo Moretti
Campus Universitario, via E. Orabona 4, 70126 Bari (Italy)
Tel: +39 0805442563 Fax: +39 0805442625
email: massimo.moretti@uniba.it

<table>
<tr><td></td><td colspan="3">Expected results concern the ability of integrate basic knowledge through personal pathways. This goal is also pursued through examples of web resources with rigorous scientific material.</td></tr>
<tr><td>Didactic methods</td><td>Lessons</td><td>Laboratory activities + Field Trip</td><td>Tot</td></tr>
<tr><td>Assisted teaching</td><td>54</td><td>15+24</td><td>93</td></tr>
<tr><td>Individual study hours</td><td>112</td><td>11</td><td>122</td></tr>
<tr><td>CFU</td><td>6</td><td>1+1</td><td>8</td></tr>
<tr><td>Evaluation Methods</td><td colspan="3">EVALUATION CRITERIA
Student assessment provides:
- a written test on the classification of rocks rocks. The written test lasts for 2 hours and consists of a brief report that gives a description and the classification of the rocks specimens. This test is not carried out only if the student has passed the two intermediate tests that take place during the course;
- the oral exam that generally consists of three questions on the topics treated in the course.
The exam score is expressed in thirtieths. It generally also takes account of: i) the student's participation in field exercises and activities and ii) the preparation of texts and other materials regarding the field trip. An excellent vote is the result of the satisfaction of most of the following evaluation criteria.

Knowledge and understanding skills
The student must demonstrate to dominate the concepts related to the dynamics of our planet. Endogenous and exogenous processes must be described with particular reference to considered scale l. s.
Ability to apply knowledge and understanding
The student is required to apply the essentially theoretical aspects acquired in the course of the major exogenous or endogenous processes (eg distribution of earthquakes, volcanism, karst collages, etc.).
Judgment autonomy
The student is able to identify a logical path between causes and effects in geological processes. The student demonstrates how to choose the methodological approaches that describe a specific geological processes and/or the right procedure to solve a stratigraphic problem.
Communicative Skills
The student must have acquired the ability to fully communicate the concepts learned and to use a correct scientific language.
Learning ability
The student must demonstrate to have the tools to enrich his knowledge also through the individual and group activities offered during the course.</td></tr>
<tr><td>Program of the Course</td><td colspan="3">Introduction
Geology and Earth Sciences. The different scales of analysis of Geology. Plate tectonics and its consequences (distribution of continents and oceans, seismicity, volcanism, etc.).</td></tr>
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Part I - Geodynamics and Structural Geology

The structure of the Earth. Chemical and rheological features of the lithosphere, asthenosphere and nucleus and depth of the main discontinuities.

From the “Continental Drift” to the “Plate Tectonics".

Divergent Plate Boundaries: from the rift to the passive margins.

Convergent Plate Boundaries: type B and A subduction. The foreland basin: identification and evolution.

Transform Plate Boundaries.

The origin of the Plate motion.

Structural Geology. Geodynamics and Structural Geology. The physical basis of deformation.

Brittle tectonics. Terminology of faults elements: footwall and hanging-wall, fault plane, fault line, etc. Normal faults. Reverse faults. Strike-slip faults. Reverse flakes. Geodynamic domains of inverse faults. Reverse Fault Schematic and Field Examples. Erosion patterns of inverse faults. Swollen faults. Generality, recognition of righteous and sinister faults. Pull-apart baskets and push-up hoists. Strong and positive flower structures.

The ductile tectonics. Terminology and geometric description of folds (axial plane, hips, hinge area, etc.). Classifications

Thrust: Flat and ramp. Thrust succession in time and space (geometric implications), backthrusting and off-sequence thrust.

Part II - Sedimentary basins and stratigraphy

Sedimentary basins: definition. Classifications based on substrate type, geodynamic system, etc. The evolution of a Sedimentary Basin: sedimentation rate, subsidence rate, basin geometry and accommodation space, eustatic variations, climate.

Introduction to Stratigraphy. Criteria for stratigraphic subdivisions. The four principles of Stratigraphy. Geometric relationships between stratigraphic units. Definitions of angular unconformity, paraconformity, disconformity. Onlap, toplap and downlap geometries. Exercises on geometric relationships (stratigraphic units, erosional surfaces, tectonic deformations and magmatic intrusions, etc.).

Litostratigraphy, Biostratigraphy, Magnetostratigraphy, Cronostratigraphy and Geocronology, Ciclostratigraphy and UBSU, Sequence Stratigraphy.

The Geological Maps. The relationship between stratigraphic contacts and topography. Examples of geological thematic maps (eg Mar Piccolo).

Part III – Laboratory activities

Definition of rock. Minerals and crystals. The litogenetic cycle. The Silicates. The most common silicates, their macroscopic recognition and their microscopic recognition.

Magmatic rocks. Origin of magma and composition. Intrusive and effusive magmatic rocks.

Sedimentary rocks. Diagenesis and components of a sedimentary rock (granules, pores, matrix and cement). The genetic classification of sediments and sedimentary rocks.

Metamorphic rocks. Generalities

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Textbooks	Grotzinger, J.P., Jordan, H.T. (2016). *Capire la Terra*. III Zanichelli Ed., 752 pp. Bosellini, A. (1978). *Tettonica delle Placche e Geologia*. Zanichelli, 144 pp. Bosellini, A., Mutti, E., Ricci Lucchi, F. (1989). *Rocce e successioni sedimentarie*. UTET, 396 pp. Germani et al., (2002). *Guida Italiana alla Classificazione ed alla Terminologia Stratigrafica*. Quaderni APAT, serie III, 9.
Other course materials	Doglioni, C. (1991). *Una interpretazione della Tettonica Globale*. Le Scienze, 270, 32-42 Doglioni, C. (1994). *Elementi di tettonica*. Il Salice. 162 pp. Doglioni, C. *et al.*, (1994). *The Puglia uplift: an anomaly...*" Tectonics, 13/5, 1309-1321 Slides of the Course Sepm strata Lecture of Sequence Stratigraphy. https://www.youtube.com/watch?v=TTxqCONVEuE&list=PLn9iJ983gm1uFTqBeew0tUkAucJKQ27Du

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