UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze della Terra e del Mare
ACADEMIC YEAR	2020/2021
BACHELOR'S DEGREE (BSC)	GEOLOGY
INTEGRATED COURSE	MINERALOGY AND MINERALOGY LABORATORY - INTEGRATED COURSE
CODE	19806
MODULES	Yes
NUMBER OF MODULES	2
SCIENTIFIC SECTOR(S)	GEO/06
HEAD PROFESSOR(S)	MERLI MARCELLO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	MERLI MARCELLO Professore Associato Univ. di PALERMO SCIASCIA LUCIANA Professore Associato Univ. di PALERMO
CREDITS	12
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**MERLI MARCELLO** Wednesday 10:00 12:00 Dip.to Distem - V. Archirafi 36 II piano ammezzato (stanza del Prof. Merli) **SCIASCIA LUCIANA** Monday 10:00 13:00 stanza del docente Thursday 10:00 13:00 stanza del docente

DOCENTE: Prof. MARCELLO MERLI

PREREQUISITES	Knowledge and skill of the contents of the courses of Mathematics, Chemistry and Physics.
LEARNING OUTCOMES	The student 1) must demonstrate knowledge of the basic principles for understanding the chemical and physical phenomena related to the genesis, the transformation and the assemblages of minerals, i.e. for identifying and classifying a rock. 2) should be able to apply his knowledge and understanding in developing the ability to correlate the different topics, as well as to recognize the appropriate analytical technique depending on the problem to be solved. 3) must be able to independently assess the implications in the fields of geo-petrology and material science of the phenomena studied throughout the course. 4) must be able to communicate the results of the study even to uninitiated and must have acquired a high degree of synthesis. 5) must be able to choose the appropriate learning method for every issue, and to connect in a overview the information obtained by the mineralogical and petrographic features of a rock.
ASSESSMENT METHODS	Grade in thirtieths as the average of: 1) Ongoing evaluation: recognition of minerals in thin section (At least 4 out of 6). 2) Final oral examination for each module: broad discussion on all the topics of the course , focusing optics and systematic mineralogy. The examination could include an identification of minerals in thin section for those who had not taken or passed laboratory examination. The exam involves 4/5 questions per subject to test the knowledge of each topic, the use of an appropriate scientific language, and the ability to link the various arguments with each other with ease. The minimum requirements for passing the exam are: I) mineral recognition in thin section and knowledge of the principles of mineralogical optics; Ii) knowledge of the systematic nature of the principal minerals constituting the rocks; Iii) knowledge of the principles and the use of the principal mineralogical analysis techniques To get a grade not less than 18/30, the student must demonstrate a basic achievement of the goals, i.e. when he demonstrates that he has acquired a basic knowledge of the topics described in the program, and shows a limited degree of autonomy. To achieve 30 with honors, the student must demonstrate that he has achieved the objectives well. The goals achieved are considered excellent when examining has gained full knowledge of the subjects of the program, demonstrates knowing how to apply the acquired knowledge in different / new / advanced contexts, he expresses it with lexical competence and is able to express autonomous judgments based on acquired knowledge.
TEACHING METHODS	Theory classroom-lessons with power-point projections and morhological crystallography and mineralogical optics practice, together with thin sections analisys.

MODULE
MINERALOGY

Prof. MARCELLO MERLI

SUGGESTED BIBLIOGRAPHY

Klein C. (2004). "Mineralogia", Ed. Zanichelli, Bologna.
Peccerillo, Perugini (2004) - "Introduzione alla microscopia ottica", Morlacchi editore
Putnis, A. (1992) "An Introduction to Mineral Sciences", Cambridge University Press

AMBIT	50192-Discipline geologiche
INDIVIDUAL STUDY (Hrs)	102
COURSE ACTIVITY (Hrs)	48

EDUCATIONAL OBJECTIVES OF THE MODULE

The aim of the module is to provide the theoretical and notional background necessary in acquiring a complete knowledge of the fundamentals of Mineralogy, ensuring that the student is able to transfer the basic concepts to other disciplines in the field of Natural Sciences. In particular, the basic preparation provides for the understanding of the concept of crystallographic symmetry, elementary thermodynamics (coupled with crystal chemistry, that explain the genesis and evolution of the mineralogical assemblies together with the structural stability of the mineral itself), chemical characterization of the mineral (analytical techniques and related basic principles) and physical properties. The course ends with the study of Systematic Mineralogy, which represents a synthesis of the basic concepts studied throughout the course, paying particular attention to the rock-forming minerals.

SYLLABUS

Hrs	Frontal teaching
1	Objectives of the Mineralogy in the natural and environmental sciences, and discussion on the disciplines in the Mineralogy framework.
6	The crystallographic symmetry and its role in the solid-state study
6	Fundamentals of crystal-chemistry
6	Elementary Thermodynamics - polymorphism
1	Crystalphysics : scalar and vectorial properties. Hardness, color, luster , cleavage , density, piezoelectricity, magnetism , thermal expansion and compressibility.
1	Mineralogical Systematics: criteria for mineral classification
3	Systematics: native elements, halides
5	Systematics: Oxydes and hydroxides
7	Systematics: Sulphides, carbonates, sulphates, phosphates
12	Classification and systematics of silicates, clay minerals and zeolites

MODULE
MINERALOGY - STUDIO

Prof.ssa LUCIANA SCIASCIA

SUGGESTED BIBLIOGRAPHY	
Klein C. (2004). "Mineralogia". Ed. Zanichelli, Bologna. Peccerillo, Perugini (2004) - "Introduzione alla microscopia ottica", Morlacchi editore	
AMBIT	50189-Ambito mineralogico-petrografico-geochimico
INDIVIDUAL STUDY (Hrs)	86
COURSE ACTIVITY (Hrs)	64
EDUCATIONAL OBJECTIVES OF THE MODULE	
The main objective of the course is to provide students with the theoretical basis for the use of the main analytical techniques for the description of minerals and their morphological, structural, physical and chemical properties. Lessons include an overview of the morphological properties of crystals and of the main structural and chemical analysis techniques (X-ray diffraction, Scanning Electron microscopy, electron microprobe, X-ray fluorescence, UV-Vis, Infrared, Raman, Mössbauer spectroscopies). In the second part, the study of the optical properties of minerals will be deepened through both frontal lectures and a laboratory course of optical mineralogy, aimed at the acquisition of a good practical skill in the analysis of thin sections, through the use of polarizing optical microscope. At the end of the course, students should have the basic knowledge needed to evaluate the most suitable experimental techniques for the study of specific problems related to the minerals investigation and will have acquired the necessary skills to characterize and identify minerals and to consult and understand the experimental data obtained from different techniques.	

SYLLABUS

Hrs	Frontal teaching
4	Morphological crystallography: the fundamental laws of crystallography.
3	Stereographic projections
6	Mineralogical analytical techniques : X-ray diffraction, X-ray Fluorescence
3	Mineralogical analytical techniques: SEM, TEM, FAA, SIMS
3	Mineralogical analytical techniques :UV-Vis, IR, Raman, Xanes, Mössbauer spectroscopies
3	Optical Mineralogy : basic principles of the nature of light, polarization. Polarized optical microscopy
3	Optical Mineralogy: birefringence, optical indicatrix, definition of optic sign
2	Optical mineralogy : extinction, extinction angle
3	Optical mineralogy: orthoscopic observations
2	Optical mineralogy: conoscopic observations

Hrs	Workshops
3	Technical description of the microscope
4	Orthoscopic observations with parallel nicol
4	Orthoscopic observations with cross nicol
7	Identification of the main minerals in thin sections: intrusive igneous rocks
7	Identification of the main minerals in thin sections: effusive igneous rocks
7	Identification of the main minerals in thin sections: metamorphic rocks