COURSE OUTLINE

1.GENERAL

SCHOOL	ENVIRONMENT AND AGRICULTURAL ENGINEERING		
ACADEMIC UNIT	NATURAL RESOURCES AND AGRICULTURAL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	2950	**SEMESTER**	1st
COURSE TITLE	MINERALOGY-PETROLOGY		

INDEPENDENT TEACHING ACTIVITIES *if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits*	**WEEKLY TEACHING HOURS**	**CREDITS**
lectures	3	3
Laboratory exercises	2	2
	5	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special background, Specialised general knowledge Skills development
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	

2.LEARNING OUTCOMES

Learning outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The course is the basic introductory course in the concepts of petrology and mineralogy. Specifically, it presents the general principles of mineralogy and petrology, the genesis, properties, and classification of minerals and rocks. The aim of the course is to understand the crystalline structure of minerals, the relationship between structure and physical and physicochemical properties, the recognition of minerals using various methods, the creation of various rocks, their mineralogical composition and classification, the functioning of the Earth, and the transformation and alteration of rocks. Finally, students should be able to respond to applications or research needs during their professional careers or during postgraduate studies.

Upon successful completion of the course, students will be able to:

• Understand the concepts of minerals and rocks.

• Understand the basic and critical identification characteristics of petrogenetic minerals, their connection to the most important types of rocks, and the processes of their creation.

• Have knowledge of scientific tools for identifying minerals and rocks in the field.

• Be able to distinguish rocks that can be altered more easily and give rise to weathering products and, consequently, to the materials that make up soils.

Finally, the student will be able to collaborate with fellow students to create and present a paper that includes

the basic structure of a thesis (Abstract - Introduction - Materials and Methods - Results - Discussion - Conclusions - References).

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

- Working independently
- Team Work
- Σχεδιασμός και Διαχείριση Έργων
- Criticism and self-criticism
- Production of new research ideas
- Production of free, creative and inductive thinking

3.SYLLABUS

Mineralogy

i Introduction - Why Agriculturalists should know Mineralogy-Petrology? Generally - Definition of Mineral - Rocks and minerals - The main milestones in the evolution of Mineralogy - Naming of minerals - Crystallization

ii Geometric Crystallography - General - Geometric properties of crystal polyhedra, terminal elements - Zone - Simple and complex crystal shapes, facets, and envelopment - Distortion of crystal shapes. Law of constant angles - Measurement of dihedral angles. Angle meters - Elements of symmetry - Law of symmetry - Crystal orders - Crystal systems - Hauy's Law or Law of parameters - Indices of crystallographic seats

iii Crystal Lattice - General - Types of lattices

iv Research on the structure of crystals with Roentgen X-rays - General - Main characteristics of Roentgen X-rays - Conditions for the refraction of Roentgen rays

v Relationships of ion radii and coordination number - Coordination - Coordination number

vi Relationship between structure type/chemical composition in minerals - Isotype - Isomorphism - Polymorphism

vii Silicate minerals - General - Structure of Silicate minerals and their classification - Complex minerals

viii Non-silicate minerals - Carbonate minerals - Sulfide minerals - Oxides/Hydroxides - Halide minerals - Native elements

ix Physical properties of minerals - Hardness - Cleavage - Color – Luster

Petrology

i Introduction

ii Igneous rocks - Composition of magma - Categories of magma and their origin - Crystallization of magma - Fractional crystallization of magma - Empirical rules regarding magma crystallization - Textures of igneous rocks - Classification of igneous rocks - Classification of plutonic rocks - Classification of veined rocks - Classification of volcanic rocks

iii Metamorphic rocks - Identification of metamorphic rocks - Categories of metamorphic rocks - Factors of metamorphism - Textures of metamorphic rocks - Zones of metamorphism - Phases of metamorphism - Classification of metamorphic rocks

iv Sedimentary rocks - Weathering - Transport of weathering products - Deposition of transport products - Diagenesis - Classification of sedimentary rocks - Classification of chemical sediments - Classification of biochemical sediments v Clay minerals and rocks used in agriculture and industry (kaolin, bentonite, zeolite, perlite, vermiculite, pummice, CaO, gypsum, volcanic ash, talc, bauxite, laterite) **Laboratory exercises** Symmetry elements - Crystallographic orders I Symmetry elements - Crystallographic orders II Minerals - Methods of determination - Mohs scale Minerals - Metallic - Non-metallic minerals Igneous rocks I Igneous rocks II Sedimentary rocks I Sedimentary rocks II Metamorphic rocks I Metamorphic rocks II Visit to the Agricultural Museum - Davi Collection Weathering exercise	

4.TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	1. Classroom, Face to face learning, synchronous teaching. 2. Visit the Museum of Minerals and Rocks of Greece "Prof. Eleftheria Davi" (Agricultural University of Athens). Presentation of the full collection to small group of students, and discussion on the special features of important minerals/rocks from Greece.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Lectures: Use of multimedia (power point presentations), Brainstorming, Working Groups - Case Study Laboratory exercises: Use of specialized software Communication: Using asynchronous eclass e-learning platform
TEACHING METHODS *The manner and methods of teaching are described in detail.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.* *The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS*	

Activity	***Semester workload***
Lecturer	36
Laboratory Exercises	24
Writing papers	25
Field Trip / Short individual projects	10
Homework	30
Course total	*125*

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Theory: I. Written final exam (80%) that includes: Short answer questions Problem solving Error detection and correction in a text Matching of theory elements II. Written assignment (10%) III. Group presentation of an assignment by 3-4 people (10%) Laboratory exams: Oral final exam (100%) that includes: Identification of minerals Identification of rocks Identification of crystals Completion of an exercise

5.ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Θεοδωρίκας, Στέργιος Σ., Ορυκτολογία-Πετρολογία, Εκδόσεις Ερωδιός, 2002
Γκάρτζος, Ε., Τσαγκαλίδης, Α., Ορυκτολογία-Πετρολογία, Πανεπιστημιακές Σημειώσεις, 2002

- Related academic journals:

Lithos Journal, Journal of Petrology, European Journal of Mineralogy, Contributions to Mineralogy and Petrology, International Journal of Earth Sciences, Journal of Metamorphic Geology, Mineralogy and Petrology, American Mineralogist, Chemical Geology, Mineralogical Magazine, Sedimentology