COURSE OUTLINE

1. GENERAL

SCHOOL	ENVIRONMENT AND AGRICULTURAL ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF NATURAL RESOURCES DEVELOPMENT AND AGRICULTURAL ENGINEERING		
LEVEL OF STUDIES	POSTGRADUATE		
COURSE CODE	630037	**SEMESTER**	B
COURSE TITLE	Soil physicochemical processes and interpretation of soil data		

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 and practical exercises	2	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*	Scientific field
PREREQUISITE COURSES:	Soil science Soil genesis and soil taxonomy Soil Chemistry Environmental Soil Science Applied Soil Science Soil mapping and soil survey
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES (in English language)
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 aims at the acquisition of theoretical and practical knowledge on the basic principles and concepts related to the physical and chemical properties of soils and the reliable interpretation of soil data at field and ecosystem level.

Upon successful completion of the course, the postgraduate students will have:

- Understand the physical properties related to the soil functions and soil health.
- Understand the chemical properties related to the functions and soil health.
- The interaction of physical and chemical properties of soils.
- The ability to interpret and evaluate soil data at the field and ecosystem level.
- The ability to use statistical methods for Interpretation of soil test reports.

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*
	Showing social, professional and ethical responsibility and sensitivity

Working independently	*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…*
	…….

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Adapting to new situations
- Decision-making `
- Working independently
- Team work
- Working in an interdisciplinary environment
- Project planning and management
- Respect for the natural environment

3. SYLLABUS

Module 1: Introduction: Physical Properties of Soils
The importance of physical properties in soil health. Particle size distribution, structure, compaction, aggregate stability, hydromorphology, soil crusting and sealing. Soils saturated with water (epi - endo saturation).

Module 2: Chemical properties of soils
The importance of chemical properties in soil health. Acidity, cation exchange capacity, chemical composition of the soil solution. Buffer capacity and resilience of soils. Chemistry of soil colloids (clay minerals, organic matter). Specific surface area. Zero-point charge (ZPC). Flocculation - dispersion.

Module 3: Soil electrical charges and soil sorption.
Origin of electric charges in soils. Permanent and variable soil charges. Equilibrium and distribution of electric charges in soil. Principles of soil sorption phenomena. Models of soil sorption phenomena. Formation of outer and inner sphere complexes.

Module 4: Interpretation of soil analyses.
Soil analyses. Reliability and accuracy of methods. Calibration. Critical limits. Interpretation of soil test results.

Module 5: Statistical methods in the evaluation of soil data.
Presentation of soil data. Descriptive statistics. Distributions. Parametric and non-parametric statistical methods.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In classrooms.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT in teaching, laboratory education, communication with students
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*	
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.*	The evaluation will be conducted in Greek, except in the case of Erasmus postgraduate students, who will be assessed in English. The grade is calculated 50% from the final written examination in multiple-choice and short-answer questions and 50% from essay/report.

Activity	***Semester workload***
Lectures	48
Study and analysis of bibliography	35
Essay writing	42
Course total	***125***

5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Hillel D. 2003. Introduction to Environmental Soil Physics. Academic Press.
2. Nyle C. Brady,2008. Natural and properties of soils. 14th edition. Prentice – Hall
3. Lal R & Shukla MK. 2004. Principles of Soil Physics. Marcel Dekker.
4. McBride MB. 1994. Environmental Chemistry of Soils. Oxford Univ. Press.
5. Sposito G. 1981. The Thermodynamics of Soil Solutions. Oxford Univ. Press.
6. Sposito G. 1984. The Surface Chemistry of Soils. Oxford Univ. Press.
7. Sposito G. 1989. The Chemistry of Soils. Oxford Univ. Press.
8. Webster, R. and Oliver, M.A., 1990: Statistical methods in soil and land resource survey. Oxford: Oxford University Press. x + 316 pp
8. Sparks, D.L. (2003) Environmental Soil Chemistry. Academic Press, Elsevier Science, Cambridge