COURSE OUTLINE

1. GENERAL

SCHOOL	SCHOOL OF ENVIRONMENT AND AGRICULTURAL ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF NATURAL RESOURCES DEVELOPMENT AND AGRICULTURAL ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**1555**	**SEMESTER**	**5th**
COURSE TITLE	Soil Physics		

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**
Theory: Lectures	3	
Laboratory:	2	
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*	General knowledge, Scientific Area, Skills development
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes (in English)
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 purpose of the course is to understand soil physical properties, the methods of determining them in the laboratory and in the field, as well as the laws of water dynamics in the soil and to use the above for the purpose of the sustainability of soils and the plants that grow in them.

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

●Understand the relationships between mass and volume of the three soil phases, the concept of moisture per mass and volume and be able to calculate them after successful sampling.

●Understand the physical properties of the solid phase and calculate them after successful sampling.

●Understand the properties of the liquid phase as well as the characteristics and mechanisms of the Statics of water in the various soil types.

●Understand the Characteristic Moisture Curve, the methods of its determination in

the laboratory and in situ and learn to calculate the available and useful moisture to use them in planning and application of irrigations.
●Understand the phenomenon of hysteresis in porous media.
● Understand the concept of soil water potential and hydraulic head.
● Understand Darcy's law for the flow of water in porous media and learn to apply it in columns and in situ both, for saturated and unsaturated soil.
● Understand the concept and importance of hydraulic conductivity, its relation to moisture and pressure head and learn to determine it in the laboratory and in situ for any moisture conditions.
● Learn the methods of determining the hydraulic properties of soils in the laboratory and in the field, to practice their application and the use of related software (RETC).
● Understand the concept and importance of diffusivity and its relation to humidity.
● It applies the continuity equation and the general flow equations for the flow of water in porous media in any wetted state.
● To construct and use the water and salt balances of an irrigated soil profile.

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…*
	…….

1. Search, Analysis and Synthesis of Data and Information, using the Necessary Technologies
2. Decision-making
3. Autonomous Work
4. Project planning and management
5. Respect for the natural environment.

3. SYLLABUS

Mass and volume relationships of the three soil phases.
●Moisture - methods of expressing and measuring soil moisture.
●Solid phase, Physical properties of soils-bulk density, density of solids, porosity, degree of saturation, root layer depth. Aggregates and their properties.
●Liquid phase of the soil. Statics of soil water - Pressure head.
●Mechanisms of retention-removal of water from the soil, Soil – Moisture Characteristics curve - hysteresis-Determination of Soil Moisture Characteristic curve in the laboratory and in the field, available and useful soil moisture.
●Dynamics of soil water. (Potential - hydraulic head, Darcy's Law - hydraulic conductivity - relationships K(Θ) and K(h) - methods of determining hydraulic properties of soils).
●Use of related software (RETC) to calculate the hydraulic properties of soils.
●Diffusivity- continuity equation- general flow equations.
●Balances of water and salts of the soil profile.

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	In classroom and in laboratory (face-to-face)
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Exploitation of Information and Communication Technologies in teaching, in laboratory training and in communication with students. Use of dedicated software. Communication with students via open eclass platform and e-mail.
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.*	I. Final written exam (50%) which includes: Theory questions (multiple choice and short answer) and problem solving. II. Final written exam (50%) concerning the subjects of laboratory exercises and laboratory work. **Marking Scale:** 0-10. **Minimum Passing Mark:** 5.

Activity	***Semester workload***
Lectures	65 hours
Laboratory work and case studies	47 hours
Exercises and presentations	13 hours
Course total	***125***

5. ATTACHED BIBLIOGRAPHY

Proposed literature -Scientific journals

Soil Science
Soil Science Society of America Journal
Vadose Zone Journal
Water Resources Research
Agricultural Water Management
Soil research
Soil and Tillage Research
Water Resources Management,
Geoderma
Catena
Journal of Hydrology