SOIL FERTILITY AND FERTILIZERS

1. GENERAL

SCHOOL	AGRICULTURAL SCIENCES		
DEPARTMENT	CROP SCIENCE		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	CRS_702	**SEMESTER OF STUDIES**	7th
COURSE TITLE	Soil Fertility and Fertilizers		

INDEPENDENT TEACHING ACTIVITIES *σε περίπτωση που οι πιστωτικές μονάδες απονέμονται σε διακριτά μέρη του μαθήματος π.χ. Διαλέξεις, Εργαστηριακές Ασκήσεις κ.λπ. Αν οι πιστωτικές μονάδες απονέμονται ενιαία για το σύνολο του μαθήματος αναγράψτε τις εβδομαδιαίες ώρες διδασκαλίας και το σύνολο των πιστωτικών μονάδων*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
lectures	2	
Tutorials	1	
laboratory exercises	2	
TOTAL	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*	Specialised general knowledge, specialised general knowledge, skills development
PREREQUISITE COURSES:	Typically, there is no prerequisite course. Students must have basic knowledge of Soil Science (pedology) and Inorganic Chemistry
TEACHING AND ASSESSMENT LANGUAGE:	Greek. However, teaching may be performed in English if foreign students attend the course.
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes.
COURSE WEBPAGE (URL)	Under construction

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 lectures aim to understand and reinforce basic knowledge of Soil Fertility and Fertilizers. The course material is an applied continuation of the introduction of students to the basic concepts of soil science and connects fertilization with soil fertility and sustainable soil management. In the course, the student will be able to combine theoretical knowledge with specific applications in the science of agriculture.
Upon completion of the course, the student will be able to:
The student acquires critical analysis and evaluation skills of biotic and abiotic factors that determine the fertility of a soil system and specific soil management.
The student understands the origin, the preparation processes, the properties of the fertilizing inputs (organic and inorganic), their combination with soil types and growth substrates, and their application procedures.
The student understands the regulatory framework, terminology, and environmental constraints that govern the application of fertilizer inputs to soils.

Finally, the student deepens the combinability of the fertilizing inputs and integrates the specific knowledge in a broader context of management and protection of natural and agricultural ecosystems.
Upon successful completion of the course, the student will be able to:
• Understand the key biotic and abiotic factors that determine/affect soil fertility
• To analyze in combination the factors that determine the fertility of a specific soil ecosystem
• To process and select cultivation scenarios
• To propose sustainable measures for soil fertility management
• Understand the properties of fertilizing inputs, regulatory frameworks, environmental conditions and application methodologies for fertilizers and fertilizing
• To process and select fertilizing scenarios

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…*

Generally, by the end of this course the student will, furthermore, have develop the following general abilities (from the list above):

- *Searching, analysis and synthesis of facts and information, as well as using the necessary technologies*
- *Adaptation to new situations*
- *Decision making*
- *Autonomous (Independent) work*
- *Exercise of criticism and self-criticism*
- *Promotion of free, creative, and inductive thinking*

3. COURSE CONTENT

• Soil nutrients and availability
• Soil microorganisms and fertility
• Organic materials and fertility - carbon sequestration.
• Biological and physicochemical indicators of soil quality/fertility.
• Relationships between nutrient availability and plant growth/yield
• The concept of fertilizer - Types of fertilizers - Properties
• Diagnostic criteria of fertilization needs
• Inorganic - Organic fertilization - Foliar fertilization
• Estimation of the required quantities of fertilizers
• Utilization of Organic Waste
• Effect of fertilization on the quantity of production, the quality of the produced products, and human health
• Economic view of fertilizers
• Fertilization in the context of integrated agriculture in Greece and the European Union

The laboratory exercises aimed at deepening and familiarizing students with the concepts and methodologies analyzed in the theoretical part. Particularly:
• Sample preparation for soil fertility assessment - Safety measures
• Determination of soil physical properties for assessing fertility
• Determination of soil chemical properties for soil fertility assessment
• Preparation and calculation of water-soluble fertilizers
• Quality control of fertilizers
• Identification of fertilization units

4. TEACHING AND LEARNING METHODS - ASSESSMENT

DELIVERY *Face-to-face, Distance learning, etc.*	Lectures, self-tests of students and problem-solving seminars (face to face)
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of Information and Communication Technologies (ICTs) (e.g. PowerPoint) in teaching. The lecture content of the course for each chapter are uploaded on the internet, in the form of a series of ppt files, which the students can freely download them using a password that is provided to them at the beginning of the course.
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 worklo***
Lectures (2 conduct hours per week x 13 weeks)	26
Lab Exercises (3 conduct hours per week x 6 weeks) - solving representative problems	18
Lab Exercises reports	13
Project	16
Job / Job Writing	16
Hours for private study of the student and preparation for mid-term or/and final examination - Final examination (3 conduct hours)	36 hours
Total number of hours for the Course (25 hours of workload per ECTS credit)	***125 hours (total stu workload)***

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.*	Optionally, two exemplary advances, the first in the middle and the second at the end of the semester. The test is conducted with development questions and/or multiple-choice questions, and questions based on laboratory exercises. In order to participate in the second progression, the student must have achieved at least grade 5 (0-10 scale) in the first progression. The final grade is the average of the two grades, provided that in the second grade, the student achieves at least grade 5. This grade is 100% involved in the final grade of the course. A written examination with development questions and/or multiple-choice questions or problem-solving as well as questions based on laboratory exercises, unless the student participated in semester progress, so the above applies. Minimum achievable grade: 5. This grade is 100% in the final grade of the course. Oral examination or presentation on the theoretical or laboratory part of the course and with questions based on theory or laboratory exercises. All of the above takes place in the Greek language and for foreign language students (eg ERASMUS students) in the English language

5. ATTACHED BIBLIOGRAPHY

BOOKS

1. Brady, N.C., and R.R. Weil, 2002. The nature and properties of soils, 13th Ed. Prentice- Hall Inc., New Jersey, USA. 960p., chapters 8, 12, 13, 14, 15, and 16.
2. JL Halvin, SL Tisdale, JD Beaton & WL Nelson Soil Fertility and Fertilizers 8th Edition, Pearson 2014
3.

Scientific Journals:

Soils and Fertilizers Abstracts