SOIL SCIENCE

COURSE OUTLINE

Responsible: Vasileios Tzanakakis

1. GENERAL			
SCHOOL	School of Agricultural Sciences		
ACADEMIC UNIT	Department of Agriculture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	0810.3.005.1	**SEMESTER**	1st
COURSE TITLE	Soil science		

INDEPENDENT TEACHING ACTIVITIES if credits are awarded for separate components of the course	**WEEKLY TEACHING HOURS**	**CREDITS**
	5	5
Total	**5**	**5**

COURSE TYPE general background, special background, specialised general knowledge, skills development	Specialised Background Course
PREREQUISITE COURSES	Recommended: Agricultural Chemistry, Biochemistry
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek
OFFERED TO ERASMUS STUDENTS	Yes (in English) — Winter Semester
COURSE WEBSITE (URL)	

2. LEARNING OUTCOMES

Learning outcomes

Upon successful completion of the course, students will have acquired the necessary knowledge of:

- the fundamental characteristics and properties of soils, including their inorganic and organic components, as well as their main physical and chemical properties;
- the importance of these properties for supporting plant production and protecting soil resources and the environment;
- soil genesis, soil development, and soil classification.

General Competences

In addition to their theoretical training, students participate in laboratory activities aimed at developing competencies in:

- evaluating the results of soil analyses related to soil properties and fertility;
- decision-making;
- independent work;
- teamwork;
- working in an interdisciplinary environment;
- generating new research ideas;
- demonstrating social, professional and ethical responsibility, as well as sensitivity to gender issues;

- critical thinking and self-evaluation;
- promoting free, creative and inductive thinking.

3. SYLLABUS

Theoretical Syllabus

I. Inorganic Soil Components

Description of minerals and rocks and their weathering processes. Description of clay minerals.

II. Organic Soil Components

Description of soil organic matter and the (bio)chemical processes involved in its transformation.

III. Soil Water and Soil Air

Water retention forces, soil water-holding capacity, and the principles governing water and air movement within the soil profile.

IV. Physical and Chemical Properties of Soil

Basic soil properties including:

- soil texture;
- soil structure;
- soil consistency;
- bulk density and particle density;
- porosity;
- soil colour.

In addition, the following topics are covered:

- ion exchange;
- soil pH;
- base saturation;
- buffering capacity;
- soil redox properties;
- soil salinity and sodicity.

V. Soil Genesis and Development

Description of soil-forming processes and the major factors influencing soil formation and evolution.

VI. Soil Classification

Description of the principal soil classification systems, including the **US Soil Taxonomy** and the **FAO–UNESCO Soil Classification System**.

Laboratory Exercises

- Soil sampling.
- Handling and preparation of soil samples in the laboratory.
- Determination of soil particle-size distribution (soil texture).
- Determination of equivalent and active calcium carbonate in soils.
- Determination of soil organic matter.
- Determination of soil pH and salinity.
- Determination of plant-available potassium and phosphorus in soils.
- Principles of soil mapping and soil classification.

4. TEACHING and LEARNING METHODS - EVALUATION	
DELIVERY Face-to-face, Distance learning, etc.	Teaching Method Theory Face-to-face lectures. Laboratory Each laboratory session begins with an explanation of the methodology for the practical exercise, followed by supervised hands-on training under the guidance of the instructor.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY Use of ICT in teaching, laboratory education, communication with students	**Use of Information and Communication Technologies (ICT)** • PowerPoint presentations and other audiovisual teaching materials. • Learning support through the HMU e-Class platform. • Communication with students via the e-Class platform and e-mail.
TEACHING METHODS The manner and methods of teaching are described in detail.	**Activity** / **Semester workload** ctivity Semester Workload (hours) Lectures 39 Laboratory Sessions 26 Independent Study 60 — 125 **Course total** — **125**
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure	**Student Assessment** **Theory** Assessment consists of: • written in-class quizzes following each lecture, including multiple-choice and essay questions selected from a question bank (providing up to 1–2 bonus marks added to the final written examination); • final written examination. **Laboratory** Assessment is based on: • individual laboratory assignments (20% of the final laboratory grade); • mid-term written progress examinations (30%); • final written laboratory examination (50%).

5. ATTACHED BIBLIOGRAPHY

- Brady, N. C., & Weil, R. R. (2011). *The Nature and Properties of Soils* (Greek Edition). Embryo Publications.
- Sinanis, K. N. (2018). *Soil: Management and Environment*. Psyhalos Publications.
- Sinanis, K. N. (2003). *Laboratory Exercises in Soil Management*. Technological Educational Institute of Heraklion.
- Sinanis, K. N. (2008). *Laboratory Exercises in Soil Science*. Technological Educational Institute of Heraklion.