

## COURSE OUTLINE

### 1. GENERAL

<b>SCHOOL</b>	School of Environment and Agricultural Engineering		
<b>ACADEMIC UNIT</b>	Natural Resources & Agricultural Engineering		
<b>LEVEL OF STUDIES</b>	Undergraduate		
<b>COURSE CODE</b>	<b>216</b>	<b>SEMESTER</b>	<b>7</b>
<b>COURSE TITLE</b>	<b>Fertilizers and Fertilizer practices</b>		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <i>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</i>	<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>	
Lectures and practicals	3+2	5	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
<b>COURSE TYPE</b> <i>general background, special background, specialised general knowledge, skills development</i>	Special background, Specialised general knowledge		
<b>PREREQUISITE COURSES:</b>	Soil Science -157 Soil Chemistry 1565 Soil Fertility 2435		
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	YES (theory only)		
<b>COURSE WEBSITE (URL)</b>	<a href="https://oeclass.aua.gr/eclass/courses/AFPGM118/">https://oeclass.aua.gr/eclass/courses/AFPGM118/</a>		

### 2. LEARNING OUTCOMES

<p><b>Learning outcomes</b></p> <p><i>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.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> <li>• <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i></li> <li>• <i>Descriptors for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i></li> <li>• <i>Guidelines for writing Learning Outcomes</i></li> </ul>
<p>The course is the basic course in Fertilizers and Fertilization practices.</p> <p>The course material is an applied continuation of the students' introduction to the basic concepts of soil fertility and connects fertilization with soil fertility and the protection of soil and water resources.</p> <p>The student understands the origin, manufacturing processes, properties of lubricating inputs (organic and inorganic), their combination with soil types and growing substrates and their application processes.</p> <p>The student understands the regulatory frameworks, terminology and environmental constraints governing the application of lubricating inputs to soils.</p> <p>Finally, the student deepens the combination of lubricating inputs and integrates this knowledge into a broader framework of management and protection of natural and agricultural ecosystems.</p> <p>The student understands modern microbial approaches to fertilization in the context of the triptych Plant-Rhizosphere-Microorganisms.</p> <p>Upon successful completion of the course the student will be able to:</p> <ul style="list-style-type: none"> <li>• Understand the properties of lubricating inputs, regulatory frameworks, environmental</li> </ul>

terms and application methodologies related to fertilizers and fertilizations.

- Analyze in combination the factors that determine the fertility of a specific soil ecosystem.
- Process and select lubricating scenarios.
- To propose measures for sustainable management of soil fertility and environmental protection through rational fertilization.

### **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*

*Adapting to new situations*

*Decision-making*

*Working independently*

*Team work*

*Working in an international environment*

*Working in an interdisciplinary environment*

*Production of new research ideas*

*Project planning and management*

*Respect for difference and multiculturalism*

*Respect for the natural environment*

*Showing social, professional and ethical responsibility and sensitivity to gender issues*

*Criticism and self-criticism*

*Production of free, creative and inductive thinking*

*.....*

*Others...*

*.....*

Working independently

Team-work

Project planning and management

Decision making

Production of constructive and inductive thinking

### **3. SYLLABUS**

1. INTRODUCTORY CONCEPTS
2. THE ROLE OF NUTRIENTS IN PLANTS AND THEIR SOURCES IN SOIL
3. LUBRICATING MACROELEMENTS, SECONDARY MACROELEMENTS & TRACE ELEMENTS
4. UPTAKE OF SOIL NUTRIENTS BY PLANTS
5. DEFINITION OF THE CONCEPT OF FERTILISER
6. REGULATORY FRAMEWORKS, TYPES (CATEGORIES) OF FERTILISERS, GROUPING OF FERTILISERS
7. TRADE NAME OF FERTILISERS, PROPERTIES, METHODS OF PREPARATION AND USE OF FERTILISERS
8. SLOW-RELEASE FERTILIZERS, ORGANIC FERTILIZERS, SOIL IMPROVERS, ORGANOCHEMICAL-ORGANO-MINERAL FERTILIZERS, BIOSTIMULANTS
9. RECYCLING OF AGRICULTURAL, INDUSTRIAL AND MUNICIPAL WASTE AND BY-PRODUCTS IN SOIL AND SUSTAINABILITY
10. PLANT NEEDS AND FERTILIZATION METHODOLOGIES
11. SOIL ECOSYSTEM MANAGEMENT AND FERTILIZATION
12. NUTRIENT BALANCES & FERTILIZATION DESIGN
13. FERTILIZATION AND SOIL / FOLIAR ANALYSIS
14. MICROBIAL VACCINES AND FERTILIZATION
15. ECONOMICS OF LUBRICATION
16. FERTILIZATION AND RECYCLING OF ORGANIC MATTER

## 17. TEACHING and LEARNING METHODS - EVALUATION

<p style="text-align: center;"><b>DELIVERY</b> <i>Face-to-face, Distance learning, etc.</i></p>	<p>In the lecture room and labs – complementary remote support</p>	
<p style="text-align: center;"><b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, communication with students</i></p>	<p><b>Specialized teaching/presentation software</b> <b>Support Learning process through e-class platform</b></p>	
<p style="text-align: center;"><b>TEACHING METHODS</b> <i>The manner and methods of teaching are described in detail.</i> <i>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.</i></p> <p><i>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</i></p>	<b>Activity</b>	<b>Semester workload</b>
	Standard Lectures	36
	Practical Exercises that focus on implementation of methodologies	26
	Teamwork study or Small individual tasks for each student	20
Independent Study	43	
Total Course (25 hours of workload per credit unit)	125	
<p style="text-align: center;"><b>STUDENT PERFORMANCE EVALUATION</b> <i>Description of the evaluation procedure</i></p> <p><i>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</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	<p>Written final exam that includes Combinations of:</p> <ul style="list-style-type: none"> <li>- Multiple choice questions</li> <li>- Scenario analysis</li> <li>- Solving problems related to quantitative data</li> <li>- Benchmarking, comparative evaluation of theory elements</li> </ul>	

## 18. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Weil, R.R. and Brady, N.C. (2017), The Nature and Properties of Soils. 15th Edition, Pearson, New York. (Background reading)

JL Halvin, SL Tisdale, JD Beaton & WL Nelson Soil Fertility and Fertilizers 8th Edition, Pearson 2014

- *Related academic journals:*

*Soil Biology and Biochemistry – Elsevier*

*Biology and Fertility of Soils – Elsevier*

*European Journal of Soil Science – Wiley*

*Journal of Plant Nutrition – Taylor & Francis*