

## COURSE OUTLINE

### 1. GENERAL

<b>SCHOOL</b>	SCHOOL OF ENVIRONMENT & AGRICULTURAL ENGINEERING		
<b>ACADEMIC UNIT</b>	NATURAL RESOURCES MANAGEMENT & AGRICULTURAL ENGINEERING		
<b>LEVEL OF STUDIES</b>	Postgraduate		
<b>COURSE CODE</b>	<b>630014</b>	<b>SEMESTER</b>	<b>2o</b>
<b>COURSE TITLE</b>	REUSE OF WASTE IN AGRICULTURE		
<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/Applications		5	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 /Skill development		
<b>PREREQUISITE COURSES:</b>			
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	Yes		
<b>COURSE WEBSITE (URL)</b>	REUSE OF WASTE IN AGRICULTURE		

### 2. LEARNING OUTCOMES

<p><b>Learning outcomes</b> <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 deals with the composition, the methods of treatment of livestock waste of high organic pollutant load, from pig farms, dairy farms, olive oil mills (2 and 3 phases) and cheese whey, the process, and the way of disposal of the final treated wastewater for fertilization of agricultural soils, crop irrigation and the current relevant environmental legislation. The treatment and reuse of livestock waste is an important parameter for tackling environmental pollution problems and part of the circular economy with the creation of value from by-products.</p> <p>Upon completion of the course students will be able to:</p> <ul style="list-style-type: none"> <li>- know the evolution of the environmental legislation on the management of waste from livestock farms</li> <li>- know the current environmental legislation on the treatment and disposal of treated liquid effluents to crops, soil and water bodies</li> <li>- understand the origin and composition of farm and livestock liquid effluents and the environmental problems they cause</li> <li>- be aware of the treatment systems for such waste and the composition of the final effluent.</li> <li>- be able to manage the application of treated liquid effluents for crop fertilisation and as a soil conditioner</li> </ul>
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- be able to manage the application for crop irrigation and groundwater recharge.

**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?*

- |   |   |
|---|---|
| <i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> | <i>Project planning and management</i>  |
| <i>Adapting to new situations</i>   | <i>Respect for difference and multiculturalism</i>  |
| <i>Decision-making</i>  | <i>Respect for the natural environment</i>  |
| <i>Working independently</i>  | <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> |
| <i>Team work</i>  | <i>Criticism and self-criticism</i>   |
| <i>Working in an international environment</i>  | <i>Production of free, creative and inductive thinking</i>                                      |
| <i>Working in an interdisciplinary environment</i>  | .....   |
| <i>Production of new research ideas</i>   | <i>Others...</i>  |
|   | .....   |

- Decision-making*  
*Project planning and management*  
*Working independently*  
*Teamwork*  
*Respect for the natural environment*  
*Search for, analysis and synthesis of data and information, with the use of the necessary technology*

**3. SYLLABUS**

- Introduction. Historical review of the development of environmental legislation in our country with emphasis on livestock farms and their waste. Current environmental legislation on livestock waste. Cases of implementation in its formulation and implementation in practice.
- Origin of treated final liquid livestock waste. Summary of their treatment systems. Calculation parameters. Form and composition of the final effluents. Comparison of production methods and production characteristics.
- Methods of disposal - utilisation of the final liquids for crop fertilization and as soil conditioner. Calculations of the land area required for their safe disposal. Exercises - Topic.
- Application of treated liquid wastewater for irrigation, required quality characteristics and application methods. Problems and limitations. Use for recharge of groundwater aquifers.
- Legislative framework for reuse of treated liquid wastewater in agriculture (international, European, National).

**4. TEACHING and LEARNING METHODS - EVALUATION**

<b>DELIVERY</b> <i>Face-to-face, Distance learning, etc.</i>	Face to face	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, communication with students</i>	Use of ICT. Applications. Laboratory education. Communication with students directly and by mail.	
<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>  <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>	<b>Activity</b>	<b>Semester workload</b>
	Lectures	55
	Applications	20
	Educational visit to livestock waste treatment plants	10
	Writing of project /Study	40

	Course total	<b>125</b>
<p align="center"><b>STUDENT PERFORMANCE EVALUATION</b></p> <p><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>Final written exam</p> <p>Writing and oral presentation with PowerPoint of a project</p>	

## 5. ATTACHED BIBLIOGRAPHY

*- Suggested bibliography:*

*Antonopoulos V.Z., 1999. Groundwater quality and pollution. Ziti Publications.*

*Albanis, T. 2005. Pollution and environmental protection technology. University of Ioannina, Ioannina.*

*Georgakakis, D. 2011. waste management, University notes, Agricultural University of Athens, Athens.*