

## COURSE OUTLINE

### (1) General information

<b>FACULTY/SCHOOL</b>	TECHNOLOGY		
<b>DEPARTMENT</b>	ENVIRONMENTAL SCIENCES		
<b>LEVEL OF STUDY</b>	<i>Undergraduate</i>		
<b>COURSE UNIT CODE</b>	<b>NEW COURSE</b>	<b>SEMESTER</b>	5 <sup>th</sup>
<b>COURSE TITLE</b>	HAZARDOUS AND TOXIC WASTE MANAGEMENT		
<b>INDEPENDENT TEACHING ACTIVITIES</b> in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits		<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>
<b>THEORETICAL BACKGROUND</b>		4	5
<b>COURSE TYPE</b> Background knowledge, Scientific expertise, General Knowledge, Skills Development	SCIENTIFIC AREA (a) WASTE MANAGEMENT (b) ENVIRONMENTAL PLANNING		
<b>PREREQUISITE COURSES:</b>	NO		
<b>LANGUAGE OF INSTRUCTION &amp; EXAMINATION/ASSESSMENT:</b>	GREEK		
<b>THE COURSE IS OFFERED TO ERASMUS STUDENTS</b>	YES		
<b>COURSE WEBSITE (URL)</b>			

### (2) LEARNING OUTCOMES

<p><b>Learning Outcomes</b> The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail. It is necessary to consult:</p> <p><b>APPENDIX A</b></p> <ul style="list-style-type: none"> <li>• Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.</li> <li>• Descriptive indicators for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and</li> </ul> <p><b>APPENDIX B</b></p> <ul style="list-style-type: none"> <li>• Guidelines for writing Learning Outcomes</li> </ul>
<p>The exact definition of "toxic and hazardous waste" has now been expanded to include a wide variety of wastes, with properties that make them dangerous to the environment or human health. Hazardous waste is defined as solid, liquid and gaseous pressurized wastes or those which, due to their quantity, concentrations or their physical, chemical or infectious properties, may:</p>

- 1) have a fatal effect or contribute significantly to the increase in mortality or the spread of serious incurable diseases or illnesses leading to physical disability and
- 2) endanger human health or the environment, unless they are effectively processed or transported, stored or disposed of in an appropriate manner.

*The aim of the course is:*

students understand the categories, properties, the threat to public health and the consequences for humans of hazardous and toxic waste and materials, as well as their basic processing methods.

*After the end of the course, the students will be able to:*

- be aware of the main categories of hazardous and toxic waste, the routes of exposure of the human body and their properties in relation to their effects on human health and the environment.
- to propose and evaluate technologies for processing these materials, as well as their management methods.

### **General Competences**

*Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?*

<i>Search for, analysis and synthesis of data and information by the use of appropriate technologies, Adapting to new situations</i>	<i>Project planning and management</i>
<i>Decision-making</i>	<i>Respect for diversity and multiculturalism</i>
<i>Individual/Independent work</i>	<i>Environmental awareness</i>
<i>Group/Team work</i>	<i>Social, professional and ethical responsibility and sensitivity to gender issues</i>
<i>Working in an international environment</i>	<i>Critical thinking</i>
<i>Working in an interdisciplinary environment</i>	<i>Development of free, creative and inductive thinking</i>
<i>Introduction of innovative research</i>	<i>.....</i>
	<i>(Other.....citizenship, spiritual freedom, social awareness, altruism etc.)</i>
	<i>.....</i>

- Adaptation to new situations
- Work in an interdisciplinary environment
- Production of new research ideas
- Respect for diversity and multiculturalism
- Respect for the natural environment
- Practice criticism and self-criticism
- Promoting free, creative and inductive thinking

### **(3) COURSE CONTENT**

#### **Theory**

1. Introduction - Definitions - Classification - Marking - Institutional framework.
2. Risk analysis.
3. Toxic and hazardous waste management.

4. Sanitary landfill.
5. Physicochemical processes.
6. Thermal processes.
7. Biological processes.
8. Electronic and electrical waste.
9. Asbestos.
10. Dioxins - Furans.
11. Polychlorinated biphenyls (PBC's).
12. Hospital waste.
13. Nuclear waste.

#### (4) TEACHING METHODS-ASSESSMENT

<p><b>MODES OF DELIVERY</b> Face-to-face, in-class lecturing, distance teaching and distance learning etc.</p>	<ul style="list-style-type: none"> <li>• Lectures in the classroom or by distance</li> <li>• Team discussion</li> </ul>											
<p><b>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY</b> Use of ICT in teaching, Laboratory Education, Communication with students</p>	<ul style="list-style-type: none"> <li>• Powerpoint.</li> <li>• View video material</li> <li>• e-mail.</li> <li>• e-class</li> </ul>											
<p><b>COURSE DESIGN</b> Description of teaching techniques, practices and methods: Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc. The study hours for each learning activity as well as the hours of self-directed study are given following the principles of the ECTS.</p>	<table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;"><i>Activity/Method</i></th> <th style="text-align: center;"><i>Semester workload</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td style="text-align: center;">52</td> </tr> <tr> <td>Theory study</td> <td style="text-align: center;">50</td> </tr> <tr> <td>Team working</td> <td style="text-align: center;">23</td> </tr> <tr> <td><b><i>Course total (25 hours of workload per credit unit)</i></b></td> <td style="text-align: center;"><b>125</b></td> </tr> </tbody> </table>		<i>Activity/Method</i>	<i>Semester workload</i>	Lectures	52	Theory study	50	Team working	23	<b><i>Course total (25 hours of workload per credit unit)</i></b>	<b>125</b>
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<p><b>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS</b> Detailed description of the evaluation procedures:  Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other.....etc.  Specifically, defined evaluation criteria are stated, as well as if and where they are accessible by the students.</p>	<p><b><u>Students are assessed in Greek or English. The final grade is formed by tests which include:</u></b></p> <ul style="list-style-type: none"> <li>• Written exam: 70% of the final grade (A)</li> <li>• Tasks: 30% of the final grade (B)</li> </ul> <p style="text-align: center;"><b>Final grade = 70% (A) + 30% (B)</b></p>											

## (5) SUGGESTED BIBLIOGRAPHY:

### -Suggested bibliography

- Ευάγγελος Γιδαράκος, Επικίνδυνα Απόβλητα, Εκδόσεις Ζυγός Θεσσαλονίκη 2006, ISBN: 960-8065-53-4.
- Γκέκας, Ν. Φραντζεσκάκη, Ε. Κατσίβελα, Τεχνολογίες Επεξεργασίας Τοξικών - Επικίνδυνων αποβλήτων , Εκδόσεις Τζιόλα, Θεσσαλονίκη 2002.
- Support to Member States in improving hazardous waste management based on assessment of Member States' performance, European Commission, Reference: ENV/2014/SI2.689463/ETU/A2.
- R. Watts, Hazardous Wastes: Sources, Pathways, Receptors, John Wiley and Sons Inc, 1998.
- L. Wang, N. Shammam, Y. Hung, Advances in hazardous industrial waste treatment, CRC Press, 2008.
- C. Wentz, Hazardous Waste Management, Second Edition, Mc Graw-Hill, Chemical Engineering Series, 1995.
- R. Schnepf, P. Gautt, Επικίνδυνα Υλικά, Εκδόσεις ΙΩΝ, Αθήνα 2000.
- Pichtel John (2005) «Waste Management Practices: Municipal, Hazardous and Industrial», CRC Press.