ΠΕΡΙΓΡΑΜΜΑ ΜΑΘΗΜΑΤΟΣ

FACULTY/SCHOOL	TECHNOLOGY		
DEPARTMENT	ENVIRONMENTAL SCIENCES		
LEVEL OF STUDY	*Undergraduate*		
COURSE UNIT CODE	**NEW COURSE**	**SEMESTER**	5th
COURSE TITLE	LIQUID WASTE EFFLUENT MANAGEMENT & PROCESSING TECHNOLOGIES		

INDEPENDENT TEACHING ACTIVITIES 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	**WEEKLY TEACHNG HOURS**	**CREDITS**
THEORETICAL BACKGROUND	3	3
LABORATORY	2	2
Προσθέστε σειρές αν χρειαστεί. Η οργάνωση διδασκαλίας και οι διδακτικές μέθοδοι που χρησιμοποιούνται περιγράφονται αναλυτικά στο 4.	5	5

COURSE TYPE Background knowledge, Scientific expertise, General Knowledge, Skills Development	BACKGROUND
PREREQUISITE COURSES:	NO
LANGUAGE OF INSTRUCTION &EXAMINATION/ASSESSMENT:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	YES
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning Outcomes

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:

APPENDIX A: Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework. Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and

APPENDIX B: Guidelines for writing Learning Outcomes

The purpose of the course is for the student to become acquainted with the nature of the pollutants found in liquid waste effluents and their main sources of production as well as with the main technologies available to process these liquid effluents, both municipal and industrial.

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?

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

- Search, analyze and synthesize data and information, using the necessary technologies
- Decision making
- Autonomous work
- Teamwork
- Project design and management
- Respect for the natural environment
- Promoting free, creative and inductive thinking

(3) COURSE CONTENT

Theory

Environmental pollution, physical and chemical characteristics of liquid waste effluents, determination of organic loading, primary, secondary and tertiary treatment, waste sludge treatment, sludge management, solid sedimentation techniques. Methods of secondary treatment: activated sludge, biological filters, lagoons. Nitrification, denitrification, chlorination. Physical treatment: adsorption, filtration and microfiltration, ion exchange, osmosis and reverse osmosis. Introduction to advanced oxidation methods: chemical, photo-chemical, electrochemical, thermal and thermochemical methods for treating non-biodegradable pollutants in liquid waste effluents.

(4) TEACHING METHODS-ASSESSMENT

MODES OF DELIVERY **Face-to-face, in-class lecturing, distance teaching and distance learning etc.**	• Lectures in the classroom or by distance • Team discussion • Laboratory exercises
USE OF INFORMATION AND COMMUNICATION TECHNOLOGY **Use of ICT in teaching, Laboratory Education, Communication with students**	• Powerpoint. • View video material • e-mail. • e-class
COURSE DESIGN **Description of teaching techniques, practices and methods: Lectures,**	

Activity	*Semester Workload*
Lectures	39
Problem solving	10

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<td>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 selfdirected study are given following the principles of the ECTS.</td>
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<table>
<tr><td>Team Working-Laboratory</td><td>30</td></tr>
<tr><td>Educational visits</td><td>20</td></tr>
<tr><td>Homework(s)</td><td>16</td></tr>
<tr><td>Individual Theory Study</td><td>10</td></tr>
<tr><td>Course total (25 hours of workload per credit unit)</td><td>125</td></tr>
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<td>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS
Detailed description of the evaluation procedures:

Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, openended 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.</td>
<td>• Midterm (optional, exam or homework assignment) = 40%
• 60% final exam, or 100% if midterm exam is not given</td>
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<td colspan="2"><u>SUGGESTED BIBLIOGRAPHY:</u>
1. Wastewater Engineering: Treatment and Reuse, 4th ed., Metcalf & Eddy, Inc., revised by G. Tchobanoglous, F.L. Burton & H.D. Stensel, Boston: McGraw-Hill, 2003).
2. Biological wastewater treatment: theory and applications, C.P. Leslie Grady, Jr. & H.C. Lim, New York: Marcel Dekker, 1980.
3. Management of liquid waste effluents, Ger. Lymberatos, D. Vagenas, Tziola Printing, 2011
4. G. Markantonatou, Processing and Management of Liquid Waste Effluents, Technological Chamber of Greece, 1999

<u>Complementary bibliography</u>

Instructor class notes</td>
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