COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
ACADEMIC UNIT	DEPARTMENT OF MINERAL RESOURCES ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	MRE835	SEMESTER	8
COURSE TITLE	Wastewater Processing Technology		

INDEPENDENT TEACHING ACTIVITIES *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*	WEEKLY TEACHING HOURS	CREDITS
LECTURES	2	
LABORATORY EXERCISES	2	
COURSE TOTAL	4	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.uowm.gr/courses/MRE173/

(2) LEARNING OUTCOMES

Learning outcomes

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.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The aim of the course is the understanding and practical familiarization of the student on issues related to the design and operation of conventional methods of wastewater treatment.

More specifically, upon successful completion of the course, students will know the basic terms used in the processes, the principles governing the physical, chemical and biological processes applied in the primary and secondary treatment of wastewater and the problems of operation of such units.

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…
…….

- 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
- Project planning and management
- Respect for the natural environment

(3) SYLLABUS

Origin and characterization of liquid waste. Methods of collection and processing. Conventional processing systems, pre-treatment / primary processing. Basic principles of subsidence and flocculation. Aeration and oxygenation techniques. Filtration. Biological treatment and disposal of wastewater, design of aeration tank and secondary precipitation. Sludge treatment and disposal.
Characteristics of liquid waste, supply, equivalent population, legislation. Wastewater treatment plants: Stages of treatment, mass balances, pretreatment and primary treatment, precipitation, flocculation. Sizing of barbecues, design of balancing and primary precipitation tank. Secondary treatment. Suspended /adherent biomass systems. Kinetic biological actions. Legislation requirements. Sludge management. Examples: Specific processing plants. Problems of operation. Design of active sludge systems (aeration tank and secondary precipitation). Selection of an editing process using software. Training in a pilot installation of biological wastewater treatment. Determination of functional parameters of processing units. Anaerobic treatment. Legislation requirements.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY
Use of ICT in teaching, laboratory education, communication with students</td><td>Bibliographic investigation via the Internet, use of e-class and e-mail. Use of software for the design of biological wastewater treatment facilities.</td></tr>
<tr><td>TEACHING METHODS
The manner and methods of teaching are described in detail.
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.

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</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>52</td></tr>
<tr><td>Laboratory exercises</td><td>26</td></tr>
<tr><td>Field work</td><td>10</td></tr>
<tr><td>Personal written reports</td><td>26</td></tr>
<tr><td>Semester project</td><td>36</td></tr>
<tr><td>Course total</td><td>150</td></tr>
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</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION
Description of the evaluation procedure

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

Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</td><td>Language of Assessment: Greek
Written Examination at the end of the semester for the theory of the course.
Oral Examination at the end of the semester for the Laboratory of the course.
Progress (midterm exam) for the theory of the course
The student is given the opportunity to see his/her writing after the graduation and to discuss with the professor.
The grading of the laboratory is done in a multiparametric way. Through oral and written examination of each laboratory exercise, individual tasks and comprehension questions and final oral or written examination in the entire laboratory course. For the laboratory course, the grading is done with a gravity system for each laboratory exercise and for each written report. The biannual work is rated as a laboratory exercise. The weighted average of the scores of the weekly laboratories is weighted by the grade of the final examination.
Students are informed orally or through the e-class about their performance.</td></tr>
</table>

(5) SUGGESTED BIBLIOGRAPHY

- Suggested bibliography:

Αμανατίδου, Ε. 2019, Προχωρημένες και Σύγχρονες Διαδικασίες Επεξεργασίας Υγρών Αποβλήτων – Βασικές Αρχές Σχεδιασμού, Εκδόσεις Τζιόλα, 264 pages

Λυμπεράτος Γ., Βαγενάς Δ., 2011, Διαχείριση Υγρών Αποβλήτων, Εκδόσεις Τζιόλα, 564 pages

Metcalf & Eddy, 2018, Μηχανική υγρών αποβλήτων, Εκδ. ΤΖΙΟΛΑ, 4η Εκδ. Επιμέλεια Κουγκουλός Αθ., Σαμαράς Π., 1104 pages

Wolkersdorfer, C., 2008, Water Management at Abandoned Flooded Underground Mines, Springer-Verlag, 465 pages

- Related academic journals:

Journal of Environmental Management, ScienceDirect

International Journal of Water and Wastewater Treatment, SciForschen