1.1.1 Urban Waste Treatment Technology

GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	CIVIL ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ΥΔΡ007	**SEMESTER**	7th
COURSE TITLE	Urban Waste Treatment 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**
	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*	Scientific Field
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	

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*

Upon successful completion of this course, students will be able to:

- know the basic water and wastewater treatment processes
- distinguish and explain the treatment stages of a municipal wastewater treatment plant
- analyse water quality characteristics and distinguish water pollution
- calculate the hydraulic layout of municipal wastewater treatment projects
- assess water and wastewater treatment studies
- prepare a technical report containing the sanitary calculations, hydraulic calculations and general arrangement drawings of relative projects

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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
	Respect for the natural environment

Decision-making *Working independently* *Team work* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Showing social, professional and ethical responsibility and sensitivity to gender issues* *Criticism and self-criticism* *Production of free, creative and inductive thinking* *……* *Others…* *…….*

- Search, analysis and synthesis of data and information
- Adapting to new situations
- Decision making
- Individual work
- Project design and management
- Criticism
- Promoting free, creative and inductive thinking

SYLLABUS

The course aims to provide students with the basic theoretical background for the course 'YDR007 Municipal Wastewater Treatment and Management'. It includes the necessary teaching material for understanding the treatment of natural water towards the production of high quality water through purification processes and methods and the analysis of wastewater treatment processes, as well as the design of relative projects.
Lectures' content:
o The hydrological cycle. Groundwater, surface water, seawater. Water consumption.
o Water quality characteristics (physico-chemical and microbiological parameters). Legislative framework. Water pollution – contamination. Protection measures.
o Groundwater and surface water treatment processes. Standard treatment, advanced treatment.
o Water treatment plants: Flocculation, sedimentation, filtration, adsorption, disinfection, water storage and distribution.
o Typical wastewater treatment system. Preliminary and primary treatment. General principles of wastewater and sludge treatment.
o Introduction to the activated sludge model (organic carbon removal and nitrification). Aeration tank design criteria. Sedimentation tank design and operation.
o Analysis of sludge treatment processes. Sludge thickening (gravity thickeners, mechanical thickeners). Sludge stabilisation (aerobic and anaerobic digestion). Sludge dewatering. Sludge disposal and utilisation.
o Design principles for pre-treatment, primary treatment, biological treatment and tertiary treatment of municipal wastewater.

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face to face.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Support of the learning process (Teaching and Communication with students) through PowerPoint lectures, through the course website, through the e-learning platform and through additional electronic communication with students (online announcements and comments, emails, etc.). Additional material (lecture presentations, educational videos, useful sites and scientific articles) posted on the e-learning page. Teacher-student collaboration time either by physical presence or by teleconference.
TEACHING METHODS *The manner and methods of teaching are described in detail.*	

Activity	*Semester workload*
Lectures	40
Practice/exercises	12

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*	Project(s) 10 Individual study 68 Course total (26 hours workload per ECTS credit) ***130***
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.*	Language of Evaluation: Greek Written test with extended answer questions (formative and/or inferential) Theory assessment (80% of the final grade): • A written progress examination (20% of the final grade) including: - Theoretical Extended Response Questions (formative and/or inferential) - Problem-solving exercises • Written final examination (60% of the final grade) including: - Theoretical extended response questions (formative and/or inferential - Problem-solving exercises Individual homework (20% of the final grade) The present course description with the assessment criteria is accessible to students in the Departmental study guide (Departmental website) and on the course website. The outline is communicated orally to students during the first lecture.

ATTACHED BIBLIOGRAPHY

• [in Greek] Νταρακάς Ευθύμιος, ΤΕΧΝΙΚΗ ΠΕΡΙΒΑΛΛΟΝΤΟΣ, Διεργασίες Επεξεργασίας Νερού και Υγρών Αποβλήτων, Εκδόσεις Εκδόσεις "σοφία", 2016, ISBN: 978-960-6706-91-2. Κωδικός Βιβλίου στον Εύδοξο: 59380527
• [in Greek] Νταρακάς Ευθύμιος, Πεταλά Μαρία, Τσιρίδης Βασίλειος, Περιβαλλοντική Χημεία και Μηχανική, Εκδόσεις ΤΖΙΟΛΑ, 2019, ISBN: 978-960-418-640-2. Κωδικός Βιβλίου στον Εύδοξο: 86054621
• [in Greek] Ανδρεαδάκης Α., Επεξεργασία Νερού Βασικές Αρχές και Διεργασίες, Εκδόσεις Συμμετρία, 2008, ISBN: 978-960-266-207-6. Κωδικός Βιβλίου στον Εύδοξο: 45236
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• [in Greek] Γκουντούλας Κων/νος, Διαχείριση Ιλύος από Εγκαταστάσεις Επεξεργασίας Λυμάτων, Εκδόσεις ΑΛΕΞΑΝΔΡΟΣ Ι.Κ.Ε., 2019 (2η έκδοση), ISBN: 978-618-84462-2-9. Κωδικός Βιβλίου στον Εύδοξο: 86200230