

8.13 CE0833 – Sanitary Technology

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	CIVIL ENGINEERING DEPARTMENT		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	CE0833	SEMESTER	8
COURSE TITLE	Sanitary Technology		
INDEPENDENT TEACHING ACTIVITIES <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>	WEEKLY TEACHING HOURS	CREDITS	
	4	4	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Specialization Course		
PREREQUISITE COURSES:	-- English level B2 or higher is required for Erasmus incoming students		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek (English/Erasmus)		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/CIV186/		

(2) LEARNING OUTCOMES

<p>Learning outcomes</p> <p><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"> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i>
<p>The course introduces the student to the basic concepts of environmental degradation, environmental protection, water management, liquid/ solid waste management and relevant treatment technologies, as well as analysis and design of solid / liquid waste management projects.</p> <p>Upon successful completion of the course the student will be able to:</p>

- understand water quality, municipal and industrial wastewater and solid waste (waste).
- participate in the analysis, design, construction, operation and management of Water Treatment Plants (WTP), Sewage Treatment Centers (STC) and Landfills (L/F).
- evaluate and propose the appropriate management and treatment processes for: drinking and industrial water, municipal and industrial wastewater and solid waste.

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

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

The course aims that the student acquires - practice the following general skills:

- Search for, analysis of, and synthesis of data and information, implementing appropriate technologies
- Independent work - Team work - Working in an international / interdisciplinary environment
- Independent work - Team work - Working in an international / interdisciplinary environment
- Proact free, creative and inductive thinking

(3) SYLLABUS

Part 1 - Water characteristics and treatment: Characteristics of water - Physical, chemical and biological. Water treatment design for drinking water and industrial water. Aeration, sedimentation, filtration, flocculation, disinfection.

Part 2 - Wastewater characteristics - Physical, chemical, biological.

Part 3 - Wastewater treatment: Fundamental understanding of many of the existing unit operations and processes used for wastewater treatment, especially those processes used for the biological removal of nutrients; Implementation of several newer treatment technologies (e.g., UV disinfection, membrane filtration, and heat drying); Concern for the long term health and environmental impacts of wastewater constituents; Advanced wastewater treatment and risk assessment for water reuse applications; Reuse and disposal of sludge (biosolids).

Part 4 - Solid waste characteristics and treatment; Reuse, recycling, disposal, sanitary landfills, composting, anaerobic digestion, thermal treatment.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face in-class teaching. When needed, distance teaching (synchronous/asynchronous)							
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Use of I.C.T. in Teaching and Student Communication							
TEACHING METHODS <i>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,</i>	<table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Activity</th> <th style="text-align: center;">Semester workload</th> </tr> </thead> <tbody> <tr> <td>In Class (/Distance) Teaching</td> <td style="text-align: center;">52</td> </tr> <tr> <td>Literature Study</td> <td style="text-align: center;">38</td> </tr> </tbody> </table>		Activity	Semester workload	In Class (/Distance) Teaching	52	Literature Study	38
Activity	Semester workload							
In Class (/Distance) Teaching	52							
Literature Study	38							

<i>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>	Exercises / Paradigms	15
	Project assignment / Essay	15
	Course total	120
STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <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> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Language of evaluation: Greek (English/Erasmus) Written examination, 2,5-hours Problem solving, Multiple choice test, Questions and Answers, Written Essay / Project The evaluation criteria are announced to the students well before the examination; weights per subject /exercise are explicitly indicated. The examination results (including total / partial grading) are announced on the web. Students may require to have access to their tests, they may ask for clarifications on mistakes, grading etc.	

(5) ATTACHED BIBLIOGRAPHY

<p><u>Greek Bibliography:</u></p> <ol style="list-style-type: none"> 1. Λυμπεράτος Γερ., Βαγενάς Δ. Διαχείριση Υγρών Αποβλήτων, Εκδόσεις Τζιόλα, 2016 2. Metcalf & Eddy., Μηχανική Υγρών Αποβλήτων, 4η Έκδοση, Εκδόσεις Τζιόλα, 2018 3. Ανδρεαδάκης Α., Επεξεργασία Νερού Βασικές Αρχές και Διεργασίες, Εκδόσεις Συμμετρία, 2008 4. Μήτρακας Μανασής, Ποιοτικά Χαρακτηριστικά και Επεξεργασία Νερού, Εκδόσεις Τζιόλα, 2001 5. Τσώνης Στυλιανός, Επεξεργασία Λυμάτων, 1η εκδ./2004, ISBN: 978-960-7530-51-6, Α. ΠΑΠΑΣΩΤΗΡΙΟΥ & ΣΙΑ Ι.Κ.Ε., 2004 6. ΝΙΚΟΛΑΙΔΗΣ ΝΙΚΟΣ, ΥΔΑΤΙΚΗ ΧΗΜΕΙΑ, Εκδόσεις Ζήτη, 2005. <p><u>Foreign Bibliography:</u></p> <ol style="list-style-type: none"> 1. "Handbook for the Operation of Water Treatment Works", Frik Schutte, 2006, http://www.wrc.org.za/wp-content/uploads/mdocs/TT%20265-web.pdf 2. "Wastewater Characteristics, Treatment and Disposal", Marcos von Sperling, IWA Publishing, 2007, https://www.iwapublishing.com/sites/default/files/ebooks/9781780402086.pdf 3. "Wastewater Management", P. Amoatey, R. Bani, ResearchGate, 2011, https://www.researchgate.net/publication/221911472 4. "Basic General Wastewater Study Guide", Wisconsin Department of Natural Resources, Wastewater Operator Certification, 2016, https://dnr.wi.gov/regulations/opcert/documents/StudyGuideBasicGeneral.pdf 5. "Wastewater Operator Certification Training - Introduction to Wastewater Treatment", W. Worrell, P. Aarne Vesilin, 2010, nt_wb.pdf https://www.researchgate.net/publication/221911472 6. "Biological and Chemical Wastewater Treatment Processes", M. Samer, Intech, 2015, https://www.intechopen.com/books/wastewater-treatment-engineering/biological-and-chemical-wastewater-treatment-processes 7. "Solid Waste Engineering", W. Worrell, P. Aarne Vesilind, Cengage Learning, 2010, https://epdf.pub/solid-waste-engineering-second-edition.html
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