

COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Financial and Management Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	FE0117	SEMESTER	4 th
COURSE TITLE	Environmental Engineering		
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
		3	4.5
<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>	General background		
PREREQUISITE COURSES:	No		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)			

(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 course introduces the principles of environmental engineering, emphasizing on management of water resources and wastewater. After successful completing the course, students will be expected to be able to:

- Understand the basic concepts of ecology with emphasis on terrestrial and aquatic ecosystems, environmental conditions, natural resources, organisms, food chains and

biogeochemical cycles

- Understand the basic principles of environmental engineering with emphasis on atmosphere and especially in composition and structure, the greenhouse effect, the ozone hole and the acid rain
- Understand the importance of water for growth and health
- Understand the universality of the problem of water resources, their use, the consumptions, the quality characteristics of drinking water, their categories, the phenomenon of eutrophication, the main sources of pollution of surface water and groundwater
- Understand the importance of proper management of water resources, with emphasis at source, in transit, in storage, in processing and distribution in water supply network so finally arrived to the consumer at the desired quality for the analogue use, at the same time ensuring the sustainability
- Understand the importance of cost management of water resources and the final price
- Understand biological and physico-chemical methods that apply to the treatment and reuse of wastewater
- Understand the use of simple mathematical equations for designing wastewater treatment systems
- Planning a wastewater treatment plant and check the proper operation
- Select the appropriate wastewater management system

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
Project planning and management
Respect for the natural environment
Criticism and self-criticism
Production of free, creative and inductive thinking

(3) SYLLABUS

The Environmental Engineering course deals with ecology, atmosphere, management of aquatic resources and wastewater. The biogeochemical circles of elements in the environment, the environmental conditions and their relations with the organisms in the ecosystems, the structure and the constitution of atmosphere and the phenomenon of greenhouse are the crucial subjects. Major themes of the course include the water resources, the circle of use of water, the qualitative characteristics of drinking water and relevant legislation, the physicochemical processes of water treatment, the organic chlorination by-products, the pesticides and the procedure of choice of source and method of treatment of water. The origin, quantity and the quality, the kinetics of biological growth and the active sludge, the lakes of treatment and the biological filters, the anaerobic and physicochemical treatment of wastewater are developed. The planning of wastewater treatment plant and the choice of administrative systems are also discussed.

Module Contents (Syllabus):

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| ➤ Ecology and Environmental Chemistry (ecosystems, organisms, food chains, biogeochemical cycles) |
| ➤ Terrestrial and aquatic ecosystems (environmental conditions, humidity, temperature, light, natural resources) |
| ➤ Introduction to Environmental Engineering (Atmosphere-Greenhouse effect) |
| ➤ Water Resources |
| ➤ Water quality (pesticides, organic disinfection by-products) |
| ➤ Water Sources |
| ➤ Water networks – City Tank |
| ➤ Water Treatment |
| ➤ Intermediate Examination |
| ➤ Chemical Precipitation |
| ➤ Chemical Oxidation - Disinfection |
| ➤ Select source and water treatment process |
| ➤ Origin, Quantity and Wastewater Quality |
| ➤ Elements of Environmental Microbiology and Biochemistry |
| ➤ Biological Growth Kinetic |
| ➤ Active Sludge |
| ➤ Treatment Ponds |
| ➤ Biological Filters |

<ul style="list-style-type: none"> ➤ Anaerobic Treatment ➤ Physico-Chemical Treatment
<ul style="list-style-type: none"> ➤ Sludge Treatment ➤ Design Of Wastewater Treatment Plant - Select Schema Management

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Use of ICT in teaching	
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, 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</i>	Activity	Semester workload
	Lectures	39
	Study and analysis of bibliography	98
	Intermediate examination	3
	Examinations	3
	Course total	143
STUDENT PERFORMANCE EVALUATION <i>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.</i>	Intermediate and final examinations at the end of the semester, which include questions (development), knowledge and understanding of the content of the course, and problem solving.	

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

Περιβαλλοντική Μηχανική I – Εισαγωγή στην Τεχνολογία του Νερού και Υγρών Αποβλήτων (Σ.Α. Αυλωνίτης, 2013)

Εισαγωγή στην Περιβαλλοντική Μηχανική (Α. Γ. Κούγκολος, 2007)

Επεξεργασία Νερού (Α. Ανδρεαδάκης, 2008)

Περιβαλλοντική ΜηχανικήI - Διαχείριση Υδατικών Πόρων (Θ. Λέκκας, 1996)

Περιβαλλοντική ΜηχανικήII - Διαχείριση Υγρών Αποβλήτων (Θ. Λέκκας, 2005)

Ποιοτικά Χαρακτηριστικά και Επεξεργασία Νερού (Μ. Μήτρακας, 2001)

Βιολογικός Καθαρισμός Αστικών Αποβλήτων (Α. Στάμου, 2004)

Καθαρισμός Νερού (Σ. Τσώνης, 2003)

Ρύπανση και Τεχνολογία Προστασίας Περιβάλλοντος (Τ. Αλμπάνης, 2006)

Μηχανική Υγρών Αποβλήτων – Επεξεργασία & Επαναχρησιμοποίηση, Τόμος Α, Β (Metcalf&Eddy, 2014)

Notes

AdditionalReferences:

Χημεία Περιβάλλοντος (Θ. Κουϊμτζής, Κ. Φυτιάνος, Κ. Σαμαρά - Κωνσταντίνου, 1998)

Η ρύπανση των θαλασσών (Κ. Φυτιάνος, 1996)

- Related academic journals:

Environmental Technology

Global Nest Journal

Science of the Total Environment

Water Research

Desalination and Water Treatment