COURSE OUTLINE

(1) GENERAL

SCHOOL	**UNIVERSITY OF THESSALY**		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ΓΚ0105	**SEMESTER**	1st
COURSE TITLE	CHEMISTRY FOR ENGINEERS		

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, specialized general knowledge, skills development*	General background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE 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 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*

Knowledge:

After completing the course, students will:

- Acquire knowledge of the basic concepts of chemistry, matter and its classification, the different ways of expressing solution concentrations, chemical reactions and their kinetics, as well as the chemistry of various materials.
- Understand the physicochemical properties of water.
- Be familiar with the structure and composition of the atmosphere, as well as the main chemical compounds and their significance.
- Understand the mechanism of photochemical atmospheric pollution, the main pollutants and their sources, as well as their impact on human health.
- Know the basic categories of microorganisms and their roles.
- Be familiar with the cycles of essential elements, the effects of human activities on them, and the role of microorganisms in their regulation.
- Comprehend the concept of eutrophication, its causes and consequences, as well as measures for the prevention and restoration of aquatic ecosystems.
- Be aware of the general characteristics of liquid waste and be able to solve problems related to the oxygen sag curve in water streams.

- Understand the fundamentals of metal corrosion and the methods for its prevention.

Skills:

After completing the course, the students will:

- Possess basic problem-solving skills in Environmental Chemistry.
- Be able to address issues in Environmental Microbiology and assess the complexity of an ecosystem, as well as the interactions between its physical, chemical, and biological components.

Competences:

After completing the course, the students will:

- Be able to understand scientific texts related to fundamental topics in Environmental Chemistry and identify key pollutants found in the environment, along with the problems they cause to ecosystems and human health.
- Be capable of understanding and evaluating proposed solutions and approaches for resolving environmental issues.

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
thinking 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
……
Others…
…….

- Ability to search, analyze, and synthesize data and information using the necessary technologies.
- Independent work skills.
- Teamwork skills.
- Respect for the natural environment.
- Ability to work in an interdisciplinary environment.

(3) SYLLABUS

S/N teaching week	Course Content
1	Introduction to solutions
2	Concentration expressions
3	Chemistry of solutions and water
4	Physicochemical properties of water
5	Atmospheric chemistry
6	Photochemical atmospheric pollution and climate change I
7	Photochemical atmospheric pollution and climate change II
8	Environmental chemistry and microbiology
9	Biogeochemical cycles
10	Eutrophication: effects, mitigation, and preventive measures
11	General characteristics of liquid waste
12	Oxygen sag curve in water streams I
13	Oxygen sag curve in water streams II
14	Metals and metal corrosion

(4) 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*	Lectures with PowerPoint presentations, exercises, and announcements on e-class
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*	

Activity	*Semester workload*
Lectures - Exercises	14*4=56 hours
Study	14*3=42 hours
Exams	3 hours
Exam preparation	24 hours
Course total	*125*

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.*	**Evaluation language** Greek or English **Assessment methods** 100% written examination: Closed books and notes. No audiovisual aids. Theory questions (essay-type), short-answer questions and problem-solving exercises.

(5) ATTACHED BIBLIOGRAPHY

- Περιβαλλοντική Μηχανική Ρύπανση & Προστασία Περιβάλλοντος, 3η Έκδοση, Α.Γ. Κούγκολος, Εκδόσεις Τζιόλα
- Οικολογία: Οικοσυστήματα και Προστασία του Περιβάλλοντος, Κ. Χατζημπίρος, Εκδόσεις Συμμετρία
- Εισαγωγή στις Διεργασίες Καθαρισμού, Νερού και Λυμάτων, Κ. Χρυσικόπουλος, Εκδόσεις Τζιόλα
- Βασικές Αρχές Ανόργανης Χημείας, Γ. Πνευματικάκης, Χ. Μητσοπούλου και Κ. Μεθενίτης, Εκδόσεις Αθ. Σταμούλης