

## COURSE OUTLINE

### 1. GENERAL

<b>SCHOOL</b>	Faculty of Engineering		
<b>DEPARTMENT</b>	Environmental Engineering		
<b>LEVEL OF STUDIES</b>	Level 7		
<b>COURSE CODE</b>	<b>B3ΥΠ</b>	<b>SEMESTER</b>	1 <sup>st</sup>
<b>COURSE TITLE</b>	Aquatic chemistry		
<b>TEACHING ACTIVITIES</b>		<b>TEACHING HOURS PER WEEK</b>	<b>ECTS CREDITS</b>
Theory		4 hours	
Laboratory courses		2 hours	
			5
<b>COURSE TYPE</b>	Background		
<b>PREREQUISITES:</b>	NO		
<b>TEACHING &amp; EXAMINATION LANGUAGE:</b>	Greek		
<b>COURSE OFFERED TO ERASMUS STUDENTS:</b>	NO		
<b>COURSE URL:</b>	<a href="https://env.duth.gr/courses/%CF%85%CE%B4%CE%B1%CF%84%CE%B9%CE%BA%CE%AE-%CF%87%CE%B7%CE%BC%CE%B5%CE%AF%CE%B1/">https://env.duth.gr/courses/%CF%85%CE%B4%CE%B1%CF%84%CE%B9%CE%BA%CE%AE-%CF%87%CE%B7%CE%BC%CE%B5%CE%AF%CE%B1/</a>		

### 2. LEARNING OUTCOMES

<b>Learning Outcomes</b>
<p>The aim of the course is the introduction of students to aquatic and environmental chemistry and to develop students' awareness of the role of chemistry in the science of environmental engineering.</p> <p>Upon successful completion of the course students will have received basic and specialized knowledge of chemistry related to aqueous chemistry and will be able to:</p> <ul style="list-style-type: none"> <li>• Define the introductory concepts of aquatic chemistry, principles and theories as well as applications of chemical processes in the aquatic environment</li> <li>• Understand chemical phenomena in the aquatic environment</li> <li>• Understand the chemical processes that determine the balance of chemicals in the environment</li> <li>• Understand the criteria for classifying spontaneous and non- spontaneous chemical reactions and processes in the environment</li> <li>• Formulate chemical reactions and stoichiometric calculations in the context of aqueous chemistry</li> <li>• Thermodynamic</li> <li>• Interpret environmental chemical processes based on existing knowledge and skills acquired during the course</li> </ul>
<b>General Skills</b>
<p>The course offers the following theoretical and practical skills:</p> <ul style="list-style-type: none"> <li>• Theoretical thinking and ability to turn theory into practice</li> <li>• Ability to apply knowledge in solving problems of aqueous chemistry and environmental chemistry in general</li> </ul>

- Work in an interdisciplinary environment
- Ability to search and analyze data and information using the necessary technologies
- Promoting free, creative and inductive thinking
- Ability to cooperate at team level to achieve the above objectives
- Understand the principles of chemical processes and apply them to environmental technology
- Autonomous Work
- Research
- Design and perform of chemical studies and research

### 3. COURSE CONTENT

1. Introduction to aquatic chemistry
2. Chemical reactions
3. Electronic properties of elements
4. Thermochemistry
5. Chemical bonds – Covalent bonds and electrostatic interactions – Molecular structure
6. Aqueous solutions
7. Reactions rates
8. Chemical reactions equilibrium
9. Acids & bases
10. Salts – Ionic strength
11. Solubility Product Constants
12. Thermodynamics & equilibrium
13. Reduction & oxidation reactions

### 4. LEARNING & TEACHING METHODS - EVALUATION

<b>TEACHING METHOD</b>	Face to face  Lectures & laboratory courses	
<b>USE OF INFORMATION &amp; COMMUNICATIONS TECHNOLOGY (ICT)</b>	Use of ICT in teaching (lectures and laboratory courses) and in communication with students	
<b>TEACHING ORGANIZATION</b>	<i>Activity</i>	<i>Workload/semester</i>
	Lectures	52
	Laboratory courses	26
	Literature study and analysis	33
	Scientific/technical reports	39
	Total	150
<b>STUDENT EVALUATION</b>	Assessment Language: Greek Assessment/evaluation Methods: 1. Written examination - 70% 2. Laboratory Report - 30%	

	<p>The brief examination before each laboratory exercise and the evaluation of the laboratory reports after the completion of the laboratory contribute equally to the score of each laboratory exercise.</p> <p>Evaluation process: Problem Solving</p> <p>The evaluation methods are analyzed at the first course of the semester and are posted in the DUTHNET e-class platform (the electronic course management system of the Foundation)</p>

## 5. SUGGESTED BIBLIOGRAPHY

1. Basis inorganic chemistry (ISBN 960-7122-27-5)
2. General chemistry (960-7990-66-8)
3. Introduction in general and inorganic chemistry (9789609322072)
4. Basic principles in inorganic chemistry (960-351-664-3)

## ANNEX OF THE COURSE OUTLINE

### Alternative ways of examining a course in emergency situations

<b>Teacher (full name):</b>	Konstantinos Christoforidis
<b>Contact details:</b>	<a href="mailto:kochristo@env.duth.gr">kochristo@env.duth.gr</a>
<b>Supervisors: (1)</b>	YES
<b>Evaluation methods: (2)</b>	Written examination with distance learning methods.
<b>Implementation Instructions: (3)</b>	<p>Questions are upload in a stepwise manner at the DUTHNET eclass platform (the electronic course management system of the Foundation). The answers are uploaded in pdf format at the eclass platform within the period specified. The duration of the examination is 2 hours. The written exam corresponds to the 100% in the final grade.</p> <p>Ten different groups of questions are given to the students and every question must be submitted within a specific period. During the course of the exam, cameras and microphones are activated and students are separated in five groups. Every group is monitored by different supervisors via MT.</p>

(1) Please write YES or NO

(2) Note down the evaluation methods used by the teacher, e.g.

- *written assignment* or/and exercises
- written or oral examination with distance learning methods, provided that the integrity and reliability of the examination are ensured.

(3) In the **Implementation Instructions** section, the teacher notes down clear instructions to the students:

a) in case of **written assignment and / or exercises**: the deadline (e.g. the last week of the semester), the means of submission, the grading system, the grade percentage of the assignment in the final grade and **any other necessary information**.

b) in case of **oral examination with distance learning methods**: the instructions for conducting the examination (e.g. in groups of X people), the way of administration of the questions to be answered, the distance learning platforms to be used, the technical means for the implementation of the examination (microphone, camera, word processor, internet connection, communication platform), the hyperlinks for the examination, the duration of the exam, the grading system, the percentage of the oral exam in the final grade, the ways in which the inviolability and reliability of the exam are ensured and any other necessary information.

c) in case of **written examination with distance learning methods**: the way of administration of the questions to be answered, the way of submitting the answers, the duration of the exam, the grading system, the percentage of the written exam of the exam in the final grade, the ways in which the integrity and reliability of the exam are ensured and any other necessary information.

There should be an attached list with the Student Registration Numbers only of students eligible to participate in the examination.