COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Environment		
ACADEMIC UNIT	Department of Environment		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**232KEY**	**SEMESTER**	**6**
COURSE TITLE	Aquatic Chemistry		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	
Laboratory/Tutorials	3	
Total credits		**6**

COURSE TYPE	Special background
PREREQUISITE COURSES:	Chemistry
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	
COURSE WEBSITE (URL)	https://www.env.aegean.gr/studies/undergraduate-degree/curriculum/aquatic-chemistry-2/

(2) LEARNING OUTCOMES

Learning outcomes
On successful completion of the course students will: • have gained knowledge about the fundamental concepts of chemical thermodynamics, with emphasis to the chemical equilibrium • have gained knowledge about the different types of reactions that are important in natural water systems (acid-base, complexation, precipitation-dissolution, reduction-oxidation, and solid-solution interface reactions) • have gained knowledge about the concepts of ionic strength of solutions, and of the concentrations, activity, activity coefficients and normality of dissolved species in aquatic solutions • be able to develop the mathematical equations of mass balance, charge balance, proton balance and equilibrium constants for systems at equilibrium • be able to produce algebraic solutions of the composition of aquatic solutions at equilibrium • have gained an understanding of the processes that govern the behavior of inorganic species in aquatic systems • be able to interpret graphical presentation of water composition data (pC – pH, pe – pH graphs, etc) • have gained an understanding of the dissolved carbon system, of alkalinity and of pH determination in natural water systems
General Competences

The course aims at providing the degree-holder with general competences regarding:

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Working in an interdisciplinary environment
- Production of inductive thinking

(3) SYLLABUS

- Introduction – concentration units – normality - ionic strength - activity
- Laws of Thermodynamics
- Chemical equilibrium
- Chemical equilibrium – solution methods: analytical, graphical - pC vs. pH diagrams
- Acids, bases, pH, buffer solutions, buffer capacity
- The carbonate open system, alkalinity
- Complexation reactions
- Precipitation and dissolution reactions, stability diagrams
- Redox reactions: introduction to redox chemistry
- Redox reactions: equilibrium calculations
- Redox Potential (pe) - pe-pH diagrams
- Solid-water interface reactions: Ion exchange, adsorption

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	**YES**
TEACHING METHODS	

Activity	***Semester workload***
Lectures	13 weeks x 3 h/week = 39 h
Tutorials	13 weeks x 3 h/week = 39 h
Study	13 weeks x 4 h/week = 52 h
Problem solving	8 weeks x 3 h/week = 24 h
Course total	***154***

STUDENT PERFORMANCE EVALUATION	Language of evaluation: Greek Methods of evaluation: • Final exam in the form of multiple choice questions, and problem solving, via Moodle: 100% of total grade

	Specifically-defined evaluation criteria are given in Moodle: https://aegeanmoodle.aegean.gr/course/view.php?id=2056#section-0

(5) ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

- Nikolaidis N. (2005). Aquatic Chemistry. Ziti Publisher (in greek)
- Brezonik P. L. and Arnold W. A. (2011). Water Chemistry: An Introduction to the Chemistry of Natural and Engineered Aquatic Systems. Oxford

- Related academic journals:

- Water Research
- Aquatic Geochemistry