COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Technology		
ACADEMIC UNIT	Department of Environmental Sciences		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**AY201**	**SEMESTER**	**2nd**
COURSE TITLE	**ANALYTICAL and ENVIRONMENTAL CHEMISTRY**		
INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**		**CREDITS**
Teaching Hours	5		5
COURSE TYPE	General background		
PREREQUISITE COURSES	None		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.uth.gr/courses/ENV_U_107		

(2) LEARNING OUTCOMES

Learning outcomes

The content of the Analytical and Environmental Chemistry course aims to introduce students to basic concepts of the structure of the Environment (soil, water, atmosphere) and the methodologies that the future Environmentalists need to master for the qualitative and quantitative determination of organic and inorganic chemical substances that pollute or simply constitute the normal composition of water, soil or atmosphere. The laboratory part of the course provides students with the opportunity to develop laboratory skills and acquire laboratory experience and knowledge.

Upon successful completion of the course students will have acquired the necessary knowledge, skills and competence, and will be able to:

- Understand basic concepts of Analytical and Environmental Chemistry.
- Apply the knowledge acquired in the course to following courses related to Chemistry, Biology, etc.
- Meet the requirements of "Good Laboratory Practice".
- Evaluate, analyze and calculate laboratory measurement data and write laboratory reports.
- Apply the knowledge acquired in the course to solve environmental problems.

General Competences

- 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
- 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

(3) SYLLABUS

- Subject of Environmental Chemistry (environment, environmental spheres, environmental pollution).
- Hydrosphere, chemistry of the hydrosphere.
- Soil (composition, soil organic matter, soil acidity, cation exchange capacity).

- Chemistry of the atmosphere, air pollution (acid rain, global warming, greenhouse effect).
- Categories of biological & organic molecules (Amino acids-peptides-proteins, Carbohydrates, Lipids, and other organic compounds).
- Subject of Analytical Chemistry.
- Analysis method selection criteria. Method calibration curve.
- Introduction to spectrophotometry - organology. Beer-Lambert law. Spectrophotometry applications.
- Introduction to separation techniques-Gas chromatography-Liquid chromatography.
- Introduction to atomic spectroscopy-Atomic absorption spectrometry.

Laboratory Exercises:
Receipt of positions – Calibration of instruments – Utensils – Materials – Reagents – Safety | Neutralization | Oximetry – Alkalimetry | Redox ($KMnO_4$) |Redox ($K_2Cr_2O_7$) |Iodiometry | Field exercises (Water & soil pH measurement, conductivity)| Photometric determination of detergents |Determination of Alkalinity and Bicarbonates| Determination of total, temporary, permanent water hardness | Chemical Oxygen Demand (COD) | Biochemically required oxygen (BOD5) | Chromatography.

(4) TEACHING and LEARNING METHODS – EVALUATION

DELIVERY	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	• Use of PowerPoint slides • View material in video • Communication with students via e-mail • Use of asynchronous distance learning (e-class)
TEACHING METHODS	

Activity	***Semester workload***
Lectures	26
Seminars	13
Laboratory practice	26
Fieldwork	2
Study and analysis of bibliography	45
Project	13
Course total (25 hours workload per credit)	**125**

STUDENT PERFORMANCE EVALUATION

Students' performance is evaluated in the Greek language. The final grade is determined by:

- A written exam (at the end of the semester) that contributes 70% to the final grade, applying one or more of the following evaluation methods: Multiple choice questions, short-answer questions, problem solving.
- A laboratory grade that contributes 30% to the final grade and consists of (i) the completion of the laboratory exercises, (ii) the delivery of a written assignment for each laboratory exercise (A), which contributes 20% to the laboratory grade, and (iii) a written examination (B) that contributes 80% to the laboratory grade.

Laboratory Grade: 20% (A) + 80% (B)

Final Grade = 70% Exam Grade + 30% Laboratory Grade

(5) ATTACHED BIBLIOGRAPHY

- Girard, James E. (2015) *Principles of Environmental Chemistry*, (3rd Edition). Athens: Parisianou Publishers. (in Greek)
- Konstantinou, V. & Pappas, Ch. (2015) *Basic Laboratory Knowledge and Exercise Techniques of General and Inorganic Chemistry*. Laboratory notes, Agricultural University of Athens. (in Greek)