COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Financial and Management Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ΓΕ0114	SEMESTER	1st
COURSE TITLE	Chemistry		

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**
	3	6
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, specialised general knowledge, skills development*	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 explores the principals of inorganic chemistry. After successful completing the course, students will be expected to be able to:

- Name and write formulas for common binary and ternary inorganic compounds
- Describe the atomic structure
- Use chemical formulas to solve various kinds of chemical problems
- Interconvert masses, moles, and formulas
- Calculate concentrations of solutions when they are diluted
- Describe the wave properties of light and how wavelength, frequency, and speed are related
- Describe the four quantum numbers, and give possible combinations of their values for specific atomic orbitals
- Write the electron configurations of atoms
- Relate the electron configuration of an atom to its position in the periodic table
- Describe the periodic table and some of the relationships that it summarizes

- Discuss chemical periodicity of the following physical properties: electron affinity, electro negativity,
  ionization energy, atomic radii
- Write Lewis dot representations of atoms
- Predict bonding between specified elements (ionic, covalent)
- Write Lewis dot and dash formulas for molecules and polyatomic ions
- Describe the basic concepts of molecular orbital theory
- Perform calculations involving the use of solutions to chemical reactions
- Understand the condition of chemical equilibrium and following laws
- Recognize and describe non electrolytes, strong electrolytes, and weak electrolytes
- Describe the theories of Bronsted-Lowry, Lewis και Arrhenius of acids and bases
- List properties of aqueous solutions of acids and bases
- Write oxidation-reduction equations
- Explain the common ion effect
- Recognize buffer solutions and describe their chemistry
- Understand the basic concepts of thermochemistry and applies them in simple chemical reactions
- Understand the basic concept of environmental chemistry (toxic organic compounds, heavy metals, etc.)

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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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*
	…….

Search for, analysis and synthesis of data and information, with the use of the necessary technology
Adapting to new situations
Production of new research ideas
Respect for the natural environment
Criticismandself-criticism
Production of free, creative and inductive thinking

(3) SYLLABUS

The course includes the following topics: Structure of atom, Atomic orbit, Periodical table of elements, Chemical bonds, Thermochemistry - Thermodynamic, Chemical balance, Non electrolytic solutions, Acids - Bases - Salts, Oxidation – Reduction, Chemical kinetic, Elements of organic chemistry, Elements of environmental chemistry, Elements of analytic chemistry, Spectroscopical methods of analysis.

Module Contents (Syllabus):

General introduction , Structure of atom
Atomic orbitals
Electronic Shell Atoms
Periodic table of elements
Intermediate Examination

Chemical bond
Chemical thermodynamic
Chemical equilibrium
Solutions
Acids-Bases-Salt
Oxidation-Reduction Chemical kinetic
Introduction to Environmental Chemistry, Toxic Organics - Heavy Metals
Introduction to Organic and Analytical Chemistry

(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*	Use of ICT in teaching
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	39
Study and analysis of bibliography	145
Intermediate examination	3
Examinations	3
Course total	190

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.*	Intermediateand 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:

Αρχές της Χημείας, Η Αναζήτηση της Γνώσης. Τίτλος πρωτοτύπου: Chemical Principles, The Quest For Insight (P. Atkins, L. Jones, L. Laverman, 2018)

Γενική & ΑνόργανηΧημεία (Σ. Παπαστεφάνου, Μ. Λάλια-Καντούρη, 2012)

Βασικές Αρχές Ανόργανης Χημείας (Γ. Πνευματικάκης, Χ. Μητσοπούλου, Κ. Μεθενίτης, 2006)

Γενική Χημεία-Θεωρία και Εφαρμογές (Μ. Κονσολάκης, 2012)

Χημεία – Η Κεντρική Επιστήμη (T.L. Brown, H.E.Lemay, Jr., B.E. Bursten, P.M. Woodward, M.W. Stoltzfus, 2016)

Notes (Εισαγωγή στην Περιβαλλοντική και Αναλυτική Χημεία)

AdditionalReferences:

Στοιχεία Γενικής Χημείας (Π. Ακριβός, 2004)

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

- Related academic journals:

Inorganica Chimica Acta

Analytica Chimica Acta

Analytical Letters

New Journal of Chemistry