COURSE LAYOUT

1. GENERAL

SCHOOL	**School of Animal Bıosciences**		
DEPARTMENT	**Department of Animal Science**		
STUDY LEVEL	**Undergraduate**		
COURSE CODE	**3630**	**SEMESTER**	**1st**
COURSE TITLE	**Inorganic Chemistry**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**ECTS**
Course: Theory and Laboratory Practice (3+2)	5	5

COURSE TYPE (Foundation course, General knowledge, Scientific area, Developing skills)	Foundation course
PREREQUISITES	No
LANGUAGE	Greek
IS THE COURSE OFFERED for ERASMUS STUDENTS?	No
COURSE WEB PAGE	https://mediasrv.aua.gr/eclass/courses/EZPY146/

2. LEARNING OUTCOMES

Learning Outcomes

Introduction to basic concepts and principles of General and Inorganic Chemistry with special focus on the structures and properties of chemical elements and molecules found in life sciences and agriculture.

Final goal is to facilitate the students to comprehend efficiently related chapters of biochemistry, pharmacology, environmental chemistry, etc.

Upon successful completion of the course, students are expected to know-understand issues concerning the:

- chemical elements and their electronic structures,
- periodic table and periodic properties of the elements,
- classes of chemical bonds, theories of valence-bonding, hybridization and molecular orbitals.
- intermolecular forces - hydrogen bonding
- liquid, gaseous and solid states of the molecules
- solutions theories and their applications in analytical chemistry
- chemical equilibrium, acid-base-salts
- ionic equilibrium, hydrolysis, buffers, colloids
- concepts of oxidation – reduction, redox reactions and galvanic cells
- nomenclature, theories, stability and bonding of complexes

Additionally, students will learn how to:

- calculate bond order and predict the geometry of simple molecules
- predict the hybridization, structure, magnetic properties and color of complexes.
- handle safely and efficiently the laboratory equipment
- apply the knowledge obtained from theory, laboratory for solving problems and analyze data

General Competences

Data analysis-synthesis, information mining. Application of relevant technologies
Adapting new situations

Teamwork (in the lab) Working in a multidisciplinary environment Respect the natural environment Exercise criticism and self-criticism Promotion of creative and inductive thinking

3. COURSE CONTENT

THEORY

- Structure of atoms (hydrogen atom, quantum numbers, magnetic properties)
- Electronic structure and properties of atoms (periodic table, size, ionization energy, electronic affinity, electronegativity, oxidation number and elements' classification)
- Ionic bond, covalent bond, molecules' geometry-VSEPR theory, bond length and energy
- Valence bond theory and orbital hybridization
- Molecular Orbital (MO) theory, application on diatomic homonuclear and heteronuclear molecules and simple polyatomic molecules consisting of elements of 1^{st} and 2^{nd} period. Calculation of their bond order and geometry.
- Chemistry of solutions (characteristics, hydration, temperature and pressure effect on solubility, concentration, vapors pressure, boiling and freezing points). Distillation, osmosis-osmotic pressure, electrolytes, colloids.
- Chemical equilibrium (description, equilibrium constants, reversible reactions, Le Chatelier's principle)
- Acids and Bases (Acids-Bases according to Arrhenius, Bronsted-Lowry and Lewis theories, strength of acids and bases)
- Ionic equilibrium (ionization of weak monoprotic acids-bases, ionization of water, pH, pH-indicators, effect of common ions, buffer solutions, ionization of polyprotic acids, titration of acid, solubility and precipitation)
- Oxidation-reduction (oxidation number, oxidation reactions, galvanic cells)
- Coordination compounds (definition, nomenclature, isomers, stability of coordination compounds, Valence Bond and Crystal Field theories, hybridization-geometry, magnetic properties, color, applications and biological significance of coordination compounds)

LABORATORY

- Laboratory safety rules-procedures
- Laboratory techniques-procedures (Weighing – Volume measurement - Statistical processing of results)
- Simple chemical reactions (1st group cations)
- Preparation of solutions Part I.
- Preparation of solutions Part II
- pH Measurement - Preparation of a buffer solution
- Acid - Base titration
- Complexometric titration: Determination of Water hardness

4. TEACHING and LEARNING METHODS - Evaluation

TEACHING METHOD	Face to face (theory-laboratory) and remote support via *e-mail*
USE OF INFORMATICS and COMMUNICATION TECHNOLOGIES	Power point presentations and video projections in lectures Use of *e-class* platform Students' support via *e-mail*

TEACHING ORGANISATION (Lectures, individual or group assignments, field trips, individual study et.c.)	***Activities***	***Workload per semester***
	Lectures	39
	Laboratory practices	26
	Individual assignment	45
	Teamwork	15
	Total contact hours and training	***125***
STUDENTS EVALUATION	**Theory** Written exams (100%) (either as final exam or as the sum of two progress exams during the semester) **Laboratory** Short answers to simple questions before practicing 15% Written exam *(Multiple choice questions, simple questions and problems)* 50% Individual work assignment 20% Laboratory-experimental exam 15%	

5. LITERATURE

- All lectures are available at *e-class* as *power-point* presentations

Books:

- «Basic principles of Inorganic Chemistry» (Greek), G. Pnevmatikakis, Ch. Mitsopoulou and K. Methenitis, Stamoulis Eds.
- «Basic Inorganic Chemistry» (Greek), N. Clouras, Travlos eds.