**Chemistry (Ist year of study,** **IInd Semester)**

**Credit value (ECTS) 4**

**Course category**

Domain (Compulsory)

**Discipline Code:** A.EMIAIA.F.102

**Course holder:**

**Assoc. Prof. PhD. Elena UNGUREANU**

**Discipline objectives (course and practical works)**

• The course is aimed at acquiring basic knowledge of general chemistry, the study of chemical elements and combinations, and the properties and importance of the main types of chemical systems found in living organisms and soil or directly related to them.

• Characterization of the matter aggregation states in the context of the structure-properties relationship;

• Defining and the proper understanding of the thermodynamic measures together with their measurement units and their application in calculating the energy variations of the reversible and irreversible physicochemical and biological processes;

• Defining the state of thermodynamic equilibrium and applying the information acquired in the characterization of physical phenomena, such as boiling, melting, sublimation, dissolution, solvent extraction, osmotic pressure, etc;

• Knowledge of kinetic parameters based on which the role and influence of factors in increasing the speed of physico-chemical phenomena (concentration, temperature, catalysts) are interpreted ;

• Defining and characterizing the interphase phenomena with applications in the food industry, such as: corrosion, surface tension, adsorption, capillarity etc;

Practical works seek to familiarize students with technical work in chemistry laboratories, knowledge of general notions relating to physical and chemical processes of substances with implications in food science and biotechnology and interpretation of results.

**Contents (syllabus)**

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| **Course (chapters/subchapters)** |
| Introduction: atom, substance, chemical formulas and reactions |
| Chemical bonds: ionic, covalent, coordinative, metallic, specific and non-specific intermolecular bonds |
| Chemical reaction: electron transfer and proton transfer reactions |
| Homogeneous disperse systems: properties, solubility, methods for separation and purification, principles, solution concentrations |
| Electrochemistry: electrode processes |
| Elements and combinations: characterization of the elements in the periodic table groups |
| Sates of aggregation: macroscopic and microscopic properties |
| Chemical thermodynamics: characteristic values, principles of thermodynamics |
| Chemical kinetics: reaction rate, chemical equilibria in homogeneous and heterogeneous systems |
| Colloidal systems: classification, methods of obtaining and purification, properties |
| The importance of chemistry in agriculture and food |

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| **Seminars and workshops** |
| Processing work safety and firefighting rules in chemistry lab. Introduction to general chemistry lab. Laboratory operations |
| The concentrations of the solutions |
| Volumetric neutralization reactions: determination of a sulfuric acid solution concentration |
| Volumetric oxidation-reduction reactions: permanganometry |
| Volumetric oxidation-reduction reactions: iodometry - determination of the concentration of a solution of iodine |
| Complexometry: determination of water hardness. |
| Substances purification methods: crystallization, dissolution, filtration, precipitation, sublimation |
| Analytical balance. Determining physical constants of liquids: density |
| pH: potentiometric determination |
| Soils preparation methods |
| Gels preparation methods |
| Final colloquium of knowledge evaluation |

**References**

1. Atkins P., De Paula J., Keeler J., 2022 - *Physical Chemistry,* Editura OUP Oxford.
2. Burgot G., Burgot J.L., 2023 - *General Analytical Chemistry,* Editura Taylor & Francis Ltd.
3. Comber N.M., 2021 - *An Introduction To Agricultural Chemistry*, Editura Hassell Street Press.
4. Dalton R., 2022 - *Understanding Inorganic Chemistry*, Editura Murphy & Moore Publishing.
5. De La Rosa J., 2022 - *Chemistry Experiments*, Editura World Book.
6. Kan J., Chen K., 2022 - *Essentials of Food Chemistry*, Editura Springer Verlag, Singapore.
7. Mccullough A., 2022 - *Environmental Chemistry: An Analytical Approach*, Editura Murphy Moore Publishing.
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9. Trofin Alina, Ungureanu Elena, 2013 - *Aplicații de chimie generală,* Editura Pim, Iaşi.
10. Trofin Alina, Ungureanu Elena, 2015 - *Alfabetul elementelor chimice*, Editura Pim, Iaşi.
11. Ungureanu Elena, Trofin Alina, 2015 - *Fundamentele chimiei fizice şi coloidale*, Editura Pim, Iaşi.
12. Ungureanu Elena, 2017 - *Coloizi în industria alimentară,* Editura Pim, Iaşi.
13. Ungureanu Elena, 2020 - *Chimie coloidală*, Editura StudIS, Iaşi.
14. Ungureanu Elena, Ariton Adina Mirela, 2021 - Chimie - *Curs și Lucrări practice*, Editura StudIS, Iaşi.
15. Ungureanu Elena, 2022 - *Aplicații Practice și Numerice de Chimie Fizică și Coloidală*, Editura Pim, Iaşi.
16. Ungureanu Elena, Fortună Maria Emiliana, 2023 - *Chimie Fizică și Coloidală*, Editura Pim, Iași.
17. Ungureanu Elena, Tofănică B.M., Fortună Maria Emiliana, 2024 - *Chimia Generală prin Experimente și Probleme*, Editura Pim, Iaşi.
18. Ungureanu Elena, 2024 - *Chimie anorganică și analitică*, Editura Ștef, Iași.

**Evaluation**

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| **Evaluation form** | **Evaluation Methods** | **Percentage of the final grade** |
| Exam | Written examination | 60% |
| Appreciation of the activity during the semester | Oral assessment during the semester, verification tests and final laboratory colloquium. | 40% |

**Contact**

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