Course ID: HFH249	**Course name: SELECTED TOPICS OF PHYSICAL CHEMISTRY II**		
Cycle: FIRST	**Year: SECOND**	**Semester: IV**	**ECTS credits: 8**
Course status: MANDATORY		**Total course hours: 120** Lectures: 45 Auditory: 45 Laboratory: 30	

Teaching participants:	**Teachers and associates with expertise in the field to which the subject belongs**
Prerequisite for enrollment:	-
Course aims:	Acquiring knowledge about the structure, properties and spectra of atoms and molecules. Explain phenomena related to electrochemical processes.
Thematic course units:	1. Electronic structure of atoms. Atomic models and classical physics. 2. Bor's theory of atoms. Hydrogen atom and hydrogen-like ions. Multielectron atoms. 3. Electronic configuration of atoms. Periodic properties of elements. 4. Energy levels and spectra of multielectron atoms. X-ray spectra of atoms. 5. Chemical bond and structure of molecules. Types of chemical bonds. Ionic bond. 6. Covalent bond. Valence bond method. Molecular orbital method. 7. Metal connection. Theories of chemical bonding in complexes. 8. Electrical and magnetic properties of molecules. Intermolecular forces. 9. Molecular spectra. Rotational spectra. Vibrational spectra. Electronic spectra. 10. Raman spectra. Fluorescent and phosphorescent spectra. Stimulated emission. 11. Photoelectronic spectra. Resonance spectra. 12. Conductivity of electrolytic solutions. Conductometric titrations. 13. Electrochemical cells, thermodynamics of cell operation, electromotive force. 14. Electrodes, electrode potential, pH scale, potentiometric determinations. 15. Electrode polarization, overvoltage, diffusion layer, polarography.
Learning outcomes:	Knowledge: After completion of the course, students will be able to better understand the essence of chemical processes by knowing the modern concept of atomic structure, how to establish chemical bonds and understand the physical and chemical properties of molecules. They will also be able to understand the laws on which electrochemical processes are based, many instrumental methods of analysis, the nature and functioning of chemical current sources, etc.

Skills:

The student will be able to connect the basics of quantum theory with the structure of atoms and molecules, perform measurements in the physico-chemical laboratory independently or as a team, present and process measurement results related to the properties and spectra of atoms and molecules, as well as to connect the basics of electrochemical properties, and how to apply electrochemical laws.

Competences:

Application of acquired knowledge and skills in professional and specialist subjects.

Teaching methodology:

Lectures (oral presentation and interactive classes)
Auditory exercises
Laboratory exercises

Assessment methods and grading system[1]:

Grading criteria			
	Criteria	Maximal score	Required score
1.	Class attendance	0	0
2.	Class activities	15	8
3.	Midterms	2 × 20	2× 11
4.	Final exam	45	25
	Total	100	55

Scores and grading		
Score	Grade (BiH)	Grade (ECTS)
< 55	5	F, FX
55–64	6	E
65–74	7	D
75–84	8	C
85–94	9	B
95–100	10	A

Literature[2]:

Mandatory literature:

1. Sabina Gojak, *Zbirka zadataka iz fizikalne hemije (struktura materije)*, Prirodno-matematički fakultet, Sarajevo, 2012.
2. M. Cacan, F. Korać, Zbirka zadataka iz fizikalne hemije, Sarajevo, 2005

Supplementary literature:

1. D. Minić, A. Antić-Jovanović, Fizička hemija, Fakultet za fizičku hemiju, Biološki fakultet, Beograd, 2005
2. Dragica Minić, Ankica Antić-Jovanović, *Fizička hemija*, Fakultet za fizičku hemiju i Biološki fakultet Univerziteta u Beogradu, Beograd, 2005.

[1] The grading structure for each subject is determined by the Council of the organizational unit before the beginning of the academic year in which the subject is taught as per Article 64, paragraph 6 of the Law on Higher Education of Sarajevo Canton

[2] The Senate of the higher education institution, as an institution, or the Council of the organizational unit of the higher education institution, as a public institution, determines by a special decision, which is published on its website before the beginning of the academic year obligatory, mandatory and recommended textbooks and manuals, as well as other recommended literature based on which exams are prepared and taken as per Article 56, paragraph 3 of the Law on Higher Education of the Sarajevo Canton