	UNIVERSITY OF EAST SARAJEVO Faculty of Technology Zvornik	
	Study programme: *Chemical Engineering and Technology*	
	Cycle I / Year II	

Course title	**Physical Chemistry 1**
Department	Department for Physical Chemistry, Electrochemical engineering and materials– Faculty of Technology Zvornik

Course code	**Course status**	**Semester**	**ECTS**
04-1-020-4	Compulsory	IV	7

Teacher	Dragan Tošković, PhD, full professor
Teaching assistant	Danijela Rajić, MSc, senior assistant

Number of classes/ teaching workload (per week)			**Individual student workload (in hours per semester)**			**Student workload coefficient S_o**
Lectures	**Auditory exercises**	**Laboratory exercises**	**Lectures**	**Auditory exercises**	**Laboratory exercises**	**S_o**
3	1	2	45	15	30	1.33
3*15+1*15+2*15=90 hours			(3*15*1.33+1*15*1.33+2*15*1.33)=120 hours			
Total course workload 90 + 120=210hours per semester						

Learning outcomes	After finishing the course, students will be able to: 1. find and use the literature data needed to determine the physical and chemical properties of the components present in the process; 2. determine the spontaneity of the process based on the process parameters; 3. apply the laws of thermodynamics to industrial systems; 4. calculate the change in the colligative properties of compounds and, based on that, determine in which area a system is stable; 5. on the basis of known parameters, construct vapor pressure-composition or temperature-composition diagrams for different systems and study the changes that occur; 6. on the basis of experimental and theoretical data, determine the type of adsorption and construct equations of adsorption isotherms as well as a graphical representation of the solution.
Prerequisites	
Teaching methods	Lectures, auditory and laboratory exercises, mid-term tests (colloquia).
Syllabus outline per week	1. Introduction to physical chemistry. The role of physical-chemical methods in scientific research and industry. 2. Structure of material particles. Molecular spectra-microwaves. 3. Infrared and ultraviolet visible region. 4. Raman spectra, states of material systems. 5. Chemical energetics, laws of thermodynamics. 6. Energy changes in physical processes. 7. Energy changes in chemical reactions. 8. Criterion of spontaneity of equilibrium in physical-chemical processes. 9. Entropy. Helmholtz and Gibbs energy. 10. Chemical potential. Partial molar quantities, dependence of chemical potential on pressure and temperature. 11. Thermodynamics of chemical equilibrium. 12. Phase equilibria, Gibbs law of phases. Phase equilibrium of a pure substance. 13. Binary systems, Ternary systems. 14. Adsorption isotherms. Thermodynamics of adsorption processes. 15. Adsorption on the surface of the solid phase. Mid-term tests are taken after the 8th week and the 15th week. Semester verification is required after the 15th week.

Obligatory reading			
Author	**Title, publisher**	**Year**	**Pages**

Tošković, D.	Physical Chemistry, Faculty of Technology Zvornik	1999	1-208

Additional reading			
Author	**Title, publisher**	**Year**	**Pages**
Holclajtner-Antrunović, I.	General course of Physical Chemistry	2012	1-157
Đorđević, S., Dražić, V.	Physical Chemistry, Faculty of Technology and metalurgy Belgrade	2002	1-370
Atkins, P.W., De Paula, J.	Physical Chemistry,9th Edition, W.H. Freeman &Co., New York	2002	1-300
Tošković, D., Aleksić, V.	Collection of exercises in Physical Chemistry, Faculty of Technology Zvornik	2002	1-202
Tošković, D., Vasiljević, Lj., Lazić, D.	Experimental Physical Chemistry, Faculty of Technology Zvornik	2005	1-98

	Type of student evaluation	**Grade points**	**Percentage**
Obligations, assessment methods and grading system	Pre-exam obligations		
	Attendance	6	6%
	Mid-term test (colloquium) I tasks	10	10 %
	Mid-term test (colloquium) I theory	17	17 %
	Mid-term test (colloquium) II tasks	10	10 %
	Mid-term test (colloquium) II theory	17	17%
	Laboratory exercises	10	10%
	Final examination		
	Final examination (oral)	30	30 %
	Total	100	100 %
Webpage	www.tfzv.ues.rs.ba		
Date	2023		