

## COURSE DESCRIPTION

<b>Academic year:</b> 2022/2023	
<b>University:</b> Comenius University Bratislava	
<b>Faculty:</b> Faculty of Pharmacy	
<b>Course ID:</b> FaF.KFChL/22-Mgr/22	<b>Course title:</b> Physical Chemistry
<b>Educational activities:</b> <b>Type of activities:</b> lecture / laboratory practicals <b>Number of hours:</b> <b>per week:</b> 2 / 3 <b>per level/semester:</b> 28 / 42 <b>Form of the course:</b> on-site learning	
<b>Number of credits:</b> 6	
<b>Recommended semester:</b> 2.	
<b>Educational level:</b> I.II.	
<b>Prerequisites:</b>	
<b>Course requirements:</b> Laboratory practicals: An accomplishment of all experiments assigned by the teacher and completed by experimental reports is compulsory. Reports are evaluated (0 – 4 points/report). The student's preparation for the assigned experiment is monitored by short tests (0 – 6 points/test). Final evaluation of laboratories (10 points maximum) is assessed as a sum of both averages, from reports and tests. Five point score is the minimum for successful completion of laboratories. Final exam is by written form and is worth maximally 60 points, including the points gained from laboratories. Grade expressed by percentage: A 92-100%, B 84-91%, C 76-83%, D 68-75%, E 60-67%, Fx < 59% Scale of assessment (preliminary/final): 10/50	
<b>Learning outcomes:</b> The course is addressed to selected areas of physical chemistry to achieve the necessary theoretical background for professional qualifications of pharmacists and their competences according to European pharmacopoeia. The aim of the course is to provide understanding of theoretical principles and methods applied in specialized pharmaceutical areas like: -technology of preparation of pharmaceuticals, drug formulae optimization and quality control -analysis and control of drugs, pharmaceuticals, radiopharmaceuticals, and excipients -action of drugs on the molecular level, drug absorption, transport through biological membranes, its distribution in living body, pharmaco-dynamics and pharmaco-kinetics. Students will acquire necessary skills for proper experimental work in the laboratory. Emphasis is put on elaboration, evaluation and interpretation of measured data.	
<b>Class syllabus:</b> Introduction to physical chemistry, chapters selected for pharmacists, terminology Structure of matter, atoms and molecules, forces and interactions Stability of elements, nuclear decay, kinetics of nuclear decay Basic principles of molecular spectroscopy (UV-VIS, luminescence, IR, Raman, NMR spectroscopy). Chemical thermodynamics. Gibb's free energy, entropy, spontaneity of processes. Chemical potential, activity. Phase equilibria, Gibb's phase rule, phase diagrams. Mono-, di- and multi-compounds systems.	

Solutions. Ideal and real solutions. Osmotic pressure, isotonic solutions. Condensed systems, eutectic mixtures in pharmacy  
 Chemical equilibria, standard thermodynamic functions  
 Electrochemistry. Strong and weak electrolytes, solubility product constant. Acid-base equilibria.  
 Chemical kinetics. Simple and complex reactions. Catalysis. Enzymatic catalysis.  
 Colloidal systems. Surfactants. Sedimentation and diffusion. Membranes and related phenomena.  
 Donnan's equilibria.  
 The lectures from physical chemistry are completed by practical exercises, where the students verify their theoretical knowledge in practice. We put the accent on acquiring the basic knowledge necessary for professional qualifications of pharmacists and their competences according to European pharmacopoeia and additional subjects, mainly pharmaceutical technology.

**Recommended literature:**

Oremusová J., Greksáková O.: Fyzikálna chémia, Zbierka úloh pre študentov farmácie, 1.vyd. Bratislava UK, 2019  
 Kopecký F.: Fyzikálna chémia pre farmaceutov I. : štruktúra a vlastnosti atómov a molekúl. 3. vyd. Bratislava: UK, 2000 (skriptá).  
 Oremusová J., Greksáková O.: Fyzikálna chémia: Laboratórne cvičenia pre farmaceutov, 2010, Univerzita Komenského Bratislava (skriptá)  
 Kopecký, F. a kol.: Praktické a výpočtové cvičenia z fyzikálnej chémie. Bratislava : UK, 1989 (skriptá).  
 Atkins, P. W.: Fyzikálna chémia : časť 1, 2a, 2b, 3. 6.vyd.. Bratislava : STU 1999.  
 Lázníčková A., Kubíček V.: Základy fyzikální chemie. Vybrané kapitoly pro posluchače Farmaceutické fakulty. Praha: Karolinum, 2014, ISBN 978-80-246-2791-5  
 Reguli J.: Fyzikálna chémia pre bakalárske štúdium. VEDA, 2015

**Languages necessary to complete the course:**

Slovak

**Notes:**

**Past grade distribution**

Total number of evaluated students: 0

A	ABS	B	C	D	E	FX	N/a
0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

**Lecturers:** prof. RNDr. Daniela Uhríková, CSc., RNDr. Alexander Búcsi, PhD., RNDr. Tomáš Fazekaš, PhD., doc. RNDr. Jana Gallová, CSc., Mgr. Lukáš Hubčík, PhD., doc. Mgr. Marcela Chovancová, PhD., Mgr. Mária Klacsová, PhD., Ing. Jarmila Oremusová, CSc., Mgr. Katarína Želinská, PhD.

**Last change:** 04.04.2022

**Approved by:** prof. RNDr. Daniela Uhríková, CSc.