



Pharmacy - Integrated academic studies

SECOND YEAR- Semester IV

2023/24 School Year

FUNDAMENTALS OF PHYSICAL CHEMISTRY

Name of the course:

FUNDAMENTALS OF PHYSICAL CHEMISTRY

ECTS credits - 5; No. of hours active teaching per week: 5 (Lectures-2, Practice-2, Seminar-1)

Teachers and instructors:

PB	Name and surname	E-mail address	Academic rank
1.	Miroslav Sovrlić	sofke-ph@hotmail.com	Assistant professor
3.	Jovica Tomović	jovicatomic2011@gmail.com	Assistant professor
4.	Aleksandar Kočovič	salekkg91@gmail.com	Assistant

Course structure:

Course contents	Weeks	Lectures	Practice	Seminar	Course Coordinator
General characteristics of gases, liquids, solids and solutions; Chemical thermodynamics and kinetics; Adsorption and catalysis; Electrochemistry and Photochemistry; Molecular spectroscopy; Physicochemical properties of a drug molecule	15	2	2	2	Asst. Prof. Miroslav Sovrlić

Students' knowledge assessment:

Students' knowledge assessment goes on during the whole semester and it includes points gained for attending lectures, completing practice work, term paper and progress tests as well as for the final written exam. The points can be gained according to the following model:

Points	
Pre-exam requirements	65 points
Attendance	5 points
Taking progress tests	30
Writing a term paper	15 points
Doing practice work	15 points
Exam requirements	35 points
Written examination	35 points

In order to pass the exam, the student must achieve more than 50 percent of the points in all forms of teaching.

Grades:

The student gains a final grade which describes the quality of his knowledge and the results achieved in the course. The interrelation between points and final grades are given in the following table:

Num. achieved points	Num. grade	Definition
0 – 50	5	UNSATISFACTORY
51 – 60	6	PASS
61 – 70	7	SATISFACTORY
71 – 80	8	GOOD
81 – 90	9	VERY GOOD
91 – 100	10	EXCELLENT

LITERATURE:

Textbook	Authors	Publisher	Availability in the library
Physical Chemistry 11 th Edition	Peter Atkins, Julio de Paula, James Keeler	Oxford University Press, 2018	YES
Student Solutions Manual to Accompany Atkins' Physical Chemistry 11th Edition	Peter Bolgar, Haydn Lloyd, Aimee North, Vladimiras Oleinikovas, Stephanie Smith, James Keeler	Oxford University Press, 2018	NO (available online for registered adopters of the book)

All lectures (powerpoint presentations) are available on the website of the Faculty of Medical science: www.medf.kg.ac.rs

PROGRAM

UNIT I (FIRST WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
Introduction to physical chemistry: Concepts and applications.	Fundamental constants in physical chemistry	Interactive discussion on the main topics of the lecture. Assignment of the topic of the term paper.

UNIT II (SECOND WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
Behaviour of gases	Numerical problems	Interactive discussion on the main topics of the lecture.

UNIT III (THIRD WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
General characteristics of liquids	Method and apparatus for measurement of fluid properties	Interactive discussion on the main topics of the lecture.

UNIT IV (FOURTH WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
The properties of solutions. Phase diagrams.	Colligative properties of solutions: problems and solutions	Interactive discussion on the main topics of the lecture.

UNIT V (FIFTH WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
Chemical thermodynamics: entropy, free energy and equilibrium	Thermodynamics practice problems	Interactive discussion on the main topics of the lecture.

UNIT VI (SIXTH WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
Chemical kinetics	Chemical kinetics practice problems	Interactive discussion on the main topics of the lecture.

UNIT VII (SEVENTH WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
Adsorption and catalysis	Experimental techniques for studying adsorption	Interactive discussion on the main topics of the lecture.

UNIT VIII (EIGHT WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
Fundamental concepts of electrochemistry	Electrochemical measurement methods	Interactive discussion on the main topics of the lecture.

UNIT IX (NINTH WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
Molecular orbital theory and molecular symmetry	Application of symmetry	Interactive discussion on the main topics of the lecture.

UNIT X (TENTH WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
Photochemistry. Fluorescence and phosphorescence.	Instruments for measuring fluorescence and phosphorescence	Interactive discussion on the main topics of the lecture.

UNIT XI (ELEVENTH WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
General features of molecular spectroscopy. Rotational and vibrational spectroscopy.	Electronic spectra	Interactive discussion on the main topics of the lecture.

UNIT XII (TWELFTH WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
Magnetic resonance	Features of NMR spectra	Interactive discussion on the main topics of the lecture.

UNIT XIII (THIRTEENTH WEEK):

Lectures (2 classes)	Practice (2 classes)	Seminar (1 class)
Solid state (crystalline state)	Crystal structure analysis	Interactive discussion on the main topics of the lecture.

UNIT XIV (FOURTEENTH WEEK):

Lectures (2 classes)

The relationship between the physicochemical properties of a drug molecule and biological activity

Practice (2 classes)

Methods for determination of physicochemical properties of drug molecules and relationships with biological activities

Seminar (1 class)

Presentation and defense of the term paper.

UNIT XV (FIFTEENTH WEEK):

Lectures (2 classes)

Recapitulation

Practice (2 classes)

Recapitulation

Seminar (1 class)

Recapitulation

SCHEDULE OF LECTURES



SCHEDULE OF PRACTICE



LESSON SCHEDULE FOR THE COURSE FUNDAMENTALS OF PHYSICAL CHEMISTRY

week	date	time	Location	form	course unit title	teacher
1				L	Introduction to physical chemistry: Concepts and applications.	Asst. Prof. Miroslav Sovrlić
				P	Fundamental constants in physical chemistry	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Interactive discussion on the main topics of the lecture. Assignment of the topic of the term paper.	Asst. Prof. Miroslav Sovrlić
2				L	Behaviour of gases	Asst. Prof. Miroslav Sovrlić
				P	Numerical problems	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Interactive discussion on the main topics of the lecture.	Asst. Prof. Miroslav Sovrlić
3				L	General characteristics of liquids	Asst. Prof. Miroslav Sovrlić
				P	Method and apparatus for measurement of fluid properties	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Interactive discussion on the main topics of the lecture.	Asst. Prof. Miroslav Sovrlić
4				L	The properties of solutions. Phase diagrams.	Asst. Prof. Jovica Tomović

LESSON SCHEDULE FOR THE COURSE FUNDAMENTALS OF PHYSICAL CHEMISTRY

week	date	time	Location	form	course unit title	teacher
				P	Colligative properties of solutions: problems and solutions	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Interactive discussion on the main topics of the lecture.	Asst. Prof. Jovica Tomović
5				L	Chemical thermodynamics: entropy, free energy and equilibrium	Asst. Prof. Miroslav Sovrlić
				P	Thermodynamics practice problems	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Interactive discussion on the main topics of the lecture.	Asst. Prof. Miroslav Sovrlić
6				L	Chemical kinetics	Asst. Prof. Miroslav Sovrlić
				P	Chemical kinetics practice problems	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Interactive discussion on the main topics of the lecture.	Asst. Prof. Miroslav Sovrlić
7				L	Adsorption and catalysis	Asst. Prof. Miroslav Sovrlić

LESSON SCHEDULE FOR THE COURSE FUNDAMENTALS OF PHYSICAL CHEMISTRY

week	date	time	Location	form	course unit title	teacher
				P	Experimental techniques for studying adsorption	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Interactive discussion on the main topics of the lecture.	Asst. Prof. Miroslav Sovrlić
				T	PROGRESS TEST 1	
8				L	Fundamental concepts of electrochemistry	Asst. Prof. Jovica Tomović
				P	Electrochemical measurement methods	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Interactive discussion on the main topics of the lecture.	Asst. Prof. Jovica Tomović
9				L	Molecular orbital theory and molecular symmetry.	Asst. Prof. Miroslav Sovrlić
				P	Application of symmetry	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović

LESSON SCHEDULE FOR THE COURSE FUNDAMENTALS OF PHYSICAL CHEMISTRY

week	date	time	Location	form	course unit title	teacher
				S	Interactive discussion on the main topics of the lecture.	Asst. Prof. Miroslav Sovrlić
10				L	Photochemistry. Fluorescence and phosphorescence.	Asst. Prof. Miroslav Sovrlić
				P	Instruments for measuring fluorescence and phosphorescence	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Interactive discussion on the main topics of the lecture.	Asst. Prof. Miroslav Sovrlić
11				L	General features of molecular spectroscopy. Rotational and vibrational spectroscopy.	Asst. Prof. Miroslav Sovrlić
				P	Electronic spectra	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Interactive discussion on the main topics of the lecture.	Asst. Prof. Miroslav Sovrlić
12				L	Magnetic resonance	Asst. Prof. Jovica Tomović

LESSON SCHEDULE FOR THE COURSE FUNDAMENTALS OF PHYSICAL CHEMISTRY

week	date	time	Location	form	course unit title	teacher
				P	Features of NMR spectra	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Interactive discussion on the main topics of the lecture.	Asst. Prof. Jovica Tomović
13				L	Solid State (crystalline state)	Asst. Prof. Miroslav Sovrlić
				P	Crystal structure analysis	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Interactive discussion on the main topics of the lecture.	Asst. Prof. Miroslav Sovrlić
14				L	The relationship between the physicochemical properties of a drug molecule and biological activity	Asst. Prof. Miroslav Sovrlić
				P	Methods for determination of physicochemical properties of drug molecules and relationships with biological activities	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				S	Presentation and defense of the term paper.	Asst. Prof. Miroslav Sovrlić

LESSON SCHEDULE FOR THE COURSE FUNDAMENTALS OF PHYSICAL CHEMISTRY

week	date	time	Location	form	course unit title	teacher
15				L	Recapitulation	Asst. Prof. Miroslav Sovrlić Asst. Prof. Jovica Tomović Asst. Aleksandar Kočović
				P		
				S		
				T	PROGRESS TEST 2	
				E	EXAM (June deadline)	