ANALYTICAL CHEMISTRY	
GENERAL INFORMATIONS	
Course coordinator	Asst. Prof. Barbara Viljetić, MedBiol et Chem, PhD
Assistant/Associate	Assoc. prof. Stana Tokić, MBiolMol, PhD Asst. Prof. Marijana Leventić, MBiol, PhD Asst. Prof. Katarina Mišković Špoljarić, MEngProc, PhD Asst. Prof.Teuta Opačak-Bernardi, MBiolMol, PhD
Study Programme	Undergraduate University Study of Medical Laboratory Diagnostics
Status of the course	mandatory
Year of study, semester	1st year, 2nd semester
ECTS	**3**
Workload (hours)	Lectures: 20; Seminars: 10; Exercises: 15
Expected number of students	30-35
COURSE DESCRIPTION	
Course objectives	
Acquiring knowledge about the basic principles and techniques of modern analytical chemistry and their application in laboratory analyses, including an understanding of the analytical process, experimental measurements, and basic statistical methods for determining and reporting experimental errors.	
Enrolment requirements and entry competencies	
General and organic chemistry optional subject	
Learning outcomes at the Programme level	
1.1, 2.1, 2.2, 2.7	
Learning outcomes at the course level	
After completing lectures, seminars and exercises, independent study and passing the exam, students will be able to: 1. explain all the steps of the complete analytical method. 2. evaluate the obtained data and the quality of measurements in chemical determinations using basic statistical methods; 3. compare qualitative and quantitative analytical methods; 4. draw conclusions about the basic concepts of chemical equilibrium, including the concept of activity and the behavior of solutions; 5. apply acquired theoretical knowledge to solve computational chemistry problems; 6. independently perform qualitative and quantitative chemical analyzes by preparing standard solutions and samples and applying chemical methods (weighing, pipetting, qualitative analysis, titration methods, chromatographic methods).	
Course content	
Lectures: Introduction to analytical chemistry, classification of analytical methods. Qualitative chemical analysis. Preparation and analysis of real samples. Errors in chemical analysis and statistical data processing. Activity and activity coefficient, ionic strength of solution. Chemical equilibria. Acid-base equilibria and neutralization titrations in aqueous and non-aqueous media. Equilibria in the formation of complexes and complexometric titrations. Oxidation-reduction equilibria and redox titrations. Spectrochemical analysis and analytical separation. Gravimetric methods of analysis. Separation techniques. Chromatography. **Seminars**: Activity, activity coefficient and ionic strength. Statistical data processing. Neutralization titrations, calculations based on experimental data. Complexometric titrations,	

determination of pM. Oxidation-reduction titrations, equilibrium constant. Solubility of the precipitate in water. Constant of the solubility product. Calculations in gravimetric analysis. **Exercises**: Calibration of laboratory equipment. Qualitative analysis of cations, anions and salts. Preparation of standard solutions. Quantitative chemical analysis: neutralization titrations, complexometric titrations. Chromatographic methods: gel-filtration and thin-layer chromatography.

Mode of teaching

Lectures, Problem solving seminars, Laboratory exercises

Student obligations

The student is obliged to attend all classes and actively participate in all forms of classes. The student can be absent from 30% of classes per type and must attend all knowledge tests. Successful completion of seminars and exercises requires prior preparation by the student. Exercises: taking entrance exams and writing papers.

Monitoring student work *(Connectivity of learning outcomes, teaching methods and grading)*

Teaching activity	ECTS	Learning outcome	Student activity	Assessment methods	Grade points	
					Min.	Max.
Attending classes	0.3	1-6	Class attendance	Attendance record	1	5
Seminars	0.5	1-5	Active participation	Attendance record	5	15
Exercises	0.5	6	entrance exams, performing exercises, keeping work diary	work diary, entrance exam	5	20
Final exam	1.7	1-6	Studying for the final exam	Written exam	36	60
Total	**3**					**100**

Evaluation of the final written exam:

Percentage of correct answers (%)	Grade points
>95.00	60
90.00-94.99	58
85.00-89.99	54
80.00-84.99	50
75.00-79.99	46
70.00-74.99	42
65.00-69.99	38
60.00-64.99	36

Calculation of final grade:

Grade points earned in the final exam are added to the grade points earned during the course. Grading in the ECTS system is done by absolute distribution, i.e. based on total achievement and is compared to the numerical system in the following manner: A - excellent (5): 80-100 grade points; B - very good (4): 70-79.99 grade points; C - good (3): 60-69.99 grade points; D - sufficient (2): 50-59.99 grade points.

Required reading (available in the library and through other media)		
Title	Number of copies in the library	Availability through other media
Njegomir Radić, Lea Kukoč Modun. Uvod u analitičku kemiju. Školska knjiga, Zagreb 2016.	10	
Manual for exercises in analytical chemistry. Internal script.		Yes. On line
Additional reading		
Daniel C. Harris. Quantitative chemical analysis. W. H. Freeman and Company, New York 2010.		
Course evaluation procedures		
Anonymous, quantitative, standardized student survey on the course and the teacher's work implemented by the Quality improvement office of the Faculty of Medicine Osijek.		