

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	Osnove analizne kemije
Course title:	Fundamentals of Analytical Chemistry

Študijski program in stopnja Study programme and level	Študijska smer Study field	Letnik Academic year	Semester Semester
Ekotehnologije, 2. stopnja Ecotechnologies, 2 nd cycle		1	1,2

Vrsta predmeta / Course type Izbirni / Elective

Univerzitetna koda predmeta / University course code: EKO2-691

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje work	Druge oblike študija	Samost. delo Individ. work	ECTS
15	15			15	105	5

Nosilec predmeta / Lecturer: Prof. dr. Maja Ponikvar-Svet

Jeziki / Languages:	Predavanja / Lectures:	slovenščina, angleščina Slovene, English
	Vaje / Tutorial:	slovenščina, angleščina Slovene, English

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:

Zaključena prva stopnja bolonjskega študija ali univerzitetni študijski program.

Prerequisites:

Completed Bologna first level or university type of undergraduate education.

Cilji:

Glavni cilj predmeta je doseči poznavanje uporabe najbolj pomembnih metod, ki se uporabljajo v analizi kemiji in možnost uporabe za reševanju realnih problemov.

Študent bo ob zaključku sposoben:

- Razlikovati med klasičnimi in instrumentalnimi analiznimi metodami
- Obvladovati principe nekaterih analiznih metod s poudarkom na klasičnih volumetričnih in gravimetričnih metodah
- Obvladovati principe nekaterih elektrokemijskih metod
- Razumeti pristop k obvladovanju naključnih in sistematičnih napak v analizi kemiji
- Razumeti osnovne statistične pojme za obvladovanje naključnih napak pri kemijski analizi

Objectives:

The main objective of the course is to understand the basics and possibilities of using different analytical methods for solving specific environmental problems.

The student will be able to:

- Distinguish between classical and instrumental analytical methods
- Manage the principles of some analytical methods with emphasis on classical volumetric and gravimetric methods
- Manage the principles of some electrochemical methods
- Understand the approach to managing random and systematic errors in analytical chemistry
- Understand basic statistical concepts for managing random errors in chemical analysis

Učni izidi:

Znanje in razumevanje:

- Osnovnih principov klasičnih analiznih metod
- Pregled najbolj pogosto uporabljenih klasičnih analiznih metod
- Razumevanje principov elektrokemijskih metod
- Razumevanje razlik med naključnimi in sistematičnimi napakami v analizi kemiji
- Pregled in uporaba osnovnih statističnih pojmov, ki se uporabljajo pri kemijski analizi

Prenesljive/ključne spretnosti in drugi atributi:

- Uporaba domače in tuje literature
- Pridobivanje sposobnosti razumevanja različnih pristopov k reševanju konkretnega problema
- Vključevanje znanja v gradnjo hipotez za reševanje problemov ciljno k temi raziskovalnega dela

Learning Outcomes:

Knowledge and Understanding:

- Basic principles of classical analytical methods
- An overview of the most commonly used classical analytical methods
- Understanding the principles of electrochemical methods
- Understanding the differences between random and systematic errors in analytical chemistry
- Review and use basic statistical concepts used in chemical analysis

Transferable / Key Skills and other attributes:

- Use of domestic and foreign literature
- Acquiring the ability to understand different approaches to solving a specific problem
- Integrating knowledge into the construction of hypotheses to solve problems targeted at the topic of research work

Vsebina:

Predmet obsega naslednje:

- Definicije, osnove, pomen analizne kemije
- Analizna kemija v času
- Primerjava analiznih metod za določanje glavnih komponent in komponent v sledovih
- Uporaba klasičnih analiznih metod v analizi kemiji
- Pregled instrumentalnih analiznih metod
- Osnovni statistični pojmi v analizi kemiji ter obravnava naključnih in sistematičnih napak
- Stopnje analiznega postopka: načrtovanje, izvedba, vrednotenje in obdelava analiznih rezultatov
- Interpretacija analiznih rezultatov

Content (Syllabus outline):

The course includes the following:

- Definitions, basics, significance of analytical chemistry
- Analytical chemistry in time
- Comparison of analytical methods for determining the main components and trace components
- Use of classical analytical methods in analytical chemistry
- Overview of instrumental analytical methods
- Basic statistical concepts in analytical chemistry and the handling of random and systematic errors
- The stages of the analytical process: design, implementation, evaluation and processing of analytical results
- Interpretation of analytical results

Temeljni literatura in viri / Readings:

- D.A. Skoog, A. Douglas A, Principles of instrumental analysis. Philadelphia: Harcourt Brace & Company (1998) ali kasnejša izdaja (or later edition).
- R. Bock, A Handbook of Decomposition Methods in Analytical Chemistry, Blackie Group, London, 1979.
- J.N. Miller, J.C. Miller, Statistics and Chemometrics for Analytical Chemistry, sixth ed., Harlow, Prentice Hall/Pearson, 2010.

Metode poučevanja in učenja:

<ul style="list-style-type: none"> • Predavanja • Seminar • Laboratorijske vaje
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Learning and teaching methods:

<ul style="list-style-type: none"> • Lectures • Seminar work • Laboratory work

Delež (v %) /

Načini ocenjevanja:

Weight (in %)

Assessment:

<ul style="list-style-type: none"> • Seminar • Ustni izpit 	50 % 50 %	<ul style="list-style-type: none"> • Seminar • Oral exam
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Reference nosilca / Lecturer's references

<ol style="list-style-type: none"> 1. PLOHL, Olivija, KRALJ, Slavko, MAJARON, Boris, FRÖHLICH, Eleonor, PONIKVAR-SVET, Maja, MAKOVEC, Darko, LISJAK, Darja. Amphiphilic coatings for the protection of upconverting nanoparticles against dissolution in aqueous media. Dalton Transactions 46 (2017) 6975-6984. 2. KOBLAR, Alenka, TAVČAR, Gašper, PONIKVAR-SVET, Maja. Stress syndrome response of nettle (<i>Urtica dioica</i> L.) grown in fluoride contaminated substrate to fluoride and fluorine accumulation pattern. J. Fluor. Chem. 172 (2015) 7-12. 3. MICHAŁOWSKI, Tomasz, GARCIA ASUERO, Agustin, PONIKVAR-SVET, Maja, MICHAŁOWSKA-KACZMARCZYK, Anna Maria, WYBRANIEC, Sławomir. Some examples of redox back titrations. The Chemical Educator 19 (2014) 217–222. 4. PONIKVAR-SVET, Maja, THOMAS, Alecia T., DOBSON, Bryan J., HENEGAR, Brittney M., BREWSTER, Mathew W., NEERCHAL, Nagarak K., LIEBMAN, Joel F. Linear model for estimating the entropy of formation of aqueous anions. Struct. Chem. 24 (2013) 2069–2082. 5. KOBLAR, Alenka, TAVČAR, Gašper, PONIKVAR-SVET, Maja. Fluoride in teas of different types and forms and the exposure of humans to fluoride with tea and diet. Food Chem. 130 (2012) 286–290.
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