

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet:	PRAKTIČNI PRISTOPI V ANALIZNI KEMIJI
Course Title:	PRACTICAL APPROACHES IN ANALYTICAL CHEMISTRY

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
UŠP Kemija, 1. stopnja	/	3.	6.
USP Chemistry, 1 st Cycle	/	3 rd	6 th

Vrsta predmeta / Course Type: izbirni strokovni / Elective Professional

Univerzitetna koda predmeta / University Course Code: KESI7

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Work	Druge oblike študija	Samost. delo Individual Work	ECTS
30	15	30 LV	/	/	75	5

Nosilec predmeta / Lecturer: izr. prof. dr. Nataša Gros / Dr. Nataša Gros, Assoc. Professor

Jeziki / Languages:

Predavanja / Lectures:	slovenski / Slovenian
Vaje / Tutorial:	slovenski / Slovenian

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

Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost.	Prerequisites: The course has to be assigned to the student.
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Vsebina:

Koncepti sodobne analizne kemije.
 Stopnje analiznega postopka; pomen in vpliv posameznih stopenj na rezultate kemijskih analiz.
 Jemanje in shranjevanje vzorcev, priprava laboratorijskega vzorca.
 Značilnosti analitike sledov, mikroanaliza značilnosti in zahteve; kontaminacija in slepa vrednost; vplivi slepe vrednosti na analizne parametre; priprava analiznih reagentov.
 Lastnosti sodobnih laboratorijskih materialov, pogoji za analitiko sledov, čiščenje reagentov in laboratorijske posode.
 Suhi, mokri sežig, taline, razkroji pri povišanem tlaku, mikrovalovni razkroj.

Content (Syllabus outline):

Concepts of modern analytical chemistry, steps in analytical procedures and their importance for the accuracy and precision of the results. Sampling, storage of samples, preparation of laboratory samples.
 Trace analysis and micro analysis, problems related with contamination of samples and blank values. The influence of blank values on the parameters of analytical procedure.
 Preparation of analytical reagents for trace analysis and cleaning of glassware for trace analysis.
 Sample decomposition; acid dissolution, decomposition by fluxes, wet and dry ashing procedures, pressurized dissolution of samples,

Pregled metod za za predkoncentriranje in separiranje analitov v kompleksnih vzorcih. Izbira analizne metode (kriteriji in strategije). Pregled metod za določevanje kemijskih zvrsti (speciacija), priprava vzorcev za speciacijsko analitiko. Praktični primeri.

Validacija analiznih metod in postopkov. Sledljivost rezultatov v kemijski analizi; SI sistem, primerljivost in sledljivost meritev, mednarodni in nacionalni merski etaloni, osnovni dokumenti v meroslovju (VIM), referenčni materiali, medlaboratorijsko preskušanje.

Kvaliteta analiznih rezultatov; sistemi kakovosti v analizi kemiji, zagotavljanje kvalitete v analiznem laboratoriju. Model ISO 17025, Model GLP, sistemi akreditacije.

Laboratorijske vaje usmerjajo slušatelje v samostojno delo v analiznem laboratoriju ter mu podajo osnove raziskovalnega dela. Nekatero okvirne teme: jemanje vzorcev, koncentriranje v atomski spektrometriji, mikrovalovni razkroji priprava in analiza kompleksnih vzorcev s tehnikami atomske spektroskopije, priprava vzorcev za kromatografsko analizo, validacija metod,...

microwave assisted decomposition.

Survey of typical separation procedures, their characteristics and importance for analytical chemistry.

Survey of methods for chemical speciation, sample preparation for speciation analysis.

Validation of analytical method.

Traceability in chemical analysis, national and international reference materials, basic documentation in metrology (VIM), proficiency testing. Quality systems and quality assurance in analytical chemistry, ISO 17025 standard, good laboratory practice, accreditation systems.

Practical laboratory training is oriented towards gaining skills for solving typical analytical problems.

Some examples: preconcentration approaches in atomic absorption spectrometry, microwave assisted decomposition of environmental samples and their analysis by AAS, preparation of samples for chromatographic analysis, validation of methods,...

Temeljna literatura in viri / Readings:

Izbrana poglavja iz različnih učbenikov v skupnem obsegu 200 strani (Skoog, , Harris),

- J. P Dux Handbook of Quality assurance for the Analytical Chemistry Lab (Van Nostrand Reinhold),
- Kateman Buydens; Quality Control in Analytical Chemistry (Wiley),
- Dokumenti EURACHEM-a

Selected chapters from fundamental textbooks (Skoog et al, Fundamental of analytical chemistry, Saunders Publishig,; Harris, Analytical Chemistry), J. Dux, Handbook of quality assurance for the analytical Chemistry, Van Nostrand Reinhold, Kateman Buydens, Quality Control in Analytical Chemistry, Wiley and sons, EURACHEM documents.(<http://www.eurachem.org/>)

Cilji in kompetence:

Študenti se pri predmetu seznanijo in usposobijo za reševanje praktičnih analiznih problemov ter nalog v analiznih in kontrolnih laboratorijih, s poudarkom na veščinah in postopkih, ki zagotavljajo kvaliteto analiznih rezultatov.

Objectives and Competences:

Students will acquire knowledge for solving practical analytical problems in analytical or control laboratory with emphasis on skills which enable quality of analytical results.

Predvideni študijski rezultati:Znanje in razumevanje

Študentje naj bi pridobili praktična znanja, ki so potrebna za uspešno delo v analiznih in kontrolnih laboratorijih in so nujna pri odločitvah (kontrola kakovosti!) in so temelj za izvedbo zanesljivih analiz. Prav tako bodo sposobni kritično presoditi zmogljivosti nekaterih analiznih metod, primerjati klasične in instrumentalne pristope v analitiki ter ustrezno obravnavati rezultate kemijskih analiz.

Uporaba

Dobljena znanja bodo omogočila uspešno delo v analizni praksi.

Refleksija

Spozna prednosti in slabosti različnih analiznih postopkov ter pridobi kritični odnos eksperimentalnega dela, ki omogoča ustrezno interpretacijo analiznih rezultatov.

Prenosljive spretnosti

Pri predmetu bo študent pridobil laboratorijske spretnosti za izvedbo zahtevnih analiznih postopkov, eksperimentalne podatke bo znal ustrezno obdelati, primerno interpretirati ter jih kvalitetno pisno podajati.

Intended Learning Outcomes:Knowledge and Comprehension

Students will gain practical knowledge necessary for work in analytical laboratories and are important for different decisions (quality control) are basis for the performance of reliable analysis. In addition they will be able for critical evaluation of different analytical procedures and to compare classical and instrumental approaches in analytical practice and to evaluate analytical results.

Application

The obtained knowledge will enable successful work in analytical laboratory.

Analysis

Student will be informed on advantages and disadvantages of different analytical procedures and will be able for critical approach important for selection of proper analytical procedure for selected problems. And will be able for the relevant interpretation of analytical results.

Skill-transference Ability

Students will gain practical skills to perform complex analytical procedures, they will be able to process and present analytical data.

Metode poučevanja in učenja:

Predavanja, seminarji, eksperimentalno delo. Projektno in problemsko usmerjeno delo.

Learning and Teaching Methods:

Lectures, experimental work, problem oriented project work.

Delež (v %) /

Weight (in %) **Assessment:****Načini ocenjevanja:**

Poročila o laboratorijskem delu	40	Reports on laboratory work
Pisni izpit	60	Written exam

Reference nosilca / Lecturer's references:

-GROS, Nataša. Microdiffusion-based UV-LED spectrometric setup for determining low levels of ethanol in fruit juice. Talanta, ISSN 0039-9140. [Print ed.], 2011, vol. 87, no. 1, str. 174-179.

-GROS, Nataša, CAMÕES, Maria Filomena, SILVA, Ricardo J. N. Bettencourt da. Detailed

uncertainty budget for major and minor ions in stock combined calibration standards : influence of impurities in chemicals. *Analytica chimica acta*, ISSN 0003-2670. [Print ed.], 2010, vol. 659, no. 1/2, str. 85-92.

-GROS, Nataša, NEMARNIK, Andrej. Accurately determining hydrogen carbonate in water in the presence of or simultaneously with the anions of carboxylic acids. *Acta chimica slovenica*, ISSN 1318-0207. [Tiskana izd.], 2007, vol. 54, no. 1, str. 210-215.

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