

## UČNI NAČRT PREDMETA / COURSE SYLLABUS

<b>Predmet:</b>	PRISTOPI V SODOBNI ANALIZNI KEMIJI
<b>Course Title:</b>	APPROACHES IN MODERN ANALYTICAL CHEMISTRY

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
DR Kemijske znanosti, 3. stopnja	/	1.	1. in 2.
Doctoral programme in Chemical Sciences, 3 <sup>rd</sup> Cycle	/	1 <sup>st</sup>	1 <sup>st</sup> and 2 <sup>nd</sup>

Vrsta predmeta / Course Type: izbirni/Elective

Univerzitetna koda predmeta / University Course Code: KZ305

Predavanja Lectures	Seminar Seminar	Vaje Tutorial	Klinične vaje Work	Druge oblike študija	Samost. delo Individual Work	ECTS
30	45	/	/	/	75	5

Nosilec predmeta / Lecturer: prof. dr. Matevž Pompe /Dr. Matevž Pompe, Full 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.

**Vsebina:**

Študent s soglasjem mentorja med spodaj navedenimi temami izbere tiste, ki so najtesneje povezane z njegovim raziskovalnim delom. Nosilec predmeta in vodja študija poskrbita, da obseg študentovega dela ustreza 5 KT. Če je nosilec več, izvajanje koordinira nosilec.

- Napredne kemometrične metode v analizni kemiji.
- Specijska analitika; načini priprave vzorca in izbira primerne analize tehnike.
- Miniaturizacija v analizni kemiji: koncept laboratorija na čipu, celoviti mikroanalizni sistemi (mTAS), izdelovalne tehnike za mTAS in integracijo detekcije v mikropretočne sisteme,

**Content (Syllabus outline):**

From the topics listed below the student selects (in agreement with the supervisor) those that are mostly related to his research work. The course coordinator, who is in charge of the course, and the leader of the study take care that the student's workload corresponds to 5 credits. If more persons are taking the study programme, the whole process is coordinated by course coordinator.

- Sophisticated chemometric methods in analytical chemistry.
- Speciation in chemical analysis, sample preparation and selection of a proper detection technique.
- Miniaturisation in analytical chemistry: lab-on-

makro – mikro vmesniki za mikropretočne sisteme.

- Uporaba sodobnih analiznih tehnik za ugotavljanje pretvorbe in vezave antropogenih onesnaževal.
- Analizni problemi v atmosferski kemiji; karakterizacija aerosolov in modeliranje.
- Reševanje analiznih problemov v kontroli prehrabnih produktov; separacija in karakterizacija sestavin živil.
- Reševanje analiznih problemov v biomedicinskih in bioloških vedah, zaščiti okolja, varovanju kulturne dediščine in industriji.

a-chip concept, micro total analytical system (mTAS), micromachining techniques for mTAS and integration of detection into microfluidics devices, macro-to-micro interfaces for microfluidics devices.

- Analytical methods in food control; separation and characterization of food constituents.
- Approaches in studying transformation and binding of anthropogenic pollutants in environment.
- Analytical problems in atmospheric chemistry, characterization of aerosols and modelling.
- Importance of modern analytical methods in biomedicine, biology, environmental protection, protection of cultural heritage and industry.

#### **Temeljna literatura in viri / Readings:**

Izbrani pregledni članki iz znanstvene literature. / Selected review papers in relevant literature.

#### **Cilji in kompetence:**

Študenti nadgradijo znanja s področju analize kemije, ki so jih pridobili na magistrskem študiju. Kompetence s področja poznavanja novih analiznih tehnik in analiznih pristopov razvijejo do ravni, ki jo terja raziskovalno delo in reševanje kompleksnih strokovnih problemov v praksi. Študentje spoznajo možnosti uporabe numeričnih metod v analizni kemiji.

#### **Objectives and Competences:**

Students extend knowledge of analytical chemistry which they have acquired at the master's level and raise their knowledge and skills to the level required for academic research and solving complex professional problems in industry. They develop abilities for proper selection of analytical methods and for solving demanding research or technological problems. Students will enhance their knowledge of the application of numerical methods and modelling in analytical chemistry.

#### **Predvideni študijski rezultati:**

##### Znanje in razumevanje

Študentje pridobi poglobljena teoretska in praktična znanja, ki so potrebna za zahtevnejše raziskovalno delo na področju razvoja novih analiznih postopkov in študijam v okolju. Sposobni bodo organizirati in voditi delo tako v industrijskih kot akademskih raziskovalnih laboratorijih.

##### Uporaba

Študent pridobi poglobljena znanja s področja njegovega doktorskega dela na področju

#### **Intended Learning Outcomes:**

##### Knowledge and Comprehension

Students will acquire enhanced theoretical knowledge and practical skills necessary for sophisticated research in the environment and related with the development of new analytical procedures. They will be capable of organizing and supervising research in the industrial as well as academic research laboratories.

##### Application

Student acquires specialized knowledge related to his doctoral research in the area of analysis

analize materialov in vzorcev iz okolja in bioloških snovi.	of materials and environmental and biological samples.
<u>Refleksija</u> Študent mora biti sposoben pridobljeno znanje uporabiti za reševanje kompleksnih analiznih problemov na svojem raziskovalnem področju.	<u>Analysis</u> Student must be capable to use the acquired knowledge for solving complex analytical problems on his research field.
<u>Prenosljive spretnosti</u> Osvoji metodologijo problemsko orientiranih raziskav. Sposoben mora biti organizirati in voditi take raziskave.	<u>Skill-transference Ability</u> Students master the methodology of problem-oriented research. They must be able to organize and supervise such research work.

**Metode poučevanja in učenja:**

Tematska uvodna predavanja nadgrajena s primeri iz znanstvene literature, individualno delo s konzultacijami, seminarsko delo.

**Learning and Teaching Methods:**

Thematic introductory lectures upgraded with case studies based on scientific literature, individual work, and seminars.

Delež (v %) /

**Načini ocenjevanja:**

Weight (in %) **Assessment:**

Pisni pregledni test	50 %	Written test
Priprava pisne seminarske naloge in njen zagovor	50 %	Preparation of written seminar with presentation

**Reference nosilca / Lecturer's references:**

TOMPA, Gorazd, SUSIČ, Robert, ROGELJ, Irena, POMPE, Matevž. Cryotrap/SPME/GC/MS method for profiling of monoterpenes in cheese and their clustering according to geographic origin. *Acta chimica slovenica*, ISSN 1318-0207. [Tiskana izd.], 2013, vol. 60, no. 3, str. 595-603.

ARH, Gregor, KLASINC, Leo, VEBER, Marjan, POMPE, Matevž. Calibration of mass selective detector in non-target analysis of volatile organic compounds in the air. *Journal of chromatography. A*, ISSN 0021-9673, 2011, vol. 1218, issue 11, str. 1538-1543.

CERAR, Janez, POMPE, Matevž, GUČEK, Marjan, CERKOVNIK, Janez, ŠKERJANC, Jože. Analysis of sample of highly water-soluble T<sub>[sub]</sub>-symmetric fullerenehexamalononic acid C<sub>[sub](66)</sub>(COOH)<sub>[sub](12)</sub> by ion-chromatography and capillary electrophoresis. *Journal of chromatography. A*, ISSN 0021-9673, 2007, vol. 1169, no. 1/2, str. 86-94.