ZAGOTAVLJANJE KAKOVOSTI V ANALIZNEM LABORATORIJU

UČNI NAČRT PREDMETA/COURSE SYLLABUS

Predmet:	Zagotavljanje kakovosti v analiznem laboratoriju
Course title:	Quality Assurance in Analytical Laboratory
Članica nosilka/UL Member:	UL FKKT

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Kemijska tehnologija, prva stopnja, visokošolski strokovni	Ni členitve (študijski program)	2. letnik, 3. letnik		izbirni

Univerzitetna koda predmeta/University course code:	0072057
Koda učne enote na članici/UL Member course code:	KTSI31

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
45	15	15 LV			75	5

Nosilec predmeta/Lecturer:	izr. prof. dr. Drago Kočar
Vrsta predmeta/Course type:	izbirni strokovni/Elective Professional

Jeziki/Languages:	Predavanja/Lectures:	Slovenščina
	Vaje/Tutorial:	Slovenščina

Pogoji za vključitev v delo oz. za opravljanje študijskih obveznosti:	Prerequisites:
Študent oz. kandidat mora imeti predmet opredeljen kot študijsko obveznost.	The course has to be assigned to the student.

Vsebina:	Content (Syllabus outline):
- Potreba po zanesljivih rezultatih (utemeljitev, družbeno-ekonomski učinek, zahteve naročnika, namen analize) - Temeljna načela zagotavljanja in nadzora kakovosti (QA/QC, različni standardi in njihove značilnosti, najboljše prakse) - Odvzem vzorca (definicija vzorčenja, vrste vzorcev, načrt vzorčenja, število vzorcev in velikost vzorca, obravnava vzorca in shranjevanje) - Priprava za analizo (izbira metode, viri metod, dejavniki presoje in izbire metod, vzroki za nepravilne analizne rezultate, validacija metode) - Meritev (dobra laboratorijska praksa, kalibracija meritve, doseganje metrološke sledljivosti, nadzor kakovosti, okolje, oprema in pribor, kemikalije in potrošnji material, vzdrževanje in kalibracija opreme)	- The need for reliable results (justification, social and economic impact, customers' requirements, purpose of analysis) - General principles of quality assurance and quality control (QA/QC, different standards and their main features, best practices) - Sampling (sampling defined, types of samples, sampling plan, numbers and sample size, sample handling and storage) - Preparation for analysis (selecting the method, sources of methods, factors to consider when selecting a method, reasons for incorrect analytical results, method validation) - Making measurement (good laboratory practice, calibration of measurement, achieving metrological traceability, quality control, environment, equipment

- Vrednotenje rezultatov (uporabljana statistika, nadzorni grafi, merilna negotovost) - Medlaboratorijske primerjave (sheme, organizacija, uporabljana statistika, pomen, sodelovalne študije) - Dokumentacija in upravljanje z njo (dokumentacija, mnenja in interpretacije) - Upravljanje s kakovostjo (sistem upravljanja, standardi za laboratorije, priročniki kakovosti in druga dokumentacija, nadzor, poročila upravljanja, odgovornost laboratorijskega osebja za kakovost)	and glassware, chemicals and consumables, maintenance and calibration of equipment) - Data treatment (statistics, control charts, measurement uncertainty) - Proficiency testing schemes (organisation, statistics, making the most of participation in proficiency testing schemes, collaborative studies) - Documentation and its management (documentation, opinions and interpretations) - Managing quality (managing system, standards available for laboratories, quality manuals and other documentation, audits, management reviews, responsibility of laboratory staff for quality)

Temeljna literatura in viri/Readings:

- E. Prichard, V. Barwick, Quality Assurance in Analytical Chemistry, Wiley, 2007, 316 pages.

Cilji in kompetence:	**Objectives and competences:**
Cilj predmeta je, da se študent usposobi za delovanje v analiznem laboratoriju, ki je skladno z načeli zagotavljanja kakovosti in vodi do veljavnih analiznih rezultatov. PREDMETNO SPECIFIČNE KOMPETENCE -Študent razume celovitost sistema zagotavljanja kakovosti, ki temelji na pravilnem izvajanju, nadzoru in dokumentiranju vseh stopenj analiznega procesa. -Študent razume strategije delovanja, ki vodijo do veljavnih analiznih rezultatov in zna prenesti te strategije na manj kompleksne realne primere.	Student develops skills for quality assurance in analytical laboratory leading to valid analytical results. COURSE SPECIFIC COMPETENCES Student understands the quality assurance system which depends on accurate procedures, control measures and documentation in all steps of analytical process. Student understands strategies which produce valid analytical results and is able to apply these strategies in practice.

Predvideni študijski rezultati:	**Intended learning outcomes:**
Znanje in razumevanje Študent pridobi znanja pomembna za zagotavljanje kakovosti v analiznem laboratoriju. Študent razume sistem in mehanizme zagotavljanja kakovosti. Uporaba Študent se usposobi za delovanje znotraj sistema zagotavljanja kakovosti v analiznem laboratoriju. Refleksija Študent se zaveda pomena zanesljivih analiznih rezultatov in spoštovanja načel dobre laboratorijske prakse. Prenosljive spretnosti Študent razvija odgovornost za zanesljivo delovanje in spoštovanje postavljenih zahtev.	Knowledge and Comprehension Student fosters knowledge which is essential for quality assurance in analytical laboratory. Student understands the quality assurance system and measures. Application Student develops skills for operation in the accordance with the system of quality assurance in analytical laboratory. Analysis Student fosters the awareness of the importance of the valid analytical results and performance in the accordance with the principles of a good laboratory practice. Skill-transference Ability Student develops personal responsibility for reliable performance and following the prescribed procedures.

Metode poučevanja in učenja:	**Learning and teaching methods:**
Predavanja, vodeni razgovor, sodelovalno učenje, študij primerov, reševanje problemov. Laboratorijsko projektno delo: ovrednotenje prispevkov k merilni negotovosti končnega rezultata dobljenega z analizno metodo.	Lectures, guided discussions, cooperative learning, case studies, problem solving. Laboratory project: Evaluation of the uncertainty contributions to the final result obtained by an analytical method.

Načini ocenjevanja:	Delež/Weight	Assessment:
Pisno preverjanje znanja.		Written exam

Reference nosilca/Lecturer's references:

- ŠTEFANE, Bogdan, GROŠELJ, Uroš, SVETE, Jurij, POŽGAN, Franc, **KOČAR, Drago**, BRODNIK ŽUGELJ, Helena. The influence of the quinoline moiety on direct Pd-catalyzed arylation of five-membered heterocycles. European journal of organic chemistry. 23 Jan. 2019, vol. 2019, iss. 2/3, str. 432-441, ilustr. ISSN 1434-193X. [COBISS.SI-ID 1537958339]
- ŠČAVNIČAR, Andrej, ROGELJ, Irena, **KOČAR, Drago**, KÖSE, Sevim, POMPE, Matevž. Determination of biogenic amines in cheese by ion chromatography with tandem mass spectrometry detection. Journal of AOAC International. 2018, vol. 101, no. 5, str. 1542-1547, ilustr. ISSN 1060-3271. [COBISS.SI-ID 1537748419]

LAVRIČ, Simona, **KOČAR, Drago**, MIHELIČ, Igor, BRAYBROOK, Carl. Accurate mass determination of melamine-formaldehyde synthetic polymers after separation on preparative HPLC. Progress in organic coatings. [Print ed.]. 2015, vol. 81, no. 1, str. 27-34. ISSN 0300-9440. [COBISS.SI-ID 1536399043]