

UČNI NAČRT PREDMETA / COURSE SYLLABUS

Predmet: INŠTRUMENTALNA ANALIZA IN MONITORING
Course Title: INSTRUMENTAL ANALYSIS AND MONITORING

Študijski program in stopnja Study Programme and Level	Študijska smer Study Field	Letnik Academic Year	Semester Semester
MAG Tehniška varnost, 2. stopnja	/	1., 2.	2., 3., 4.
USP Technical Safety, 2 nd Cycle	/	1 st , 2 nd	2 nd , 3 rd , 4 th

Vrsta predmeta / Course Type:

izbirni / Elective

Univerzitetna koda predmeta / University Course Code:

TV2B7

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:

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:

Pri predmetu "Inštrumentalna analiza, monitoring, sistemi" bomo obravnavali naslednje teme:

- Pregled instrumentalnih tehnik za analitiko nevarnih in toksičnih snovi
- Pregled škodljivih snovi v delovnem okolju ali pri gorenju (posamezne organske snovi, kovine, prašni delci,...)
- Pregled različnih načinov jemanja vzorcev za prašne delce ter onesnaževala v plinski fazi
- pasivni vzorčevalniki (osebni dozimetri)
- off-line jemanje vzorcev (filtri, izpiralke, kartuše, adsorpcijska sredstva,...).
- on-line jemanje vzorcev
- Osnove monitoring sistemov

Content (Syllabus outline):

In this course "Instrumental analysis and monitoring", the following topics be discussed:

- Overview of instrumental techniques for analysis of hazardous and toxic substances
- Review of harmful substances in the workplace or during combustion (individual organic materials, metals, dust, ...)
- Review of sampling procedures for determination of the dust particles and the gas phase pollutants.
- Passive sampling (personal dosimeters)
- off-line sampling (filters, impingers, cartridge, adsorption tubes ...).
- on-line sampling
- Basic monitoring systems

- Načrtovanje meritev ter eksperimentov
- Vrednotenje dobljenih rezultatov in priprava poročil
- Pregled metod določevanja pomembnejših onesnaževal (EU, OSHA standardi)

VSEBINA VAJ (individualne vaje):
 Vaje bi obsegale praktične primere enostavnejših metod določevanja pomembnejših onesnaževal. Poudarek bi bil predvsem na rokovanju z osebnimi dozimetri.

- Planning of measurements and experiments design
- Evaluation of the results and the preparation of the reports
- Review standard methods for determination of major pollutants (EU-OSHA standards)

CONTENTS OF PRACTICALS (individual exercises):
 Practical should encompass practical examples of simple methods for determination of major pollutants. The focus would be primarily on the handling of personal dosimeters.

Temeljna literatura in viri / Readings:

- S.A. Ness, Air monitoring for Toxic Exposures, Van Nostrand Reinhold, New York. (10 %)
- J.P. Lodge, ed. Methods of Air Sampling and Analysis, Lewis Publishers, Chelsea, Michigan. (10 %)
- D. C. Harris, Quantitative Chemical Analysis, W.H. Freeman, New York. (10 %)
- D.A. Skoog, D.M. West, Holler, Analytical Chemistry an Introduction, Holt-Saunders Int. Ed. New York

Cilji in kompetence:

Pri predmetu "Instrumentalna analiza, monitoring, sistemi" naj bi študentje univerzitetnega programa varstva pri delu in požarne varnosti dobil znanje o osnovah jemanja vzorcev zraka v delovnem okolju, določevanju posameznih komponent v vzorcih zraka (monitoring sistemi) ter vrednotenju dobljenih rezultatov s povezavo z ustreznimi standardi in priporočili

Objectives and Competences:

In this course, "Instrumental analysis and monitoring", the students should gain knowledge about the basics of sampling of air in the work environment, determining the individual components in samples of air (monitoring systems), and the evaluation of the obtained results taking into account the relevant standards and recommendations.

Predvideni študijski rezultati:

Znanje in razumevanje
 Študentje naj bi pridobili osnovna teoretska in praktična znanja, ki so potrebna za načrtovanje ter izvedbo meritev onesnaževal v delovnem okolju. Obenem bodo sposobni kritično presoditi primernost posameznih tehnik ter interpretirati dobljene rezultate.

Uporaba
 Znanje, ki ga bo pridobil student je namenjeno reševanje praktičnih problemov tako pri načrtovanju in izvedbi monitoring sistemov kot tudi za oceno učinkovitosti ukrepov pri

Intended Learning Outcomes:

Knowledge and Comprehension
 Students will acquire basic theoretical knowledge and practical skills necessary for planning and execution of the measurements of pollutants in the work environment. At the same time they will be able to critically assess the suitability of particular techniques and interpret the obtained results.

Application
 Obtained knowledge will enable students to solve practical problems in both the design and implementation of monitoring systems, as well as to assess the effectiveness of measures taken

sanacija stanja. Pomemben vidik predmeta je predstaviti študentu kritičen pogled na podajanje rezultatov in zmogljivosti različnih analiznih postopkov.	to improve working environment. An important aspect of this course is to provide students with a critical view on the reliability of the obtained results as well as the performance of the various analytical procedures.
<u>Refleksija</u> Teoretska in praktična znanja bo lahko študent uporabil pri reševanju realni problemov načrtovanja meritev onesnaževal v delovnem okolju. Spoznanja o zmogljivostih in omejitvah posameznih metod v praksi pomenijo osnovo za mnoge pomembne odločitve.	<u>Analysis</u> Theoretical and practical knowledge will be used by the student to implement the measurements of pollutants in the work environment. Knowledge about capability and limitation of each method in practice is the basis for many important decisions.
<u>Prenosljive spretnosti</u> Študenti bodo razumeli pomen validiranih analiznih postopkov. Sposobni bodo kritično ovrednotiti rezultate in jih predstaviti v pisni in ustni obliki, kar je ključnega pomena za nadaljnji proces odločanja za sanacijo stanja v delovnem okolju.	<u>Skill-transference Ability</u> Students will understand the importance of validated analytical procedure. They are able to critically evaluate the results and present them in written and oral form, which is crucial for further decision making process for improving working environment.

Metode poučevanja in učenja:

Predavanja/seminarji/vaje

Learning and Teaching Methods:

Lectures/Seminars/Practicals

Načini ocenjevanja:

Pisni izpit po uspešno opravljenem praktičnem delu.

Delež (v %) /

Weight (in %)

Assessment:

Written exam after successful completion of practical exercise.

Reference nosilca / Lecturer's references:

1. 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.
2. BUSZEWSKI, Bogusław, LIGOR, Tomasz, FILIPIAK, Wojciech, VASCONCELOS, Maria Teresa, **POMPE, Matevž**, VEBER, Marjan. Study of sorptive properties of trap systems for selective enrichment of volatile organic compounds from tobacco smoke samples. Toxicological and environmental chemistry, ISSN 0277-2248, 2008, vol. 90, no. 1, str. 51-64.
3. **POMPE, Matevž**, DAVIS, Joe M., SAMUEL, Clint D. Prediction of thermodynamic parameters in gas chromatography from molecular structure : hydrocarbons. Journal of chemical information and computer sciences, ISSN 0095-2338, 2004, vol. 44, no. 2, str. 399-409.