

# INSTRUMENTALNA ANALIZA IN MONITORING

## UČNI NAČRT PREDMETA/COURSE SYLLABUS

<b>Predmet:</b>	Inštrumentalna analiza in monitoring
<b>Course title:</b>	Instrumental Analysis and Monitoring
<b>Članica nosilka/UL Member:</b>	UL FKKT

Študijski programi in stopnja	Študijska smer	Letnik	Semestri	Izbirnost
Tehniška varnost, druga stopnja, magistrski (od študijskega leta 2023/2024 dalje)	Ni členitve (študijski program)	1. letnik, 2. letnik		izbirni

<b>Univerzitetna koda predmeta/University course code:</b>	0072277
<b>Koda učne enote na članici/UL Member course code:</b>	TV2B7

Predavanja /Lectures	Seminar /Seminar	Vaje /Tutorials	Klinične vaje /Clinical tutorials	Druge oblike študija /Other forms of study	Samostojno delo /Individual student work	ECTS
30	15	30			75	5

**Nosilec predmeta/Lecturer:** prof. dr. Matevž Pompe

**Vrsta predmeta/Course type:** izbirni strokovni/Elective Professional

<b>Jeziki/Languages:</b>	Predavanja/Lectures:	Angleščina, Slovenščina
	Vaje/Tutorial:	Angleščina, Slovenščina

### 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 "Instrumentalna 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
- Načrtovanje meritev ter eksperimentov

### 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
- Planning of measurements and experiments design

<ul style="list-style-type: none"> <li>• Vrednotenje dobljenih rezultatov in priprava poročil</li> <li>• Pregled metod določevanja pomembnejših onesnaževal (EU, OSHA standardi)</li> </ul> <p>VSEBINA VAJ (individualne vaje):  Vaje bi obsegale praktične primere enostavnejših metod določevanja pomembnejših onesnaževal.  Poudarek bi bil predvsem na rokovanju z osebnimi dozimetri.</p>	<ul style="list-style-type: none"> <li>• Evaluation of the results and the preparation of the reports</li> <li>• Review standard methods for determination of major pollutants (EU-OSHA standards)</li> </ul> <p>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.</p>
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### 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 "Inštrumentalna 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 sanaciji stanja.  
Pomemben vidik predmeta je predstaviti študentu kritičen pogled na podajanje rezultatov in zmogljivosti različnih naliznih postopkov.  
Refleksija  
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.  
Prenosljive spretnosti  
Študenti bodo razumeli pomen validiranih analiznih postopkov. Sposobni bodo kritično ovrednotiti rezultate in jih predstaviti v pisni in ustni obliki, kar je

### 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 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.  
Analysis  
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.  
Skill-transference Ability  
Students will understand the importance of validated analytical procedure. They are able to critically

ključnega pomena za nadaljnji proces odločanja za sanacijo stanja v delovnem okolju.	evaluate the results and present them in written and oral form, which is crucial for further decision making process for improving working environment.
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<b>Metode poučevanja in učenja:</b> Predavanja/seminarji/vaje	<b>Learning and teaching methods:</b> Lectures/Seminars/Practicals
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<b>Načini ocenjevanja:</b> Pisni izpit po uspešno opravljenem praktičnem delu.	<b>Delež/Weight</b>	<b>Assessment:</b> Written exam after successful completion of practical exercise.
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**Reference nosilca/Lecturer's references:**

<ol style="list-style-type: none"> <li>1. ARH, Gregor, KLASINC, Leo, VEBER, Marjan, <b>POMPE, Matevž</b>. 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.</li> <li>2. BUSZEWSKI, Boguslaw, LIGOR, Tomasz, FILIPIAK, Wojciech, VASCONCELOS, Maria Teresa, <b>POMPE, Matevž</b>, 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.</li> <li>3. <b>POMPE, Matevž</b>, 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.</li> </ol>
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