


**KAPITAŁ LUDZKI**  
 NARODOWA STRATEGIA SPÓJNOŚCI

 Projekt współfinansowany przez  
 Unię Europejską w ramach  
 Europejskiego Funduszu  
 Społecznego

**UNIA EUROPEJSKA**  
 EUROPEJSKI  
 FUNDUSZ SPOŁECZNY


<b>Course title</b>		<b>ECTS code</b>	
Monographic lecture - Sampling and its preparing for analysis		13.3.0435	
<b>Name of unit administrating study</b>			
null			
<b>Studies</b>			
<b>faculty</b>	<b>field of study</b>	<b>type</b>	drugiego stopnia
Wydział Chemii	Chemia	<b>form</b>	stacjonarne
		<b>specjalty</b>	chemia biomedyczna, chemia i technologia środowiska, analityka i diagnostyka chemiczna, chemia obliczeniowa
		<b>specialization</b>	wszystkie
<b>Teaching staff</b>			
prof. UG, dr hab. Monika Paszkiewicz			
<b>Forms of classes, the realization and number of hours</b>		<b>ECTS credits</b>	
<b>Forms of classes</b>		3	
Lecture		classes - 30 h	
<b>The realization of activities</b>		tutorial classes – 10 h	
classroom instruction		student's own work – 35 h	
<b>Number of hours</b>		Total: 75 h - 3 ECTS	
Lecture: 30 hours			
<b>The academic cycle</b>			
2023/2024 winter semester			
<b>Type of course</b>		<b>Language of instruction</b>	
obligatory		polish	
<b>Teaching methods</b>		<b>Form and method of assessment and basic criteria for evaluation or examination requirements</b>	
multimedia-based lecture		<b>Final evaluation</b>	
		Graded credit	
		<b>Assessment methods</b>	
		- (mid-term / end-term) test	
		- graded course credit based on individual grades obtained during the semester	
		<b>The basic criteria for evaluation</b>	
		The final grade will be determined on the basis of the arithmetic mean of the 2 partial grades received during the semester. A negative final grade can be improved on the basis of an additional colloquium. Positive evaluation of the colloquium is min. 51% of possible points.	
<b>Method of verifying required learning outcomes</b>			
<b>Required courses and introductory requirements</b>			
<b>A. Formal requirements</b>			
Chemistry, Organic chemistry, Analytical chemistry.			
<b>B. Prerequisites</b>			
Knowledge of the basics of chemistry, organic chemistry, as well as chemical and instrumental analysis.			
<b>Aims of education</b>			
The aim of the lecture is to familiarize students with the issue of sampling and preparation of samples for further stages of chemical analysis.			
Knowledge of modern sampling and preparation techniques that are an integral part of the analytical process			
<b>Course contents</b>			

The program includes discussion of issues related to the collection and preparation of air, water and soil samples as well as other selected materials as well as natural samples for further chemical analyzes. General principles of the sampling process, sample representativeness, sample components (matrix, analyte). Problems of trace analysis. Units used to express concentrations of trace analytes. Sampling in environmental analysis. Preservation and storage of samples and issues related to the loss of analytes. Matrixes and their impact on the preparation of samples for analysis. Preparation of samples for analysis with modern separation techniques: extraction techniques (among others liquid-liquid extraction, gas phase extraction, solid phase extraction, solid phase microextraction, extraction of solid samples), membrane techniques and chromatographic techniques. Examples of sampling and preparation of samples for analysis.

### Bibliography of literature

Literature required to pass the course

- Pawliszyn J. Sampling and sample preparation for field and laboratory: fundamentals and new directions in sample preparation. Elsevier, 2002.
- Mitra S. Sample preparation techniques in analytical chemistry. Wiley, 2003.
- Namieśnik J., Jamrógiewicz Z., Pilarczyk M., Torres L. Przygotowanie próbek środowiskowych do analiz. WNT, Warszawa, 2000.
- Namieśnik J., Łukasiak J., Jamrógiewicz Z. Pobieranie próbek środowiskowych do analiz. PWN, Warszawa, 1995.
- Harvey D. Modern analytical chemistry. McGraw-Hill, USA, 2000.
- Zhang C.C. Fundamentals of Environmental Sampling and Analysis. Wiley, 2007.
- Popek E. P. Sampling and analysis of environmental chemical pollutants. Academic Press, California, USA, 2003.

Extracurricular readings

- Namieśnik J., Jamrógiewicz Z., Pilarczyk M., Torres L. Przygotowanie próbek środowiskowych do analiz. WNT, Warszawa, 2000.
- Namieśnik J., Łukasiak J., Jamrógiewicz Z. Pobieranie próbek środowiskowych do analiz. PWN, Warszawa, 1995.
- Stepnowski P., Synak E., Szafranek B., Kaczyński Z. Techniki separacyjne. Wydawnictwo UG 2010.

### The learning outcomes (for the field of study and specialization)

#### Knowledge

After completing the course, the student:

1. defines concepts regarding the collection and preparation of samples for analysis
2. explains the main goals and importance of sampling and preparation of samples for analysis
3. presents and describes techniques, tools and equipment sets suitable for collecting environmental samples: soils, water and atmospheric air
4. lists factors causing loss of analytes or contamination of the sample
5. presents and describes the methods of storing and fixing samples
6. presents and describes extraction techniques and chromatographic techniques used to prepare samples for proper analysis

#### Skills

#### Social competence

After completing the course, the student understands the need for further education allows to acquire specialist qualifications

### Contact

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