


**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>	
Diploma lecture - Modern technologies in environmental analysis		13.3.0405	
<b>Name of unit administrating study</b>			
null			
<b>Studies</b>			
<b>faculty</b>	<b>field of study</b>	<b>type</b>	pierwszego stopnia
Wydział Chemii	Chemia	<b>form</b>	stacjonarne
		<b>specjalty</b>	chemia biomedyczna, chemia kosmetyków, analityka i diagnostyka chemiczna, chemia żywności
		<b>specialization</b>	wszystkie
<b>Teaching staff</b>			
dr hab. Łukasz Haliński; dr hab. Anna Białk-Bielińska, profesor uczelni; prof. dr hab. Piotr Stepnowski; dr Joanna Dołżonek; 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>		2	
Lecture		classes 30 h	
<b>The realization of activities</b>		tutorial classes 5 h	
classroom instruction		student's own work 15 h	
<b>Number of hours</b>		TOTAL: 50 h - 2 ECTS	
Lecture: 30 hours			
<b>The academic cycle</b>			
2024/2025 summer 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	
		- oral course credit	
		<b>The basic criteria for evaluation</b>	
		Lecture:	
		• pass the test with open and closed questions concerning the whole course content	
		91-100%: 5.0	
		81-90%: 4.5	
		71-80%: 4.0	
		61-70%: 3.5	
		51-60%: 3.0	
		Less than 51% 2.0	
<b>Method of verifying required learning outcomes</b>			
<b>Required courses and introductory requirements</b>			
<b>A. Formal requirements</b>			
Basic chemistry, organic chemistry, inorganic chemistry, analytical chemistry, physical chemistry.			
<b>B. Prerequisites</b>			
Skills in basic chemistry, organic chemistry and physical chemistry. Basic knowledge on methods used in the chemical analysis.			
<b>Aims of education</b>			

To provide students a clear understanding of the most important issues in modern chemical analysis of environmental pollutants

- To familiarize students with the basic knowledge on environmental pollution and pollutants
- To familiarize students with main stages of the analytical procedures
- To introduce students to principles of designing the analytical process basing on the structure and properties of the substance
- To learn students how to independently design simple analytical process

### Course contents

The course includes principles of the modern environmental analysis. Specified topics of lectures are given below.

Classification of selected environmental pollutants, their sources and environmental fate. Selected physicochemical properties of compounds emitted to the environment. Main stages of the analytical process. Designing the analytical process basing on the structure and properties of chemicals.

Extraction of pollutants from selected environmental matrices. Purification and separation of analytes. Chromatographic and spectroscopic techniques in determination of environmental pollutants. Examples of the whole analytical process: pesticides and petroleum-derived organic compounds.

### Bibliography of literature

Literature required to pass the course

A. Literatura wymagana do ostatecznego zaliczenia zajęć (zdania egzaminu):

A.1. Literature used during classes:

Stepnowski P., Synak E., Szafranek B., Kaczyński Z. Techniki separacyjne. Wydawnictwo UG 2010.

Witkiewicz Z. Podstawy chromatografii, Wydawnictwa Naukowo-Techniczne, Warszawa, 2005.

A.2. Literature form individual studies:

Stepnowski P., Synak E., Szafranek B., Kaczyński Z. Techniki separacyjne. Wydawnictwo UG 2010.

Witkiewicz Z. Podstawy chromatografii, Wydawnictwa Naukowo-Techniczne, Warszawa, 2005.

Szczepaniak W. Metody instrumentalne w analizie chemicznej, Wydawnictwo Naukowe PWN, Warszawa, 2002.

Extracurricular readings

Alloway B.J., Ayres D.C. Chemiczne podstawy zanieczyszczenia środowiska, PWN, Warszawa, 1999.

Van Loon G.W., Duffy S.J. Chemia środowiska, PWN, Warszawa, 2008.

Namieśnik i in. Przygotowanie próbek środowiskowych do analizy, WNT, W-wa, 2000.

Johnstone R.A.W., Rose M.E. Spektrometria mas. Podręcznik dla chemików i biochemików. PWN, Warszawa, 2001.

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

#### Knowledge

Students know main sources of selected pollutants and understand importance of structure-activity relationship of a substance in determining its environmental fate. Students are able to describe main stages of the analytical process and is familiar with principles of its design. Students know selected modern methods of extraction, purification and chemical analysis of organic pollutants. Students are able to define possibilities and limitations of basic analytical methods. Students understand the importance of chemical structure and physicochemical properties of substances in choosing the most useful analytical technique for their determination.

#### Skills

Students are able to design simple analytical process basing on properties of the analyte. Students are able to find and verify the data in different sources. Students perform the critical review of analytical methods described in literature and estimate their usefulness in independently performed experiments. Students are able to discuss topics associated with environmental pollution, using clear language and correct nomenclature.

#### Social competence

Students understand the need of life-long learning in environmental pollution-related topics. Students are able to estimate the impact of human activity on natural environment in a conscious way. Students tend to verify data found in popular and scientific literature in a critical way. Students promote the importance of mathematics in describing phenomenons and processes

### Contact

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