

<b>Course title</b> Chemia zanieczyszczeń środowiska/Chemistry of environmental pollutants		<b>ECTS code</b> 13.3.1162	
<b>Name of unit administrating study</b> Faculty of Chemistry			
<b>Studies</b>			
<b>Field of study</b>	<b>Type</b>	<b>Form</b>	
Chemistry	Master	Full-time studies	
<b>Teaching staff</b> dr Łukasz Haliński			
<b>Forms of classes, the realization and number of hours</b>		<b>ECTS credits</b>	
<b>A. Forms of classes, in accordance with the UG Rector's regulations</b> lecture, laboratory classes		classes 60 h tutorial classes 20 h student's own work 20 h TOTAL: 100 h - 4 ECTS	
<b>B. The realization of activities</b> In-class learning			
<b>C. Number of hours</b> lecture 30 h, laboratory classes 30 h			
<b>The academic cycle</b> Second year, winter semester			
<b>Type of course</b> obligatory		<b>Language of instruction</b> Polish	
<b>Teaching methods</b> Lectures including multimodal presentation Laboratory experiments		<b>Form and method of assessment and basic criteria for evaluation or examination requirements</b>	
		<b>A. Final evaluation, in accordance with the UG study regulations</b> Course completion, exam	
		<b>B. Assessment methods</b> Lectures - exam, Lab classes – Course credit with a grade	
		<b>C. The basic criteria for evaluation or exam requirements</b> Lecture: • pass the exam 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  Laboratories: • completed all tests 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 The final grade will be calculated as a weighted average of the results of the final test covering all topics from the lab classes (40%), single tests from each class (40%) and laboratory reports (20%)	
<b>Required courses and introductory requirements</b> Inorganic chemistry, organic chemistry, analytical chemistry, physical chemistry.			

Requirements: Knowledge on the chemical structure and physicochemical properties of basic classes of organic and inorganic compounds. Basic skills in the chemical nomenclature, stoichiometry and its application, calculations of concentrations of compound solutions. Skills in using the laboratory glassware and basic analytical equipment. Knowledge on basic safety rules in the chemical laboratory.

#### Aims of education

- To provide students a clear understanding of the most important issues in the chemistry of environmental pollutants
- To familiarize students with the basic types of environmental pollutants, their transport, environmental fate and transformations
- To introduce students to principles of prediction of environmental fate of selected classes of pollutants
- To learn students how to independently estimate environmental risks associated with the use of certain substances basing on their chemical structure

#### Course contents

A. Topics of the lecture: Chemical pollution of the environment. Chemistry and physics of interaction of chemicals with components of environment. Environmental fate of selected pollutants: transport, stability and degradation. Global effects caused by the chemical pollution. Basic principles of environmental fate assessment of chemicals basing on structure-activity relationship.

B. Topics of lab classes: Determination of selected physicochemical parameters of pollutants using traditional and instrumental techniques. Estimation of the impact of environmental conditions on environmental fate of chemicals. Determination of adsorption rate of chemicals to soils.

#### Bibliography of literature

##### A. Literature required to pass the course

A.1. literatur used during classes:

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

Manahan S.E. Toksykologia środowiska. Aspekty chemiczne i biochemiczne, PWN, Warszawa, 2010.

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

A.2. Literature for individual studies:

Manahan S.E. Toksykologia środowiska. Aspekty chemiczne i biochemiczne. PWN, Warszawa, 2010.

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

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

Stepnowski P., Synak E., Szafranek B., Kaczyński Z. Monitoring i analityka zanieczyszczeń w środowisku. Wydawnictwo UG, 2010.

##### B. Extracurricular readings

Piotrowski J.K. (red.) Podstawy toksykologii. Kompendium dla studentów szkół wyższych. wyd. 2, WNT, Warszawa, 2008.

Pigon K. Chemia Fizyczna tom I. Wydawnictwo PWN, Warszawa, 2005.

Atkins P.W. Chemia fizyczna. PWN, Warszawa, 2001.

#### Knowledge

1. Students define basic terms associated with risk assessment and chemical hazards.
2. Students understand importance of structure-activity relationship of a substance in determining its environmental fate.

3. Students are able to estimate the exposition of certain environment components on pollutants in association with the amounts of chemicals emitted and the way they are used.
4. Students identify some characteristic types of the chemical structure that are responsible for certain physiochemical properties and biological activity.
5. Students understand and characterize selected global effects, associated with the presence of chemical compounds in the environment.

#### **Social competence**

1. Students understand the need of life-long learning in pollutant-related topics.
2. Students show creativity in independent and team work.
3. Students are able to estimate the impact of human activity on natural environment, in local and global scale, in a conscious way.
4. Students are responsible for their own safety and safety of their co-workers; they are keeping safety measures when working with chemicals and analytical instruments.