

<b>Course title</b> Ochrona środowiska w przemyśle chemicznym/Environmental protection in chemical industry		<b>ECTS code</b> 13.3.0746	
<b>Name of unit administrating study</b> Faculty of Chemistry			
<b>Studies</b>			
<b>Field of study</b>	<b>Type</b>	<b>Form</b>	
Chemical Business	Bachelor / Engineer	Full-time studies	
<b>Teaching staff</b> Prof. dr hab. Ewa Siedlecka, dr inż Aleksandra Pieczyńska, dr inż. Anna Malankowska			
<b>Forms of classes, the realization and number of hours</b>		<b>ECTS credits 2</b>	
<b>A. Forms of classes, in accordance with the UG Rector's regulations</b> lecture, laboratory classes		classes - 30 h tutorial classes – 5 h student's own work – 15 h	
<b>B. The realization of activities</b> in-class learning		Total: 50 h - 2 ECTS	
<b>C. Number of hours</b> 30 h (15 h lecture, 15 h laboratory classes)			
<b>The academic cycle</b> Fourth year, winter semester			
<b>Type of course</b> obligatory		<b>Language of instruction</b> Polish	
<b>Teaching methods</b>  Lectures with multimedia presentation Laboratory: performing 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 (with a grade)	
		<b>B. Assessment methods</b>  Written test with open questions (tasks) Laboratory: <ul style="list-style-type: none"> <li>- execution of a specific practical work and presentation of results in the form of a report (written)</li> <li>- activity during classes</li> <li>- written test including the topics mentioned in the program contents of the laboratory</li> </ul>	
		<b>C. The basic criteria for evaluation or exam requirements</b>	
<b>Required courses and introductory requirements</b> Basic knowledge of chemistry Basic knowledge of chemical technology			
<b>Aims of education</b> Familiarize students with the ways of pollution spreading from industry. Familiarize students with wastewater, air and soil methods treatment, coming from industry. The ability to present the results in writing form. The ability to independently carry out the experiment in laboratory. The ability to use the methodology given in the instructions and the interpretation of the obtained results.			
<b>Course contents</b>  <b>A. Lectures:</b>  The current state of air, water and soil pollution in the country in the aspect of industry impact. The spread of pollutants in the atmosphere, water and soil. The impact of selected industrial pollutants on living organisms. Classification, characteristics and sources of industrial waste generated in the technological process. The quality parameters of waste gases. Selected methods for reducing of pollutants in waste gases; dust removal, SO <sub>2</sub> , NO <sub>x</sub> and hydrocarbons removal. Odor removal. Soil and its protection.			

Selected methods of utilization and neutralization of industrial waste. Parameters of quality of industrial wastewater. Characteristics of wastewater generated in selected industry. Wastewater treatment: raw material recovery, neutralization, precipitation, sedimentation, flotation, coagulation, oxidation and reduction, biological wastewater treatment. Selection of appropriate treatment methods depending on the quality of sewage. Discussion of selected wastewater treatment technologies coming from selected industries (refinery, textile, food, etc.).

**B. Laboratory:**

Laboratory experiments related to the soils, sewage, leachate and air treatment.

**Bibliography of literature**

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

Głowiak B.: Podstawy ochrony środowiska, PWN, Warszawa 1985.

Koniecznyński J.: Oczyszczanie gazów odlotowych, Politechnika Śląska, Gliwice 1990.

Materiały dotyczące przedmiotu publikowane w czasopismach: Ochrona Powietrza i Problemy Odpadów, Ochrona Środowiska, Chemik, Przemysł Chemiczny.

**B. Extracurricular readings**

**Knowledge**

Student:

- classifies and lists the basic sources of pollution of individual elements of the ecosystem
- lists the ways of pollutants spread in the environment and the global and local effects of its pollution
- lists and characterizes basic technologies used for soil remediation
- lists and characterizes the basic technologies used for air purification and wastewater treatment
- applies basic technological and chemical concepts describing environmental remediation technologies
- discusses the advantages and disadvantages of selected water, soil and wastewater treatment technologies.

**Skills**

1. Student recognizes the laboratory equipment and uses it to carry out experiments.
2. Student in an understandable way shows the correct technology.
3. Student observes research procedures.
4. Student performs the analysis of the selected parameter based on the laboratory procedure.
5. Student predicts, verifies and criticizes the results of experiments.
6. Student independently searches information in the literature.

**Social competence**

1. Student understands the necessity of sewage, soil and air treatment.
2. Student understands the necessity of life-long learning a personal development.
3. Student shows creativity in independent and teamwork.