86S1-ASS **ANTHROPOGENIC ENVIRONMENTAL POLLUTION** **ECTS: 3.0**

HOURS PER SEMESTER/WEEK: LECTURES: 15/1; CLASSES: 30/2
FIELD OF THE STUDY: Chemistry
Level of study: First-cycle (Bachelor's degree) program

Course status: optional *
Year of the study: III

COURSE CONTENTS

LECTURES: Sources and classification of anthropogenic environmental pollution. Point and diffuse pollution - migration routes. Contamination of ground, surface, and underground waters. Water eutrophication and its effects. Organic pollution of waters. Air pollution and its deposition. Emission of gas and dust pollutants. International activities in the field of atmosphere protection. Micropollutants (pesticides, surfactants (SPC), polycyclic aromatic hydrocarbons (PAH), by-products of oxidation (UPU) and water disinfection (UPD), heavy metals, radionuclides) and their toxicity measures. Threats to the environment resulting from the natural use of sewage and waste.

CLASSES: Precipitation chemistry as an indicator of air pollution. Surface water contamination, BOD5 indicators, pH, nitrates, phosphates. Soil contamination - biological tests - assessment of root growth inhibition. Soil degradation - salinity, pH, Hh, total alkaline cations. Soil contamination with heavy metals - determination of metal content Zn, Cd, Pb using the ASA method. Soil humus content as an indicator of soil degradation - determination of total C, organic and inorganic C. Contamination of food products - nitrates, pesticides, PAHs. Principles of balancing nutrients in agricultural areas.

EDUCATIONAL PURPOSE: Understanding the cause and effect relationships between human economic activity and changes in the natural environment; obtaining knowledge in the field of: types of anthropogenic pollution, their sources emissions, environmental impact, and methods of environmental protection against their formation and spread.

LEARNING OUTCOMES

Knowledge. Can indicate the causes and effects as well as the types of pollutant emissions from anthropogenic sources, knowing the appropriate research methodologies allowing for their identification. Can safely and responsibly perform analyses appropriate for a given analyte in a chemical laboratory.

Skills. Based on the known analytical methods, he can identify types of anthropogenic pollution and link them to the appropriate sources. Can determine the routes of migration of substances and chemical compounds in the environment. Based on the known research methods, he has the skills to conduct experiments and perform calculations in the field of migration of pollutant loads, including the ability to carry out balance calculations.

Social competences. Is aware of the importance of environmental protection issues in the sphere of human economic activity. In the context of scientific and technological progress, can critically refer to the current research techniques and the level of knowledge covering the issues of environmental contamination. Understanding the need to popularize issues related to the use of chemical substances in the social environment, can indicate to entrepreneurs the appropriate solution to the problem.

TEACHING FORMS AND METHODS

Lectures. Computer text and graphic presentation (tables, graphs, photographs), informative lecture, problem lecture.

Classes. Presentation of measurement instruments, practical analysis of environmental tests, interpretation of the results obtained, drawing conclusions, drawing up a report on the course of exercises, and developing the indicated issues.

FORM AND CONDITIONS FOR VERIFICATION OF LEARNING OUTCOMES

Lectures. written test - credit with a grade.

Classes. (Report) - Students prepare a summary of laboratory classes in the form of a report on an ongoing basis. The report should briefly describe the methods, assumptions, and results obtained and state the conclusions. Students absent from laboratory classes m

BASIC LITERATURE

1) Kociołek-Balawejder E., Stanisławska E. 2012. Chemia Środowiska., Wyd. Uniwersytet Ekonomiczny we Wrocławiu. 2) Duffy S. J., VanLoon G. 2007. Chemia Środowiska. Wyd. PWN. 3) Wierzbicka M. (red.) 2015. Ekotoksykologia. Rośliny, gleby, metale. Wyd. UW. 4) Marczewska B., Mazurkiewicz-Boroń G. (red.) 2014. Zagrożenia jakości wód powierzchniowych i metody działań ochronnych., Wyd. KUL. 5) Janka R.M. 2013. Zanieczyszczenia pyłowe i gazowe. Podstawy obliczania i sterowania poziomem emisji. Wyd. PWN

ADDITIONAL LITERATURE

1) Merkisz, J., W. Piekarski, Słowik T. 2005. Motoryzacyjne zanieczyszczenia środowiska, Wyd. Uniwersytet Przyrodniczy w Lublinie

THE TEACHER/TEACHERS CONDUCTING THE CLASSES:

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* note: optional course availability depends on Polish students' choice!