COURSE DESCRIPTION CARD

<table>
<tr><td colspan="10">Faculty of Civil Engineering and Environmental Sciences</td></tr>
<tr><td>Field of study</td><td colspan="6"></td><td colspan="2">Degree level and programme type</td><td></td></tr>
<tr><td>Specialization/ diploma path</td><td colspan="6"></td><td colspan="2">Study profile</td><td>Academic profile</td></tr>
<tr><td rowspan="2">Course name</td><td colspan="6" rowspan="2">Environmental chemistry</td><td colspan="2">Course code</td><td>IS-FCEE-00068-1S</td></tr>
<tr><td colspan="2">Course type</td><td>Erasmus</td></tr>
<tr><td rowspan="2">Forms and number of hours of tuition</td><td>L</td><td>C</td><td>LC</td><td>P</td><td>SW</td><td>FW</td><td>S</td><td>Semester</td><td>summer</td></tr>
<tr><td>15</td><td></td><td>30</td><td></td><td></td><td></td><td></td><td>No. of ECTS credits</td><td>4</td></tr>
<tr><td>Entry requirements</td><td colspan="9">Chemistry</td></tr>
<tr><td>Course objectives</td><td colspan="9">To familiarize the student with the division and characteristics of the most important laboratory techniques used in physico-chemical analyses of water and wastewater. Presentation of the division of environmental pollutants and their sources. Teaching methodology for determining the indicators characterizing the physical state, including thermal conditions, oxygen conditions, organic pollutants, salinity, acidification, nutrient conditions used in the classification of the state surface water bodies and determinants the discharge of sewage into water or soil, including substances especially harmful to the aquatic environment. To familiarize the student with circulation and toxicity of selected chemical compounds in the environment. Presentation of the general characteristics and identification methodology by-products resulting from technological processes unit water treatment and wastewater treatment. To familiarize the student with physico-chemical and biochemical change selected chemical compounds occurring in water and sewage. Introduction with the basic statistical analysis of the obtained test results.</td></tr>
<tr><td>Course content</td><td colspan="9">The lecture: Division and characteristics of the most important laboratory techniques used in the physico-chemical analysis of water and wastewater. Detailed methodology of performing the markings required by standard for classification water and sewage. Characteristics and classification of water pollutants. Circulation cycle nitrogen, phosphorus, sulfur in the environment. Processes of biodegradation of pollutants organic. Basic issues of the toxicity of chemical compounds: dose, response, dose-response curves, compound toxicity
Introduction to problem connected with water chemical oxidation and disinfection by-products e.g. TOX, LTOX, NTOX, THM, AOX, EOX and others.
Laboratory classes: Principles of sampling, preservation and preparation of samples environmental. Testing the aggressiveness of water against concrete. Analysis physico-chemical properties of water in the direction of water corrosivity assessment. Analysis by weight and by volume in water and sewage. Spectroscopic methods, potentiometric and conductometric in water and wastewater analysis. Remediation of the water-soil environment. Calculation of the ionic water balance.</td></tr>
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Teaching methods	Information lecture, problem lecture, laboratory classes	
Assessment method	Lecture - written test, the pass mark is an achievement minimum 50% of the test points. Lab classes. - partial written tests of preparation for individual classes. The condition for obtaining credit is the presence and active participation in individual laboratories, completion of exercise reports.	
Symbol of learning outcome	**Learning outcomes**	**Reference to the learning outcomes for the field of study**
LO1	The graduate has knowledge and understands in depth basic laboratory techniques and methods of water and wastewater physico-chemical analysis	IS_W01 IS2_U01
LO2	A graduate knows the newest directions of methodology development analytical in environmental engineering, can interpret the obtained results and on this draw correct conclusions	IS_W01 IS2_U01
LO3	The graduate knows and understands the sources of environment pollution and the chemistry of changes taking place in water and sewage, can properly plan and perform physico-chemical analyses, interpret results and draw correct conclusions on this basis	IS_W01 IS2_U01 IS2_U05 IS2_K06
LO4	The graduate knows and understands the latest methodologies identifying and managing by-products that arise as a result of technological unit water treatment processes and wastewater treatment, can use the literature scientific, popular science and industry standards subjects, legal acts, internet databases properly use the information obtained, a also formulate and present opinions	IS2_W01 IS2_W04 IS2_U09
LO5	The graduate is ready to apply and keep rules of professional ethics and behavior in professional way of taking samples, planning and conducting physical and chemical, with the use of specialized scientific and research apparatus, as well as interpret obtained results and draw conclusions	IS2_U05 IS2_K06
Symbol of learning outcome	**Methods of assessing the learning outcomes**	**Type of tuition during which the outcome is assessed**
LO1	Discussion during classes and lectures , written tests, exercise reports	L, LC
LO2	Discussion during classes and lectures , written tests, exercise reports	L, LC
LO3	Discussion during classes and lectures , written tests, exercise reports	L, LC
LO4	Discussion during classes and lectures , written tests, exercise reports	L, LC
LO5	Observation of laboratory work, reports from exercises, tests	LC

Student workload (in hours)		No. of hours	
Calculation	Participation in lectures	15	
	Participation in laboratory exercises	30	
	Preparation for a written test from the lecture	10	
	Preparation of reports on laboratory exercises	10	
	Preparation for tests that pass the exercises laboratory	7	
	Participation in consultations	3	
	TOTAL:	**75**	
Quantitative indicators		**HOURS**	**No. of ECTS credits**
Student workload – activities that require direct teacher participation		48	2
Student workload – practical activities		50	2,5
Basic references	Saternus M., Fornalczyk A., Chemistry for every student, Politechnika Śląska, Gliwice, 2013 Chojnacki J., Dołęga A., Dręczewski B. Selected topics in general and inorganic chemistry, Politechnika Gdańska, Gdańsk, 2001 Instructions for laboratory exercises, available at the Department of Technology in Environmental Engineering Wastewater Engineering- treatment, disposal, reuse. Metcalf&Eddy-Mc-Graw Hill, 2003		
Supplementary references	Manahan S., Fundamentals of environment al chemistry, CRC Press LLC,2001 Barceló, Damià, Kostianoy, Andrey G., The Handbook of Environmental Chemistry, Springer 2019		
Organisational unit conducting the course	**Department of Technology in Environmental Engineering**	**Date of issuing the programme**	
Author of the programme	**Assoc. Prof. Joanna Szczykowska PhD**	**10.02.2020**	

L – lecture, C – classes, LC – laboratory classes, P – project, SW – specialization workshop, FW - field work, S – seminar