

Course title:		component code: 52C0000
Environmental Chemistry Chemia środowiska		
Field of study: Environmental Engineering / Erasmus+		
Type of study: full-time studies	The level of education: second-cycle studies	Education profile: general academic
Type of subject: optional	Semester: I	Course language: English
Course type: lecture, tutorials	Number of hours: 15L, 15T	ECTS Credit points: 5

SYLLABUS

COURSE OBJECTIVES

- C.1. Presentation of environmental chemistry knowledge in English
- C.2. Presentation of knowledge about environmental impact of contaminants and toxic substances in English
- C.3. Presentation of ways for solving environmental chemistry calculational problem in English

PRELIMINARY COURSE REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

- 1. Student knows principal rules and laws in mathematics, chemistry and physics necessary for environmental chemistry calculations
- 2. Student is able to individual using of literature materials in English
- 3. Student is able to logical thinking and estimation of the quality of results obtained during calculation

SUBJECT EDUCATIONAL EFFECTS

- EU 1 - Student is able to description and interpretation of phenomena and processes in surrounding environment in English
- EU 2 - Student is able to solve of environmental chemistry calculational problems given in English
- EU 3 - Student is aware of importance of acquired knowledge in the aspect of engineering activity, is able to critically access the results of calculations

COURSE CONTENT

Form of classes - lectures	Hours
Course organization, assignment rules	1
Geoecosystems characterization	1
Chemical reactions in the atmosphere: formation and decomposition of stratospheric ozone	1

Chemical reactions in the atmosphere: formation of smog	1
Chemical reactions in the atmosphere: acid rains	1
Earth energy balance: greenhouse effect	1
Water in environment	1
Basic parameters of natural water	1
Nutrient elements in natural waters – eutrophication	1
Structure, characteristics and role of soil	1
Structure, characteristics and role of soil, continuation	1
Geochemical cycles of selected chemical elements	1
Inorganic and organic pollutants in environment	1
Chemical pollution in environment – self-treatment processes and chemical treatment methods	1
Assignment	1
Form of classes - tutorials	Hours
Introduction to the course, workplan presentation, rules of assignment	1
Gaseous state, ideal gas law	1
Mixtures of gases, Dalton law of partial pressures	1
Atmospheric chemistry – atmospheric ozone	1
Atmospheric chemistry – principal and trace elements in the atmosphere	1
Solubility of simple gases in water, Henry's law	1
Gases reacting with water	1
Gases reacting with water, continuation	1
Water chemistry: hardness, alkalinity, pH of water	1
Hydrosphere chemistry: carbonate equilibria	1
Dissolved oxygen in water	1
Dissolved oxygen in water, continuation	1
Chemistry of soil, components of soil	1
Nutrient substances in soil	1
Assignment	1

COURSE STUDY METHODS

1. blackboard, interactive whiteboard
2. multimedia presentation
3. sets of problems for solving during classes and for individual sol
4. physico – chemical tables, periodic table of elements

METHODS OF ASSESMENT (F - formative; S - summative)

F1. - activity in classes
S1. - test on lectures
S2. – tasks during tutorials

STUDENT WORKLOAD

Form of activity	Workload (hours)
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Participation in lectures	15 h
Participation in classes	15 h
Laboratory	- h
Participation in project classes	- h
Participation in seminar	- h
Preparation course on e-learning	- h
Test	- h
Entrance test for laboratory classes	- h
Project's defence	- h
Exam	- h
Consultation hours	40 h
DIRECT TEACHING, hours/ ECTS	70 h / 2,8 ECTS
Preparation for tutorials	45 h
Preparation for laboratories	- h
Preparation for projects	- h
Preparation for seminars	- h
Preparation for e-learning classes	- h
Participation in e-learning classes	- h
Working on project	- h
Preparation for tests	10 h
Preparation for exam	- h
SELF-STUDY, hours/ ECTS	55 h / 2,2 ECTS
TOTAL (hours)	Σ 125
TOTAL ECTS	5 ECTS

PRIMARY AND SUPPLEMENTARY TEXTBOOKS

vanLoon G.W., Duffy S.J., Environmental Chemistry. Global perspective, Oxford University Press, Oxford, UK, 2010
O'Neil P., Environmental Chemistry, CRC Press, UK, 1998
Manahan S.E., Environmental Chemistry, CRC Press, UK, 2009
Silberberg M.S., Principles of General Chemistry, McGraw Hill International Edition, New York, USA 2007
Tchobanoglous G., Burton F., Stensel H.D., Wastewater Engineering Treatment and Reuse, Metcalf&Eddy, Inc, 2004
Gray N.F., Water Technology an Introduction for Environmental Scientists and Engineers, Elsevier, 2005
Evangelou V.P., Environmental Soil and Water Chemistry, Principles and Applications, A Wiley& Sons, Inc, 1998

SUBJECT COORDINATOR (NAME, SURNAME, E-MAIL ADDRESS)

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NAME OF LECTURER (s) (NAME, SURNAME, E-MAIL ADDRESS)

1. Beata Karwowska, beata.karwowska@pcz.pl

Learning outcome	In relation to the learning outcomes specified for the field of study	Course objectives	Course content	Course study methods	Methods of assessment
EU 1	K_W01	C1, C2	lecture, tutorials	1, 2, 3, 4	F1, P1, P2
EU 2	K_U01	C2, C3	lecture, tutorials	1, 2, 3, 4	F1, P1, P2
EU 3	K_K01	C3	tutorials	2, 3, 4	F1, P2

OTHER USEFUL INFORMATION

1. All the information on the class schedule is posted on the student information board and online at: <https://is.pcz.pl/>.
2. The information about the consultation hours is provided to students on the first class meeting and posted online at <https://is.pcz.pl/>.
3. The information on course completion and grade is provided to students on the first class meeting.