

**Przewodnik po przedmiocie - wersja angielska**  
**Syllabus template**

Course title: <b>Environmental chemistry</b> <b>Chemia środowiska</b>		
Programme: <b>Environmental Engineering/ERASMUS</b>		Code: <b>1.1</b>
Type of course: <b>basic sciences, module 1</b>	Course level: <b>second cycle studies</b>	Semester: <b>I</b>
Form of classes: <b>lectures, tutorials</b>	Number of hours per week/meeting: <b>1L, 1T</b>	Credit points: <b>2ECTS</b>
Education profile: <b>General academic</b>		Course language: <b>English</b>
Enrolment: <b>yes/ no</b>		

## **GUIDE TO THE SUBJECT**

### **I. COURSE CHART**

#### **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

#### **LEARNING OUTCOMES**

- EK 1 -** Student is able to description and interpretation of phenomena and processes in surrounding environment in English.
- EK 2 -** Student has got general knowledge about basic processes of neutralization of environmental contaminations in English.
- EK 3 -** Student is able to solve of environmental chemistry calculational problems given in English.

## COURSE CONTENT

Form of classes - lectures	Hours
Geoecosystems characterization	1
Chemical reactions in atmosphere	2
Earth's energy balance	1
Water in environment	2
Chemical compounds in water	1
Partial test 1	1
Structure, characteristics and role of soil	2
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	2
Partial test 2	1
Form of classes - tutorials	Hours
Introduction to the course, workplan presentation, rules of assignment	1
Gaseous state, ideal gas law	2
Mixtures of gases, Dalton law of partial pressure	1
Atmospheric chemistry	2
Equilibria gas/water	2
Equilibria in aqueous solution	1
Water chemistry: hardness, alkalinity, pH of water	1
Partial test 1	1
Substances with limited solubility, solubility, solubility product	1
Chemistry of soil	1
Pollutants in soil	1
Partial test 2	1

## COURSE STUDY METHODS

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

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

<b>F1.</b> – activity in classes
<b>S1.</b> – 2 partial tests on tutorials
<b>S2.</b> – 2 partial tests on lectures

## STUDENT WORKLOAD

Form of activity	Workload (hours)
<b>Participation in lectures</b>	<b>15 h</b>
<b>Participation in classes</b>	<b>15 h</b>
<b>Laboratory</b>	<b>- h</b>

<b>Participation in project classes</b>	<b>- h</b>
<b>Participation in seminar</b>	<b>- h</b>
<b>Preparation course on e-learning</b>	<b>- h</b>
<b>Test</b>	<b>- h</b>
<b>Entrance test for laboratory classes</b>	<b>- h</b>
<b>Project's defence</b>	<b>- h</b>
<b>Exam</b>	<b>- h</b>
<b>Consultation hours</b>	<b>10 h</b>
<b>DIRECT TEACHING, hours/ ECTS</b>	<b>40 h / 1,33 ECTS</b>
<b>Preparation for tutorials</b>	<b>10 h</b>
<b>Preparation for laboratories</b>	<b>- h</b>
<b>Preparation for projects</b>	<b>- h</b>
<b>Preparation for seminars</b>	<b>- h</b>
<b>Preparation for e-learning classes</b>	<b>- h</b>
<b>Participation in e-learning classes</b>	<b>- h</b>
<b>Working on project</b>	<b>- h</b>
<b>Preparation for tests</b>	<b>10 h</b>
<b>Preparation for exam</b>	<b>- h</b>
<b>SELF-STUDY, hours/ ECTS</b>	<b>20 h / 0,67 ECTS</b>
<b>TOTAL (hours)</b>	<b>∑ 60 h</b>
<b>TOTAL ECTS</b>	<b>2 ECTS</b>

#### 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
Naumczyk J., Chemia środowiska, Wydawnictwo Naukowe PWN, Warszawa 2017
vanLoon G.W., Duffy S.J., Chemia środowiska, Wyd. Naukowe PWN, Warszawa 2007
O'Neil P., Chemia środowiska, Wyd. Naukowe PWN, Warszawa 1998
Andrews J., Brimblecombe P., Jickelis T.D., Liss P.S., Wprowadzenie do chemii środowiska, Wyd. Naukowo-Techniczne, Warszawa, 2006

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

1. Dr Beata Karwowska, bkarwowska@is.pcz.pl

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

1. Dr Beata Karwowska, bkarwowska@is.pcz.pl

<b>Learning outcome</b>	<b>In relation to the learning outcomes specified for the field of study</b>	<b>Course objectives</b>	<b>Course content</b>	<b>Course study methods</b>	<b>Methods of assesment</b>
<b>EK 1</b>	<b>K_W01, K_U01, K_U05</b>	<b>C.1</b>	<b>Lectures</b>	<b>1, 2, 4, 5</b>	<b>F1., S1.</b>
<b>EK 2</b>	<b>K_W01, K_U01, K_U05</b>	<b>C.2</b>	<b>Lectures</b>	<b>1, 2, 4, 5</b>	<b>F1., S1.</b>
<b>EK 3</b>	<b>K_W01, K_U01, K_U05</b>	<b>C.3</b>	<b>Tutorials</b>	<b>1, 2, 3, 4, 5</b>	<b>F1., S2.</b>

**II. OTHER USEFUL INFORMATION**

1. All the information on the class schedule is posted on the student information board and online at: [www.is.pcz.pl](http://www.is.pcz.pl)
2. The information about the consultation hours is provided to students on the first class meeting and posted online at website of *Faculty of Infrastructure and Environment* as well as of *Department of Chemistry, Water and Wastewater Technology*.
3. The information on course completion and grade is provided to students on the first class meeting.