

Course title: Environmental chemistry Chemia środowiska		
Programme: Environmental Engineering		Code: 1.1
Type of course: exact sciences, module 1	Course level: first cycle studies	Semester: I
Form of classes: lecture, tutorials	Number of hours per week: 1W, 1C	Credit points: 3 ECTS
Education profile: academic		Course language: English

GUIDE TO THE SUBJECT

I. COURSE CHART

COURSE OBJECTIVES

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

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;
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;
- EK 2** - Student has got general knowledge about basic processes of neutralization of environmental contaminations;
- EK 3** - Student is able to solve of environmental chemistry calculational problems;

COURSE CONTENT

Form of classes - lectures	Hours
W 1,2 –Geoecosystems characterization	2
W 3,4 –Chemical reactions in atmosphere	2
W 5,6 - Earth's energy balance	2

W7,8,9 - Chemical pollution in environment – selftreatment processes and chemical treatment methods	3
W10,11 - The chemical element cycles in environment	2
W 12,13 - Water in environment	2
W 14,15 - Soil chemistry	2
Form of classes - tutorials	Hours
C1 –Introduction to course, revive of important chemical principles	1
C2 –Gas laws	1
C3,4 –Atmospheric chemistry	2
C5 - Partial test 1	1
C6,7 – Equilibria in aqueous solution	2
C8,9 – Water chemistry	1
C10 – Partial test 2	2
C11,12 – Environmental chemistry of colloids and surfaces	1
C13 – Soil chemistry	2
C14 – Pollutants in soil	1
C15 – Partial test 3	1

COURSE STUDY METHODS

1. multimedia presentation
2. clssicalblackboard
3. physico – chemical tables, periodic table of elements
4. sets of problems for solving during tutorials or for individual work of student
5. educational equipment for lectures and tutorials

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

F1. – individual preparation of student to classes
F2. – cooperation with other students during classes
F3 – 3 partial tests during tutorials

STUDENT WORKLOAD

Form of activity	Workload (hours)
Participation in class activities.....	15W, 15C →..... 30
Preparation for tutorials 15
Preparation for tests..... 6
Consultation hours 15
Total	Σ 66h
Total ECTS	3 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;
Tessier A., Campbell P.G.C., Bisson M.: „Sequential Extraction Procedure for the Speciation of Particulate Trace Metals”, Analytical Chemistry, 51(7), 1979, 844 – 850;
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;
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;
Migaszewski Z.M., Gałuszka A.: „Podstawy geochemii środowiska”, Wyd. Naukowo-Techniczne, Warszawa, 2007;
Dobrzańska B. Dobrzański D. Kielczowski D.: „Ochrona środowiska przyrodniczego”, Wyd. Naukowe PWN, Warszawa, 2008;
Hermanowicz W., Dojlido J., Dożańska W., Koziarowicz B., Zerbe J.: „Fizyczno-chemiczne badanie wody i ścieków”, Arkady, Warszawa 1999;
Dojlido J.R.: „Chemia wód powierzchniowych”, Wyd. Ekonomia i Środowisko, Białystok, 1995;
Gomółka E., Szaynok A.: „Chemia wody i powietrza”, Ofic. Wyd. Pol. Wrocławskiej, Wrocław, 1997;
Kołodziejczyk A.: „Naturalne związki organiczne”, Wyd. Naukowe PWN, Warszawa, 2006;

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

1. dr Beata Karwowska, bkarwowska@is.pcz.czest.pl

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

1. dr Beata Karwowska, bkarwowska@is.pcz.czest.pl

Learning outcome	In relation to the learning outcomes specified for the field of study	Course objectives	Course content	Course studymethods	Methods of assesment
EK 1	K_W02, K_U02	C1, C2	W1 – W15	1,2,3,5	F1, F2
EK 2	K_W02, K_U02	C1, C2	W1 – W15	1,2,3,5	F1, F2
EK 3	K_W02, K_U02	C3	C1 – C15	2,3,4,5	F1, F2, F3

II. EVALUATION

Learning outcomedescription	Mark 2	Mark 3	Mark 4	Mark 5
EK 1 - Student is able to description and interpretation of phenomena and processes in surrounding environment	Student can not to describe the phenomena and processes in environment	Student can to describe the single phenomena and processes in environment, but does not understand the idea of them	Student can to describe the most phenomena and processes in environment,	Student can to describe practically all phenomena and processes in environment, understand them and analyses correlation between them
EK 2 - Student has got general knowledge about basic processes of neutralization of environmental contaminations	Student does not know basic processes of neutralization of environmental contaminations	Student is able to make mention of basic processes of neutralization of environmental contaminations	Student can to make mention of the most basic processes of neutralization of environmental contaminations, knows their theory and the base of their conducting	Student can to make mention of all basic processes of neutralization of environmental contaminations, knows their theory and the base of their conducting, is able to propose a method for selected environmental problem and to predict the course of the process
EK 3 -Student is able to solve of environmental chemistrycalculational problems	Student can not to solve simple environmental chemistry calculations	Student can to solve simple environmental chemistry calculational problems only	Student can to solve complex environmental chemistrycalculational problems linking two or three subjects, but has problems with critical judgment of results and with physical meaning of them	Student can to solve complex environmental chemistry calculational problems linking a lot of chemical subjects, judges critically obtained results and interprets them correctly

III. 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
2. The information about the consultation hours is provided to students on the first class meeting and posted online at website 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.

