



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Environmental Chemistry

Course

Field of study

Environmental Engineering Extramural First

Area of study (specialization)

Level of study

First-cycle studies

Form of study

part-time

Year/Semester

1/1

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

18

Laboratory classes

0

Other (e.g. online)

Tutorials

18

Projects/seminars

Number of credit points

4

Lecturers

Responsible for the course/lecturer:

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Faculty of Environmental Engineering and
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Responsible for the course/lecturer:

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Prerequisites

1.Knowledge:

The knowledge of chemistry at the high school level, the basic level

2.Skills:

The solving of equations and systems of algebraic equations, the formulation of the chemical and physico-chemical problems in mathematics languages, solve the simple differential and logarithmic equations



3. Social competencies

The awareness of the need to constantly update and supplement knowledge and skills.

Course objective

The aim of the education in the context of this course is to strengthen and broaden the students knowledge of the basic areas of chemistry necessary for further study environmental engineering. The students will have knowledge of the structures and properties of chemical compounds and chemical reactions. They will learn about the factors affecting their reactivity. The students understanding the importance of chemical equilibrium and kinetics of the processes. During the course students will obtain the ability to design and conduct laboratory experiments and analyzing the results. The students will be write based on literature about the problems in the basic and physical chemistry

Course-related learning outcomes

Knowledge

1. The student knows the basic concepts and laws of chemistry - [KIS_W01, KIS_W03,]
2. The student has knowledge of the properties of the substance depending on the type of bonds present in the intra- and intermolecular reactions. The student know the types of the inorganic compounds and the thermodynamic parameters of the chemical reaction. The student understand the impact of concentration, temperature and catalyst on the rate of chemical reactions - [KIS_W04, KIS_W03]
3. The student knows the principles and methods of computational chemistry (chemical laws, formulas and chemical equations, concepts: the concentration of solutions and reactions in solutions) - [KIS_W04]
4. The student knows and understands the chemical phenomena occurring in the environment - [KIS_W03]
5. The student has knowledge of the ways and methods of prevention and reduction of the chemical contaminants in the environment - [KIS_W04]

Skills

1. The student is able to obtain information on chemical topics from literature, databases and other properly selected sources - [KIS_U01]
2. The student can see the relationship between the structure of the substance and its physical and chemical properties; is able to balance reaction equations, performs chemical calculations, distinguishes between basic types of bonds in molecules, recognizes systemic aspects when formulating and solving problems - [KIS_U05]
3. The student can practically apply the acquired chemical knowledge in practice, presents and interprets the results obtained and draws conclusions - [KIS_U03]



Social competences

1. The student understands the non-technical aspects and effects of engineering activities and their impact on the environment - [K_K01]
2. The student is aware that knowledge in the field of chemistry is necessary in order to properly solve problems related to the profession of environmental engineer, is aware of the responsibility for making decisions - [KIS_K03]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture:

- 1-piece written final test time of 90 minutes, the test includes checking skills (2 tasks), and knowledge test (3 questions);
- In addition, continuous assessment for all classes (rewarding activity).

Classes:

- 2 mini-written tests during the semester;
- In addition, continuous assessment for all classes (rewarding activity)

The possibility of obtaining additional points for the activity in the classroom, especially for:

- reporting any confusion conducting
- propose other ways of solving problems;
- assistance in the improving teaching materials;
- identifying opportunities to improve the teaching process

Scale of written evaluations:

50% - 60% sufficient

61% - 70% positive plus

71% - 80% good

81 - 90% good plus

91 - 100% very good

Programme content



The Lecture

Basic definitions and laws of chemistry. Elementary particles. Construction of atoms and molecules. Chemical elements. The periodic table of elements. The valence bond theory and the theory of molecular orbitals. The chemical bonds. Electronegativity and polarity. Intermolecular interaction. The chemical reactions and chemical equations. The rate of chemical reactions, the effect of concentration and temperature. Chemical equilibrium. Redox reactions. Electrolytes, dissociation, pH. Solutions and their properties. Fundamentals of electrochemistry: electrochemical series of the metals, galvanic cell, electrolysis. Outline of organic chemistry. Selected groups of organic compounds: hydrocarbons, alcohols, organic acids, amines, thiols, polymers.

Classes

Calculations based on the chemical formula of the compound. molar and procentage concentration, mixing, dilution and increasing the concentration of the solutions. Equilibria in aqueous electrolyte solutions: electrolytic dissociation, the degree of dissociation, ionic product of water, the hydrogen ion exponent - pH. redox reactions

Teaching methods

information lecture, lecture with multimedia presentation, problem lecture; tutorials:accounting exercises;

Bibliography

Basic

1. Szperliński Z., Chemia w ochronie i inżynierii środowiska, tomy 1-3, Oficyna Wydawnicza PW, W-wa 2002
2. Sienko M.J., Plane R.A., Chemia ? podstawy i zastosowania, WNT, W-wa, 1999.
3. Whittaker A.G., Mount A.R., Heal M.R., Krótkie wykłady, Chemia fizyczna, PWN S.A.,W-wa 2003

Additional

1. Cox P.A., Krótkie wykłady. Chemia nieorganiczna, PWN S.A.,W-wa 2003.
2. Cox P.A. Krótkie wykłady. Chemia organiczna, PWN S.A.,W-wa 2003
3. Dojlido J.R.: Chemia wód powierzchniowych, Wydawnictwo Ekonomia i Środowisko, Białystok, 1995
4. Lee J.D., Związła chemia nieorganiczna, PWN, W-wa, 1994.
5. Pauling L., Pauling P., Chemia, PWN, W-wa, 1997



Breakdown of average student's workload

	Hours	ECTS
Total workload	100	4,0
Classes requiring direct contact with the teacher	36	1,5
Student's own work (literature studies, preparation for classes, preparation for tests) ¹	64	2,5

¹ delete or add other activities as appropriate