



COURSE DESCRIPTION CARD - SYLLABUS

Course name

General and Inorganic Chemistry

Course

Field of study

Year/Semester

Environmental Protection Technologies

I/2

Area of study (specialization)

Profile of study

-

general academic

Level of study

Course offered in

First-cycle studies

Polish

Form of study

Requirements

full-time

compulsory

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

0

45

0

Tutorials

Projects/seminars

0

0

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

dr eng. Andrzej Szymański

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Faculty of Chemical Technology

street: Berdychowo 4, 60-965 Poznań

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Prerequisites

Knowledge:

Student has knowledge resulting from passing the course of General and Inorganic Chemistry in the first semester, in particular:

W1) Has extended knowledge regarding the structure of matter; identifies the components of matter and characterizes the interactions between them; knows the structure of atoms and the genesis of their creation; defines and explains the laws governing the interaction of matter components



W2) Indicates the properties of chemical elements associated with their electron configuration, and location in the periodic table; knows and explains the relationship between electron configuration and reactivity

W3) Lists the reactions of inorganic compounds of industrial importance - describes and explains their chemistry

W4) Knows and describes the harmful effects on the environment of some inorganic compounds - identifies the main sources of their emissions into the environment

Skills:

Student has the skills resulting from passing the course of General and Inorganic Chemistry in the first semester, in particular:

1. Student analyzes and interprets the content of computational tasks and performs chemical calculations (mainly in the field of concentration conversion, stoichiometry and basics of thermodynamics of chemical reactions)
2. Uses the periodic table of elements and is able to use it as a basic source of information about the physicochemical properties of elements and their compounds
3. Uses the current nomenclature of inorganic compounds and is especially able to combine the correct name of the compound with its correct summary (stoichiometric) formula, which can correctly write, and on this basis prepare its structural formula
4. Writes and correctly balances chemical reactions and is able to predict the direction of chemical reactions of any type; can quantify the steady state of the reaction (he can calculate the equilibrium constant of a chemical reaction)

Social competences:

Student has the social competences resulting from passing the course of General and Inorganic Chemistry in the first semester, in particular:

- K1) Is aware of the continuous, rapid increase of knowledge in the field of inorganic chemistry, and on this basis - the level of his knowledge in this field, which causes him a determination and an active attitude in further study and assimilation of new knowledge on his own initiative
- K2) Is aware that knowledge regarding inorganic chemistry is widely used in industry and the economy; understands in this connection and reckons with the necessity of practical use of acquired knowledge and skills in the future; is aware of the responsibility associated with this



Course objective

Deepening and consolidation of knowledge regarding general and inorganic chemistry and expanding it with knowledge and practical skills related to work in a chemical laboratory. Introduction of the principles of safe work in the laboratory. Introduction of the organization of laboratory work and the basic techniques used in laboratory work. Teaching the correct interpretation of experimental results

Course-related learning outcomes

Knowledge

1. Has solid theoretical knowledge in the field of inorganic and general chemistry and, in particular, describes the structure of matter at the nuclear, atomic and molecular level; identifies the properties of elements and their compounds, explaining them in connection with the place of the element in the periodic table (K_W07)
2. Knows the principles of health and safety at work in a chemical laboratory and, in particular, the principle of maintaining order in the workplace; knows the basic principles of first aid in the event of accidents and incidents (K_W16)
3. Lists and characterizes the basic techniques of laboratory work (K_W09)
4. Knows how to plan and carry out a simple chemical experiment and how to analyze, develop and describe its results (K_W12)

Skills

1. Has well-established skills in the field of chemical calculations, using the periodic table of elements, notation of summary and structural formulas of chemical compounds as well as writing and balancing of any type of chemical reactions involving inorganic compounds (K_U01)
2. Is able to analyze and solve typical chemical problems based on knowledge from various sources, including knowledge sought independently; knows how to compare knowledge from different sources (K_U01)
3. Can organize his own work in a chemical laboratory; correctly applies laboratory work techniques; correctly uses laboratory equipment and correctly interprets the results obtained (K_U01, K_U11)
4. Practically implements the principles of safe work in a chemical laboratory (K_U14)

Social competences

1. Perceives the relationship between own safety as well as the safety of others working in a chemical laboratory and the compliance with the regulations which apply in a chemical laboratory; develops a habit of maintaining order in the workplace (K_K03)
2. Is aware of the threat to the natural environment from some commonly used, inorganic chemical compounds; understands the need for action to minimize these harmful effects (K_K02, K_K06)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:



Laboratory: the teacher regularly controls the theoretical preparation of students for the implementation of the laboratory exercise plan. The check is carried out by oral questioning and/or in the form of written tests. The teacher observes and assesses the behavior of students in the laboratory, including the ability to organize laboratory work and manual skills during the performance of the exercises planned. Written reports on performed exercises are subject to evaluation. The final grade from laboratory classes is the outcome of the above three components - it is evaluated according to the scale of grades in force at Poznan University of Technology

As a summary of the entire course of General and Inorganic Chemistry (1st and 2nd semester), a final exam is carried out, consisting of 15-20 questions of varying degrees of difficulty (differently scored) - credit threshold: 50% of the points. Based on the number of points obtained, the final grade is issued, according to the rating scale in force at Poznan University of Technology

Programme content

A set of laboratory exercises performed:

1. pH scale
2. Acid-base reactions
3. The pH of aqueous solutions of salts
4. Buffer solutions
5. Complexing reactions I (gradual of coordination complexes formation, buffer solution of the coordination complex)
6. Complexing reactions II (properties of coordination complexes: coordination complexes and acidity, stability of coordination complexes)
7. Oxidation and reduction reactions I (reduction with metals, hydrogen ion as an oxidant, power of oxidants and reducers, the effect of temperature on the redox reaction)
8. Oxidation and reduction reactions II (effect of pH on redox reactions, disproportionation reactions)
9. Separation by precipitation
10. Separation by extraction
11. Verification of the accuracy of laboratory pipettes
12. Qualitative analysis of cations (according to the division of Fresenius into five analytical groups)
13. Qualitative analysis of anions (according to the division of Aleksiejew into three analytical groups)
14. Qualitative analysis of salts

Teaching methods



Classes are practical, they consist in the students themselves doing exercises included in the course plan. Exercises are performed in accordance with the attached instructions. The teacher personally shows and explains how to perform the activities and operations that students meet for the first time. The teacher constantly controls the student's behavior in the laboratory and the way of performing his work themselves. He immediately notices and corrects irregularities. Students are required to keep notes on the basis of which they prepare reports on laboratory exercises

Bibliography

Basic

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Additional

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2. F.A. Cotton, G. Wilkinson, C. Murillo, M. Bochmann, Chemia nieorganiczna. Podstawy, PWN, Warszawa 1995
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6. G.W. van Loon, S. J. Duffy, Chemia środowiska, PWN, Warszawa 2008

Breakdown of average student's workload

	Hours	ECTS
Total workload	110	5,0
Classes requiring direct contact with the teacher	58	2,6
Student's own work (literature studies, preparation for laboratory classes, preparation of laboratory reports, preparing for the partial tests (laboratory) and for the final exam) ¹	52	2,4

¹ delete or add other activities as appropriate