COURSE DESCRIPTION CARD - SYLLABUS

Course name

Inorganic Technology

Course

Field of study

Chemical and Process Engineering

Year/Semester

3/5

Area of study (specialization)

-

Profile of study

general academic

Level of study

First-cycle studies

Course offered in

polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

30

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

5

Lecturers

Responsible for the course/lecturer:

D. Sc. Filip Ciesielczyk

e-mail: Filip.Ciesielczyk@put.poznan.pl

telephone 61 665-36-26

Faculty of Chemical Technology

Instituite of Chemical Technology and Engineering

Berdychowo 4, PL-60965 Poznan

Responsible for the course/lecturer:

Dr. Eng. Agnieszka Kołodziejczak-Radzimska

e-mail: Agnieszka.Kolodziejczak-Radzimska@put.poznan.pl

telephone 61 665-36-26

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Prerequisites

Student has knowledge of general and inorganic chemistry, physical chemistry and apparatus of chemical industry, knows the basic methods, techniques and tools used in chemical analysis (core curriculum of I and II year of the studies). Student can obtain information from literature, databases and other sources, can interpret the obtained information to draw conclusions and formulate opinions in the area of general and inorganic chemistry. Student is able to apply that knowledge in practice, both during the implementation work and the further education. Student is able to interact and work in a group.

Student is able to properly identify the priorities used to perform a specific task. Student understands the need for further education.

Course objective

Acquiring basic knowledge in the field of inorganic chemical technology. Understanding the basic industrial processes and operations related to inorganic technology. Ability to select raw materials and chemical intermediates. Understanding the methods of obtaining inorganic products and their identification. Indication of the possibility of using products manufactured in inorganic technology processes. Proper waste handling. Proposal of using environmentally friendly technologies.

Course-related learning outcomes

Knowledge

K_K03 - has structured, theoretically founded general knowledge in the field of inorganic, organic, physical and analytical chemistry enabling understanding, description and study of chemical phenomena and processes related to inorganic chemical technology

K_W04 - has general knowledge in the field of inorganic chemical technology as a related field of study to chemical and process engineering.

K_W05 - has basic knowledge related to the selection of materials used in the construction of chemical apparatus and installations

K_W09 - has knowledge of raw materials, products and processes used in the chemical industry and directions of development of the chemical industry in the country and in the world

K_W10 - knows the basics of kinetics, thermodynamics and catalysis of chemical processes

K_W13 - has structured, general and detailed knowledge of inorganic chemical technology and the apparatus of the chemical industry

K_W14 - has a basic knowledge of the life cycle of products, equipment and installations in the chemical industry

Skills

K_U01 - is able to obtain information from literature, databases and other sources related to inorganic chemical technology, also in a foreign language, integrate them, interpret and draw conclusions and form opinions

K_U03 - can prepare in Polish and in a foreign language a well documented study in the field of inorganic chemical technology in Polish and in a foreign language

K_U05 - has the ability to self-study

K_U14 - can use the principles of saving raw materials and energy, and through the modernization of equipment and processes obtains favorable economic indicators and reduction of environmental burden

K_U22 - can work in a team, plan and organize team work

Social competences

K_K01 - understands the need for further training and raising their professional and personal competences

K_K02 - is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the environment and the associated responsibility for decisions made

K_K04 - is aware of the responsibility for own work and readiness to submit to work in a team and to bear responsibility for jointly performed tasks

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture - exam, criterion: 3 - 50.1%-70.0%; 4 - 70.1%-90.0% and 5 from 90.1%

Laboratory - reports from laboratory exercises, colloquium, oral/written answer, presentation of theoretical and experimental material, solving scientific problems, assessment of student's activity in laboratory classes, evaluation of practical classes, evaluation of teamwork; criterion: 3 - basic theoretical and practical knowledge, preparation skills concerning reports from laboratories, basic participation in theoretical and practical classes without additional involvement; 4 - practical preparation supported by theoretical knowledge, the ability to formulate the right conclusions from the data obtained during the laboratory, active participation in classes supported by the desire to acquire additional practical and theoretical knowledge; 5 - complete preparation for classes, the ability to draw conclusions at an advanced level, and also posed defense, precise execution of entrusted tasks, independent search additional theoretical knowledge, coordination of work in a research team, an ambitious approach to the subject matter.

Programme content

1. Chemical concept of method and technological principles with particular reference to inorganic processes.

2. Mineral and fuel resources.

3. Wet and dry methods of enrichment of minerals.

4. Coal processing core processes: combustion, gasification and degasification of coal, desulfurization of coal.

5. Production of synthesis gas.

6. Heterogenous catalysis.

7. Technology of sulfur compounds (sulfur combustion, oxidation of SO2-SO3, absorption of SO3, sulfuric acid).

8. Technology of nitrogen compounds (ammonia synthesis, combustion of ammonia, absorption of nitrogen oxides, synthesis of urea, nitrogen fertilizers, nitric acid).

9. High pressure processes in gas and liquid phases.

10. Production of soda.

11. Industry of phosphorus and phosphate fertilizers.

12. Preliminary information on trends in the inorganic chemical technology.

Teaching methods

Lecture - multimedia presentation

Laboratory - teaching materials for the laboratory in pdf files, practical exercises

Bibliography

Basic

1. K. Schmidt-Szałowski, J. Sentek, J. Raabe, E. Bobryk, Podstawy technologii chemicznej. Procesy w przemyśle nieorganicznym, Oficyna Wydawnicza Politechniki Warszawskiej Warszawa 2004.

2. J.A. Moulijn, M. Makkee, A. van Diepen: Chemical Process Technology, Wiley-Blackwell, Chichester 2013.

3. J. Szarawara, J. Piotrowski, Podstawy teoretyczne technologii chemicznej, WNT Warszawa 2010.

Additional

1. C.H. Bartholomew and R.J. Farrauto, Fundamentals of industrial catalytic processes, Wiley, Hoboken, New Jersey 2006.

2. M.B. Hocking, Handbook of chemical technology and pollution control, Elsevier, Amsterdam 2005.

3. G. Ertl, H. Knözinger, F. Schüth, J. Weitkamp, Handbook of heterogeneous catalysis, WILEY-VCH Weinheim 2008.

4. S. Bretsznajder, W. Kawecki, J. Leyko, R. Marcinkowski: Podstawy ogólne technologii chemicznej, WNT, Warszawa 1973.

5. M. Taniewski: Technologia chemiczna - surowce, Wydawnictwo Politechniki Śląskiej, Gliwice 1997.

6. H. Konieczny: Podstawy technologii chemicznej, PWN, Warszawa 1975.

7. J. Kępiński: Technologia chemiczna nieorganiczna, PWN, Warszawa 1975.

8. Materiały laboratoryjne (opracowania ćwiczeń)

Breakdown of average student's workload

	Hours	ECTS
Total workload	135	5,0
Classes requiring direct contact with the teacher	85	3,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	50	2,0

[1] delete or add other activities as appropriate