COURSE DESCRIPTION CARD - SYLLABUS

Course name

Zielona chemia i recykling materiałów przemysłowych (Green chemistry and recycling of industrial materials)

Course

Field of study	Year/Semester
Technologia chemiczna (Chemical Technology)	II/3
Area of study (specialization)	Profile of study
Technologia organiczna (Organic Technology)	general academic
Level of study	Course offered in
Second-cycle studies	Polish
Form of study	Requirements
full-time	compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
15	0	0
Tutorials	Projects/seminars	
0	0	

Number of credit points

2

Lecturers

Responsible for the course/lecturer:

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Instituite of Chemical Technology and Engineering

Berdychowo 4, PL-60965 Poznan

Responsible for the course/lecturer:

Prerequisites

Structured and systematic knowledge in the field of general and inorganic chemistry, organic chemistry and chemical technology, and apparatus of the chemical industry (the curriculum of the full-time first cycle studies). Ability to solve elementary engineering problems based on knowledge. Ability to obtain information from the indicated sources in Polish and a foreign language. Understanding the need for further education, understanding the need to expand their competences, readiness to cooperate within a team.

Course objective

Acquiring basic knowledge in the field of waste substances managment raising from the processes of inorganic chemical technology. Understanding the basic industrial processes and operations related to inorganic technology and energy acquisition. Ability to select raw materials and chemical intermediates. Indication of the possibility of using post-production wastes in inorganic technology processes. Learning methods of reducing the harmful impact of technological processes and methods of energy acquisition on the environment. Acquisition of basic information related to waste management. Proposal of using environmentally friendly technologies.

Course-related learning outcomes

Knowledge

K_W2 - has expanded and in-depth knowledge in chemistry and other related areas of science, allowing to formulate and solve complex tasks related to chemical technology

K_W3 - has knowledge of complex chemical processes, including the appropriate selection of materials, raw materials, methods, techniques, apparatus and equipment for carrying out chemical processes and characterizing the products obtained

K_W6 - has expanded knowledge of the latest chemical and material technologies, including advanced materials and nanomaterials technologies, knows current trends in the development of chemical industrial processes

K_W7 - knows modern methods of testing the structure and properties of materials, necessary to characterize raw materials and products of the chemical and related industries

K_W11 - has a well-established and expanded knowledge of the selected specialty

K_W13 - has extended knowledge of advanced devices and apparatus used in chemical technology

K_W14 - has knowledge of selected issues of modern chemical knowledge and aspects of copyright and industrial property

Skills

K_U1 - has the ability to obtain and critically evaluate information from literature, databases and other sources, and formulate opinions and reports on this basis

K_U2 - has the ability to work in a team and lead a team

K_U5 - can independently determine the directions of further education and implement self-education

K_U11 - is able to properly verify the concepts of engineering solutions in relation to the state of knowledge in technology and chemical engineering

K_U12 - has the ability to adapt knowledge of chemistry and related fields to solve problems in the field of chemical technology and planning new industrial processes

K_U15 - can critically analyze industrial chemical processes and introduce modifications and improvements in this area, using the acquired knowledge, including knowledge about the latest achievements of science and technology

K_U16 - has the ability to assess the technological suitability of raw materials and the selection of the technological process in relation to the quality requirements of the product

K_U23 - has the ability to use the knowledge acquired under the specialty in professional activity

Social competences

K_K1 - is aware of the need for lifelong learning and professional development

K_K2 - is aware of the limitations of science and technology related to chemical technology, including environmental protection

K_K4 - observes all rules of teamwork; is aware of the responsibility for joint ventures and achievements in professional work

K_K6 - can think and act in a creative and entrepreneurial way

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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

Programme content

1. Characteristics of inorganic and organic pollutant streams within inorganic technology

2. Characteristics and methods of waste management generated during the acquisition of energy from fossil fuels (fly ash, saline mine water)

3. The phosphorus compounds industry and harmful waste - waste phosphogypsum management

4. Waste management of fluorine compounds

5. Soda technology and post-production waste

6. Inorganic pigments technology with particular emphasis on titanium white production

Teaching methods

Lecture - multimedia presentation

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. Jess Andreas, Chemical Technology: An Integral Textbook, Wiley 2013, ISBN13 (EAN): 9783527304462, ISBN10: 3527304460.

3. Moulijn Jacob A., Chemical Process Technology, Wiley-Blackwell 2013, ISBN13 (EAN): 9781444320251, ISBN10: 1444320254.

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 2016.

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

4. F. A. Henglein, Chemical Technology, Elsevier, 2013, ISBN 1483160254, 9781483160252.

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

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

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

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

Breakdown of average student's workload

	Hours	ECTS
Total workload	45	2,0
Classes requiring direct contact with the teacher	25	1,1
Student's own work (literature studies, preparation for test) [1]	20	0,9

[1] delete or add other activities as appropriate