



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Chemical Technology

Course

Field of study

Year/Semester

Environmental Protection Technologies

III/5

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)

60

45

0

Tutorials

Projects/seminars

0

15

Number of credit points

7

Lecturers

Responsible for the course/lecturer:

D. Sc. Katarzyna Materna

e-mail: katarzyna.materna@put.poznan.pl

telephone 61 665-36-84

Faculty of Chemical Technology

Institute of Chemical Technology and
Engineering

Berdychowo 4, PL-60965 Poznan

Responsible for the course/lecturer:

D. Sc. Katarzyna Siwińska-Ciesielczyk

e-mail: katarzyna.siwinska-ciesielczyk@put.poznan.pl

telephone 61 665-36-26

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Prerequisites

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

Course-related learning outcomes

Knowledge

K_W03 - has basic knowledge related to the selection of materials used in the construction of apparatus and installations used in environmental protection technologies

K_W05 - knows the rules of environmental protection related to chemical production and waste management

K_W06 - knows the rules for defining and characterization of raw materials, products and processes used in the chemical industry; has knowledge of the development of chemical industry in the country and in the world

K_W07 - has structured, theoretically founded general knowledge in the field of chemistry and organic and inorganic chemical technology

K_W08 - knows the basics of kinetics, thermodynamics and catalysis of chemical processes

K_W11 - has the knowledge to describe the basic development trends related to environmental protection technologies

K_W12 - knows the methods, techniques, tools and materials used to solve simple engineering tasks related to environmental technologies

K_W13 - has basic knowledge about the life cycle of products, devices and installations in environmental protection technologies

Skills

K_U01 - obtains information from literature, databases and other sources related to chemical sciences, integrates them, interprets and draws conclusions and formulates opinions

K_U02 - works individually and cooperates effectively in a team

K_U04 - can prepare a report concerning scientific problem in the field of study, in Polish and a foreign language



K_U05 - knows how to prepare and present an oral presentation related to issues of environmental protection technology, in Polish and foreign language

K_U06 - has the ability to self-study

K_U18 - can assess the suitability and choose tools and methods to solve the problem in the field of environmental protection technology

Social competences

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

K_K03 - is able to interact and work in a group, taking on various roles in it

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 and projects - reports from laboratory exercises, colloquium, oral/written answer, presentation of theoretical and experimental material, solving scientific problems, assessment of student's activity in lectures, laboratory and project classes, evaluation of practical classes, evaluation of teamwork; criterion: 3 - basic theoretical and practical knowledge, preparation skills concerning reports from laboratories and projects, 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 and the projects, 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, preparation of project assumptions at a high substantive level and their presentation, 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

Organic Technology:

1. Raw material base for organic industry - renewable and fossil raw materials.
2. Technological principles in the organic industry (the principle of best use of potential difference, the principle of best use of raw materials, energy, apparatus, the principle of technological moderation).
3. Receiving and processing of the most important organic compounds (including synthesis gas, olefins, aromatic hydrocarbons and others), large volume organic industry products.
4. Basic unit processes and technologies for processing of chemical raw materials into finished products and semi-finished products for further synthesis. Application products: surfactants, dyes, selected low-tonnage organic products.



5. Biomass - chemical raw material.
6. Preliminary information on development trends in organic chemical technology.

Inorganic Technology:

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 SO_2 - SO_3 , absorption of SO_3 , 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

Project - multimedia presentations, illustrated with examples on a board, group work, discussion of scientific problems.

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. E. Grzywa, J. Molenda: Technologia podstawowych syntez organicznych, T. 1 i 2, WNT, Warszawa 2008.
3. J.A. Moulijn, M. Makkee, A. van Diepen: Chemical Process Technology, Wiley-Blackwell, Chichester 2013.
4. J. Szarawara, J. Piotrowski, Podstawy teoretyczne technologii chemicznej, WNT Warszawa 2010.
5. E. Kociołek-Balawejder (red.): Technologia chemiczna organiczna: wybrane zagadnienia, Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu, 2013.
6. B. Burczyk: Biomasa. Surowiec do syntez chemicznych i produkcji paliw, Oficyna Wydawnicza Politechniki Wrocławskiej, Wrocław 2011.
7. M. Stasiewicz (red.): Technologia chemiczna organiczna : ćwiczenia laboratoryjne, Wydawnictwo Politechniki Poznańskiej, Poznań 2013.

Additional

1. S. Bretsznajder, W. Kawecki, J. Leyko, R. Marcinkowski: Podstawy ogólne technologii chemicznej, WNT, Warszawa 1973.
2. R. Zieliński: Surfaktanty: budowa, właściwości, zastosowania, Wydawnictwo Uniwersytetu Ekonomicznego, Poznań 2017.
3. B.I. Stiepanow [tł. z jęz. ros.: Wojciech Czajkowski et al.]: Podstawy chemii i technologii barwników organicznych, WNT, Warszawa 1980.
4. M. Taniewski: Technologia chemiczna - surowce, Wydawnictwo Politechniki Śląskiej, Gliwice 1997.
5. M. Taniewski: Przemysłowa synteza organiczna. Kierunki rozwoju, Wydawnictwo Politechniki Śląskiej, Gliwice 1991.
6. H. Konieczny: Podstawy technologii chemicznej, PWN, Warszawa 1975.
7. J. Kępiński: Technologia chemiczna nieorganiczna, PWN, Warszawa 1975.
8. Laboratory materials (exercise elaboration).

Breakdown of average student's workload

	Hours	ECTS
Total workload	180	7,0
Classes requiring direct contact with the teacher	128	5,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	52	2,0

¹ delete or add other activities as appropriate