COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fundamentals of chemical technology [S1IFar2>PTC]

Course

Field of study
Pharmaceutical Engineering

Year/Semester
3/5

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
15

Laboratory classes
30

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

4,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of general and organic chemistry, physical chemistry, thermodynamics and chemical engineering; ability to solve elementary problems in the field of chemical technology, including the ability to assess the possibility of implementing the process on an industrial scale and control its course, and analysis of its impact on the natural environment; the ability to obtain information from indicated sources;

Course objective

Obtaining knowledge in the field of creating a technological project of any technology as well as material and energy balancing processes

Course-related learning outcomes

Knowledge:
1. Student has ordered, theoretically founded general knowledge in the field of inorganic, organic, physical and analytical chemistry enabling understanding, description and research of chemical phenomena and processes related to pharmaceutical engineering. [K_W4]
2. Student knows the rules of environmental protection related to pharmaceutical technology and waste management, has the necessary knowledge about the risks associated with the implementation of

chemical and pharmaceutical processes. [K_W8]
3. Student knows the basics of kinetics, thermodynamics and catalysis of chemical processes. K_W11]
4. Student has basic knowledge in the field of apparatus and installation construction in the pharmaceutical industry and related industries. [K_W18]
5. Student knows the basic methods, techniques, tools and materials used to solve simple engineering tasks in the field of pharmaceutical engineering and related industries. [K_W21]

Skills:
1. Student explains the basic phenomena related to significant ones based on general knowledge processes, distinguishes between types of chemical reactions and has the ability to select them for chemical processes. [K_U2]
2. Student can well-prepare documentations in pharmaceutical engineering. [K_U5]
3. Student is able to analyze and evaluate the functioning of basic processes and unit operations of pharmaceutical engineering. [K_U14]
4. Student can identify the basic processes and unit operations of pharmaceutical engineering and formulate their specifications. [K_U15]
5. Student can choose the proper way of solution and choose the adequate equipment to solve simple and complex engineering tasks related to pharmaceutical engineering. [K_U16]

Social competences:
1. Student is ready to critically assess his knowledge, understands the need for further training, supplementing specialized knowledge and raising his professional, personal and social competences, understands the importance of knowledge in solving problems and is ready to seek expert opinions. [K_K1]
2. Student is able to properly define priorities for the implementation of the task specified by himself or others, has a habit of supporting assistance activities. [K_K5]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written/oral exam (stationary or online on the e-courses platform) including 3-5 open questions, assessed on a point scale (51% -60% (3.0), 61% -70% (3.5); 71% -80% (4.0), 81% -90% (4.5), 91% -100% (5.0).
Assessment of student activity during laboratory classes, assessment of knowledge necessary for the implementation of individual laboratory classes, project - assessment of team work and ability to solve scientific problems.

Programme content

The program covers the following topics:
1. Stages of creating a technological project: chemical concept of the process; technological concept of the process; cale-up of the process; technological diagram.
2. Enthalpy plots.

Course topics

The lectures, laboratory classes and projects cover the following topics:
1. Stages of creating a technological project.
1.1 Chemical concept of the process
a) stoichiometric analysis of the process (basic concepts; mass balance of the reaction);
b) thermodynamic analysis of the process (sources of thermodynamic data, the chemical equilibrium constant and thermodynamic potential; calculation of the composition of the reaction mixture, calculation of the reaction equilibrium constant)
c) kinetic analysis of the process (the rate of the chemical-technological process and the chemical reaction; the rate of the homogeneous reaction; the effect of the temperature; the effect of the pressure, kinetic curves).
1.2 Technological concept of the process (technological principles and principles of green chemistry).
1.3 Scale-up of the process (quarter technical scale; semi-technical scale; pilot installation).
1.4 Technological diagram (schematic diagram of the process; mass balance; energy balance).

2. Enthalpy plots (stoichiometric process).

Teaching methods

Lecture: multimedia presentation illustrated with examples shown on a blackboard.
Laboratory classes - practical exercises; project - examples of calculations of mass and energy balancing

Bibliography

Basic:
1. skrypt „Podstawy technologii chemicznej i inżynierii reaktorów”, pod red. M. Wiśniewskiego, K. Alejskiego, Wydawnictwo Politechniki Poznańskiej, Wydanie II, Poznań 2017.
2. J. Szarawara, J. Piotrowski, Podstawy teoretyczne technologii chemicznej, WNT Warszawa 2010.
3. A. Burghardt, G. Bartelmus, Inżynieria reaktorów chemicznych, PWN Warszawa 2001.
4. E. Bortel, H. Konieczny, Zarys technologii chemicznej, Warszawa, WNT 1992.
5. J. Szarawara, J. Skrzypek, A. Gawdzik, Podstawy inżynierii reaktorów, Warszawa, WNT 1980

Additional:
1. P.W. Atkins, Chemia fizyczna, Wyd. Nauk. PWN, Warszawa 2003.
2. S. Bretsznajder, Podstawy ogólne technologii chemicznej, Warszawa, WNT 1973.

Breakdown of average student's workload

	Hours	ECTS
Total workload	102	4,00
Classes requiring direct contact with the teacher	64	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	38	1,50