COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fundamentals of chemical technology [S1TCh2>PTC]

Course

Field of study
Chemical Technology

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
30

Laboratory classes
30

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

5,00

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; the ability to obtain information from indicated sources;

Course objective

Obtaining theoretical and practical knowledge in the field of creating a technological project; material balance and energy balance of processes; calculating of homogeneous chemical reactors.

Course-related learning outcomes

Knowledge:
K_W03 - student has the necessary knowledge of chemistry to enable understanding of chemical phenomena and processes
K_W09 - student has the necessary knowledge about both natural and synthetic raw materials, products and processes used in chemical technology, as well as about the directions of development of the chemical industry in the country and in the world
K_W12 - student knows the principles of construction, operation and selection of devices, reactors and

apparatus used in chemical technology

Skills:
K_U01 - can obtain the necessary information from literature, databases and other sources related to chemical sciences; correctly interprets them, draws conclusions, formulates and justifies opinions
K_U03 - can prepare technological documentation, communicate using various techniques in a professional environment
K_U18 - distinguishes between types of chemical reactions and has the ability to select them for chemical processes
K_U26 - assesses the risk associated with increasing the scale of chemical operations and processes
K_U33 - solves simple engineering tasks related to the implementation of processes and unit operations in chemical technology

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

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written/oral exam graded on the basis of a points system (0-100 points)
3 50,1 -70,0 points
4 70,1 -90,0 points
5 90,1 -100 points
assessment of student's activity in laboratory classes, assessment of teamwork and the ability to solve scientific problems:
3 basic participation in classes without additional involvement
4 active participation in classes supported by the desire to acquire additional practical and theoretical knowledge
5 precise performance of assigned tasks, independent search for additional theoretical knowledge, coordination of work in a research team, ambitious approach to the subject matter

Programme content

The lectures cover the following topics:
1. Stages of creating a technological project.
2. Chemical process concept.
3. Technological concept of the process (technological principles and principles of green chemistry)
4. Scaling up the process (semi-technical scale, semi-technical scale, pilot plant)
5. Mass and energy balance of the process (enthalpy diagrams for reaction systems)
6. Thermodynamic and kinetic analysis of the reaction system.
7. Classification of chemical reactors.
8. Ideal reactors and methods of their calculations.
9. Selection of the type of reactor depending on the type of reaction.

Teaching methods

Lecture: presentation, discussion on the blackboard.
Laboratory classes - practical exercises.

Bibliography

Basic:
1. J. Szarawara, J. Piotrowski, Podstawy teoretyczne technologii chemicznej, Warszawa, PWN 2010.
2. skrypt „Podstawy technologii chemicznej i inżynierii reaktorów”, pod red. M. Wiśniewskiego, K. Alejskiego, Wydawnictwo Politechniki Poznańskiej, Wydanie II, Poznań 2017.
3. A. Burghardt, G. Bartelmus, Inżynieria reaktorów chemicznych, PWN Warszawa 2001.
4. Fogler H. Scott, Elements of Chemical Reaction Engineering, Prentice Hall 2016.

Additional:

1. P.W. Atkins, Chemia fizyczna, Wyd. Nauk. PWN, Warszawa 2003.
2. J. Szarawara, Termodynamika chemiczna stosowana, WNT 2007.
3. Handbook of Petroleum Technology,Springer International Publishing AG, 2017.

Breakdown of average student's workload

	Hours	ECTS
Total workload	125	5,00
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)	61	2,50