COURSE DESCRIPTION CARD - SYLLABUS

Course name
Fundamentals of Chemical Technology

Course

Field of study
Environmental Protection Technologies

Year/Semester
III/5

Area of study (specialization)

Profile of study
general academic

Level of study
Second-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)

Tutorials
0

Projects/seminars
0

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
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Responsible for the course/lecturer:

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 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_W06 - knows the rules for defining and characterizing the raw materials, products and processes used in the chemical industry

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

Skills

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

K_U06 - has the ability to self-study

K_U08 - uses the terminology and nomenclature in force in the field of environmental protection technology correctly

K_U17 - can - as intended - design a technological installation

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

Programme content

The lectures cover the following topics:

1. Stages of creating a technological project.

2. Chemical process concept

a) stoichiometric analysis of the process (basic concepts, mass balance of the reaction);

b) thermodynamic analysis of the process (thermodynamic data sources, chemical equilibrium constant and thermodynamic potential, calculation of post-reaction mixture composition,calculation of thereaction equilibrium constant)

c) kinetic analysis of the process (speed of chemo-technological process and chemical reaction, speed of homogeneous reaction, temperature effect, pressure effect, kinetic curves).

3.Technological concept of the process (technological principles and principles of green chemistry)

4. Increasing the scale of the process (semi-technical scale, semi-technical scale, pilot plant)

5.Technological scheme (process schematic diagram, mass balance, energy balance).

6. Enthalpy graphs (stoichiometric process).

7. Classification of chemical reactors and calculation methods for basic types of homogeneousreactors.

Teaching methods

Lecture: multimedia presentation illustrated with examples shown on a blackboard.

Laboratory classes - practical exercises.

Bibliography

Basic

1. skrypt „Podstawy technologii chemicznej i inżynierii reaktorów”, pod red. M. Wiśniewskiego, K. Alejskiego, Wydawnictwo Politechniki Poznańskiej, Wydanie II, Poznań 2017.

2. A. Burghardt, G. Bartelmus, Inżynieria reaktorów chemicznych, PWN Warszawa 2001.

2. E. Bortel, H. Konieczny, Zarys technologii chemicznej, Warszawa, WNT 1992.

3. J. Szarawara, J. Skrzypek, A. Gawdzik, Podstawy inżynierii reaktorów, Warszawa, WNT 1980niowe z kinetyki chemicznej i adsorpcji z elementami katalizy, Wydawnictwo Politechniki Śląskiej 2010

Additional

1. P.W. Atkins, Chemia fizyczna, Wyd. Nauk. PWN, Warszawa 2003.

2. S. Bretsznajder, Podstawy ogólne technologii chemicznej, Warszawa, WNT 1973. Handbook of Petroleum Technology,Springer International Publishing AG, 2017.

Breakdown of average student's workload

	Hours	ECTS
Total workload	85	4,0
Classes requiring direct contact with the teacher	60	3,0
Student's own work (literature studies, preparation for laboratory classes and tests/exam)[1]	25	1,0

[1] delete or add other activities as appropriate