



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fundamentals of chemical technology [N1TCh2>PTC]

### Course

Field of study	Year/Semester
Chemical Technology	3/6
Area of study (specialization)	Profile of study
–	general academic
Level of study	Course offered in
first-cycle	Polish
Form of study	Requirements
part-time	compulsory

### Number of hours

Lecture	Laboratory classes	Other
20	40	0
Tutorials	Projects/seminars	
0	0	

### Number of credit points

6,00

### 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 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

### Programme content

Issues related to fundamentals of chemical technology.

### Course topics

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 the reaction 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 chemist

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 homogeneous reactors.

### Teaching methods

Lecture: multimedia presentation illustrated with examples shown on a blackboard. In special cases, the online form of the lecture is allowed.

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.
3. Handbook of Petroleum Technology, Springer International Publishing AG, 2017.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	150	6,00
Classes requiring direct contact with the teacher	65	2,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	85	3,50