



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Process Apparatus - Equipment design for the selected exchange process

### Course

Field of study

Circular System Technologies

Area of study (specialization)

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Level of study

First-cycle studies

Form of study

full-time

Year/Semester

2/3

Profile of study

general academic

Course offered in

Polish

Requirements

elective

### Number of hours

Lecture

0

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

15

### Number of credit points

1

### Lecturers

Responsible for the course/lecturer:

Piotr Wesołowski, Ph.D

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Responsible for the course/lecturer:

Faculty of Chemical Technology

Institute of Chem. Technology and Engineering

Department of Process Engineering

60-965 Poznan, 4 Berdychowo street, 116B

### Prerequisites

Knowledge: The student has basic knowledge of mathematics, physics, chemistry and technology information and engineering graphics, acquired during classes in semesters 1 and 2 in the field of Circular System Technologies, enabling the understanding of the principles of designing process apparatus and construction of technical documentation.

Skills: The student is able to acquire and complete information about the structure and operation process apparatus from academic textbooks, scientific studies and the internet.

Has the ability to self-educate, can work individually and in a team, knows how to prepare technical drawings of devices and their parts, and knows the basic principles of building technical documentation.

Social competencies: The student understands the need to constantly improve their skills and the need to enrich the knowledge acquired in the course of studies. Is aware of responsibility incurred for team tasks.



### Course objective

Obtaining knowledge of the design apparatus along with the instrumentation selected on the basis of currently applicable standards on the example of an apparatus for the selected exchange process. Obtaining knowledge of the construction materials used in the construction of apparatus operating in selected process installations, with particular emphasis on Circular System Technologies. Getting acquainted in practice with the principles of construction of technical documentation of apparatus.

### Course-related learning outcomes

#### Knowledge

1. The student has knowledge of mathematics that allows the use of mathematical methods to perform calculations needed in engineering practice (K\_W01).
2. The student knows the principles of environmental protection related to chemical production and the management of raw materials, materials and waste in a closed cycle (K\_W06).
3. The student has knowledge of the negative impact of manufacturing and processing technologies on the natural environment (K\_W08).
4. The student has knowledge of raw materials, products and processes used in Circular System Technologies (K\_W10).
5. The student has a basic knowledge of the life cycle of products, devices and installations used in Circular System Technologies (K\_W12).
6. The student has basic knowledge of the properties, production and processing of construction materials used in the construction of machines and equipment (K\_W18).
7. The student knows the nomenclature, construction and principle of operation of structural elements of machines and mechanical equipment (K\_W20).

#### Skills

1. The student is able to take part in the debate by presenting and assessing opinions on Circular System Technologies (K\_U07).
2. The student is able to plan and organize work individually and in a team (K\_U08).
3. Student selects methods of process control and quality assessment of raw materials, products and waste (K\_U10).
4. The student can read and execute technical drawings and technological schemes (K\_U18).

#### Social competences

1. The student shows independence and creativity in individual work, and work together effectively as a team, playing different roles in it. Objectively assesses the effects of his own work and that of team members (K\_K02).



2. The student objectively assesses the level of his knowledge and skills, understands the importance of improving professional and personal competences adequately to the changing social conditions and the progress of science (K\_K05).

3. The student participates in discussions and is able to conduct discussions, is open to different opinions and ready to assertively express feelings and critical remarks (K\_K08).

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Current control activity.

Presentation and defense of the completed project in front of the group.

### Programme content

Design classes conducted in parallel with the lecture are aimed at acquiring skills preparation of technical documentation of the designed process equipment. Students have the option choosing an alternative design.

B - Equipment design for the selected exchange process.

The aim of the project is to propose and present to the group an original proprietary design solution for an apparatus for the equipment design for the selected exchange process used in Circular System Technologies. The undertaken task usually includes the optimization of energy expenditure incurred for the implementation of the process. The project is carried out in teams of two in order to acquire the ability to cooperate during the implementation of various project works.

### Teaching methods

1. Participation in the lecture.
2. Participation in consultations.
3. Execution and defense of the project (team work).

### Bibliography

Basic

1. Wesołowski P., Borowski J.: Aparatura chemiczna i procesowa. I. Wymienniki ciepła i masy, Wydawnictwo Politechniki Poznańskiej, Skrypty, Poznań 2002.
2. Wesołowski P., Szaferki W., Borowski J.: Aparatura chemiczna i procesowa. II. Mieszalniki i separatory, Wydawnictwo Politechniki Poznańskiej, Skrypty, Poznań 2003.

Additional

1. Błasiński H., Młodziński B.: Aparatura przemysłu chemicznego, WNT, Warszawa 1976.
2. Pikoń J.: Aparatura chemiczna, t. I, II, III. SUPŚ w Gliwicach, Gliwice 1972/73.



3. Pikoń J.: Podstawy konstrukcji aparatury chemicznej, t. I i II, PWN, Warszawa 1979.

4. Stręk F.: Mieszanie i mieszalniki, WNT, Warszawa 1981.

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	25	1,0
Classes requiring direct contact with the teacher	16	0,5
Student's own work (literature studies, preparation for tutorials, preparation for tests, project preparation) <sup>1</sup>	9	0,5

<sup>1</sup> delete or add other activities as appropriate