



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Process design - analysis of the material circuits in the selected processing process
[S1TOZ1>PPaomwwpp]

Course

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|--|--------------------------------------|
| Field of study Circular System Technologies | 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 elective |

Number of hours

| | | |
|----------------|-------------------------|--------------------------|
| Lecture 0 | Laboratory classes 0 | Other (e.g. online) 0 |
| Tutorials 0 | Projects/seminars 15 | |

Number of credit points

1,00

Coordinators

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Lecturers

Prerequisites

Knowledge: The student has basic knowledge in the field of: mathematics, physics, chemistry as well as information technology and engineering graphics, acquired during previous classes in the field of Circular System Technologies, enabling understanding of the principles of designing process installations and construction of technical documentation. Skills: The student is able to acquire and supplement information on the construction and operation of the process installation 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 the responsibility of teamwork.

Course objective

Acquiring the ability to design process lines in a selected processing process along with equipment selected on the basis of currently applicable standards. Obtaining knowledge of the work of process nodes on installation lines in the chemical industry and other related industries. Getting acquainted in practice with the principles of building technical documentation for the designed installation.

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 raw materials, products and processes used in circular system technologies. (k_w10)
4. the student has a basic knowledge of the life cycle of products, devices and installations used in circular system technologies. (k_w12)
5. the student knows the nomenclature, construction and principle of operation of structural elements of machines and mechanical devices. (k_w20)
6. the student has basic knowledge related to the selection of devices used in circular system technologies. (k_w21)
7. the student has knowledge of the physical and chemical basis of unit operations in circular system technologies. (k_w22)

Skills:

1. the student is able to take part in the debate by presenting and assessing opinions in 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. based on the acquired knowledge, the student is able to develop an independent or team project/report on the work performed and make its multimedia presentation. (k_u15)
5. the student is able to prepare mass and energy balances of both unit processes and entire installations occurring in circular system technologies. (k_u17)
6. the student can read and execute technical drawings and technological schemes. (k_u18)
7. the student can make process designs of installations based on circular system technologies. (k_u20)

Social competences:

1. the student demonstrates independence and inventiveness in individual work, as well as effectively interacts in a team, playing various roles in it; objectively assesses the effects of his own work and that of team members. (k_k02)
2. 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)
3. the student is aware of the negative impact of human activity on the state of the environment and actively counteracts its degradation. (k_k10)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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

Familiarization with the structure of technical documentation of an installation working in a selected processing process. Analysis of material flows in a selected processing process. selection of apparatuses and equipment as well as construction material.

Course topics

Design classes are aimed at acquiring the ability to prepare technical documentation of an installation working in a selected processing process.

The aim of the project is to propose and present to the group an original own analysis of material flows in a selected processing process. Design works include the selection of apparatuses and equipment as well as construction material from which individual elements of the installation should be made. 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, Alejski K., Staszak M., Wesołowski P.: Projektowanie systemów procesowych. Wydawnictwo Politechniki Poznańskiej, Poznań 2013.
2. Alejski K., Staszak M., Wesołowski P.: Wprowadzenie do inżynierii reaktorów chemicznych. Przepływy nieidealne w reaktorach i reaktory heterogeniczne. Wydawnictwo Politechniki Poznańskiej, Poznań 2013.

Additional

1. Synoradzki L.: Projektowanie procesów technologicznych. Od laboratorium do instalacji przemysłowej. Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2006.
2. Wesołowski P., Borowski J.: Aparatura chemiczna i procesowa. I. Wymienniki ciepła i masy, Wydawnictwo Politechniki Poznańskiej, Poznań 2002.
3. Wesołowski P., Szaferski W., Borowski J.: Aparatura chemiczna i procesowa. II. Mieszalniki i separatory, Wydawnictwo Politechniki Poznańskiej, Poznań 2003.

Breakdown of average student's workload

| | Hours | ECTS |
|---|-------|------|
| Total workload | 25 | 1,00 |
| Classes requiring direct contact with the teacher | 16 | 0,50 |
| Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation) | 9 | 0,50 |