



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Process Equipment - the mixer with a low speed stirrer

		Course
Field of study		Year/Semester
Environmental Protection Technologies		II/3
Area of study (specialization)		Profile of study
-		general academic
Level of study		Course offered in
First-cycle studies		Polish
Form of study		Requirements
full-time		elective

		Number of hours
Lecture	Laboratory classes	Other (e.g. online)
0	0	0
Tutorials	Projects/seminars	
0	15	
Number of credit points		
2		

		Lecturers
Responsible for the course/lecturer:		Responsible for the course/lecturer:
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Prerequisites

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

Skills: The student is able to acquire and supplement information on the construction and operation of process equipment from academic textbooks, scientific studies and the web. Has the ability to self-education, can work individually and in a team, is able to draw technical drawings of cameras 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 during the course. He / she is aware of the responsibility for the tasks carried out in a team.



Course objective

Acquiring the ability to design the apparatus together with the instrumentation selected based on the currently valid standards on the example of a selected tank reactor with a mechanical low-speed mixer. Acquiring knowledge in the field of construction materials used in the construction of equipment working in the chemical industry and other related industries, with particular emphasis on technologies applied in the field of environmental protection. Getting to know in practice the principles of building technical documentation of the designed equipment.

Course-related learning outcomes

Knowledge

1. Strengthening of knowledge in the field of mathematics in the field allowing to perform calculations needed in engineering design practice. (K_W01)
2. Acquisition of knowledge regarding the selection of materials used in the construction of process equipment found in installations used in environmental technologies. (K_W03)
3. Supplementing the knowledge necessary to characterize raw materials and products occurring in the processes used in the chemical industry. (K_W06)
4. Mastering basic concepts in the field of material and machinery science. (K_W10)
5. Understanding the methods and techniques used to solve simple engineering tasks related to environmental technologies. (K_W12)
6. Acquiring basic knowledge about the method of operation of equipment, devices and installations in environmental protection technologies. (K_W13)
7. Acquisition of knowledge about the legal consequences of running a project activity. (K_W14)

Skills

1. Strengthening effective teamwork. (K_U02)
2. Extension of vocational vocabulary for terms appearing in technical documentation and used in the process of designing process apparatus. (K_U03)
3. Acquisition of preparation skills, preparation of the problem and its professional presentation on group forms. (K_U04)
4. Strengthening the skills of practical use of AutoCAD to develop an offer drawing of the proposed equipment. (K_U07)
5. Acquiring the ability to suggest various construction materials used in the construction of chemical equipment. (K_U13)
6. Understanding the necessity of taking into account the principles of health and safety at work and the methods of controlling the course of various processes at the design stage of the apparatus. (K_U14)



7. Acquiring the ability to prepare technical documentation of the designed equipment in the field of environmental protection technologies. (K_U17, K_U19)

Social competences

1. Strengthening the need for lifelong learning and raising professional competences. (K_K01)
2. Understanding the importance of non-technical aspects of engineering activities, including its impact on the environment and the related responsibility for decisions. (K_K02)
3. Acquiring awareness of responsibility for jointly implemented tasks, connected with teamwork. (K_K03, K_K06)

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Current control of work progress. Presentation and defense of the completed project.

Programme content

Design classes conducted in parallel with the lecture aimed at acquiring the ability to prepare technical documentation of designed process equipment. Students have the option of choosing an alternative project.

The aim of the project is to propose and presentation of the group's own original design solution reactor equipped with low-speed mechanical stirrer. Taken task typically involves the problem of the intensification of heat transfer. Design works include the selection of the type of agitator, tank and apparatus as well as the construction material from which individual elements of the apparatus should be made. The project is carried out in teams of two to acquire the ability to cooperate in the implementation of various design work.

Teaching methods

1. Participation in design classes
2. Participation in consultations
3. Project implementation and defense (teamwork)

Bibliography

Basic

1. Pikoń J.: Podstawy konstrukcji aparatury chemicznej, t. I i II, PWN, Warszawa 1979.
2. Stręk F.: Mieszanie i mieszalniki, WNT, Warszawa 1981.

Additional

1. Pikoń J.: Aparatura chemiczna, t. I, II, III. SUPŚ w Gliwicach. Gliwice 1972/73.



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

Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2
Classes requiring direct contact with the teacher	30	1,0
Student's own work (literature studies, preparation for project classes, preparation for tests, project preparation) ¹	25	1,0

¹ delete or add other activities as appropriate