STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Process Equipment		**1010701131010720519**
Field of study: **Chemical and Process Engineering**	Profile of study (general academic, practical): **general academic**	Year /Semester: **2 / 3**
Elective path/specialty: **-**	Subject offered in: **Polish**	Course (compulsory, elective): **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time, part-time): **full-time**	
No. of hours: Lecture: **30** Classes: **15** Laboratory: **-** Project/seminars:		No. of credits: **3**
Status of the course in the study program (Basic, major, other): **basic**	(university-wide, from another field): **university-wide**	
Education areas and fields of science and art: **Technical sciences** **Technical sciences**		ECTS distribution (number and %): **3 100%** **3 100%**

Responsible for subject / lecturer:

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Responsible for subject / lecturer:

Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	- basics math, physics and chemistry - principles of design documentation, - basis of materials science and mechanical engineering
2	**Skills**	- ability to use calculation software
3	**Social competencies**	-The student is aware of the advantages and limitations of individual and group work in solving the problems of an industrial nature and design, - The student knows the limits of his knowledge and sees the need to deepen their knowledge.

Assumptions and objectives of the course:

Obtaining knowledge about apparatus used in unit operations performed in the chemical and related industries. the student acquires the ability to read and understand and create simple flowsheet, as well as basic calculations of selected process equipment.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Knowledge of the basic types of apparatus used in processes for the exchange of momentum, heat, mass, and other. - **[K_W12, K_W15]**
2. Knowledge of graphic symbols of equipment and machinery used in the creation of technological schemes in accordance with PN EN ISO 10628h. - **[K_W12, K_W15]**
3. Knowledge of advantages and disadvantages of major process equipment. - **[K_W12, K_W15]**
4. Knowledge of methods for calculating the selected process equipment. - **[K_W12, K_W15]**

Skills:

1. The ability to read and create technological schemes of industrial installations - **[K_U01]**
2. The ability to perform basic calculations of process equipment - **[K_U07]**
3. The ability to select the basic process equipment - **[K_U15]**
Social competencies:
1. The student has the awareness and understanding of aspects of the practical application of knowledge. - **[K_K01]**
2. The student knows the limits of his own knowledge and understands the need for continuing education. - **[K_K01]**

Assessment methods of study outcomes
Knowledge Test - 1,2,3, 4 **Skills** Test - 1,2,3 **Social competencies** Test - 1 Activity during course - 2
Course description
During the course are discussed: - Types and principles of the creation of the flowsheets, P&ID software, principles of pipelines design, pipeline classes according to ISO and ANSI standards, types of storage vessels, design of stirred vessels, static mixers, pneumatic mixers and jet mixers, solid-gas separators, solid-liquid separators, evaporators and heat exchangers; Within the exercise are discussed: - discharge time from the apparatus, Bernoulli's equation, calculations of pressure drop, the selection and calculation of the pumps, the creation of technological schemes
Basic bibliography: 1. J. Warych, Aparatura chemiczna i procesowa, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa, 2004 2. H. Błasiński, B. Młodziński, Aparatura przemysłu chemicznego , WNT, Warszawa, 1983 3. J. R. Couper, W. R. Penney, J. R. Fair, S. Walas, Chemical Process Equipment - Selection and Design, Elsevier 2010. 4. PN-EN ISO 10628-2:2013-06E Schematy dla przemysłu chemicznego i petrochemicznego -- Część 2: Symbole graficzne 5. PN-EN ISO 10628:2005P Schematy technologiczne instalacji przemysłowych. Zasady ogólne 6. N.A. Kazulin, W.N. Sokołow, A.J. Szapiro, Maszyny przemysłu chemicznego. Przykłady i zadania, WNT, Warszawa, 1970.
Additional bibliography: 1. Aparatura chemiczna, Pikoń J., Państwowe Wydawnictwa Naukowe, Warszawa, 1983
Result of average student's workload

Activity	**Time (working hours)**

1. Participation in lectures	30
2. Participation in exercises	15
3. Participation in consultation	10
4. Preparation for the test	10
5. Preparation for the exercises	10

Student's workload		
Source of workload	**hours**	**ECTS**
Total workload	75	3
Contact hours	55	2
Practical activities	15	1