STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Material science and theory of machines in chemical technology	

Field of study	Profile of study (general academic, practical)	Year /Semester
Chemical Technology	**general academic**	**1 / 2**
Elective path/specialty	Subject offered in: **English**	Course (compulsory, elective) **elective**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours	No. of credits
Lecture: **30** Classes: **-** Laboratory: **-** Project/seminars: **15**	**4**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
other	**university-wide**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences **Technical sciences**	**4 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Knowledge in the field of mathematics, physics and the basics of technical drawing and engineering graphics
2	**Skills**	Ability to read and understand technical drawings
3	**Social competencies**	Ability to take decisions and cooperation within a specified team and have awareness of the need for continuous development

Objectives of the course:

The goal of the course is to obtain the knowledge about strength properties of construction materials used in process equipment. Other aims of the course are to familiarize with the elements of machines occurring in the construction of industrial apparatus and devices, and development of engineering skills for independent designing of the process equipment.

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

Knowledge:

1. Student knows the basic concepts in the field of strength of materials- [K_W13]
2. Student knows the basic concepts associated with the forces occurring in the construction of machines and equipment - [K_W13]
3. Student knows the basic elements of machines found in the process facility- [K_W12, K_W13]
4. Student knows the selection criteria of materials for the components of process equipment. - [K_W12]
5. Student knows the effects of the equipment's working conditions on their strength in the assumed working time - [K_W4, K_W14]
6. Student knows the process of designing the pressure vessel - [K_W12]

Skills:

1. Student can use the basic physical and chemical laws in the construction of industrial equipment - [K_U1, K_U5]
2. Student can describe and select machine elements and their joins - [K_U15]
3. Student can choose the right type of construction material for the designed process equipment. - [K_U27, K_U7]
4. Student is able to assess the influence of the type of selected material on the working time of equipment in terms of corrosivity.- [K_U8]
5. Student can design a pressure vessel which is the basic laboratory and industrial equipment in chemical facility. - [K_U31]

Social competencies:

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1. Student knows the limits of her/his own knowledge and understands the need for continuous education and improving the professional skills - [K_K1]
2. Student knows the advantages and disadvantages of team work. - [K_K3]
3. Student can think and act in a creative and entrepreneur manner. - [K_K6]

Assessment methods of study outcomes

Knowledge

Assessment of acquired theoretical knowledge on the basis of a written exam.

Practical application of the acquired knowledge in the form of the project focused on a pressure tank design developed individually and discussion of the selected type of construction material or parts of machines used in the chemical equipment prepared in the form of a presentation in groups of 2-3 students. Applies to points 1-6.

Skills

Activity during classes and assessment of the delivered project. Applies to points 1-5.

Social competencies

Presentation and defense of the project in the form of a multimedia presentation and activity during the classes. Applies to points 1-3

Course description

During the course, the basic knowledge of materials used in the construction of process equipment is presented, such as: steel alloyes, cast steel and cast iron, non-ferrous metals and their alloys, plastics and natural materials. The influence of various factors on the corrosion rate and protective coatings used in process equipment. Basics of strength of materials and machine elements and their combinations. Practical strength calculations of components of equipment and their joints. Types of drives and clutches. Principles of a pressure vessel design as the basic process equipment for laboratory and industrial chemical facility.

Basic bibliography:

1. Potrykus J., Poradnik mechanika, REA, Warszawa 2008
2. Wilczewski T., Pomoce projektowe z podstaw maszynoznawstwa chemicznego, Wydawnictwo Politechniki Gdańskiej, Gdańsk 2008
3. Lewandowski W.M., Ryms M., Maszynoznawstwo chemiczne podstawy wytrzymałości i przykłady obliczeń, PWN, Warszawa 2017
4. Katalog norm branżowych
5. Pikoń J.: Podstawy konstrukcji aparatury chemicznej, cz. I i II, PWN, Warszawa 1979

Additional bibliography:

1. Mały Poradnik Mechanika, t. I i II, WNT, Warszawa 1985
2. Błasiński H., Młodziński B.: Aparatura przemysłu chemicznego, WNT, Warszawa 1971
3. Lisowski A., Siemieniec A.: Wytrzymałość materiałów -przykłady obliczeń - zadania, PWN, Warszawa - Kraków 1976
4. Marcolla k.: Maszynoznawstwo, t. IV, Części maszyn, PWN, Warszawa - Poznań 1972
5. Mrowiec A., Mrowiec M.: Maszynoznawstwo i technika cieplna, t. II, cz. II, Podstawy wytrzymałości materiałów, Kraków 1974

Result of average student's workload

Activity	Time (working hours)
Preparation for exam	**30**
Preparation of the project	**30**
Preparation of a presentation	**15**

Student's workload

Source of workload	hours	ECTS
Total workload	50	3
Contact hours	25	2
Practical activities	25	1

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