



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Materials science and basics of machine construction

Course

Field of study

Circular Systems Technologies

Area of study (specialization)

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Level of study

First-cycle studies

Form of study

full-time

Year/Semester

1/2

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

Number of hours

Lecture

30

Laboratory classes

0

Other (e.g. online)

0

Tutorials

0

Projects/seminars

0

Number of credit points

3

Lecturers

Responsible for the course/lecturer:

dr inż. Waldemar Szaferski

Responsible for the course/lecturer:

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Politechnika Poznańska

Zakład Inżynierii i Aparatury Chemicznej

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Prerequisites

Knowledge in the field of mathematics, physics and the basics of technical drawing and engineering graphics. Ability to read and understand technical drawings. Readiness to make decisions and cooperate within a specified team and be aware of the need of lifelong learning.

Course objective

Obtaining knowledge about the strength properties of construction materials used in the construction of process equipment used in the chemical and related industries. Getting to know the elements of machines found in the constructions of these apparatus and industrial devices. Acquiring engineering



skills in the selection of materials that meet the criteria of high purity of the product in the chemical and related industries.

Course-related learning outcomes

Knowledge

1. The student knows the basic concepts in the field of strength of materials used in the chemical and related industries [K_W13].
2. The student knows the basic concepts associated with the forces occurring in the construction of machines and equipment [K_W5, K_W15].
3. The student knows the basic elements of machines found in the process facility [K_W13].
4. The student knows the selection criteria of materials for the components of process equipment in the industrial equipment [K_W14].
5. The student knows the effects of the equipment's working conditions on their strength in the assumed working time [K_W5].

Skills

1. The student can use the basic physical and chemical laws in the construction of industrial equipment of the industry equipment [K_U1, K_U5].
2. The student can describe and select machine elements and their joints [K_U1].
3. The student can choose the right type of construction material for the designing apparatus and machines for the chemical and related industries [K_U20].
4. The student is able to assess the influence of the type of selected material on the working time of equipment in terms of corrosivity [K_U14].
5. The student using analytical, simulation and experimental methods knows how to formulate assumptions and methods of their implementation for simple engineering tasks in the field of design and operation of installations used in closed-loop technologies [K_U22].

Social competences

1. The student is aware of the limitations of their own knowledge, and therefore the need for education and development [K_K01].
2. The student knows the pros and cons of teamwork and adheres to the principles accompanying such a way of solving problems in industry [K_K4].
3. The student can think and act in a creative and entrepreneurial way [K_K5].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Knowledge acquired as a part of a lecture is verified at the final exam after the fifteenth lecture. The



exam consists of 40-50 test questions (constant scoring for all questions) or 5-10 open questions (different scoring). Passing threshold: 51% of points. Issues for the final test, on the basis of which questions are developed, will be sent to students by e-mail using the university e-mail system.

If the classes will be held remotely, the forms of course assessments will remain unchanged and will be carried out with the use of tools provided by the Poznań University of Technology (<https://elearning.put.poznan.pl/>), about which students will be informed as soon as possible possible.

Programme content

As part of the course, basic knowledge of materials used in the construction of process apparatus as: alloy steels, acid-resistant and heat-resistant steels, non-ferrous metals and their alloys, structural plastics and natural materials will be presented. Fundamentals of strength of materials and elements of machines and their connections. Discussion of the most important types of normal stress, tangential and equivalent stresses.

Teaching methods

Multimedia presentation illustrated with examples on the board, and supportive materials to classes sent to students by e-mail using the university e-mail system.

Bibliography

Basic

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. Pikoń J., Podstawy konstrukcji aparatury chemicznej, cz. I i II, PWN, Warszawa 1979.
5. Biernat J., Materiałoznawstwo. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2016.

Additional

1. Bańkowski Z., Mały poradnik mechanika. T. 1, Nauki matematyczno-fizyczne, materiałoznawstwo. Wydawnictwa Naukowo-Techniczne, Warszawa 1996.
2. Bańkowski Z., Mały poradnik mechanika. T. 2, Podstawy konstrukcji maszyn, maszynoznawstwo. Wydawnictwa Naukowo-Techniczne, Warszawa 1994.
3. Niezgodziński T., Wytrzymałość materiałów. Wydawnictwo Naukowe PWN, Warszawa 2010.
4. Niezgodziński M.E., Niezgodziński T., Wytrzymałość materiałów. Wydawnictwo Naukowe PWN, Warszawa 2010.



5. Bielewicz E., Wytrzymałość materiałów. Wydawnictwo Politechniki Gdańskiej, Gdańsk 2013.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	38	1,5
Student's own work (literature studies, preparation for classes, preparation for exam) ¹	37	1,5

¹ delete or add other activities as appropriate