COURSE DESCRIPTION CARD - SYLLABUS

Course name
Material Science and Theory of Machines

Course

Field of study
Chemical Technology

Year/Semester
2/3

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in
English

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes

Other (e.g. online)

Tutorials

Projects/seminars
15

Number of credit points

3

Lecturers

Responsible for the course/lecturer:
Ph.D. Eng. Piotr T. Mitkowski

email: piotr.mitkowski@put.poznan.pl

tel. +48 61 665 3334

Responsible for the course/lecturer:

Prerequisites

Student possess knowledge in the field of mathematics, physics and has ability to read and understand technical drawings.

Course objective

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.

Course-related learning outcomes

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 facilities. [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 the chemical facilities. [K_U31]

Social competences

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 teamwork. [K_K3]

3. Student can think and act in a creative and entrepreneur manner. [K_K6]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

The acquired knowledge during the lectures is verified by the exam in the form of test. The test consists of about 30 closed and 5 open test questions. Passing threshold is 51% points. The required material and appropriate references for questions will be delivered in the university's e-Learning system.

Programme content

During the course, the basic knowledge of materials used in the construction of process equipment is presented, such as steel alloys, 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 the strength of materials and machine elements and their combinations.

Practical strength calculations of components of equipment and their joints. Principles of a pressure vessel design as the basic process equipment for laboratory and industrial chemical facility.

Teaching methods

Multimedia presentation and calculation examples. Materials are shared in the university's e-Learning system.

Bibliography

Basic

1. Materials delivered by the lecturer.

2. William D. Callister, Jr., Materials Science and Engineering, John Wiley & Sons, Inc., 2007

3. Couper J.R., Penney W.R., Fair J.R., Walas S.M., Chemical Process Equipment. Selectionand Design, Elsevier, 2012

Additional

1. Potrykus J., Poradnik mechanika, REA, Warszawa 2008

2. Elayaperumal K., Raja V.S., CORROSION FAILURES, Theory, Case Studies, and Solutions, Wiley, 2015

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,0
Classes requiring direct contact with the teacher	40	1,6
Student's own work (literature studies, preparation for classes, preparation for exam, project preparation) [1]	35	1,4

[1] delete or add other activities as appropriate