COURSE DESCRIPTION CARD - SYLLABUS

Course name
Metal science with heat treatment

Course

Field of study
Construction and operation of means of transport

Year/Semester
1/2

Area of study (specialization)

Profile of study
general academic

Level of study
First-cycle studies

Course offered in

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture	Laboratory classes	Other (e.g. online)
18	9	
Tutorials	Projects/seminars	

Number of credit points

4

Lecturers

Responsible for the course/lecturer:
prof. dr hab. inż. Leszek Małdziński email:
leszek.maldzinski@put.poznan.pl

Responsible for the course/lecturer:

Prerequisites

Knowledge: Basic knowledge of metallurgy and heat treatment of metals: construction of metals and alloys, carbon and alloy steels, non-ferrous metal alloys, steel corrosion, properties and practical application.

Course objective

Knowledge of the theoretical foundations of metals and their alloys. Understanding the basics of heat treatment and thermochemical properties of steels and metals and their alloys. Knowing the grades of unalloyed and alloy steels, cast steels, cast irons and selected non-ferrous metal alloys: their physical and functional properties and their application in practice.

Course-related learning outcomes

Knowledge

The student has a basic, organized knowledge of metal materials used in construction machines such as iron, aluminum, copper, etc. alloys used in mechanical engineering, and in in particular about their structure, properties, methods of production, heat treatment and thermal.

chemical and the influence of plastic working on their strength.

Skills

Student is able to obtain information from literature, the Internet, databases and other sources. He can integrate interpret the obtained information and draw conclusions from it, and create and justify opinions

Social competences

The student is ready to fulfill professional roles responsibly, including: observing the principles of ethics professional and demanding it from others, caring for the achievements and traditions of the profession

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Written and oral exam

Programme content

General characteristics of materials. Importance of materials in product manufacturing processes; manufacturing processes, materials used in manufacturing processes.

Basic groups of engineering materials; metals and their alloys, polymers, ceramics, composites.

The structure of metals

Structure of matter; matter and its components, structure of the atom, classification of chemical elements, bonds between atoms.

The actual structure of metals; classification of crystal structure defects, point defects, dislocations, interaction between dislocations, polycrystalline structure of metals, grain boundaries and boundaries interphase, the effect of defects in the crystal structure on the properties of metals.

Metal alloys and their structure

Iron alloys with carbon

Carbon cast iron.

Heat treatment of metal alloys.

Alloys steel.

Non-ferrous metals and their alloys.

Corrosion of metals and alloys

Teaching methods

Lecture with multimedia presentation. Laboratory classes.

Bibliography

Basic

1. Michael Ashby i in.: Materials selection in Mechanical design, 2017, ISBN: 978-0-08-100599-6

2. Michael Ashby i in.: Materials Engineering, science. Procrssing and Design. North Amerrican Edition: ISBN-13: 978-1-85617-743-6

3. Budinski, K.G. et all: Engineering Materials, Properties and Selection, 2010, ISBN 978-0-13-712842-6

4. Callister, W.D.: Material Science and Engineering, ISBN 978-1-118-54689-5

5. Mechanical Properties of Matter. New Yourk Congress Number 65-14262

Additional

1. Shackelford J.F.: Introduction to Materials Science for Engineers, 2014, ISBN 978-0133789713

2. Metal hanndbook ASM 2012

2. Burakowski T., Wierzchoń T.: Surface engineering of metals – principles, equipment, technology. CRS Press, Boca Raton – London-New York-Washington, D.C., 1999.

Breakdown of average student's workload

	Hours	ECTS
Total workload	100	40,0
Classes requiring direct contact with the teacher	45	20,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) [1]	55	20,0

[1] delete or add other activities as appropriate