COURSE DESCRIPTION CARD - SYLLABUS

Course name
Metal science with heat treatment [N1Trans1>MzOC]

Course

Field of study
Transport

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
part-time

Requirements
compulsory

Number of hours

Lecture
18

Laboratory classes
9

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

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 ordered and theoretically founded general knowledge in the field of key issues of technology and detailed knowledge in the field of selected issues in this discipline of transport engineering

Skills:

Student is able, when formulating and solving tasks in the field of transport, to apply appropriately selected methods, including analytical, simulation or experimental methods
The student is able - in accordance with the given specification - to design (create a model of a fragment of reality), formulate a functional specification in the form of use cases, formulate non-functional requirements for selected quality characteristics) and implement a device or a widely understood system in the field of means of transport, using appropriate methods, techniques and tools

Social competences:
The student is aware of the importance of knowledge in solving engineering problems, knows examples and understands the causes of malfunctioning transport systems that have led to serious financial and social losses or to serious loss of health and even life

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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

Course topics

none

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
6. S. Rudnik: Metaloznawstwo. PWN, Warszawa, 1996
7. F. Staub; Metaloznawstwo, 1979
8. W. Luty [i in.]: Poradnik inżyniera. Obróbka cieplna stopów żelaza, 1977
9. L. Dobrzański: Metaloznawstwo z podstawami nauki o materiałach. WNT, Warszawa, 1996
10. S. Prowans: Metaloznawstwo. PWN, Warszawa, 1988
11. K. Przybyłowicz: Metaloznawstwo. WNT, Warszawa, 1996
12. L. A. Dobrzański: Metaloznawstwo i obróbka cieplna

13. L. A. Dobrzański: Podstawy nauki o materiałach i metaloznawstwo, WNT, Gliwice 2002
14. Karol Przybyłowicz, Janusz Przybyłowicz, Materiałoznawstwo w pytaniach i odpowiedziach, Wydawnictwo Naukowo-Techniczne, 2004
Additional
1. Michael Ashby i in.: Inżynieria materiałowa tom I i II, Wydawnictwo Galaktyka, 2006
2. Michael Ashby i in.: Materiały inżynierskie tom I i II, WNT, 1996
3. Poradnik Inżyniera: Obróbka cieplna metali, WNT, 1979
4. Mały poradnik mechanika, tom I i II, WNT1999
5. Wilhem Domke: Vademecum materiałoznawstwa, NT, 1997
6. Feliks Wojtking, Jurij Soncew: Materiały specjalnego przeznaczenia, Wydawnictwo Politechniki Radomskiej, 2001

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	27	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	43	2,00