COURSE DESCRIPTION CARD - SYLLABUS

Course name
Materials Science – properties and applications of materials [N1IZarz1>MWiZM]

Course

Field of study
Engineering Management

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
12

Laboratory classes
12

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of chemistry and physics. Ability to solve basic problems of science on the basis of existing knowledge, the ability to obtain information from identified sources. Understanding the need to broaden the competence, willingness to work together as a team.

Course objective

Provide students with basic knowledge of materials science and technology, to the extent specified by the content of the program relevant to the field of study. Development of students' ability to solve simple problems related to the choice of nanomaterials and analysis of the results of studies based on the gained knowledge.

Course-related learning outcomes

Knowledge:
The student names and describes the classification of engineering materials and their physicochemical

properties [P6S_WG_14].
The student defines concepts related to the structure of materials, such as crystalline structure and defects in crystalline structure [P6S_WG_17].
The student describes key engineering materials, including metals, polymers, ceramics, and composites, as well as their properties and applications [P6S_WG_17].

Skills:
The student explains and interprets the relationships between the structure and properties of engineering materials [P6S_UW_09].
The student plans and conducts experiments, including measurements and computer simulations, and interprets the results in the context of materials science [P6S_UW_09].
The student recognizes and identifies design tasks related to the construction and operation of machines and solves simple design problems in this field [P6S_UW_14].

Social competences:
The student is aware of the impact of material selection on the economy, engineering, marketing, law, and organizational aspects in the product creation process [P6S_KO_02].
The student is conscious of the importance of non-technical and ecological aspects in engineering activity and the responsibility for the decisions made [P6S_KR_01].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

In respect of lectures: on the basis of answers to questions about the knowledge assimilated in previous lectures or assessment based on a written test of knowledge
In respect of laboratory classes: on the basis of answers to questions and reports about the knowledge correspond to given theme

Programme content

Matter
Basics of materials design. Knowledge of engineering materials, their properties and applications
Design of structure, microstructure and properties of materials (crystallization, plastic deformation, recrystallization, heat treatment, phase transformations, diffusion, layers)
Mechanical properties, corrosion, wear resistance, fatigue.
Steel and iron based materials
Nanomaterials
Plastics and composites
Nanotechnology
Materials testing

Course topics

LECTURE:
Structure and microstructure,
mechanical properties of materials,
mechanical synthesis,
biomaterials,
corrosion of materials,
steel and other Fe alloys,
materials surface treatment technologies,
nanotechnologies,
Thermal treatment.
nanomaterials,
powder metallurgy,
LAB:
constantly in delivery condition
Thermal treatment
tool materials
casting alloys

copper alloys
aluminum alloys
surface treatment
composites
wear mechanisms of machine parts

Teaching methods

Lecture - presentations, Laboratory classes

Bibliography

Basic:
Leszek. A. Dobrzański, Podstawy nauki o materiałach, Wydawnictwo Naukowo-Techniczne
Leszek. A. Dobrzański, Metaloznawstwo i obróbka cieplna, Wydawnictwo Naukowo-Techniczne
Skrypt: Materiały w Bodowie Maszyn red. Andrzej Barbacki, Wydawnictwo Politechniki Poznańskiej

Additional:
Karol Przybyłowicz, Janusz Przybyłowicz, Materiałoznawstwo w pytaniach i odpowiedziach , Wydawnictwo Naukowo-Techniczne

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	25	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	50	2,00