



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Optimization of properties and employment of steels

### Course

Field of study

Materials Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

4/7

Profile of study

general academic

Course offered in

polish

Requirements

compulsory

### Number of hours

Lecture

15

Laboratory classes

Tutorials

Projects/seminars

15

Other (e.g. online)

### Number of credit points

3

### Lecturers

Responsible for the course/lecturer:

dr inż. Natalia Makuch-Dziarska

Responsible for the course/lecturer:

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Wydział Inżynierii Materiałowej i Fizyki

Technicznej

ul. Jana Pawła II 24, 61-139 Poznań

### Prerequisites

The knowledge of engineering materials and its production technology.

Logical thinking, using information from the library and the Internet.

Understanding the need to learn and acquire new knowledge.

### Course objective

Learn of main methods of selection and optimization of properties and applications of steels.

### Course-related learning outcomes

Knowledge



1. Student has detailed knowledge about engineering materials. Student knows how to identify, describe and classify steels.
2. Student has detailed knowledge about development trends in engineering and materials technology concerning the material design.
3. Student can define the principles of selection of engineering materials, describe elements and phases in engineering design, functional factors and issues in product quality assurance, sociological, ecological and economic factors as well as methodology of engineering design.

#### Skills

1. Student knows how to retrieve information from literature, databases and other properly selected sources (also in English) in the area of materials engineering.
2. Student knows how to prepare (in Polish and English) well documented problems in area of materials engineering, especially concerning materials selection, production technology, methods of materials examination.
3. Student knows how to carry out preliminary economic analysis of engineering activities undertaken and to evaluate economic conditions for using various materials, technologies and research methods.

#### Social competences

1. Student understands the need for lifelong learning, can inspire and organize the learning process of others.
2. Student is aware of the role of engineering materials in the contemporary economy and their importance to society and the environment.

#### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Written test at the end of the semester consisting of: open questions, test questions or test on the e-learning platform.

Grading scale: <51% 2.0; 51% -62% 3.0; 63% -72% 3.5; 73% -83% 4.0; 84% -94% 4.5; > 95% 5.0

Project: individual presentation of project and active participation during presentation of other students.

#### Programme content

Lecture:

1. Classification of steels, influence of alloying elements on properties of steels.
2. Identification of functions and requirements necessary for specific application of steels.



3. The most often used criteria of optimization.
4. The use of knowledge of heat treatment and surface treatment for steel selection, technology and its parameters.
5. The factors causes degradation of machine elements and tools.
6. The basics of design of chemical compositions and structure of steel.

Project:

The individual presentation of project concerning the optimization of properties and application of steel for concrete product.

**Teaching methods**

Lecture: multimedia presentation.

Tutorials: multimedia presentation, practical exercises, discussion.

**Bibliography**

Basic

1. M.F. Ashby - Dobór materiałów w projektowaniu inżynierskim, WNT 1998
2. M.F. Ashby, D.R.H. Jones - Materiały inżynierskie t. 1 i 2, WNT 1995 i 1996
3. M. Blicharski, Inżynieria materiałowa. Stal, WNT , 2013
4. L.A. Dobrzański, Podstawy kształtowania struktury i własności materiałów metalowych, Wydawnictwo Politechniki Śląskiej, Gliwice, 2007

Additional

- L. A. Dobrzański, Zasady doboru materiałów inżynierskich, Wyd. Politechniki Śląskiej, 2000

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	60	3,0
Classes requiring direct contact with the teacher	30	1,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	30	1,5

<sup>1</sup> delete or add other activities as appropriate