



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Fundamentals of materials science [S1IMat1>PNoM1]

### Course

Field of study

Materials Engineering

Year/Semester

1/1

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

### Number of hours

Lecture

30

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

3,00

### Coordinators

prof. dr hab. inż. Michał Kulka  
michal.kulka@put.poznan.pl

### Lecturers

### Prerequisites

Knowledge: basic knowledge of chemistry, physics, Skills: logical thinking, use of the information obtained from the library and the Internet. Social competencies: understanding the need for learning and acquiring new knowledge.

### Course objective

To know the nature, methods of manufacture, the structure and properties of materials.

### Course-related learning outcomes

Knowledge:

1. student has a systematic general theoretical knowledge covering the key issues from the scope of the materials science. (t1a\_w03) k\_w08
2. student has a systematic general theoretical knowledge on engineering materials. (t1a\_w04) k\_w10

Skills:

1. student can obtain information concerning materials engineering from literature, databases and other properly selected sources (also in english). (t1a\_u01) k\_u01

2. student has the ability to self-study. (t1a\_u05) k\_u05

Social competences:

1. student understands the need of the learning by the whole life; can inspire and organize the learning of others. (t1a\_k01) k\_k01
2. student is aware of importance and understanding the different aspects and effects of engineering activity, including its impact on the environment and the associated responsibility for decisions. (t1a\_k02, inza\_k01) k\_k02

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture: Ranking based on written examination consisting of general and test questions (ranking in case of getting at least 51% of points: <51% 2 - ndst, 51%-62% 3 - dst, 63%-72% 3,5 - dst+, 73%-83% 4 - db, 84%-94% 4,5 - db+, > 94% 5 - bdb) written for the end of the semester.

### Programme content

Classifications and general characteristics of engineering materials. Factors directly influencing the properties of materials: type of atoms, chemical bonds, arrangement of atoms, structure defects. Properties of materials and methods of their testing. Fundamentals of thermodynamics of alloys and diffusion. Phase equilibrium diagrams. Crystallization of metals and alloys. Phase transformations.

### Course topics

Lecture:

1. Classification and characterization of materials: metals, polymers, ceramics, composites.
2. Other categories of classification of materials: structural, functional, ecomaterials, biomaterials
3. Structure of the materials in the macro, micro and nano scale.
4. Bonds, the crystal structure.
5. Defects of crystalline materials: spotlights, linear, spatial.
6. The most important material properties: physical, chemical, mechanical, technological, performance tests.
7. Basic methods for measuring the properties of materials.
8. Fundamentals of thermodynamics and diffusion in materials.
9. Phase equilibrium systems, metal alloys, phases, solutions.
10. Mechanism of crystallization.
11. Characteristics of phase transformations and their classification.

### Teaching methods

Lecture: multimedia presentation, illustrated with examples on the board.

### Bibliography

Basic

1. Blicharski M. Wstęp do inżynierii materiałowej. WNT, Warszawa, 2003.
2. Przybyłowicz K. Metaloznawstwo, WNT, Warszawa, 2007.

Additional

1. Dobrzański L. Podstawy nauki o materiałach i metaloznawstwo. WTN, Warszawa, 2002.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	71	3,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	41	2,00