



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Physical aspects of materials science [S1Trans1>FAM]

### Course

Field of study

Transport

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

2,00

### Coordinators

dr hab. inż. Marta Paczkowska prof. PP  
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### Lecturers

### Prerequisites

Knowledge: Basic knowledge of physics, mathematics and chemistry. Skills: The ability to effectively self-study. Social competences: Is aware of the social role of the engineer. He is willing to expand his competences. He can work in a team.

### Course objective

Getting to know the micro structure and selected properties of solids used in engineering practice.

### Course-related learning outcomes

Knowledge:

The student has extended and in-depth knowledge of physics useful for formulating and solving selected technical tasks, in particular for correct modeling of real problems

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:

The student is able to obtain information from various sources, including literature and databases (both in Polish and in English), integrate it properly, interpret it and critically evaluate it, draw conclusions, and comprehensively justify his/her opinion.

The student is able to design means of transport with appropriate external requirements (e.g. regarding environmental protection)

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 exam covering the issues discussed during the lectures

### Programme content

Introduction to solid state physics. Solids and engineering materials. Classification of solids used in engineering practice. Classification of properties of solids. Atomic structure of solids (basic types of lattices, examples of lattices of solids, diffraction on crystals). Crystal lattice imperfections, dislocations. Movement of atoms in crystal lattices - diffusion. Mechanical properties of solids (elasticity, plasticity, fracture, fatigue, creep). Electrical and magnetic properties of solids. Thermal properties. Porous solids. Physical and mathematical models of solids.

### Course topics

The classes concern the physical aspect of the structure of materials related to the structure of the atom, interatomic bonds, the structure of crystals, the movement of atoms and the properties of materials.

### Teaching methods

Lecture with multimedia presentation

### Bibliography

Basic

1. C. Kittel, Wstęp do fizyki ciała stałego, PWN, Warszawa 1974
2. B. N. Buszmanow, J. A. Chromow, Fizyka ciała stałego, WNT, Warszawa 1973
3. D. R. Askeland, The science and engineering of materials, PWS Publishers, Boston 1985

Additional

1. M. F. Ashby, D. R. H. Jones, Materiały inżynierskie, t.1 i 2, WNT, Warszawa 1996

### Breakdown of average student's workload

	Hours	ECTS
Total workload	55	2,00
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)	25	1,00