



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Design of the properties of materials [S2IMat1>PWM]

Course

Field of study

Materials Engineering

Year/Semester

1/1

Area of study (specialization)

–

Profile of study

general academic

Level of study

second-cycle

Course offered in

Polish

Form of study

full-time

Requirements

compulsory

Number of hours

Lecture

15

Laboratory classes

0

Other

0

Tutorials

0

Projects/seminars

15

Number of credit points

3,00

Coordinators

prof. dr hab. inż. Michał Kulka
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Lecturers

Prerequisites

Knowledge: basic knowledge of materials engineering, strength of materials, material technologies. Skills: logical thinking, use of the information obtained from the library and the Internet, operation of the basic computer software. Social competencies: understanding the need for learning and acquiring new knowledge.

Course objective

Acquainting with theoretical and practical problems of design of materials and technological processes in order to provide required functional properties for products.

Course-related learning outcomes

Knowledge:

1. student has systematic and theoretically underpinned general knowledge in the field of materials engineering, and can describe basic functional properties of materials, technological properties of materials, factors having an influence on properties of materials - chemical and phase composition, structure, manufacturing processes, workplace. (t2a_w03) k_w04
2. student has a basic knowledge about the life cycle of devices, of objects and of technical systems, and

can describe methods of the quality check, and can describe criteria of engineering materials selection for technical applications, and is able in an optimal way to apply materials and technologies. (t2a_w06) k_w09

Skills:

1. student is able - at formulating and solving engineering problems - to integrate the knowledge in the materials engineering and to apply the system approach taking also into account non-technical aspects . he is able to influence the structure and properties of materials engineering by the selection of the adequate technological process. (t2a_u10) k_u11
2. student is able to assess the usefulness and the possibility of applying the latest technical and technological achievements in the materials engineering. he is able to design of engineering materials and technological processes, to produce materials about required physicochemical and functional properties. (t2a_u12) k_u13

Social competences:

1. student is able to establish priorities serving the realization determined by oneself or other tasks. (t2a_k04) k_k04
2. student is able to think and to act in the creative and enterprising way. (t2a_k06) k_k06

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.

Project: Ranking based on the elaborated project according to the suggestions of lecturer

Programme content

Material design in engineering design. The role and methodology of material design in the production of products. Characteristics of materials and technological processes to which the materials are subjected. Material selection criteria based on material indicators, also taking into account shape. Economic and ecological aspects of material design. Biomaterials and design of their properties. Materials in industrial design.

Course topics

Lecture:

1. Material design in the engineering design. Methodology of the material design.
2. The role and principles of the material design and relations of the material and technological design of products and their elements.
3. Materials and processes.
4. Properties of materials.
5. Fundamentals of the adequate material selection. Material indicators. Criteria of material selection. Role of the shape of material.
6. Technological processes shaping properties of materials.
7. Economic aspects of the material design.
8. Environmental aspects of the material design.
9. Design of the properties of biomaterials.
10. Development of new materials.
11. Materials in the industrial design.
12. Fundamentals of computer aided material design.

Project:

Project including the design of material properties using the adequate processes in order to produce the products

Teaching methods

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

2. Project: individual project work of the student consulted with the lecturer.

Bibliography

Basic

1. Ashby M., Jones D., Materiały inżynierskie. Tom I – właściwości i zastosowanie, WNT, Warszawa 1995; Tom II – Kształtowanie struktury i właściwości, dobór materiałów, WNT, Warszawa 1996
2. Dobrzański L.A., Materiały inżynierskie i projektowanie materiałowe. Podstawy nauki o materiałach i metaloznawstwo, Wydawnictwo Politechniki Śląskiej, 2006
3. Dobrzański L.A., Podstawy metodologii projektowania materiałowego, Wydawnictwo Politechniki Śląskiej, 2009

Additional

1. Burakowski T., Wierzchoń T., Inżynieria powierzchni metali, WNT, Warszawa, 1995
2. Jurczyk M., Nanomateriały: wybrane zagadnienia, Wyd. Politechniki Poznańskiej, 2001
3. Kusiński J., Lasery i ich zastosowanie w inżynierii materiałowej, Kraków, Wyd. Nauk. Akapit, 2000
4. Leda H., Materiały inżynierskie w zastosowaniach biomedycznych, Wyd. PP, 2011

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	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)	15	2,00