# 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 (e.g. online)
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

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) | 45 | 2,00 |