



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Application of engineering materials [N1ZiIP2>ZMK]

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### Course

Field of study

Management and Production Engineering

Year/Semester

2/4

Area of study (specialization)

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Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

part-time

Requirements

compulsory

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### Number of hours

Lecture

8

Laboratory classes

8

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

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### Coordinators

### Lecturers

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### Prerequisites

Student should have basic knowledge of materials science and manufacturing techniques.

### Course objective

Student should obtain knowledge about mechanical, physical and chemical aspects of materials properties in their application in practice.

### Course-related learning outcomes

Knowledge:

The student has basic knowledge of materials science, including the types of materials used in technology.

The student knows the principles of selecting engineering materials in machine construction - comparing their structure, properties and applications.

The student knows the basics of material design.

Skills:

The student is able to propose the selection of the properties of a construction material, mainly in terms of its application.

The student is able to conduct basic tests of materials used in machine construction (tests of strength

properties, hardness and impact strength), is able to interpret the test results.  
The student is able to formulate conclusions regarding the use of specific construction materials.

Social competences:

The student is aware of the importance and understands issues related to environmental protection.  
The student is aware of the limitations associated with natural resources.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture

Written colloquium at the end of the semester, contains 7 to 12 of open questions o (credit in case of obtaining at least 50 % correct answers).

Assignment of grades to percentage ranges of results: <90-100> very good; <80-90) good plus; <70-80) good; <60-70) satisfactory plus; <50-60) satisfactory; <0-50) unsatisfactory.

Laboratory classes

Passing on the basis of written tests and oral answers of all performed laboratory meetings. All laboratory exercises must be passed with positive note.

### Programme content

1. Engineering materials - classification, general characteristics.
2. Technological and functional properties of engineering materials.
3. General and specific criteria for selection of materials.
4. Selected methods of materials testing.

### Course topics

Lecture

Selective description of engineering materials. Comprehensive analysis of material properties and the material application (metals, plastics, elastomeric materials, wood, ceramic materials, composites ). The discussion concerning the onfluence of processing conditions and the structure on the base properties of the materials. Analysis of some important mechanical properties (described in static and dynamic conditions), thermal and usable properties of the materials in machine building. Data bases of materials properties.

Criteria of materialsselection for certain application. Description of materials selection procedure for making construction elements (case study).

Laboratory classes:

Application of typical methods for testing materials properties based on plastics and rubber concerning performing of: static tensile test, hardness test, impact test, methods of materials identification, specific gravity testing and flammability of plymeric materials).

### Teaching methods

Lecture: multimedia presentation illustrated with examples given on a board.

Laboratory classes: performing experimental procedure of testing of materials properties, solving tasks, discussion, teamwork.

### Bibliography

Basic:

1. Ashby M.F., Jones D.R.H., Materiały inżynierskie, Tom 1. Właściwości i zastosowanie. Wydawnictwa Naukowo-Techniczne, Warszawa 1997.
2. Ashby M.F., Jones D.R.H., Materiały inżynierskie, Tom 2. Kształotowanie struktury i właściwości, dobór materiałów. Wydawnictwa Naukowo-Techniczne, Warszawa 1998.
3. Dobrzański L.A., Podstawy nauki o metalach i metaloznawstwo: materiały inżynierskie z podstawami projektowania materiałowego. Wydawnictwa Naukowo-Techniczne, Warszawa 2002.
4. Dobrzański L.A., Wprowadzenie do nauki o materiałach. Wyd. Polit. Śląskiej, Gliwice 2007.
5. Garbarski J., Części maszyn z tworzyw sztucznych, Oficyna Wyd. PW, Warszawa 2016.
6. Oczóś K.E., Kształotowanie ceramicznych materiałów technicznych, Oficyna Wyd. Politechniki Rzeszowskiej, Rzeszów 1996.

Additional:

1. Ashby M.F., Dobór materiałów w projektowaniu inżynierskim. Wydawnictwa Naukowo-Techniczne, Warszawa 1998.
2. Łączyński B., Nietalowe elementy maszyn, Wydawnictwa Naukowo-Techniczne, Warszawa 1988.
3. Dobrzański L.A., Zasady doboru materiałów inżynierskich z kartami charakterystyk. Wyd. Polit. Śląskiej, Gliwice 2001.
4. Dobrzański L.A., Metalowe materiały inżynierskie. Wydawnictwa Naukowo-Techniczne, Warszawa 2004.
5. Dobrzański L.A., Podstawy nauki o materiałach. Wyd. Polit. Śląskiej, Gliwice 2013.

**Breakdown of average student's workload**

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	16	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	34	1,50