



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Selection of materials for construction elements [N2MiBP1>DMnEK]

### Course

Field of study	Year/Semester
Mechanical and Automotive Engineering	1/1
Area of study (specialization)	Profile of study
Railway Vehicles	general academic
Level of study	Course offered in
second-cycle	Polish
Form of study	Requirements
part-time	compulsory

### Number of hours

Lecture	Laboratory classes	Other
9	0	0
Tutorials	Projects/seminars	
0	0	

### Number of credit points

1,00

### Coordinators

dr inż. Grzegorz Kinal  
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### Lecturers

### Prerequisites

Knowledge: Basic knowledge of chemistry, materials science: metals and their alloys, plastics, ceramics and composites. Skills: Conducting selected research in the field of metallography and heat treatment of metal alloys as well as performing and interpreting the results of metallographic tests. The student is able to obtain information from literature and databases, to interpret and justify opinions. Social competences: The student is aware of the importance of technical activity, understands the need for development and education

### Course objective

Understanding the basics of selecting engineering materials for selected engineering objects. Discussion of the working conditions of selected engineering structures, wear criteria, material requirements, selection of materials that meet the requirements. car engines, thermo-fan-jet engines.

### Course-related learning outcomes

Knowledge:  
Has extended knowledge of modern construction materials such as carbon plastics, composites, ceramics, in terms of their construction, processing technology and applications.

Has extensive knowledge of selected departments of technical mechanics related to the selected specialization.

Has a general knowledge of the principles and methods of constructing working machines, in particular the methods of functional and strength calculations, mathematical optimization of mechanical structures and modeling of machine structures in 3D systems.

#### Skills:

He can correctly select the optimal material and its processing technology for typical parts of working machines, taking into account the latest achievements in material engineering.

Can program the technological process of manufacturing machine parts, including the development of a simple program to control the machine tool.

He can estimate the cost of making a working machine or a vehicle with a high degree of complexity from a selected group of machines.

#### Social competences:

Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in case of difficulties in solving the problem on its own.

It is ready to fulfill social obligations, inspire and organize activities for the benefit of the social environment.

It is ready to initiate actions for the public interest.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:

Final test

### Programme content

General characteristics of the basis for the selection of engineering materials for specific engineering objects.

Discussion of the working conditions and wear criteria of selected engineering structures: the most important parts of a car engine, a passenger jet fan-jet engine, gas turbine, nuclear power plant.

Characteristics of physical, mechanical and functional properties of engineering materials. Overview of the selection of materials for the above-mentioned engineering structures, taking into account the properties meeting the requirements, durability and operational reliability, costs.

### Course topics

none

### Teaching methods

Lecture with multimedia presentation

### Bibliography

#### Basic

1. L. Dobrzański: Metaloznawstwo z podstawami nauki o materiałach. WNT, Warszawa, 1996
2. J.R. Davis: Metals Handbook Desk Edition 2nd Edition. ASM Handbook, 1998
3. L.A. Dobrzański: Zasady doboru materiałów inżynierskich z kartami charakterystyk. Wyd. Politechniki Śląskiej, 2000r.
4. L.A. Dobrzański: Materiały inżynierskie i projektowanie materiałowe. Podstawy nauki o materiałach i metaloznawstwo. WNT, 2006r.
5. Michael F. Ashby: Engineering Materials Volume 1; 2nd edition by Butterworth-Heinemann, 1996r.
6. David R.H. Jones Michael Ashby: Engineering Materials Volume 2 2nd Edition An Introduction to Microstructures, Processing and Design by Butterworth-Heinemann, 2013r.

#### Additional

1. Michael Ashby i in.: Inżynieria materiałowa tom I i II, Wydawnictwo Galaktyka, 2006
2. Michael Ashby i in.: Materiały inżynierskie tom I i II, WNT, 2004
3. Poradnik Inżyniera: Obróbka cieplna metali, WNT, 1979

4. Wilhem Domke: Vademecum materiałoznawstwa, NT, 1997

5. Feliks Wojtking, Jurij Soncew: Materiały specjalnego przeznaczenia, Wydawnictwo Politechniki Radomskiej, 2001

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	15	1,00
Classes requiring direct contact with the teacher	9	0,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	6	0,50