



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Non-metallic materials and safe use of operating materials [N1Energ2>MNiBUME]

### Course

Field of study

Power Engineering

Year/Semester

2/4

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

Polish

Form of study

part-time

Requirements

elective

### Number of hours

Lecture

20

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

The student starting this subject should have basic knowledge in mathematics, physics, mechanics and thermodynamics. Should have the ability to obtain information from specified sources.

### Course objective

Providing students with knowledge of ceramic materials, plastics and composites, methods of their production and processing, practical applications and safe use of operating materials.

### Course-related learning outcomes

Knowledge:

The student has ordered knowledge of materials that meet the construction and operational requirements of machines and devices, strength analysis of materials; has the knowledge needed to understand the principles of the material for typical machine parts. Knows and understands the principles of correct operation of machines and devices made of specific materials, knows the basic processes occurring in the life cycle of devices including the safe use of operating materials.

Skills:

The student is able to use the known analytical and experimental methods to critically evaluate existing and designed technical solutions in terms of the materials used.

Social competences:

Student understands the need and knows the possibilities of continuous training, raising professional, personal and social competences (e.g. through second and third degree studies, postgraduate studies, courses); and is ready to critically assess knowledge, recognizes its importance in solving cognitive and practical problems.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Checking knowledge during the last lecture.

### Programme content

The classes cover basic issues related to non-metals and their characteristics - chemical composition, structure, properties and safety related to the use of consumables - e.g. storage.

### Course topics

Classification and general characteristic of basic groups of engineering materials: metals and their alloys, plastics, ceramics and glass, composites.

Plastics, polymers construction, covalent and van der Waals bonds, crystalline and amorphous structure, methods of polymer processing, molding, properties, types (plastomers, elastomers), examples of application.

Construction of ceramic materials, covalent and ionic bonds, crystal and amorphous structure, methods of ceramic and glass processing, molding, properties, types (traditional, engineering), examples of application.

Construction of composites, types of composites, production methods, properties, examples of application.

Construction and production of main petroleum products.

Storage of fuels and other petroleum products.

Petroleum materials - explosive characteristic

Counteracting the harmful effects of operating materials.

### Teaching methods

Lecture with multimedia presentations.

### Bibliography

Basic:

1. L. A. Dobrzański: Podstawy nauki o materiałach i metaloznawstwo, WNT, Gliwice 2002.
2. K. Przybyłowicz, J. Przybyłowicz, Materiałoznawstwo w pytaniach i odpowiedziach, WNT, 2009.
3. Zwierzycki W.: Oleje, paliwa i smary dla motoryzacji i przemysłu, Wyd. ITeE, Radom 2001.

Additional:

1. M. Ashby i in.: Inżynieria materiałowa tom I i II, Wydawnictwo Galaktyka, 2006.
2. M. Ashby i in.: Materiały inżynierskie tom I i II, WNT, 1996.
3. Mały poradnik mechanika, tom I i II, WNT, 2002.
4. L.A. Dobrzański, R. Nowosielski: Metody badania metali i stopów. Badania własności fizycznych. WNT, W-wa, 1987.
5. W. Domke: Vademecum materiałoznawstwa, NT, 1997.
6. F. Wojtking, J. Soncew: Materiały specjalnego przeznaczenia, Wydawnictwo Politechniki Radomskiej, 2001.
7. Zwierzycki W.: Płyny eksploatacyjne dla środków transportu drogowego. Charakterystyka funkcjonalna i ekologiczna. Wyd. Politechniki Poznańskiej, Poznań 2006.

### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	20	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	30	1,00