COURSE DESCRIPTION CARD - SYLLABUS

Course name
Metalmaterials and operating materials [S1Energ1>MMiE]

Course

Field of study
Power Engineering

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

dr hab. inż. Marta Paczkowska prof. PP
marta.paczkowska@put.poznan.pl

Lecturers

dr hab. inż. Marta Paczkowska prof. PP
marta.paczkowska@put.poznan.pl

prof. dr hab. inż. Wiesław Zwierzycki
wieslaw.zwierzycki@put.poznan.pl

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 metal and ceramic materials, plastics and composites, methods of their production and processing, practical applications as well as consumables (oils, lubricants).

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.

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:
studnet 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:

Learning outcomes presented above are verified as follows:
Checking knowledge during the last lecture.

Programme content

Classification and general characteristic of basic groups of engineering materials: metals and their alloys, plastics, ceramics and glass, composites.
Construction of metal materials, metallic bonds, crystal structure, crystal lattice and its elements, crystallographic systems and types of lattice, crystalline defects, solid solutions and factors conditioning their formation, intermetallic phases, interstitial phases and complex structures, phase mixtures, balance diagrams , metal alloys, heat treatment, mechanical properties (tensile strength, tensile modulus, bending strength, impact resistance, hardness), types of metal alloys (ferrous, non-ferrous), examples of application.
The types of friction and the conditions in which they occur. Hydrodynamic and elastohydrodynamic lubrication of friction nodes. Construction and preparation of mineral and synthetic lubricating oils. Functions and required properties of lubricants. Lubricants used in the automotive industry (engine and transmission oils, plastic lubricants). Motor fuels. Industrial consumables (machine, compressor, turbine, transmission, hydraulic oils, etc.). Areas of application of lubricants in power industry. Classification of turbine oils. Components of hydraulic turbines subject to lubrication. Required properties of turbine oils. Types and properties of electro-insulating oils. Synthetic transformer oils. Occupational aging of oils and working fluids (diagnosis of states). Consumables and the natural environment.

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	68	3,00
Classes requiring direct contact with the teacher	28	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	40	2,00