

| STUDY MODULE DESCRIPTION FORM | | |
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| Name of the module/subject Unmetallic Materials | | Code 1010621271010611298 |
| Field of study Mechanical Engineering | Profile of study (general academic, practical) general academic | Year /Semester 4 / 7 |
| Elective path/specialty Internal Combustion Engines | Subject offered in: Polish | Course (compulsory, elective) obligatory |
| Cycle of study: First-cycle studies | Form of study (full-time, part-time) full-time | |
| No. of hours Lecture: 1 Classes: - Laboratory: - Project/seminars: - | | No. of credits 1 |
| Status of the course in the study program (Basic, major, other) other | | (university-wide, from another field) university-wide |
| Education areas and fields of science and art technical sciences | | ECTS distribution (number and %) 1 100% |
| Responsible for subject / lecturer: dr hab. inż. Marta Paczkowska email: marta.paczowska@put.poznan.pl tel. 616475906 Wydział Inżynierii Transportu ul. Piotrowo 3 60-965 Poznań | | |
| Prerequisites in terms of knowledge, skills and social competencies: | | |
| 1 | Knowledge | The student should have knowledge of basic sciences, ie: physics and chemistry, and knowledge of subjects realized at the first level of study, ie: physical chemistry, thermodynamics, mechanics, strength of materials, machine construction. |
| 2 | Skills | The student should demonstrate the general ability to identify problems, create algorithms for solving them and the ability to solve engineering tasks. The student should understand the basic phenomena occurring in solid bodies, be able to identify and characterize them. |
| 3 | Social competencies | The student is ready to deepen knowledge in the field of interdisciplinary subjects. The student is open to learning about new technologies and engineering solutions. |
| Assumptions and objectives of the course: The aim of the course: Non-metallic materials is to familiarize students with such materials as plastics, ceramics and composites. In particular, familiarization with their structure and properties | | |
| Study outcomes and reference to the educational results for a field of study | | |
| Knowledge: 1. Has basic, ordered knowledge of non-metallic and composite materials used in the construction and operation of machines, including mainly ceramic materials, synthetic materials, non-metallic natural materials (wood, glass, stone) - [M1_W10] | | |
| Skills: 1. Can acquire information from literature, the internet, databases and other sources. Can integrate the information obtained and interpret conclusions and create and justify opinions - [M1_U01] | | |
| Social competencies: 1. Is ready to recognize the importance of knowledge in solving cognitive and practical problems and to consult experts in the event of difficulties in solving the problem - [M1_K02] | | |
| Assessment methods of study outcomes | | |
| - written verification | | |
| Course description | | |
| Classification of the main groups of engineering materials: metals and their alloys, plastics, ceramics and glass, composites. Construction of metallic materials, metallic bonding, the crystal structure, the lattice crystal, and the elements, crystal systems and types of the lattice, the defects of the crystalline structure, solid solution and the factors influencing their creation phase | | |

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| <p>intermetallic phases interstitial and structures of the complex mixture of phases, charts balance , 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.</p> <p>Plastics, polymers construction, covalent and van der Waals bonds, crystal and amorphous structure, methods of polymer processing, molding, properties, types (plastomers, elastomers), examples of application.</p> <p>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.</p> <p>Construction of composites, types of composites, production methods, properties, examples of application.</p> | | |
| <p>Basic bibliography:</p> <ol style="list-style-type: none"> 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. M. Ashby i in.: Inżynieria materiałowa tom I i II, Wydawnictwo Galaktyka, 2006 4. M. Ashby i in.: Materiały inżynierskie tom I i II, WNT, 1996 5. W. Domke: Vademecum materiałoznawstwa, NT, 1997 | | |
| <p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. Mały poradnik mechanika, tom I i II, WNT, 2002 | | |
| <p>Result of average student's workload</p> | | |
| <p>Activity</p> | | <p>Time (working hours)</p> |
| 1. Preparation for lectures | | 1 |
| 2. Participation of lectures | | 15 |
| 3. Preservation of content from classes | | 2 |
| 4. Consultation | | 1 |
| 5. Preparation for verification of knowledge | | 5 |
| 6. Participation of verification of knowledge | | 1 |
| <p>Student's workload</p> | | |
| <p>Source of workload</p> | <p>hours</p> | <p>ECTS</p> |
| Total workload | 25 | 1 |
| Contact hours | 17 | 0 |
| Practical activities | 0 | 0 |