



## Subject card

|   |   |   |  |            |  |         |     |
|---|---|---|--|------------|--|---------|-----|
| Subject name and code                       | Non-metallic materials, PG_00056150   |   |  |            |  |         |     |
| Field of study                              | Transport and Logistics   |   |  |            |  |         |     |
| Date of commencement of studies             | October 2021  | Academic year of realisation of subject   |  |            | 2021/2022  |         |     |
| Education level                             | first-cycle studies   | Subject group   |  |            | Obligatory subject group in the field of study<br>Subject group related to scientific research in the field of study |         |     |
| Mode of study                               | Full-time studies   | Mode of delivery  |  |            | at the university  |         |     |
| Year of study                               | 1   | Language of instruction   |  |            | Polish   |         |     |
| Semester of study                           | 1   | ECTS credits  |  |            | 4.0  |         |     |
| Learning profile                            | general academic profile  | Assessment form   |  |            | assessment   |         |     |
| Conducting unit                             | Department of Theory and Ship Design -> Faculty of Mechanical Engineering and Ship Technology   |   |  |            |  |         |     |
| Name and surname of lecturer (lecturers)    | Subject supervisor  | dr hab. inż. Lech Rowiński  |  |            |  |         |     |
|   | Teachers  | mgr inż. Piotr Bela<br>dr hab. inż. Leszek Matuszewski<br>dr inż. Gabriel Strugała<br>dr hab. inż. Lech Rowiński  |  |            |  |         |     |
| Lesson types and methods of instruction     | Lesson type   | Lecture   | Tutorial   | Laboratory | Project  | Seminar | SUM |
|   | Number of study hours   | 15.0  | 0.0  | 15.0       | 0.0  | 15.0    | 45  |
|   | E-learning hours included: 0.0<br>Adresy na platformie eNauczanie:<br>Materiały niemetalowe TIL WIMIO - Moodle ID: 18596<br><a href="https://enauzanie.pg.edu.pl/moodle/course/view.php?id=18596">https://enauzanie.pg.edu.pl/moodle/course/view.php?id=18596</a> |   |  |            |  |         |     |
| Learning activity and number of study hours | Learning activity   | Participation in didactic classes included in study plan  | Participation in consultation hours                | Self-study | SUM  |         |     |
|   | Number of study hours   | 45  | 10.0   | 45.0       | 100  |         |     |
| Subject objectives                          | Provide basic knowledge regarding organic synthetic materials (plastics) that are utilized in machine and boat building as well as principles of selection of materials for structures, glues and surface coats.  |   |  |            |  |         |     |
| Learning outcomes                           | Course outcome  | Subject outcome   | Method of verification                             |            |  |         |     |
|   | [K6_U05] can formulate a simple engineering task and its specification within the range of design, construction and operation of means and systems of transport   | Student is able to select plastic material for typical technical product basing on technical specification and technological properties   | [SU2] Assessment of ability to analyse information |            |  |         |     |
|   | [K6_W03] has a basic knowledge on hydromechanics, thermodynamics, machine construction, ecology, materials science and electronics necessary to understand the construction and operation principles of means of marine transport                                 | Student knows principal plastics; Knows basic data of synthetic materials. Is able to describe the properties of synthetic materials; Knows basic technological processes; Knows basic technological processes and its influence on the usable properties of synthetic materials, he distinguishes main composites categories; Knows the basic types resins and reinforcing materials used in boat building and reinforcing materials. Knows the principles of procurement polymer/fiber composites | [SW1] Assessment of factual knowledge              |            |  |         |     |

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|--|--|---|-------------------------------|
| Subject contents   | Basic definitions and nomenclature (monomers and polymers); Review of non-metallic materials - natural and synthetic (cellulose, proteins, natural caoutchouc); Material characteristics for different application areas; Thermoplastics and elastomers. Mechanical and thermal properties of thermoplastics. Duromers and their chemistry. Resins and reinforcements for marine application. Technological process of reinforced structures. Technological process of a large structural element of reinforced synthetic resin. |   |                               |
| Prerequisites and co-requisites                                | Basic chemistry. Basic mechanical properties of materials  |   |                               |
| Assessment methods and criteria                                | Subject passing criteria   | Passing threshold   | Percentage of the final grade |
|  | Short test during every lesson   | 60.0%   | 50.0%                         |
|  | Laboratory report  | 80.0%   | 50.0%                         |
| Recommended reading  | Basic literature   | 1. Dobrosz K., Matysiak A., Tworzywa sztuczne Warszawa WSZIP 1985<br>2. Kłosowska-Wońkiewicz Z., Królikowski W., Penczek P., Żywice i laminaty poliestrowe. Warszawa WNT 1980<br>3. Kozłowski J., Wilczopolski M., Materiałoznawstwo okrętowe czIII Okrętowe Tworzywa Polimerowe. Gdynia WSMW 1982<br>4. Królikowski W., Tworzywa wzmocnione i włókna wzmacniające, Warszawa WNT 1988<br>5. Żuchowska D., "Polimery konstrukcyjne". Warszawa WNT 1995 |                               |
|  | Supplementary literature   | 1. Błędzki A.K. i inni: Recykling materiałów polimerowych, Wydawnictwa Naukowo Techniczne, Warszawa, 1997<br><br>2. Composites World ( <a href="https://www.compositesworld.com">https://www.compositesworld.com</a> )  |                               |
|  | eResources addresses   | Materiały niemetalowe TIL WIMIO - Moodle ID: 18596<br><a href="https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18596">https://enauczanie.pg.edu.pl/moodle/course/view.php?id=18596</a>   |                               |
| Example issues/<br>example questions/<br>tasks being completed |  |   |                               |
| Work placement   | Not applicable   |   |                               |