GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | , PG_00070383 | | |
| Field of study | Materials Engineering, Materials Engineering | | |
| Date of commencement of studies | October 2025 | Academic year of realisation of subject | 2026/2027 |
| 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 | 2 | Language of instruction | Polish |
| Semester of study | 4 | ECTS credits | 1.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Division of New Functional Materials For Energy Conversion -> Institute of Nanotechnology and Materials Engineering -> Faculty of Applied Physics and Mathematics -> Faculties of Gdańsk University of Technology | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Jakub Karczewski | |
| | Teachers | dr hab. inż. Jakub Karczewski | |

**Lesson types**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 15.0 | 0.0 | 0.0 | 0.0 | 0.0 | 15 |

E-learning hours included: 0.0

**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 | 15 | 2.0 | 8.0 | 25 |

**Subject objectives**

Understanding modern methods of imaging materials.

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K6_U02] Can operate typical laboratory equipment and analyze material tests | The student is able to prepare and perform measurements of various materials using selected microscopic methods. | [SU4] Assessment of ability to use methods and tools |
| [K6_W02] has knowledge of physics and chemistry, useful for formulating and solving simple problems within the scope of materials science | The student knows the physical basis of operation of selected microscopic methods. | [SW1] Assessment of factual knowledge |
| [K6_W06] Knows selected methods, techniques, tools and materials used in solving simple engineering problems within the scope of materials engineering. | The student is able to correctly analyze and interpret the results obtained from material measurements using various microscopic methods. | [SW2] Assessment of knowledge contained in presentation |

<table>
<tr><td>Subject contents</td><td>Course content – lecture<br>Understanding the theoretical foundations of microscope operation:<br><br>optical microscopy<br><br>tunneling microscopy<br><br>atomic force microscopy<br><br>scanning electron microscopy<br><br>transmission electron microscopy</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>knowledge of basic physics</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>exam</td><td>50.0%</td><td>100.0%</td></tr>
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</td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>• Weilie Zhou Zhong Lin Wang "Scanning Microscopy Techniques and Applications"<br>• V. L.Mironov"Fundamentals of Scanning Probe Microscopy"</td></tr>
<tr><td>Supplementary literature</td><td>• Nanosurf easyScan 2 - operating instruction</td></tr>
<tr><td>eResources addresses</td><td></td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">• principle of atomic force microscopy methods<br>• limitations of SEM microscopy<br>• comparison of nanostructure imaging</td></tr>
<tr><td>Practical activites within the subject</td><td colspan="2">Not applicable</td></tr>
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