GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

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|---|---|---|---|
| Subject name and code | Advanced engineering materials, PG_00064822 | | |
| Field of study | Mechanical Engineering | | |
| Date of commencement of studies | February 2026 | Academic year of realisation of subject | 2025/2026 |
| Education level | second-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 | English |
| Semester of study | 1 | ECTS credits | 4.0 |
| Learning profile | general academic profile | Assessment form | assessment |
| Conducting unit | Division of Materials Science and Technology -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology -> Wydziały Politechniki Gdańskiej | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr inż. Krzysztof Krzysztofowicz | |
| | Teachers | | |

**Lesson types and methods of instruction**

| Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
|---|---|---|---|---|---|---|
| Number of study hours | 30.0 | 0.0 | 15.0 | 0.0 | 0.0 | 45 |

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 | 45 | 16.0 | 39.0 | 100 |

**Subject objectives**

Obtaining the basic knowledge on the advanced construction materials and its behavior in various enviroments

**Learning outcomes**

| Course outcome | Subject outcome | Method of verification |
|---|---|---|
| [K7_U01] utilizes information obtained from the literature and other sources in the field of Mechanics and Mechanical Engineering and presents and analyses the results of solutions to technical problems in this field | the student demonstrates the ability to obtain and analyze information from various sources | [SU2] Assessment of ability to analyse information |
| [K7_W04] demonstrates knowledge covering selected topics of advanced specific knowledge, in particular methods, techniques, tools specific to Mechanics and Mechanical Engineering processes, systems and equipment | the student demonstrates knowledge of selected problems related to the use of materials | [SW3] Assessment of knowledge contained in written work and projects |
| [K7_U12] dvelops her/his own potential and independently plans own, lifelong learning, while also being able to guide others in this regard | student explains importance of continuous learning | [SU2] Assessment of ability to analyse information |

**Subject contents**

LECTUE: Rules and criteria for metallic materials selection. Weldable increased and high strength steels. Maraginig steels. Steels for automotive body sheets. Corrosion resistant and acid resistant steels: austenitic and duplex type ferritic-austenitic, corrosion resistant superalloys. Steels for elevated temperatures application.
Heat resistant and high-temperature creep resistant steels. High-temperature creep resistant iron, nickel and cobalt superalloys for power generation turbines, aviation turbines, petrochemical and chemical industry. Refractory
metals and alloys: molybdenum, niobium, rhenium, tantalum, zirconium and hafnium. Superplastic materials. MEMS and materials used in it. Materials for nuclear power generation. High entropy materials and alloys (HEM).
LABORATORY: Weldable increased and high strength steels. High alloying corrosion resistant steels. Materials for high temperature applications. Composites.

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|---|---|---|
| Prerequisites and co-requisites | | |
| Assessment methods and criteria | | |

| Subject passing criteria | Passing threshold | Percentage of the final grade |
|---|---|---|
| Egzamin | 50.0% | 30.0% |
| Preparation of essay | 50.0% | 35.0% |
| Laboratory | 50.0% | 35.0% |

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| Recommended reading | Basic literature | 1. Adamczyk J., Szkaradek K.: Materiały metalowe dla energetyki jądrowej. Wyd. Politechniki Śląskiej, Gliwice 1992.<br><br>2. Ashby M., Jones D.: Materiały inżynierskie. Tom I właściwości i zastosowanie. WNT, W-wa 1995.<br><br>3. Ashby M., Jones D.: Materiały inżynierskie. Tom II Kształtowanie struktury i właściwości, dobór materiałów. WNT, W-wa 1996.<br><br>4. Baczkowska A. i in.: Kompozyty. Oficyna Wydawnicza Politechniki Warszawskiej, W-wa 2000.<br><br>5. Blicharski M.: Wstęp do inżynierii materiałowej. WNT, Warszawa 2003.<br><br>6. Blicharski M.: Inżynieria materiałowa. Stal. WNT, Warszawa 2017.<br><br>7. Chodorowski J., Ciszewski A., Radomski T.: Materiałoznawstwo lotnicze. Oficyna Wydawnicza Politechniki Warszawskiej, W-wa 1996.<br>8. Ciszewski B., Przetakiewicz W.: Nowoczesne materiały w technice. Wyd. Bellona, W-wa 1993.<br><br>9. Cantor B., Assender H., Grant P.: Aerospace Materials. IoP, Bristol and Philadelphia 2001 |
| | Supplementary literature | 1. Oczoś K.: Kształtowanie ceramicznych materiałów technicznych. Oficyna Wydawnicza Politechniki Rzeszowskiej, Rzeszów 1995.<br><br>2.Pampuch R.: Siedem wykładów o ceramice. Wyd. Akademii Górniczo-Hutniczej, Kraków 2001.<br>3. Śledziona J.: Podstawy technologii kompozytów. Wyd. Politechniki Śląskiej, Gliwice 1998. |
| | eResources addresses | |
| Example issues/ example questions/ tasks being completed | 1. Aerospace materials<br>2. Materials for power generation<br>3. MEMS | |
| Work placement | Not applicable | |

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