SYLLABUS

Name: *Materials Science*
Name in Polish: *Nauka o materiałach (Materiałoznawstwo)*
Name in English:

Information on course:

Course offered by department:	Faculty of Organisation and Management
Course for department:	Silesian University of Technology
Study level and form:	Bachelor's degree, Full-time
Term:	summer semester 2024/2025
Coordinator of course edition:	Dr hab. inż. Dorota Klimecka-Tatar, prof. PCz

Default type of course examination report:

Credit

Language:

English

Course homepage:

https://platforma.polsl.pl/roz/

ECTS

3

Short description:

The aim of the subject and its curriculum is to acquire structured knowledge, skills, and social competencies related to the classification and characterization of engineering materials used in technology and industry. Additionally, it aims to gain fundamental skills in material selection based on their basic utility properties.

Description:

Detailed program contents
Lecture:

1. Materials classification: metals, polymers, ceramics, and composites.
2. Structure of materials: arrangement of atoms, crystal structures, and defects in materials.
3. Properties of materials: mechanical, thermal, electrical, optical properties etc..
4. Material processing: common processing methods include casting, forging, injection and 3d printing.
5. Material characterization and their performance.
6. Materials recycling - environmental and sustainability considerations.
7. Materials in Industry: automotive, electronics, healthcare, and construction.
8. Materials testing and materials quality control.

Laboratory:

1. General characteristics of all groups of engineering materials.
2. Observation and analysis of the structure and microstructure of materials, taking into account various material groups and manufacturing technologies.
3. Selection of materials based on their properties (mechanical, thermal, electrical, etc.).
4. Besic methods of material testing.

Total number of contact hours with academic instructors or other instructors and students:
Lecture: 15 hours
Laboratory: 30 hours

Total number of hours for student self-study:
Preparation for assessment: 30 hours
Preparation for laboratory sessions and report writing: 30 hours
Preparation of laboratory session reports: 15 hours
Total number of hours: 120
ECTS: 4

The number of ECTS credit points obtained through classes conducted with the direct participation of academic instructors or other instructors and students is 2.

Bibliography:

1. Ashby M., Shercliff, Ceb H.on D., Materials: Engineering, Science, Processing and Design, Amsterdam ; Oxford : Butterworth-Heinemann / Elsevier, 2014.
2. Callister William D., Jr., Rethwisch David G., Fundamentals of Materials Science and Engineering: an Integrated Approach : International Student Version, Singapore : John Wiley and Sons, 2016.
3. Askeland Donald R., Wright Wendelin J.; SI Edition prepared by D. K. Bhattacharya, Raj P. Chhabra, The Science and Engineering of Materials: SI Edition, Boston: Cengage Learning, 2016.
4. Supplementary resources:

5. Borkowski S., Sygut P. Improvement Processes in Materials Engineering and Commodity Science: Monography, Sci. Eds.: Zagreb, Croatian Quality Managers Society, 2015.
6. Cook R. D., Young Warren C., Advanced Mechanics of Materials. New York : Macmillan Publishing Company, 1985.
7. Abramovich H., Intelligent Materials and Structures, Berlin : Walter de Gruyter, 2016.

Learning outcomes:

Knowledge: knows and understands
K1A _W3 - Basic engineering processes and technologies in the life cycle of technical equipment, objects and systems and ways of solving typical engineering tasks, particularly in relation to the organization of production processes and production management.

Skills: is able to
K1A _U4 - When identifying and formulating specifications for engineering tasks and solving them: − select and use analytical, simulation and experimental methods, including computer-aided methods, − recognize their system and non-technical aspects, including ethical aspects − make preliminary economic assessment of the proposed solutions and engineering actions taken, − analyse technology transfer and innovation.
K1A _U8 - Solve practical engineering tasks taking into account engineering standards and norms and applying specific technologies appropriate to production engineering, using experience gained in a professional engineering environment.

Social competence: is ready for
K1A _K1 - Critical evaluation of knowledge and received content, recognition of the importance of knowledge in solving cognitive and practical problems, and consulting experts in the event of difficulties in solving problems on their own

Assessment methods and assessment criteria:

Lecture:
- Multimedia presentations.
- Case studies.
- Discussion and debate.

Laboratory:
- Completion of tasks according to instructions.
- Preparation of reports on the activities.

Assessment Methods and Criteria:

Lecture:
Attendance in lectures is not mandatory.
To pass the lecture, a positive evaluation can be obtained based on participation in the lecture or, in the case of not attending the lecture, by passing a concluding test.
A passing grade requires obtaining more than 50% of the possible points.

Laboratory:
Attendance in laboratory sessions is mandatory.
In the event of a student's absence during laboratory sessions and related academic deficiencies, these must be made up according to the specified conditions.
Laboratory tasks are carried out individually or in sections.
To pass the laboratory, it is necessary to submit correctly prepared reports from the activities and receive more than 50% of the possible points.
Reports from the activities are assessed in terms of both form and content.
Incorrectly prepared reports can be corrected twice.

The final assessment for the course takes into account 50% of the grade from the lecture and 50% of the grade from the laboratory. The final grade is the arithmetic average of the grades from the lecture and laboratory sessions.

Practical placement:

N/A