COURSE DESCRIPTION CARD - SYLLABUS

Course name
Computer aided in materials engineering [S2ETI2>KWwIM]

Course

Field of study
Education in Technology and Informatics

Year/Semester
1/2

Area of study (specialization)
–

Profile of study
general academic

Level of study
second-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
15

Other
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of materials science, materials processing, and manufacturing techniques. Ability to think logically, use information obtained from libraries and the Internet, and operate basic computer software. Understanding of the need to learn and acquire new knowledge.

Course objective

Students become familiar with theoretical and practical issues related to computer aided in materials engineering.

Course-related learning outcomes

Knowledge:
1. The student has detailed knowledge of selected issues related to modeling and computer-aided design in materials engineering.
2. The student has knowledge of the use of computer techniques in the preparation of documentation on the structure and properties of materials.

Skills:

1. The student is able to use their knowledge of materials engineering to solve problems related to the selection of materials and processes that determine the properties of materials.
2. The student is able to obtain information from material databases and use it to select materials for specific applications.

Social competences:
1. The student understands the need to constantly search for information on development trends in the field of computer-aided design.
2. The student is able to work creatively.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: written credit at the end of the semester
Laboratory: credit on the basis of a written test and written reports from the realized program content during the project.
Assessment criteria/assessment: in accordance with the study regulations

Programme content

Students become familiar with theoretical and practical issues related to computer aided in materials engineering:
- selection of materials
- evaluation of the structure and properties of materials
- material design processes

Course topics

Lecture:
1. Informatic Engineering Databases. Sources of information about engineering materials, theirproperties and applications. Informative bibliographic databases.
2. Computer aided design and manufacturing CAD/CAM. Computer Aided Materials Design (CAMD) and Computer Aided Materials Selection (CAMS).
3. Modeling, selecting and constructing of a process model. Mathematical and physical modeling.
4. Practical applications of modeling in processes, which shaping the structure and properties of materials: assessment of hardenability of steel, modeling of thermo-chemical processing (carburizing, nitriding), modeling of chemical composition, phase composition and properties of diffusion layers, modeling of dimensional changes after heat treatment and thermochemical treatment.
5. Computer Aided Materials Testing: analysis of metallographic images, analysis of wear resistance and contact resistance of diffusion layers.
6. Computer aiding in technological processes, which shaping the properties of materials.
Laboratory:
1. Material databases
2. Computer-aided assessment of steel hardenability
3. Computer-aided carbon hardening of steel
4. Computer-aided assessment of contact fatigue resistance
5. Computer-aided microstructure and macrostructure testing
6. Computer-aided testing of selected material properties

Teaching methods

Lecture: multimedia presentation.
Laboratory: practical exercises, discussion, problem solving.

Bibliography

Basic:
1. Dobrzański L.A.: Materiały inżynierskie i projektowanie materiałowe. Podstawy nauki o materiałach i metaloznawstwo, Wydawnictwo Politechniki Śląskiej, 2006
2. Miecielica M., Wiśniewski W.: Komputerowe wspomaganie projektowania procesów technologicznych, Wydawnictwo Naukowe PWN, 2005

3. Ashby M.: Dobór materiałów w projektowaniu inżynierskim, Wydawnictwa Naukowo-Techniczne, 1998.
4. Dobrzański L.A.: Podstawy metodologii projektowania materiałowego, Wydawnictwo Politechniki Śląskiej, 2009.

Additional:
1. Dobrzański L.A.: Materiały inżynierskie z podstawami technologii procesów materiałowych. T. 1 i T.2, PWN, 2024.
2. Ashby M., Shercliff H., Cebon D.: Inżynieria materiałowa. Tom 1, Galaktyka, 2011
3. Ashby M., Shercliff H., Cebon D.: Inżynieria materiałowa. Tom 2, Galaktyka, 2011

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00