COURSE DESCRIPTION CARD - SYLLABUS

Course name
Ecomaterials [S1IMat1>Ekomat]

Course

Field of study
Materials Engineering

Year/Semester
3/6

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-cycle

Course offered in
Polish

Form of study
full-time

Requirements
elective

Number of hours

Lecture
15

Laboratory classes
15

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge in materials science, production technology, engineering design. Ability to think logically, use of information obtained from libraries and the Internet. Understanding the need to learn and acquire new knowledge

Course objective

Familiarization with contemporary environment – friendly materials and production technologies.

Course-related learning outcomes

Knowledge:
1. student should know how to define ecological materials and their properties [k_w02, k_w03]
2. students should be able to describe production technology of environment-friendly material [k_w08, k_w11, k_w14]

Skills:
1. students should know how to select eco-friendly materials for a given application [k_u01, k_u05, k_u14]

2. students should be able to suggest production technology of materials that is environment-friendly [k_u01, k_u05, k_u08, k_u12]
3. student knows how to design a technology process of a selected product taking into account ecology as well production costs [k_u08, k_u13, k_u14, k_u16]

Social competences:
1. student to aware of ecological issues of the natural enviroment [k_k02]
2. student know how to apply eco-friendly materials and technologies in contemporary economy [k_k04]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Assessment at the end of the semester: below 51% - 2.0; from 51% to 62%? - 3.0; from 63% to 72% - 3.5; from 73% to 83% - 4.0; from 84% to 94% - 4.5; above 94% - 5.0.
Lectures: Credit given in writing at the end of semester, covering five issues discussed in lectures.
Laboratory classes: Credit given or the basis of oral or written tests on every individual laboratory class as well as on the basis of written reports of laboratory classes as required by the teacher. Final credit is given by summing all positive results of tests and reports.

Programme content

• Holistic definition of ecomaterials in the context of the ecosystem.
• Materials used to replace previously used materials that pose a dangered to the natural environment and cause its degradation.
• New engineering materials used, taking into account their development and ecological conditions.
• Modern technologies used to produce ecological materials.
• Optimization of materials production.
• The role of materials in environmental management using the Life Cycle Assessment method.
• The impact of materials on the costs and eco-costs of products.

Course topics

Lecture:
1. Definition, classification and properties of eco-materials.
2. Characteristics of selected materials: iron, aluminium, titanium alloys, ceramic materials, polymer materials, composites, nanomaterials, biomaterials, shape-memory materials.
3. Modern technologies used for production of eco-material: nanotechnologies, laser technologies, plasma (ion), vacuum technologies, recycling of materials.
4. Optimization of materials production: process design, production of materials and modelling their structure and properties.
5. Life Cycle Assessment (LCA) used to evaluate the role materials in environment management, costs and eco-costs of products.

Laboratory:
1. Controlled gas nitriding
2. Sintered materials
3. Heat-resistant iron alloys
4. Laser boriding
5. Composite materials

Teaching methods

1. Lecture: multimedia presentation.
2. Laboratory exercises: performing exercises, discussion, team work.

Bibliography

Basic
1. Dobrzański L. Metalowe materiały inżynierskie. WTN, Warszawa, 2004

2. Przybyłowicz K. Inżynieria stopów żelaza. Wyd. Politechniki Świętokrzyskiej, Kielce, 2008
3. Ciszewski A.: Materiałoznawstwo. Oficyna Wyd. Politechniki Warszawskiej, Warszawa, 2009
Additional
1. Burakowski T., Wierzchoń T.: Inżynieria powierzchni metali. WNT, Warszawa, 1995
2. Szewieczek D. i in. Wprowadzenie do projektowania procesów obróbki cieplnej metali i stopów. Wyd. Politechniki Śląskiej, Gliwice, 2009

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	33	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	0,00