



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Ecomaterials

### Course

Field of study

Materials Engineering

Area of study (specialization)

Level of study

First-cycle studies

Form of study

full-time

Year/Semester

3/6

Profile of study

general academic

Course offered in

polish

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

15

Other (e.g. online)

Tutorials

Projects/seminars

### Number of credit points

2

### Lecturers

Responsible for the course/lecturer:

Aneta Bartkowska, PhD

Responsible for the course/lecturer:

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Faculty of Materials Engineering and Technical

Physics

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### 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 environment [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:

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 on 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

Lectures:

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. Contemporary 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 classes:

1. Nitriding regulated
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	62	2,0
Classes requiring direct contact with the teacher	32	1,0
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) <sup>1</sup>	30	1,0

<sup>1</sup> delete or add other activities as appropriate