



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Eco-materials in motor vehicles [S1MiTPM1>EwPM]

### Course

Field of study	Year/Semester
Materials and technologies for automotive industry	3/6
Area of study (specialization)	Profile of study
–	general academic
Level of study	Course offered in
first-cycle	Polish
Form of study	Requirements
full-time	elective

### Number of hours

Lecture	Laboratory classes	Other
15	15	0
Tutorials	Projects/seminars	
0	0	

### Number of credit points

2,00

### Coordinators

dr hab. inż. Aneta Bartkowska prof. PP  
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### Lecturers

### Prerequisites

Knowledge: basic knowledge of materials science, manufacturing technology, engineering design. Skills: the ability to think logically, use of information obtained from libraries and the Internet. Social competencies: understanding the need to learn and acquire new knowledge.

### Course objective

Learning about modern environmentally friendly materials and production technologies used in the automotive industry.

### Course-related learning outcomes

Knowledge:

1. Student should define ecological materials and their properties.
2. Student should be able to describe technologies for producing environmentally friendly materials intended for the automotive industry.

Skills:

1. Student is able to select ecological material for specific applications in the automotive industry.

2. Student is able to propose an environmentally friendly material production technology.
3. Student is able to design the technological process of producing a selected part used in the automotive industry, taking into account ecology and recycling.

Social competences:

1. Student is sensitive to ecological problems.
2. Student is open to the use of ecological materials and production technologies in the modern economy.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

End-of-semester grade:

- a) in the scope of laboratory classes, based on oral or written answers to each exercise, and a report on its progress according to the instructor's instructions. The final grade is obtained based on the average of all positive grades from the answers and reports.
- b) in terms of lectures based on a written assessment conducted during the last classes.

Final grade criteria: <90–100> 5.0 (A); <80–90) 4.5 (B); <70–80) 4.0 (C); <60–70) 3.5 (D); <50–60) 3.0 (E); <0–50) 2.0 (F)

### Programme content

Holistic definition of ecomaterials against the background of the ecosystem. New materials used to replace previously used materials that pose a threat to the natural environment and cause its degradation. Modern technologies used to produce ecological materials.

Optimization of material 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, properties of ecomaterials.
2. Principles of best available technique (BAT).
3. Classification of "zero emission" technologies: 1. reduce, 2. reuse, 3. recycle.
4. Characteristics of selected types of engineering materials used in the automotive industry.
5. Modern technologies used in the automotive industry to produce ecological materials.
6. Optimization of materials production: designing processes, producing materials and modeling their structure and properties.
7. LCA (Life Cycle Assessment) method for assessing the role of materials in managing the environment and the costs and eco-costs of products.

Laboratory:

1. Gas nitriding in the automotive industry.
2. Sintered materials in the automotive industry.
3. Heat-resistant materials in the automotive industry.
4. Laser alloying as an alternative to diffusion processes.
5. Composite materials in the automotive industry.

### Teaching methods

Lecture: multimedia presentation, sample examples, discussion.

Laboratory: practical exercises, discussion.

### Bibliography

Basic:

1. Adamczyk W.: Ekologia wyrobów. Jakość, cykl życia, projektowanie. Polskie Wydawnictwo Ekonomiczne. Warszawa 2004
2. Dobrzański L.: Metalowe materiały inżynierskie. WTN. Warszawa, 2004

3. Jabłoński J. i in.: Technologie „Zero emisji”. Wydawnictwo Politechniki Poznańskiej. Poznań 2011

Additional:

1. Ashby M. F.: Materials and the Environment. Wydawnictwo Elsevier. Oxford 2009

2. Daty P., Janasa D.: Materiały przyszłości. Wydawnictwo Politechniki Śląskiej. Gliwice 2023

3. Dobrzański L. A.: Podstawy kształtowania struktury i właściwości materiałów metalowych. Wydawnictwo Politechniki Śląskiej. Gliwice 2007

4. Dobrzański L. A.: Podstawy metodologii projektowania materiałowego. Wydawnictwo Politechniki Śląskiej. Gliwice 2007

5. Kaczorowski M., Krzyńska A.: Konstrukcyjne materiały metalowe, ceramiczne i kompozytowe. Oficyna Wydawnicza Politechniki Warszawskiej. Warszawa 2017

#### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	32	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	18	0,50