



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Nanomaterials and nanotechnologies in the automotive industry [S1MiTPM1>NiNwM]

Course

Field of study

Materials and technologies for automotive industry

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

0

Tutorials

0

Projects/seminars

0

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Basic knowledge of materials science and materials technology Ability to solve simple material problems based on acquired knowledge, ability to obtain information from indicated sources. Understanding the need to expand your competences.

Course objective

Providing students with knowledge about nanotechnology and nanomaterials used in automotive production,

Course-related learning outcomes

Knowledge:

Has basic knowledge of development trends in materials engineering and technology, especially automotive ones, regarding material design, technology and their selection.

Skills:

Is able to select engineering materials and methods of shaping them in order to produce automotive parts, can compare the basic mechanical, technological and operational properties of automotive

materials.

Social competences:

Is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the environment and the related responsibility for decisions made.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Lecture: Assessment based on discussion during classes, students' activity in discussions and solving group tasks

Programme content

The content discussed during the lectures concerns nanomaterials and nanotechnologies used or having the potential to be used in the automotive industry. Two- and three-dimensional nanomaterials, thin layers, polycrystalline nanomaterials and their powder forms will be discussed. Selected unconventional technologies for producing nanomaterials and their impact on the microstructure and properties of future products used in the automotive industry will be presented. These technologies include: mechanical synthesis, powder metallurgy methods, vapor deposition,

Course topics

The topics of the classes include the following topics:

nanomaterials - definitions, division, properties

nanotechnologies - mechanical synthesis, high-energy grinding, reactive grinding, hydrogenation processes, methods of consolidating powder materials, methods of deposition of thin layers using PVD and CVD methods, sol-gel technology,

properties of nanomaterials and their connection with nanostructure and manufacturing technology, application of nanomaterials in the automotive industry.

Teaching methods

Lecture: multimedia presentation, illustrated with examples given on the board.

Bibliography

Basic:

JCR publications provided by the teacher during classes

Additional:

JCR publications provided by the teacher during classes

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