



COURSE DESCRIPTION CARD - SYLLABUS

Course name

Nanomaterials in engine design

Course

Field of study

Year/Semester

Construction and Exploitation of Means of Transport

2/3

Area of study (specialization)

Profile of study

Internal Combustion Engines

general academic

Level of study

Course offered in

Second-cycle studies

polish

Form of study

Requirements

part-time

compulsory

Number of hours

Lecture

Laboratory classes

Other (e.g. online)

9

0

0

Tutorials

Projects/seminars

0

0

Number of credit points

1

Lecturers

Responsible for the course/lecturer:

Responsible for the course/lecturer:

dr hab. inż. Jarosław Kałużny

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Wydział Inżynierii Lądowej i Transportu

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Prerequisites

Knowledge: Base knowledge in physics, according to the course for the faculty of mechanics; base knowledge in chemistry, according to the course for the faculty of mechanics

Competences: Ability to conduct self studies in literature; ability for creative usage of knowledge in various fields of physics, chemistry and engineering sciences

Social competences: Understanding of continuous personal development; understanding of the impact of engineering products on the human environment.



Course objective

Analysis of the process of piston-cylinder friction. Hydrodynamic theory of lubrication.

Course-related learning outcomes

Knowledge

Extending the competences in rapidly developed nanotechnology

Skills

The student can formulate and test hypothesis.

Social competences

The student becomes to be happy to start his activity striving public affairs

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Discussion during the lesson

Mutual or written exam

Programme content

- Definition of nanomaterials, types of nanomaterials
- Application of nanomaterials in mechanical and electronics design
- Carbon allotropes
- Growth of carbon nanomaterials
- Carbon nanomaterials for friction reduction
- Results of the tests targeting application of carbon nanotubes in combustion engines, discussion
- Electron microscopy, types of microscopes, principles of imaging process
- EDX spectroscopy
- Raman Spectroscopy

Teaching methods

various

Bibliography

Basic

1. ACS Nano



2. Nano Today

Additional

1. Nature

2. Science

Breakdown of average student's workload

	Hours	ECTS
Total workload	30	1,0
Classes requiring direct contact with the teacher	15	0,5
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation) ¹	15	0,5

¹ delete or add other activities as appropriate