COURSE DESCRIPTION CARD - SYLLABUS

Course name
Synthesis of nanomaterials [S2IMat1-Nanomat>SN]

Course

Field of study
Materials Engineering

Year/Semester
1/2

Area of study (specialization)
Nanomaterials

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
0

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

2,00

Coordinators

dr hab. inż. Andrzej Miklaszewski prof. PP
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Lecturers

Prerequisites

Knowledge: basic knowledge of physics, chemistry, materials science, Skills: logical thinking, using information obtained from the library and the Internet Social competences: understanding the need to learn and acquire new knowledge

Course objective

1. Providing students with basic knowledge of the technology of obtaining nanomaterials, to the extent specified by the program content appropriate for the field of study 2. Developing students" skills in solving simple problems related to the selection of the process of obtaining nanostructures and the analysis of the results of microscopic observations based on the acquired knowledge 3. Shaping students" teamwork skills

Course-related learning outcomes

Knowledge:
1. the student should be able to characterize nanomaterials - [k_w04, k_w10]
2. the student should characterize the basic processes of obtaining nanomaterials - [k_w06, k_w11]

Skills:

1. the student is able to select nanomaterials depending on the applications - [k_u011}
2. the student is able to propose the use of nanomaterials - [k_u07, k_u05]
3. the student is able to conduct research on nanomaterials - [k_u05, k_u08, k_u09]

Social competences:
1. the student can work in a group - [k_k03]
2. the student is aware of the role of nanomaterials in the modern economy and in society - [k_k02]

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture: Pass on the basis of a test consisting of 5 general questions (pass if the correct answer to at least 3 questions: <3? Ndst, 3? Dst, 3.5? Dst +, 4? Db, 4.5? Db +, 5? ? bdb) carried out at the end of the semester.

Programme content

Lecture: Selected unconventional methods of material synthesis. Technologies: vapor deposition, non-equilibrium processes (mechanical synthesis, high-energy grinding, reactive grinding), hydrogenation processes (HD, HDDR), thin layer technique, sol-gel method, gas phase chemical reactions. Methods of consolidation of powder materials.

Teaching methods

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

Bibliography

Basic
1. Nanomateriały inżynierskie konstrukcyjne i funkcjonalne. Red. K. Kurzydłowski, M. Lewandowska. PWN
2. A. Sokołowska, A. Michalski, K. Zdunek, A. Olszyna, Niekonwencjonalne środki syntezy materiałów, PWN, Warszawa 1991.
3. M. Jurczyk, J. Jakubowicz, Nanomateriały ceramiczne. Wyd. Pol. Pozn. 2004
4. M. Jurczyk, Mechaniczna synteza, Wyd. Pol. Pozn. 2003
Additional
1. Domestic and foreign scientific journals, Nano, Mater. Design

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	20	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	0	0,00