



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Bio-nanomaterials [S2IMat1-Nanomat>Bio]

### 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

15

Laboratory classes

15

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 biomaterials, within the scope defined by the curriculum content appropriate for the field of study 2. Developing students' skills in solving simple problems related to the selection of bionanomaterials, distinguishing materials, and analyzing the results of microscopic observations based on the acquired knowledge 3. Shaping students' teamwork skills

### Course-related learning outcomes

Knowledge:

1. the student should characterize bionanomaterials - [k\_w04, k\_w10]
2. the student should characterize the basic processes of obtaining bionanomaterials - [k\_w08, k\_w07, k\_w11]

#### Skills:

1. the student is able to select bionanomaterials depending on the applications - [k\_u11, k\_u13]
2. the student is able to propose the use of bionanomaterials - [k\_u13]
3. the student is able to conduct research on bionanomaterials - [k\_u12 k\_u13]

#### Social competences:

1. the student can work in a group - [k\_k03]
2. the student is aware of the role of biomaterials 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 based on 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.

Laboratory: Assessment based on an oral or written answer concerning the content of each performed laboratory exercise, a report on each laboratory exercise according to the instructions of the laboratory teacher. To pass the laboratories, all exercises must be passed (positive grade from the answers and the report).

### Programme content

#### Lecture:

Nanoscience-nanotechnology. Modern bio-nanomaterials - definition, bio-nanomaterials - characteristics of materials used in medicine: metallic bio-nanomaterials, bionanoceramics, bionanocomposites, biological corrosion, in vitro and in vivo tests.

#### Lab:

1. Titanium and titanium alloys used in medicine
2. Stainless steel and its application in medicine
3. Cobalt alloys used in medicine
4. Resorbable ceramics
5. Neutral ceramics and bioglass
6. Technologies of producing biomaterials

### Teaching methods

1. Lecture: multimedia presentation, presentation illustrated with examples given on the blackboard.
2. Laboratory exercises: practical exercises, discussion, and preparation of the results in the form of a report, and formulation of conclusions concerning the issues discussed during classes.

### Bibliography

#### Basic

1. M. Jurczyk, J. Jakubowicz, Bionanomateriały, Wyd. Pol. Pozn. 2008
2. Z. Święcki, Bioceramika dla ortopedii, IPPT, Warszawa 1992.
3. R. Pampuch i inni, Nowe materiały węglowe w medycynie, PWN, Warszawa 1988.
4. J. Marciniak, Biomateriały w chirurgii kostnej, Wydawnictwo Politechniki Śląskiej, Gliwice 1992.
5. Leda H: Materiały w budowie maszyn i aplikacjach medycznych, Wyd. Politechniki Poznańskiej, 2008
6. Nanomateriały inżynierskie konstrukcyjne i funkcjonalne. Red. K. Kurzydłowski, M. Lewandowska. PWN

#### Additional

Krajowe i zagraniczne czasopisma naukowe ? Biomaterials, Nano

### Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	15	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	2,00