



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Bionanomaterials [S1IMat1>Bionano]

### Course

Field of study

Materials Engineering

Year/Semester

4/7

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

0

Other

0

Tutorials

0

Projects/seminars

15

### Number of credit points

3,00

### Coordinators

dr inż. Maciej Tuliński

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### Lecturers

### Prerequisites

Basic knowledge of physics, chemistry and materials science. Reasoning skills, use of information obtained from libraries and the Internet. Understanding the need for learning and acquiring new knowledge.

### Course objective

1. Provide students with basic knowledge of materials used in medicine. 2. Developing in students the ability to solve simple problems related to the selection of materials for medical applications, distinguishing between biomaterials and analysis of the results of observations based on gained knowledge.

### Course-related learning outcomes

Knowledge:

a student can describe the basic engineering materials having a medical purpose in mind [k\_w10, k\_w11]

Skills:

a student is able to select the appropriate biomaterials for specific applications [k\_u21]

a student who has completed the course can formulate simple conclusions on the basis of the results of

calculations, measurements and conducted observations [k\_u09]  
a student can choose the appropriate production technologies in order to design products, their structure and properties [k\_u21]

Social competences:

a student can work in a group [k\_k03]

a student is aware of the role of biomaterials in today's economy and society [k\_k02]

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Lecture: on the basis of the test conducted at the end of the semester.

Laboratory: Assessment based on the oral or written answers concerning the content of each exercise performed during laboratory, report after each laboratory exercise. To pass laboratories all the exercises must be positively evaluated.

### Programme content

The program covers basic issues related to biomaterials and bionanomaterials - their division, properties and applications.

### Course topics

Biomaterials - definition, classification and characterization, bionanomaterials - definition, characteristics of the materials used in medicine: metallic bionanomaterials, ceramic bionanomaterials, plastics, nano-composites, biological corrosion, in vitro and in vivo studies, medical applications i.e. dentistry. Getting acquainted with nano-metallic materials (Ti, 316L steels, Co-alloys), ceramics and plastics used in medicine and modern engineering techniques in shaping the surface of the bionanomaterials.

### Teaching methods

1. Lecture: multimedia presentation, illustrated with examples on the board.
2. Laboratory: measurements conducted using x-ray diffractometer, microhardness tester, density tester and corrosion resistance tester

### Bibliography

Basic

1. J. Marciniak, Biomateriały w chirurgii kostnej, Wydawnictwo Politechniki Śląskiej, Gliwice 1992
2. M. Jureczek, J. Jakubowicz, Bionanomateriały, Wyd. Pol. Pozn. 2008

Additional

1. Z. Święcki, Bioceramika dla ortopedii, IPPT, Warszawa 1992
2. R. Pampuch i inni, Nowe materiały węglowe w medycynie, PWN, Warszawa 1988
3. M. Jureczek, J. Jakubowicz, Nanomateriały ceramiczne. Wyd. Pol. Pozn. 2004

### Breakdown of average student's workload

	Hours	ECTS
Total workload	0	30,00
Classes requiring direct contact with the teacher	0	15,00
Student's own work (literature studies, preparation for laboratory classes/tutorials, preparation for tests/exam, project preparation)	0	15,00