COURSE DESCRIPTION CARD - SYLLABUS

Course name
Modern technologies of biomaterials [S2IBio1-IIiP>NTB]

Course

Field of study
Biomedical Engineering

Year/Semester
1/2

Area of study (specialization)
Engineering of Implants and Prosthesis

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
0

Other
0

Tutorials
0

Projects/seminars
15

Number of credit points

2,00

Coordinators

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Lecturers

Prerequisites

Students should have a basic knowledge of materials science, materials processing and biomaterials. They should also have the ability to think logically and to obtain information from various sources as well as be ready to cooperate within a team. In addition, they should understand the need to learn and acquire new knowledge

Course objective

Providing to students information about modern biomaterials and techniques for their production and modification.

Course-related learning outcomes

Knowledge:
1) Students have knowledge of modern and future-oriented biomaterials.
2) Students have knowledge of modern techniques of biomaterials production and modification.

Skills:
1) Students can propose a treatment that improves the quality of biomaterials.

2) Students are able to propose a modern method of implants fabrication.

Social competences:
1) Students can work together in a team.
2) Students are aware of the role of biomaterials and modern technologies in modern economy and for societies.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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1) Knowledge acquired during the lectures is verified at the final test lasting 45 minutes. There are two credit deadlines to which every student is entitled. In addition, students can improve their grades in additional term. Final test consists of 3-5 questions. The pass threshold is 50% of the points.
2) Skills acquired as part of theprojects are checked on an ongoing basis during each class in the form of an oral presentation and assessed on the basis of written report/project. To pass the project classes it is required to obtain a positive mark from an oral presentation and and a written report/project.

Programme content

Methods of shaping biomaterials and medical devices with various properties.

Course topics

Lecture:
1. Modern metal, ceramic and composite biomaterials, including nanobiomaterials.
2.Modern methods of implants forming:
a) modern powder metallurgy (methods of producing powders of the biomaterials, additive methods of powders consolidation: SLM, SLS; hot pressing with various heat sources)
b) special casting and plastic deformation processing methods
c) methods of bionanomaterials manufacturing (mechanical, chemical and physical)
d) modern methods of producing biocompatible coatings (PVD, CVD, laser and plasma processing)
3. Methods of biomaterials properties evaluation - heat treatment and thermo-chemical treatment.
Project:
1. Materials and technology selection to the given implant.
2. Propose a solution to the problems of biomaterials technology.

Teaching methods

1) Lecture: multimedia presentation, illustrated with examples on the board.
2) Project: solving practical problems, working in teams, discussion.

Bibliography

Basic
1. Publications from the Elsevier and Springer database available through Library PUT
2. J. Jakubowicz, Obróbka powierzchniowa biomateriałów tytanowych, Wydawnictwo Politechniki Poznańskiej, Poznań 2019
3. J. Marciniak, Biomateriały, Wyd. Politechniki Śląskiej, Gliwice 2002
4. Biomateriały, Tom 4, Biocybernetyka i Inżynieria Biomedyczna 2000, pod red. M. Nałęcza, Akademicka Oficyna Wydawnicza EXIT, Warszawa 2003.
Additional
1. M. Jurczyk, J. Jakubowicz, Bionanomateriały, Wyd. Politechniki Poznańskiej, Poznań 2008

Breakdown of average student's workload

	Hours	ECTS
Total workload	50	2,00
Classes requiring direct contact with the teacher	30	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	0,50