COURSE DESCRIPTION CARD - SYLLABUS

Course name
Biomaterials [S1IMat1>Biomat]

Course

Field of study
Materials Engineering

Year/Semester
2/3

Area of study (specialization)
–

Profile of study
general academic

Level of study
first-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

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Lecturers

Prerequisites

Students should have a basic knowledge of materials science, physics and chemistry. 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 basic groups of biomaterials, their properties and application.

Course-related learning outcomes

Knowledge:
1) students have knowledge of basic groups biomaterials, their properties and applications - [k_w10].

Skills:
1) students are able to characterize the basic biomaterials and their properties - [k_u01, k_u14].
2) students are able to select biomaterials for various applications - [k_u01, k_u03, k_u14, k_u16, k_u17].

Social competences:
1) students can work together in a team - [k_k03].
2) students are aware of the role of biomaterials in modern economy and for societies - [k_k02].

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
1) Knowledge acquired during the lectures is verified at the final test lasting 45 minutes. There are two credit deadlines in the December /January of the winter semester to which every student is entitled. In addition, students can improve their grades in February. Final test consists of 3-5 questions. The pass threshold is 50% of the points.
2) Skills acquired as part of the laboratory classes are checked on an ongoing basis during each class in the form of an oral or written answer to the questions asked and assessed on the basis of reports from each laboratory exercise. Each laboratory exercise requires a positive evaluation. At the end of the semester, after completing compulsory exercises, there is a possibility to pass a corrective exam of selected exercises.

Programme content

Biomaterials characterization:
- classification,
- structure,
- properties,
- technologies,
- application.

Course topics

Lecture:
1. Definition of biomaterials, the role of its chemical composition, work environment, applications and classification of biomaterials.
2. Metal-based biomaterials:
a) classification, chemical composition, mechanical and physical properties, applications,
b) austenitic steels,
c) cobalt alloys,
d) titanium alloys,
e) other alloys based on nickel, gold, silver, tantalum.
3. Ceramic biomaterials:
a) classification, chemical composition, mechanical and physical properties, applications,
b) resorbed in tissues (hydroxyapatite),
c) with controlled surface reactivity (bioglass),
d) inert (Al2O3, ZrO2).
4. Polymer-based biomaterials:
a) classification, properties and applications,
b) natural,
c) synthetic.
5. Carbon and composite biomaterials.

Laboratory classes:
1. Materials for surgical instruments.
2. Titanium and its alloys.
3. Cobalt alloys.
4. Austenitic steels.
5. Ceramic biomaterials.

Teaching methods

1) Lecture: multimedia presentation, illustrated with examples on the board.
2) Laboratory exercises: microscopic observations; performance of tasks given by the teacher - practical exercises.

Bibliography

Basic
1. J. Marciniak, Biomateriały, Wyd. Politechniki Śląskiej, Gliwice 2002
2. 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	1,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	20	1,00