



## COURSE DESCRIPTION CARD - SYLLABUS

Course name

Dental materials and implants [S1IBio1E>MiIS]

### Course

Field of study

Biomedical Engineering

Year/Semester

2/4

Area of study (specialization)

–

Profile of study

general academic

Level of study

first-cycle

Course offered in

English

Form of study

full-time

Requirements

elective

### Number of hours

Lecture

15

Laboratory classes

15

Other

0

Tutorials

0

Projects/seminars

0

### Number of credit points

2,00

### Coordinators

dr inż. Jakub Grabski  
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### Lecturers

### Prerequisites

- Basic knowledge from biology and chemistry. - Logical thinking, sourcing information from the library and the internet. - Understanding the need to learn and acquire interdisciplinary knowledge.

### Course objective

Learning about selected biomaterials as implants and dental materials, preliminary familiarity with the conditions for the creation and practical use of biomaterials as implants and dental materials in the biological life cycle.

### Course-related learning outcomes

Knowledge:

1. Student should describe the types of biomaterials as implants in medicine and dentistry.
2. Student should describe biomaterial / tissue interactions, biocompatibility and immunological issues.
3. Student should describe the mechanical and physical properties of osteoarticular structures, including the specificity of oral tissues.

Skills:

1. Student can acquire information regarding the area of medical knowledge.
2. Student is able to assess the medical conditions in the field of biomedical engineering.
3. Student is able to integrate the obtained information, interpret and draw conclusions needed in the construction of medical implants and dental materials.

Social competences:

1. Student is aware of the importance and understanding of non-technical aspects of engineering.
2. Student is able to set priorities for the implementation of a specific project.

### Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

Forming rating:

a) for the lectures:

- Based on answers to questions concerning the material discussed in previous lectures

b) for the laboratories:

- On the basis of an assessment of the current progress of tasks,

Summary rating:

a) Lecture

Credit based on a test in the form of a multiple choice MCQ (pass mark in the case of correct answers at least 60% at the end of the semester (grading scale: <59% -ndst, 60% -defective, 75% -go good, 80% - good, 85% - not good, 90% - very good)

b) Lab

Evaluation of the report and written response from each laboratory exercise as indicated by the laboratory instructor. Getting a pass on the basis of a positive assessment of the answer and report and the MCQ test assessed on the same scale as the lecture part.

### Programme content

Lecture

1. Basic types of implants in medicine. Division according to clinical criteria and medical specialties
2. The essence of biomaterial / tissue interaction. Cellular reactions to the implant. The inflammatory, repair and cancer process
3. Methods of biological, mechanical, rheological and thermal tests of biomaterials used in medicine.
4. Classification and application of polymers and composite materials in restorative dentistry. Surface properties. Shrinkage of polymerization.
5. Classification and application of metals and alloys in restorative dentistry. Surface properties and interaction with the oral environment.
6. Classification and use of cements in restorative dentistry. Properties of dental cements based on deionized glass.
7. Classification and application of biomaterials for the regeneration of oral tissues.
8. The issue of adhesion of biomaterials to tissues. Intermediate connecting factors to tooth tissues - modern work techniques.
9. Disinfection and sterilization issues. The cross-contamination problem associated with dental materials.
10. The issue of aesthetics in medicine and dentistry. The meaning of light and color.

Lab

1. Handling of chemically cured and light-curing materials in practice - part 1
2. Handling of chemically-hardened and light-curing materials in practice - part 2
3. Determining the time of mixing, work, binding, polymerization of biomaterials used in dentistry.
4. Treatment and clinical use of dental implants.
5. The treatment of dental materials and the characteristics of the work of the dental team in the dental office in practice.

### Course topics

none

### Teaching methods

1. Lecture: multimedia presentation.

2. Laboratory exercises: performing exercises, discussion, team work.

## Bibliography

Basic:

1. Combe E.C.: Wstęp do materiałoznawstwa stomatologicznego. Sanmedica, Warszawa 1997.

Additional:

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## 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