(KARTA PRZEDMIOTU)

Name of the department/clinic providing the course:
Department of General Dentistry
Course profile: academic
Level of course unit: PhD studies
Course unit title:
Basic properties of biomaterials used in medicine and dentistry
Course aims:

1. An introduction to biomaterial properties.
2. Definition of biomaterials, requirements and standards appropriate for these materials depending on usage.
3. The description of selected research methods used for biomaterials.

Number of ECTS credits allocated and their structure according to students' learning:
2
Names of course unit's faculty:
Dr hab. n. med. Kinga Bociong, prof. UMED
Learning activities and teaching methods:
The seminars will be divided into a lecture part (approx. 1 h) and practical work in the laboratory (3 h).
Lectures will be multimedia presentations. Students will take part in discussions.
During the laboratory part, students will prepare samples from selected biomaterials, measure them and perform the tests. After the tests, students will compile and analyse the results.
Course unit content:
Module 1

- Introduction to biomaterials and their properties, classification of biomaterials used in medicine and dentistry.
- Concepts in mechanics: stress, strain, Young's modulus, flexural/tensile/compressive/impact strength; testing methods.
- Laboratory part: flexural and tensile strength tests; impact tests for selected biomaterials.

Module 2

- Mechanical properties: compressive strength test, hardness; testing methods.
- Laboratory part: compressive strength tests; hardness tests for selected biomaterials.

Module 3 and 4

- Surface profile and roughness, structure–properties–function relationships; relevance of surface properties, measurement methods.
- Laboratory part: surface profilometry, the contact angle and the free energy measurements of the biomaterials surface.

Module 5

- The shear bond strength test – relevance in medicine, characteristics.
- Laboratory part: SBS before and after ageing vs different surface preparation.

Course objectives:
Knowledge:

Students gain knowledge about:

1. Basic mechanical properties of materials, especially biomaterials.
2. Introduction to experimental protocol.
3. Methods to assess the basic biomaterial features connected with usage.

Skills:
Students can:

1. Divide and describe the major properties of biomaterials.
2. Describe the basic method of mechanical characterisation of biomaterials.
3. Choose an appropriate method to assess selected biomaterial properties.

Attitudes and transferable (generic) competencies:

1. Student is aware of the differentiation of biomaterials used in dentistry and medicine.
2. Student should understand the need to test materials so they are used in the appropriate place.
3. Student is aware of the multiplicity of material testing methods.
4. Student is aware of the influence of new technologies on the development of biomaterials.
5. Student should understand the need to expand and update knowledge in biomaterials.
6. Student should be able to work in an interdisciplinary team.

Assessment methods and criteria:

- Students must attend and actively participate in all seminars.
- Students may miss only one class if the absence is due to health problems and is documented by sick leave issued by a doctor.
- Course assessment consists of submitting two projects: one from modules 1–4 and one from module 5.