

**Course title:** **Bio-polymers - materials of the future**  
**Institute/Division:** **FACULTY OF CHEMICAL ENGINEERING AND TECHNOLOGY**

**Number of contact hours:** 45 hours (5h of lecture, 10h seminar and 30h of laboratory)  
**Course duration:** 1 semester (6<sup>th</sup> semester of regular I cycle studies - winter)  
**ETCS credits:** 3

**Course description:** During the course, students will learn to define the basic types of biomaterials, material specifications, the range of their applications, and basic methods of biomaterials production. After the course, students will be also able to define the role that biomaterials play in medicine and indicate development prospects and forecasts for the use of biomaterials (e.g. in medicine, pharmacology, and industry). The student will know how to select biomaterials for specific applications.

1. Students become familiar with the definition of biomaterials, their properties, and exemplary methods of their synthesis.
2. Students will know the characteristics of the materials used as implantation materials - metals, ceramics, carbon materials, polymers, or (nano)polymer composite materials.
3. Students become familiar with the methods of the characterization of biomaterials, biomimetics in biomaterials engineering, and composite biomaterials.
4. Students will get acquainted with methods of degradation of polymeric biomaterials.

**Education effects :**

- knowledge: the student knows the most important types of biomaterials and their application;
- skills: presentation skills, knowledge of exemplary methods of biomaterials synthesis and methods of their characteristics
- social: students can work both independently and as a part of a team at the project group;

**Literature:**

- [1] Wagner, W. R., Sakiyama-Elbert, S. E., Zhang, G., Yaszemski, M. J. (Eds.). (2020). Biomaterials science: an introduction to materials in medicine. Academic Press.  
[2] Park, J., Lakes, R. S. (2007). Biomaterials: an introduction. Springer Science & Business Media.  
[3] Cooper, S. L., Guan, J. (Eds.). (2016). Advances in polyurethane biomaterials. Woodhead Publishing. Li, J., Osada,  
[4] Li, J., Osada, Y., Cooper-White, J. (Eds.). (2018). Functional hydrogels as biomaterials (Vol. 12). Berlin: Springer.

**Assessment method:** Presentation and laboratory experiments  
**Prerequisites:** Basic knowledge in laboratory preparation and organic chemistry  
**Primary target group:** Students from all specialties

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**Remarks:** The course is selectable