

**Course title:** Modern materials for medicine – ~~selectable~~ / regular course

**Number of contact hours:** 45 hours (15h lectures, 30h laboratories)

**ETCS credits:** 3

**Course description:** The lecture reviews basic definitions and classification of implant materials. Biocompatibility, bioactivity of implanted materials. Human system response to implant materials. Bioinert materials such as metals, polymers, inert ceramics (alumina, zirconia) in preparation of load bearing implants (hip, knee prostheses). Bioactive materials: bioglass, glass-ceramics A-W, calcium phosphate bioceramics, especially hydroxyapatite (HA) ceramics. Composite bioactive and composite biodegradable, including HA/Polyethylene, HA/Polylactic acid materials. Bioactive coatings on metallic (Ti, stainless steel) or alumina ceramic implants. HA coatings, Bioglass coatings.

The laboratories consist of exercises on synthesis and characterization of bioactive calcium phosphate, preparation of dense and porous bioceramic materials and determination of content of calcium and phosphorus, porosity and FT-IR investigations. Investigation in simulated body fluid and FT-IR studies.

**Education effects (P7S\_UW, P6S\_UW):**

- **knowledge:** student knows the most important types of biomaterials; knows the methods of synthesis and characterization of materials for medicine
- **skills:** student can synthesize various types of calcium phosphates and characterize them in respect of standards for biomaterials; can use the specific apparatus dedicated for characterization of biomaterials; knows how to prepare high-quality research report from performed laboratory exercises
- **social:** student is able to work independently and in the group both at the laboratories and during preparation of the report; understand the reason of fulfilling the biomaterials standards

**Literature:**

[1] Encyclopedic handbook of biomaterials and bioengineering. Part A: Materials, v.2. Marcel Dekker, Inc. New York 1995.Press

[2] Biomaterials science, An introduction to materials in medicine edited by B.D. Ratner et al. Academic Press

**Assessment method:** Final test, completing the laboratories (presence and delivering of reports from each performed exercise)

**Prerequisites:** Basic knowledge in chemistry and technology

**Primary target group:** All specialties students

**Lecturer:** dr hab. inż. A. Sobczak-Kupiec, Contact person: dr hab. inż. A. Sobczak-Kupiec, e-mail: [asobczak@chemia.pk.edu.pl](mailto:asobczak@chemia.pk.edu.pl)