1.	**Field of study**	**Materials Science and Engineering**
2.	Faculty	Faculty of Science and Technology
3.	Academic year of entry	2019/2020 (winter term), 2020/2021 (winter term), 2021/2022 (winter term), 2022/2023 (winter term)
4.	Level of qualifications/degree	first-cycle studies (in engineering)
5.	Degree profile	general academic
6.	Mode of study	full-time

Module: Biomaterials

Module code: IM1A_BIOM

1. Number of the ECTS credits: 3

2. Learning outcomes of the module

code	description	learning outcomes of the programme	level of competence (scale 1-5)
IM1A_BIOM_1	Understanding the issues related to the biocompatibility of implant materials - ‘in vivo’ and ‘in vitro’ tests, learning the interactions between the tissue and the implant, the organism response to the implant, understanding the issues of corrosion resistance from the medical applications point of view.	IM1A_W17	3
IM1A_BIOM_2	Learning the specific nature of diverse ceramic, polymer, carbon and composite biomaterials used in medicine.	IM1A_W16	5
IM1A_BIOM_3	The skill to analyse requirements related to the structure and resulting from it properties of metallic biomaterials, learning the specific nature of ceramic biomaterials in view of their application in medicine.	IM1A_K05 IM1A_U25	1 5
IM1A_BIOM_4	The skill to choose appropriate biomaterials for specific applications in medicine, the skill of communication between a biomaterials engineer and the medical staff.	IM1A_K05 IM1A_U09 IM1A_U13 IM1A_U14	1 1 2 1

3. Module description

Description	The Biomaterials module shall enable that students are knowledgeable about specific properties and structure of metallic, ceramic, polymer and carbon materials and also composites for applications in medicine. Owing to that students shall acquire the skill of selecting appropriate materials for specific applications, shaping their properties through the choice of chemical and phase composition, the application of appropriate thermomechanical treatment as well as surface modification.
Prerequisites	It is required to achieve effects of education of the modules: physics, chemistry, crystallography, materials science, and materials testing methods.

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
IM1A_BIOM_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended classes.	IM1A_BIOM_1, IM1A_BIOM_2, IM1A_BIOM_3, IM1A_BIOM_4
IM1A_BIOM_w_2	Written test	Checking the acquired skill to choose the biomaterial for applications, to determine biotolerance, to test mechanical and physical properties.	IM1A_BIOM_1, IM1A_BIOM_2, IM1A_BIOM_3, IM1A_BIOM_4
IM1A_BIOM_w_3	Test	Assessment of mastering the basic knowledge necessary for individual performance of a practical exercise.	IM1A_BIOM_1, IM1A_BIOM_2
IM1A_BIOM_w_4	Report	Assessment of the skill to understand the structure shaping mechanisms and to connect them with properties of materials for medicine by a correct formulation of conclusions.	IM1A_BIOM_3, IM1A_BIOM_4

5. Forms of teaching

code	form of teaching			required hours of student's own work		assessment of the learning outcomes of the module
	type	description (including teaching methods)	number of hours	description	number of hours	
IM1A_BIOM_fs_1	lecture	The lecture shall enable understanding issues related to the structure of diverse materials for applications in medicine, and also of their specific properties and possibilities of shaping them. The information will be provided on legal regulations and ethical aspects of tests on animals.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	25	IM1A_BIOM_w_1
IM1A_BIOM_fs_2	laboratory classes	The application of the acquired theoretical knowledge in practical learning of the structure, chemical and phase composition, determination of significant biomaterials' properties. Exercises are performed by students individually with the use of equipment of teaching and scientific laboratories.	15	Preparation of theoretical basics and issues related to the topic of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results.	10	IM1A_BIOM_w_2, IM1A_BIOM_w_3, IM1A_BIOM_w_4