1.	**Field of study**	**Materials Science and Engineering**
2.	Academic year of entry	2018/2019 (summer term)
3.	Level of qualifications/degree	second-cycle studies
4.	Degree profile	general academic
5.	Mode of study	full-time

Module: Specialised subject 3. Testing biomaterials corrosion resistance and biocompatibility

Module code: IM2A_PS3_MBOKiBB

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)
PS3_MBOKiBB_1	Understanding the role and importance of corrosion resistance and biocompatibility of biomaterials used in medicine and technology	IM2A_W02	2
PS3_MBOKiBB_2	Deepened knowledge from the field of biological environment action on biomaterials used in implantation techniques	IM2A_W08 IM2A_W09	3 3
PS3_MBOKiBB_3	The skill to apply knowledge related to operation of instruments as well as traditional and new technologies for biomaterials surface modification to obtain an effective improvement to their corrosion resistance and biocompatibility	IM2A_U11	3
PS3_MBOKiBB_4	The skill to define and explain, based on examples, the types and mechanisms of corrosion destruction occurring on biomaterials in contact with the living organism environment and also to recognise complications, to determine the reasons of their origination and to suggest prevention methods	IM2A_U14	2
PS3_MBOKiBB_5	The skill to forecast the biomaterials corrosion rate in the environment of systemic tissues and fluids based on in vitro measurements and to design medical products intended for implants and medical instruments, featuring a high corrosion resistance and biocompatibility	IM2A_U15	3

3. Module description

Description	The module Testing biomaterials corrosion resistance and biocompatibility shall ensure that students learn testing methods allowing to determine the life of metallic implants in the environment of living tissues and systemic fluids in a human organism and the biomaterials biocompatibility. The module shall enable that students are knowledgeable about types of metallic biomaterials corrosion (general, pitting, crevice, stress) and about principles of the testing methodology for corrosion processes and corrosion resistance of materials for medical implants and instruments. The module shall also enable proficiency in the field of issues related to in vitro and in vivo tests for biomaterials biocompatibility assessment. The understanding of the correlation existing between the biomaterial type, its structure and surface condition and functional properties referred to applications in medicine and technology

	shall result in acquiring by students the skill of proper biomaterial selection for implantation, satisfying requirements of biocompatibility and of high corrosion resistance
Prerequisites	The knowledge of chemistry, materials science, corrosion and corrosion protection, materials electrochemistry, metallic biomaterials, and tissue engineering modules is required

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
PS3_MBOKiBB_w_1	Written examination	Verification of the knowledge based on the lectures content, recommended literature and attended laboratory classes	PS3_MBOKiBB_1, PS3_MBOKiBB_2, PS3_MBOKiBB_3, PS3_MBOKiBB_4, PS3_MBOKiBB_5
PS3_MBOKiBB_w_2	Written tests	Checking the skill to use the acquired knowledge to assess and examine biomaterials corrosion destruction and to make decisions on the way to improve their corrosion resistance and biocompatibility	PS3_MBOKiBB_1, PS3_MBOKiBB_2, PS3_MBOKiBB_3, PS3_MBOKiBB_4, PS3_MBOKiBB_5
PS3_MBOKiBB_w_3	Weekly reports	The assessment of mastering the skill of independent performance of a practical exercise and of a team work, of measurement results and measurement error analysis as well as of formulating the conclusions properly	PS3_MBOKiBB_3, PS3_MBOKiBB_4, PS3_MBOKiBB_5
PS3_MBOKiBB_w_4	Interview	The assessment of understanding the reasons and mechanisms of the course and studying biomaterials corrosion processes and biocompatibility	PS3_MBOKiBB_1, PS3_MBOKiBB_2

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	
PS3_MBOKiBB_fs_	lecture	The lecture shall enable learning extended knowledge about biomaterials application in implantation techniques. The lecture is aimed at providing knowledge about the biological environment action on biomaterials and materials used in medicine and technology. It presents the measuring methodology used to assess biomaterials biocompatibility and corrosion resistance. The lecture is delivered using demonstrations and modern audio-visual aids	30	The work with the recommended literature comprising independent acquisition of knowledge related to issues presented during the lectures	10	PS3_MBOKiBB_w_1
PS3_MBOKiBB_fs_2	laboratory classes	Individual and team performance of tests reflecting the lecture issues in teaching laboratories and using scientific-research instruments in scientific laboratories. Independent processing of obtained results, preparing graphs, analysis of experimental error and formulation of conclusions	30	Preparation of theoretical basics and issues related to the subject matter of performed exercise. Independent preparation of a theoretical introduction. Individual preparation of exercise results	20	PS3_MBOKiBB_w_2, PS3_MBOKiBB_w_3