1.	**Field of study**	**Materials Science and Engineering**
2.	Faculty	Faculty of Science and Technology
3.	Academic year of entry	2019/2020 (summer term), 2020/2021 (summer term), 2021/2022 (summer term), 2022/2023 (summer term), 2023/2024 (summer term), 2024/2025 (summer term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

Module: Specialised subject 3. Advanced IT techniques in medicine

Module code: IM2A_PS3_ZIMED

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)
IM2A_PS3_ZIMED_1	Learning the ways of image data acquiring, coding and storing for the needs of medicine. Learning principles of operation and the type of information delivered by selected measuring and diagnostic devices (X-ray, ultrasonograph, ECG, EEG, NMR) as well as principles of image processing; their qualitative and quantitative analysis	IM2A_U01 IM2A_W11 IM2A_W15	1 2 2
IM2A_PS3_ZIMED_2	Modelling in biology and medicine	IM2A_W05 IM2A_W11	3 3
IM2A_PS3_ZIMED_3	Development of the awareness of IT role in the process of medical decisions making	IM2A_K02	1

3. Module description

Description	The module Advanced IT techniques in medicine shall enable students learning IT techniques in medicine with special emphasis on the ways of image data acquiring, processing, coding, storing, and analysing. Owing to that students shall understand the role of digital techniques in the field of medical data processing and analysing by means of statistical methods and also based on heuristic methods to support decisions in medical systems. The introduction to modelling in biology and medicine is the second issue. Students will learn basic models of population and interactions between populations.
Prerequisites	The achievement of effects of education of mathematics and IT techniques in medicine modules is recommended.

4. Assessment of the learning outcomes of the module			
code	**type**	**description**	**learning outcomes of the module**
IM2A_PS3_ZIMED_w_1	Oral examination	Checking the theoretical knowledge provided during the lecture and deepened by own student's interests	IM2A_PS3_ZIMED_1, IM2A_PS3_ZIMED_2, IM2A_PS3_ZIMED_3
IM2A_PS3_ZIMED_w_2	Written report 1	Report on the exercise carried out during classes (image processing) and expanded by the student on his/her own.	IM2A_PS3_ZIMED_1
IM2A_PS3_ZIMED_w_3	Written report 2	Report on the exercise carried out during classes (simulation of a biological or medical process) and expanded by the student on his/her own.	IM2A_PS3_ZIMED_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**	
IM2A_PS3_ZIMED_fs_1	lecture	The lecture shall enable a look at sources (X-ray, ultrasonograph, ECG, EEG, NMR, tomography) and at acquiring medical data, mainly image data, and also at decision making based on qualitative, quantitative, statistical or supported by heuristic methods analyses. Moreover, student shall understand dynamic relationships between populations, based on modelling. The lecture is delivered with the use of multimedia and teaching programs.	30	The work with the recommended literature comprising independent acquisition of knowledge related to basic issues.	10	IM2A_PS3_ZIMED_w_
IM2A_PS3_ZIMED_fs_2	laboratory classes	Practical resolution of problems based on examples. Learning the difference between various graphical files, mastering basics of image purification methods. Qualitative and quantitative analysis of image examples. Models of interactions between populations. Exercises are performed by students individually with the use of computers in the teaching laboratory.	30	Preparation of theoretical basics and issues related to the topic of performed exercise. Individual and critical preparation of exercise results.	20	IM2A_PS3_ZIMED_w_