University of Silesia in Katowice

1.	Field of study	**Biophysics**
2.	Faculty	Faculty of Science and Technology
3.	Academic year of entry	2022/2023 (winter term), 2023/2024 (winter term), 2024/2025 (winter term), 2025/2026 (winter term)
4.	Level of qualifications/degree	second-cycle studies
5.	Degree profile	general academic
6.	Mode of study	full-time

Module: Computer Modeling

Module code: W4-2BF-MB-21-23

1. Number of the ECTS credits: 4

2. Learning outcomes of the module			
code	**description**	**learning outcomes of the programme**	**level of competence (scale 1-5)**
MB_23_1	Student has knowledge of advanced modeling methods in physics, chemistry and biology	KBF_K04	4
		KBF_W03	4
		KBF_W08	4
MB_23_2	Student knows the basic mathematical relations used in molecular modeling	KBF_K02	4
		KBF_U02	4
		KBF_U06	4
		KBF_W08	4
MB_23_3	Student knows how to apply the mathematical modeling mechanism to solve complex problems in physics and biophysics	KBF_K02	3
		KBF_U02	3
		KBF_U06	3
		KBF_W08	3
MB_23_4	Student can use selected software packages for the analysis of molecular structure, proteins, drugs, etc.	KBF_K02	3
		KBF_U02	3
		KBF_U06	3
		KBF_W08	3

3. Module description
Description

	During the course, students in practice become familiar with: 1. Deterministic modeling based on numerical solving for ordinary differential equations - examples and applications in biophysics: - transmission of nerve impulses, - tumor growth, - molecular motors, 2. Amino acid and protein databases. 3. Modeling of molecules and their systems using density functional methods (DFT); geometry parameters, charge distribution characteristics and molecular spectra of organic molecules (e.g. amino acids). 4. Modeling of organic molecules and their systems using molecular dynamics methods.
Prerequisites	

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
MB_23_w_1	credit	average of marks for self-made projects	MB_23_1, MB_23_2, MB_23_3, MB_23_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	
MB_23_fs_1	laboratory classes	Solving specific problems of computer modeling. Both group and individual work	30	Group work on project tasks, independent work, preparation of the presentation of the results	45	MB_23_w_1