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

Module: Algorithmics and Advanced Data Structures

Module code: W4-IN-S2-20-1-AiZSD

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)
M_001	Has knowledge in the field of advanced methods of determining the computational complexity of algorithms. Knows and understands classes of algorithms complexity.	K_W01 K_W04	2 2
M_002	Has knowledge in the field of advanced paradigms of algorithms constructing, among others: exhaustive search, greedy strategies. Knows and understands basics of operation and advantages and disadvantages of these algorithms.	K_W04	4
M_003	Has knowledge in the field of graph algorithms.	K_W01 K_W04	1 3
M_004	Knows the concept of approximation algorithm and examples of such algorithms using different approaches, e.g. combinatorial or based on the theory of linear programming.	K_W01 K_W04	1 3
M_005	Knows examples of Monte-Carlo and Las-Vegas randomized algorithms.	K_W01 K_W04	1 3
M_006	Can designate computational complexity of recurrent algorithms and record their complexity, e.g. in the form of recurrent equation and solve such an equation.	K_W01 K_W04	2 2
M_007	Can choose and implement an appropriate, basic or advanced paradigm of algorithm construction for solution of a given problem. Can justify his choice.	K_U08 K_U09	1 3
M_008	Is able to implement an appropriate algorithm to solve a given problem, as well as select the appropriate data structure.	K_U09	3
M_009	Is aware of substantial importance of algorithm features (complexity, correctness) on the basis of which the components (modules, functions, procedures) of bigger software systems are built on final efficiency, correctness of operation and security of these systems.	K_K01 K_U09	1 2

3. Module description

Description	Algorithmics is the science of algorithms. It includes algorithm design, i.e. the art of building a schema that effectively solves a specific problem or class of problems as well as algorithm analysis. The purpose of this module is to introduce the listener to advanced methods of algorithm design and issues of analysis of algorithms as well as data structures
Prerequisites	

4. Assessment of the learning outcomes of the module

code	type	description	learning outcomes of the module
W_001	Written exam	Verification of knowledge basing on content presented during lectures.	M_001, M_002, M_003, M_004, M_005, M_006, M_009
W_002	Reports	Solving assigned tasks and elaborating them in the form of reports.	M_006, M_007, M_008, M_009

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	
Z_001	lecture	Presenting educational content with use of audio-visual aids and other written education aids. Focusing on issues difficult to understand and these with deeper theoretical bases. Elicitation of students by asking questions concerning presented content.	30	Exam preparation.	30	W_001
Z_002	laboratory classes	Detailed preparation of the students for solving tasks indicating proceeding methodology and proceedings sequence.	30	Individual solution of tasks given during the laboratory class, elaboration of reports.	30	W_002