STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Algorithms and data structures		**1010341721010340103**
Field of study	Profile of study (general academic, practical)	Year /Semester
Mathematics in Technology	**general academic**	**1 / 2**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**
Cycle of study:	Form of study (full-time,part-time)	
First-cycle studies (Polish Qualifications Framework level six)	**full-time**	
No. of hours		No. of credits
Lecture: **30** Classes: **-** Laboratory: **30** Project/seminars: **-**		**4**
Status of the course in the study program (Basic, major, other)	(university-wide, from another field)	
major	**university-wide**	
Education areas and fields of science and art		ECTS distribution (number and %)
Technical sciences		**4 100%**
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Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Knowledge of the course Introduction to Programming, Programming Methods, Discrete Mathematics, Logic and Set Theory and Information Technology. - [K_W01 (P6S_WG)], [K_W02 (P6S_WG)], [K_W06 (P6S_WG)]
2	**Skills**	Computer skills, including programming. The ability of effective self-education in the field related to the chosen field of study. - [K_U04 (P6S_UW)], [K_U09 (P6S_UW)], [K_U10 (P6S_UW)], [K_U12 (P6S_UK)], [K_U14 (P6S_UO)].
3	**Social competencies**	Knowledge of the limits of their knowledge and understanding of the need for further education. - [K_K01 (P6S_KK)], [K_K02 (P6S_KK)], [K_K03 (P6S_KO)].

Assumptions and objectives of the course:

Design and analysis of algorithms. Overview of basic algorithms and data structures.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. has expanded and in-depth knowledge of various branches of higher mathematics and detailed knowledge of the applications of mathematical methods and tools in technical sciences - [K_W01 (P6S_WG)]
2. has the ordered and theoretically founded knowledge of computer science, including numerical methods; knows at least one software package or programming language - [K_W06 (P6S_WG)]

Skills:

1. can construct an algorithm for solving a simple engineering task and implement it and test it in a chosen programming environment - [K_U04 (P6S_UW)]
2. can operate equipment, tools, etc. in accordance with general requirements and technical documentation; knows how to apply the principles of health and safety at work - [K_U09 (P6S_UW)]
3. can work individually and in a team; knows how to estimate the time needed to complete the task ordered; is able to develop and implement a schedule of works to ensure that the deadline is met - [K_U14 (P6S_UO)]

Social competencies:

1. is aware of the level of his knowledge in relation to the conducted research in exact and technical sciences - [K_K01 (P6S_KK)]

Assessment methods of study outcomes

- evaluation of knowledge acquired in the lecture
- skills assessment related to the implementation of project tasks
- evaluation of student preparation for classes and laboratory evaluation of skills related to the implementation of laboratory exercises
- evaluation of reports
- evaluation of team skills

Course description

Date of revision: 31/10/2018

Data abstraction.

Stacks, queues, bags.

Analysis of algorithms.

Sorting.

Searching.

Graphs.

Applied education methods

1) lectures:

- lecture with multimedia presentation supplemented with examples given on the board,
- a lecture conducted in an interactive manner with formulating questions to a group of students or to specific students indicated,
- students' activity during classes is taken into account when issuing the final mark,
- during the lecture initiating the discussion,
- theory presented in close connection with practice,
- theory presented in connection with the current knowledge of students,
- presenting a new topic preceded by a reminder of related content known to students in other subjects.

2) laboratory:

- laboratories supplemented with multimedia presentations (including: drawings, photos, animations, sound, films),
- detailed reviewing of reports by the laboratory chair and discussions on comments,
- using tools that enable students to perform tasks at home (eg open source software),
- demonstrations,
- work in teams,
- computational experiments.

Basic bibliography:

1. Algorithms (4th Edition), Robert Sedgewick, Kevin Wayne, Addison-Wesley Professional; 4th edition (March 19, 2011)
2. Introduction to Algorithms (third ed.), Cormen, Thomas H.; Leiserson, Charles E.; Rivest, Ronald L.; Stein, Clifford, MIT Press, 2009.

Additional bibliography:

1. G. Cornell, C. Horstmann, Core Java Volume I--Fundamentals
2. B. Eckel, Thinking in Java.
3. D.E.Knuth, The Art of Computer Programming.
4. Algorytmy i struktury danych, L. Banachowski, K. Diks, W. Rytter, WNT, 2006.

Result of average student's workload

Activity	Time (working hours)

1. participation in lectures (15x2 hrs.)	30
2. participation in laboratory classes (15x2 hrs.)	30
3. participation in the consultations related to the implementation of the education process, in particular laboratory / project	10
4. completion (within own work) reports on laboratory exercises	5
5. write a program / programs, commissioning and verification (time outside of the classroom laboratory)	15
6. preparation for laboratory exercises	15
7. preparation for tests / test	5
8. read with the specified literature / teaching materials	5

Student's workload

Source of workload	hours	ECTS
Total workload	105	4
Contact hours	70	2
Practical activities	75	3