Name of the module/stubled         Code           Algorithms and data structures         Profile of study         Year /Semeate           Field of study         Profile of study         Year /Semeate           Mathematics in Technology         Subject offend in:         11/2           Subject offend in:         Subject offend in:         Courses (computedwe) electronic           Optimization         First-cycle studies         full-time           (Polish Qualifications Framework level six)         Form of study (full-sime.part-sime)         4           Status of the course in the study program (Back.major, other)         university-wide         ECTS distribution (number and off)           Education areas and fields of solence and at         Technical sciences         4         100%           Technical sciences         4         100%         4         100%           Responsible for subject / lecturer:         drink.tarol Gajda         emait.karol Gajda (figue theorang pl etc.file Science)         4         100%           10.         Knowledge         Movinger Science)         Movinger Science)         Foreignerming.Programming Methods. Discrete Methodscience Plocesculture Methods. Discrete Methods. Discrete Method	STUDY MODULE DESCRIPTION FORM								
Field of study     Profile of study/ general academic     Year/Senester       Mathematics in Technology     -     1/2       Elective path/specialty     -     Polish     Course computeous, elective) obligatory       Cycle of study:     -     Polish     Course computeous, elective) obligatory       Cycle of study:     First-cycle studies     full-time_part-time)     Course computeous, elective)       Polish     Course computeous, elective)     Diligatory     -       No. of roadits     Lecture:     30     Classes:     -     Laboratory:     30     Project/seminars:     No. of credits       Lecture:     30     Classes:     -     Laboratory:     30     Project/seminars:     4     100%       Status of the course in the study program (Base, majer, other)     (university-wide     ECTS distribution (umber and status)     4     100%       Education arease and fields of sciences     4     100%     4     100%       Responsible for subject / lecturer:     or the status of sciences     4     100%       Prerequisites in terms of knowledge, skills and social competencies:     -       1     Knowledge     Knowledge of the course introduction to Programming. Programming Methods, Discrete Mathematika, Lagic and sciences and end study. [K, U00 (PS_WOI)], [K, U00 (PS_WOI)], [K, U00 (PS_WOI), [K, U00 (PS_WOI)], [K, U00 (PS_WOI), [K, U00 (PS_WOI), [K, U0	Name of the module/subject Algorithms and data structures					Coc 101	le 10341721010340103		
Mathematics in Technology         Image: Subject Alexand Subje	Field of	study			Profile of study		Year /Semester		
Elledive path/specially       -       Subject offered in:       Course (computatory, elective) obligatory         Cycle of study:       First-cycle studies       Form of study (full-lime,part-time)       full-time         Polish Qualifications Framework level six)       full-time       4         No. of credits       Lacture:       30       Classes: - Laboratory: 30       Project/seminars: -       4         Status of the course in the study program (Basic, major, other)       university-wide, from another field)       6         Education areas and fields of science and art       Cresting (another)       4       100%         Technical sciences       4       100%       4       100%         Responsible for subject / lecturer:       drinz. Karol Gajda email: karol gajda @putpoznan.pl tel. 61 665 2806       Faculty of Electrical Engineering u.l. Plotrowo 3A 60-965 Poznan       Knowledge of the course Introduction to Programming. Programming Methods, Discrete Mathematics, Logic and Set Theory and Information Technology [K, W01 (PES,WG]).         2       Skills       Computer skills, including programming. The ability of effective self-education in the field related to the chosen field of study. (K, W02 (PES, WG)).       (K, W01 (PES, WG)).         2       Skills       Computer skills, including programming. The ability of effective self-education in the field related to the chosen field of study. (K, W02 (PES, WG)).       (K, W01 (PES, WG)).         3	Math	ematics in Tech	nology		general academic		1/2		
Cycle of study:         First-cycle studies         Form of study (full-time,part-time)           Image: The study of the study in the study in the study in the study (full-time, part-time)         No. of credits           Inclusion:         Classes:         Laboratory:         30         Project/Seminars:         -         4           Status of the course in the study program (Base, major, other)         university-wide, from another field)         Intervention         4         100%           Education areas and fields of science and ant         Education areas and fields of science and ant         ECT3 distribution (number and %)         4         100%         4         100%         4         100%         4         100%         4         100%         4         100%         4         100%         10% <td< td=""><td>Elective</td><td>path/specialty</td><td>-</td><td></td><td>Subject offered in: <b>Polish</b></td><td></td><th>Course (compulsory, elective) <b>obligatory</b></th></td<>	Elective	path/specialty	-		Subject offered in: <b>Polish</b>		Course (compulsory, elective) <b>obligatory</b>		
First-cycle studies         full-time         Polich Qualifications Framework level six)       No. of credits         No. of hours       A         Lecture       30       Classes:       -       Laboratory:       30       Project/seminars:       -       4         Status of the course in the study program (Basic, major, other)       (university-wide, from another fired)       university-wide         Education areas and fields of science and at       ECTS distinution (number and %)       4       100%         Technical sciences       Technical sciences       4       100%       4       100%         Responsible for subject / lecturer:       d'       4       100%       4       100%         Responsible for subject / lecturer:       d'       100%       4       100%         Pracity of Electrical Engineering       u.e. Piotrowo 3A 60-965 Poznani       Project/seming. Programming Methods, Discrete         Memoledge       Knowledge of the course Introduction to Programming. Programming Methods, Discrete       No. Vol (PES_WG)], K. W02 (PES_WG)], K. W01 (PES_WG)], K. W01 (PES_WG)], K. W02 (PES_WG)], K. W02 (PES_WG)], K. W02 (PES_WG)], K. W01 (PES_WG)], K. W02 (PES_WG)],	Cycle of	study:		For	m of study (full-time,part-time)				
(Polish Qualifications Framework level six)         No. of hours       Lecture: 30 Classes: - Laboratory: 30 Project/seminars: - 4         Status of the course in the study program (Basic, major, other)       (university-wide, from another lind)         Education areas and fields of solence and art       ECTS status of the course in the study program (Basic, major, other)         Technical sciences       4         Technical sciences		First-cyc	ele studies		full-t	tim	e		
No. of hours       No. of readits         Lacture:       30       Classes:       -       Laboratory:       30       Project/seminars:       -       4         Status of the course in the study program (Basic, major, other)       (university-wide, from another lind)       ECTS status/university-wide         Education areas and fields of science and art       ECTS status/university-wide       ECTS status/university-wide         Technical sciences       Technical sciences       4       100%         Technical sciences       Technical sciences       4       100%         Responsible for subject / lecturer:       dr inz, Karol Gajda       4       100%         email:       karol Gajda       Entitional sciences       4       100%         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, - IK_W01 (P6S_W0)], [K_W02 (P6S_W0)], [K_W01 (P6S_W0)], [K_W01 (P6S_W0)]       Extense and analysis of algorithms. Verview of basic algorithms and data structures.         3       Social competencies       Knowledge of various branches of higher mathematics and detailed knowledge of the applicatoris of a field	(Poli	sh Qualification	s Framework level six)						
Lecture:       30       Classes:       - Laboratory:       30       Project/seminars:	No. of h	ours					No. of credits		
Image       Image <th< td=""><td>Status o</td><td>e: <b>JU</b> Classes</td><td>S: - Laboratory: JU</td><td>(</td><td>Project/seminars:</td><td>- ield)</td><th></th></th<>	Status o	e: <b>JU</b> Classes	S: - Laboratory: JU	(	Project/seminars:	- ield)			
Education areas and fields of science and at       ECT sciences       ECT sciences       ECT sciences       4 100%       4 100%         Technical sciences       Technical sciences       4 100%       4 100%       4 100%         Responsible for subject / lecturer:         drinz, Karol Gajda       email: karol gajda@put.poznan.pl       tel. 61 665 2805         Faculty of Telerctical Engineering       ut. Plotrowo 3A 60:965 Poznaf       Version 2000         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 (PGS_W0]), [K_U02 (PGS_W0]), [K_U02 (PGS_W0]), [K_U02 (PGS_W0]), [K_U02 (PGS_W0]), [K_U02 (PGS_W0]), [K_U02 (PGS_W0]), [K_U010 (PGS_UW)), [K_U10 (PGS_UW)), [K_U10 (PGS_UW)), [K_U10 (PGS_UW)), [K_U10 (PGS_UW)), [K_U10 (PGS_UW)), [K_U11 (PGS_UW), [K_U12 (PGS_UW)), [K_U12 (PGS_UW)), [K_U10 (PGS_UW)), [K_U10 (PGS_UW)), [K_U12 (PGS_UW)), [K_U10 (PGS_UW)), [K_U10 (PGS_UW)), [K_U10 (PGS_UW)), [K_U10 (PGS_UW)), [K_U11 (PGS_UW), [K_U12 (PGS_UW)), [K_U12 (PGS_UW)), [K_U12 (PGS_UW)), [K_U12 (PGS_UW)), [K_U10 (PGS_UW)), [K_U12 (PGS_UW)), [K_U12 (PGS_UW)), [K_U12 (PGS_UW), [K_U12 (PGS_UW)), [K_U12 (PGS_UW), [K_U12 (PGS_UW)), [K_U12 (PGS_UW), [K_U	Olalus U		major	(	university-wide, norm another in unive	ersi	ty-wide		
Technical sciences       4 100%         Responsible for subject / lecturer:       dr. n2. Karol Gajda         dr. n2. Karol Gajda       email: karol.gajda@putpoznan.pl         tel. 61 665 2005       Faculty of Electrical Engineering         ul. Piotrowo 3A 60-965 Poznań       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_W01 (P6S_WG)], [K_W01 (P6S_WG)], [K_W02 (P6S_WG)], [K_W01 (P6S_WG)], [K_W03 (P6S_KG)].         3       Social competencies       Knowledge of the course!         Besign and analysis of algorithms. Overview of basic algorithms and data structures.       Study outcomes and reference to the educational results for a field of study         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)]       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)]       A coordinate with general require	Educatio	on areas and fields of scie	ence and art				ECTS distribution (number and %)		
Technical sciences       4 100%         Responsible for subject / lecturer:       dr in2: Karol Gajda         dr in2: Karol Gajda       email: karol Gajda         email: Competencies       Knowledge of the course Introduction to Programming. Programming Methods. Discrete         Mathematics. Logic and Set Theory and Information Technology IK_V001 (P6S_WG)].       (K_V00 (P6S_WG))         2       Skills       Computer skills. Including programming. The ability of effective self-aducation in the field         related to the chosen field of study IK_V01 (P6S_WO)].       (K_U01 (P6S_WO)].         3       Social       Knowledge of the Course!         Computer skills. Including programming. The ability of effective self-aducation in the field         esign and analysis of algorithms. Overview of basic algorith	Tech	nical sciences					4 100%		
Responsible for subject / lecturer:         drinz. Karol Gajda email: karol.gajda@put.poznan.pl tel. 61 665 2805         Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznah         Prerequisites in terms of knowledge, skills and social competencies:         1       Knowledge       Knowledge of the course Introduction to Programming. Programming Methods, Disorete Mathematics, Logic and Set Theory and Information Technology [K_W01 (P6S_WG)], [K_W02 (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_U10 (P6S_UW)], [K_U12 (P6S_WG)]         3       Social competencies       Knowledge of the course:         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 Applications of mathematical methods and tools in technical sciences - [K_W01 (P6S_WG)]         Study outcomes and reference to the educational results for a field of study 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)]       Scial competencies in accordance with general requirements and technical documentation; knows how to apply the principles of health and safety at work - [K_U09 (P6S_UW)]         Study outcomes and perference with general requirements and technical documentation; knows how to ap		Technical scie	ences				4 100%		
Responsible for subject / lecturer:         dr inz. Karol Gajda         email: karol.gajda@put.poznan.pl         tel. 61 665 2805         Faculty of Electrical Engineering         ul. Plottowo 3A 60-965 Poznan         Prerequisites in terms of knowledge, skills and social competencies:         1       Knowledge         Knowledge       Knowledge of the course Introduction to Programming, Programming Methods, Discrete Mathematics, Logic and Set Theory and Information Technology [K_W01 (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_U109 (P6S_WG)].         3       Social competencies       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_U109 (P6S_WG)].         3       Social competencies       Computer skills, including programming. The ability of effective self-education in the field related to the chosen field of study [K_U04 (P6S_KG)].         Assumptions and objectives of the course:       Education [K_K01 (P6S_KK)], [K_K02 (P6S_KK)], [K_K03 (P6S_KG)].         Assumptions and objectives of the course:       Study outcomes and reference to the educational results for a field of study         1. has expanded and in-depth knowledge of various branches of higher mathematics and detailed knowledge of the applications of mathematicos and tolos in technical sciences - [K_W01 (P6S_WG)]<									
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_W02 (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 imits of their knowledge and understanding of the need for further education [K_K01 (P6S_KK)], [K_K02 (P6S_KK)], [K_K03 (P6S_KO)].         Study outcomes and reference to the educational results for a field of study         Mowledge         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)]         Subject colspan="2">Subject colspan="2">Subject colspan="2">Subject colspan="2">Subject colspan="2">Subject colspan="2"         Study co	Responsible for subject / lecturer: dr inż. Karol Gajda email: karol.gajda@put.poznan.pl tel. 61 665 2805 Faculty of Electrical Engineering ul. Piotrowo 34 60-965 Poznań								
Image         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_KK)], [K_U14 (P6S_UO)].           3         Social competencies         Knowledge of the course: 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           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)]         Stills           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)]         S. 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)]         S. can operate equipment, tools, etc. in accordance with general requirements and technical documentatio; knows how	Prere	Prerequisites in terms of knowledge, skills and social competencies:							
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         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         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)]         Scial competencies:       1. is aware of the level of his knowledge in relation to the conducted res	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)]						
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_U0)]         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_K0)]	2	Skills	Computer skills, including progra related to the chosen field of stu (P6S_UW)], [K_U12 (P6S_UK)]	skills, including programming. The ability of effective self-education in the field the chosen field of study [K_U04 (P6S_UW)], [K_U09 (P6S_UW)], [K_U10 )], [K_U12 (P6S_UK)], [K_U14 (P6S_UO)].					
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_K1)	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)].						
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_K01)]	Assumptions and objectives of the course:								
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)]	Design	and analysis of algori	thms. Overview of basic algorithm	ns ar	nd data structures.				
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_K1)]	Study outcomes and reference to the educational results for a field of study								
<ol> <li>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)]</li> <li>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)]</li> <li>Skills:         <ol> <li>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)]</li> <li>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)]</li> <li>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)]</li> </ol> </li> <li>Social competencies:         <ol> <li>is aware of the level of his knowledge in relation to the conducted research in exact and technical sciences - [K_K01 (P6S_K1)]</li> </ol> </li> </ol>	Knowledge:								
<ul> <li>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)]</li> <li>Skills: <ol> <li>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)]</li> <li>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)]</li> <li>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)]</li> </ol> </li> <li>Social competencies: <ol> <li>is aware of the level of his knowledge in relation to the conducted research in exact and technical sciences - [K_K01 (P6S_K1)]</li> </ol> </li> </ul>	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)]								
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_U0)]         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_K1)]	2. has the ordered and theoretically founded knowledge of computer science, including numerical methods; knows at least								
<ol> <li>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)]</li> <li>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)]</li> <li>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)]</li> <li>Social competencies:         <ol> <li>is aware of the level of his knowledge in relation to the conducted research in exact and technical sciences - [K_K01 (P6S_KK)]</li> </ol> </li> </ol>	one software package or programming language - [K_W06 (P6S_WG)]								
<ul> <li>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)]</li> <li>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)]</li> <li>Social competencies: <ol> <li>is aware of the level of his knowledge in relation to the conducted research in exact and technical sciences - [K_K01 (P6S_KK)]</li> </ol> </li> </ul>	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)]								
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)]	2. can apply th	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)]							
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)]	3. can develor	work individually and i p and implement a sch	n a team; knows how to estimate nedule of works to ensure that the	the t dea	ime needed to complete th dline is met - [K_U14 (P6S	ie ta _UC	sk ordered; is able to ))]		
1. is aware of the level of his knowledge in relation to the conducted research in exact and technical sciences - [K_K01 (P6S_KK)]	Socia	I competencies:			\				
	1. is av (P6S_k	vare of the level of his (K)]	knowledge in relation to the cond	ucte	d research in exact and teo	chnie	cal sciences - [K_K01		

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 implement exercises	ntation of laboratory						
- 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 IFundamentals							
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						