

**LEARNING OUTCOMES**  
**Field of study: Computer Science**  
**First degree study programme - general academic education**

**Field of study in the area of education**

Computer Science programme falls within two areas of education: science and technical sciences. It is directly connected with areas of knowledge to which belongs computer science as a discipline

(area of science, field of mathematical sciences, area of technical sciences, field of technical sciences).

**Explanation of the symbols used:**

**K** (before bottom hyphen) – learning outcomes for the field of study

**W** – category of knowledge

**U** – category of skills

**K** (after bottom hyphen) – social competences category

**T1A** – learning outcomes in the field of education in technical sciences for first degree study programme

**X1A** – learning outcomes in the field of education in science for first degree study programme

**01, 02, 03** and subsequent – number of the learning outcome

Symbol	DESCRIPTION OF LEARNING OUTCOMES FOR THE FIELD OF STUDY  Following the completion of the first degree studies in <i>Computer Science</i> a graduate:	Reference to learning outcomes in the area of education in the field of technical sciences and science
<b>KNOWLEDGE</b>		
K_W01	has basic knowledge about logic, discrete mathematics, algebra and mathematical analysis	X1A_W02 T1A_W01
K_W02	has basic knowledge about statistics and probabilistic methods	X1A_W02 T1A_W02
K_W03	knows the idea of algorithm and the rules of designing and analysing algorithms	X1A_W02 T1A_W03 T1A_W07
K_W04	knows basic techniques and methods of programming, programming paradigms and languages	X1A_W04 T1A_W03 T1A_W07
K_W05	knows the rules of collecting and saving data	X1A_W08 T1A_W03
K_W06	knows basic methods of approximate and exact calculations, understands the significance of error analysis in numerical calculations	X1A_W02 X1A_W04 T1A_W07
K_W07	knows possibilities to use software for numerical calculations	X1A_W04 T1A_W07
K_W08	knows methodologies and tools allowing to create software in local, distributed and internet environment	X1A_W05 T1A_W06
K_W09	knows methods of network communication as well as rules of network safety	X1A_W05 T1A_W05 T1A_W06

K_W10	knows basic rules of operating systems functioning	X1A_W01 T1A_W03
K_W11	knows basic concepts of artificial intelligence, representation and processing knowledge, human-computer interaction; knows common information technology applications	X1A_W01 T1A_W04 T1A_W05
K_W12	knows foundations of software engineering	X1A_W04 T1A_W06
K_W13	knows basic methods of technology and elements of distributed systems architecture , fundamental assumptions of parallel and distributed programming, fundamental models of parallel and distributed calculations	X1A_W01 X1A_W02 X1A_W04 T1A_W04 T1A_W05
K_W14	knows basic concepts of automata theory and mathematical linguistics	X1A_W03 X1A_W05 T1A_W02
K_W15	has basic knowledge referring to legal and ethical issues connected with Computer Science ; knows fundamental rules of Occupational Safety and Health while using computer hardware	X1A_W06 X1A_W07 X1A_W09 T1A_W08 T1A_W10
<b>SKILLS</b>		
K_U01	can use algebra methods: follow simple reasoning inside theories of basic algebraic structures (groups, rings, fields); can use matrix to solve problems	X1A_U01
K_U02	can use methods of mathematical analysis to solve problems: notion and properties of functions, sequences and series, limits and continuity of the function of one and a lot of variables , total and differential calculus of a function with one and a lot of variables	X1A_U01
K_U03	can use statistical and probabilistic methods for data analysis	X1A_U02 T1A_U08
K_U04	uses apparatus of mathematical logic to describe and verify facts, can use inductive and deductive reasoning	T1A_U01
K_U05	formulates and interprets information technology concepts using mathematical construction and computational methods	X1A_U04 T1A_U09
K_U06	can themselves design algorithms realizing selected tasks, can analyse complexity of an algorithm	X1A_U01 X1A_U02 T1A_U09
K_U07	chooses an appropriate paradigm and programming language to solve tasks of a certain type	X1A_U01 X1A_U04 T1A_U15
K_U08	independently implements algorithms using proper elements of a chosen programming language	X1A_U01 X1A_U04 T1A_U16
K_U09	can solve algebraic and analytical problems in a numerical way	X1A_U01 X1A_U03 X1A_U04 T1A_U09
K_U10	can apply software for numerical calculations to solve problems, can estimate an error of numerical calculations, can implement known numerical algorithms in a chosen programming language	X1A_U01 X1A_U02 X1A_U04 T1A_U15
K_U11	can design and optimize a database in accordance with a specification, can efficiently search for required information in an existing database, can implement a database in a selected system of databases	X1A_U03 T1A_U01 T1A_U16
K_U12	can design a local area network, can ensure safety while managing a local area network	T1A_U07 T1A_U14

K_U13	can take advantage of possibilities of different operating systems in computer systems realising different functions	X1A_U03 T1A_U13 T1A_U15
K_U14	can describe problems expressed in a natural language using a terminology of artificial intelligence	X1A_U05 T1A_U09
K_U15	makes use of design patterns, uses api, is able to use tools supporting the process of creating, testing, debugging software	X1A_U01 X1A_U03 T1A_U08 T1A_U14 T1A_U15 T1A_U16
K_U16	can use knowledge of the automata theory as well as formal languages to solve simple problems regarding human-computer interaction, artificial intelligence, formulating algorithms and designing simple information systems	X1A_U01 X1A_U03 T1A_U14 T1A_U15
K_U17	can create a client-server model of computer software	X1A_U03 X1A_U05 T1A_U16
K_U18	uses technologies of creating software working in the Internet	X1A_U03 X1A_U05 T1A_U15 T1A_U16
K_U19	can use parallel calculations to increase the efficiency of algorithmic problem resolution, can choose a suitable algorithm for a model of parallel and distributed calculations	X1A_U01 X1A_U02 T1A_U15
K_U20	can implement the resolution of a problem requiring interaction between processes in distributed environment employing available software	T1A_U05
K_U21	uses computer terminology in a foreign language	X1A_U10 T1A_U06
K_U22	can prepare a study of computer concepts in Polish and present them	X1A_U08 X1A_U09 T1A_U03 T1A_U04
K_U23	can work in a programming team to solve assigned problem comprehensively	X1A_U03 T1A_U01
K_U24	can independently devise the resolution of an assigned information technology task which is a borderline case of theory and practice as well as present the resolution and conclusions	X1A_U03 X1A_U06 T1A_U04 T1A_U10
K_U25	can numerically model selected phenomena and simulate simple processes in a computational way; can optimize numerical representations of phenomena and processes	X1A_U03 T1A_U08 T1A_U09
K_U26	can use selected computation models	X1A_U01 X1A_U04
<b>SOCIAL COMPETENCES</b>		
K_K01	is able to cooperate in a team completing collective tasks	X1A_K02 T1A_K03
K_K02	understands the need to raise their qualifications and improve skills	X1A_K01 X1A_K05 T1A_K01
K_K03	carefully determines priorities and the order of actions	X1A_K03 T1A_K04
K_K04	understands the need to obey ethical rules and legal regulations connected with activity in information technology environment	X1A_K04 T1A_K05

K_K05	shows creative and innovative attitude necessary to undertake practical activity in information technology environment	X1A_K06 X1A_K07 T1A_K07
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