

3. Educational program.

3.1. Profile of the educational program "Computer Science" in the specialty 122 "Computer Science"

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1 –General information	
Full name of the institution of higher education and structural subdivision	State University of Trade and Economics Faculty of Information Technologies Department of Computer Sciences and Information Systems
Higher education degree and the name of the qualification in the language of the original	Degree of higher education junior bachelor specialty "Computer Science"
The official name of the educational program	"Computer Science"
Compliance with the standard of higher education of the Ministry of Education and Science of Ukraine	Standard is not available
Type of diploma and volume of educational program	Junior bachelor's diploma, elementary, 120 ECTS credits, study period 1 year 10 months
Availability of accreditation	Initial accreditation is planned for 2022 (extended to July 1, 2023 by Resolution of the Cabinet of Ministers of Ukraine No. 295 of March 16, 2022)
Cycle / Level	NQF of Ukraine – the 5th level FQ for EHEA – the short cycle EQF for LLL – the 5th level
Prerequisites	Full secondary education
Language (s) of teaching	Ukrainian
The duration of the educational program	2 years
Internet address of the permanent placing of the educational program	https:// knute.edu.ua
2 –The purpose of the educational program	
To provide high-quality education in the field of information technology, competitive in the labor market, to prepare students with a special interest in issues in the field of computer science, ready for undergraduate studies.	
3 - Characteristics of the educational program	
Subject area description	<i>Object(s) of study and/or activity:</i> - mathematical, informational models of real phenomena, objects,

	<p>systems and processes, subject areas, presentation of data and knowledge;</p> <ul style="list-style-type: none"> - methods and technologies of obtaining, storing, processing, transmitting and using information; - theory, analysis, development, performance evaluation, implementation of algorithms, high-performance computing. <p><i>Learning objectives:</i> training specialists capable of conducting theoretical and experimental research in the field of computer science; apply mathematical methods and algorithmic principles in modeling, designing, developing and supporting information technologies; carry out development, implementation and maintenance of systems of analysis and data processing of organizational, technical, natural and socio-economic systems.</p> <p><i>Theoretical content</i> of the subject area: modern models, methods, algorithms, technologies, processes and methods of obtaining, presenting, processing, analyzing, transmitting, storing data in information systems.</p> <p><i>Methods, techniques and technologies:</i> mathematical models, methods and algorithms for solving theoretical and applied problems that arise during IT development; modern technologies and programming platforms; methods of collection, analysis and consolidation of distributed information; technologies and methods of design, development and quality assurance of IT components; computer graphics methods and data visualization technologies.</p> <p><i>Tools and equipment:</i> computer systems; computer networks; mobile and cloud technologies, database management systems, operating systems.</p>
<p>Orientation of the educational program</p>	<p>Educational and professional, fundamental, applied.</p>
<p>The main focus of the educational program</p>	<p>General education in the field of information technologies, educational and professional program "Computer Science".</p> <p>EP is focused on providing high-quality, competitive on the labor market, education in the field of IT, based on mastering modern achievements in the field of computer science, acquiring theoretical knowledge and practical skills for solving applied problems using fundamental and applied methods of computer science and technology, which provides graduates with opportunities to effectively solve tasks in their professional activities.</p> <p>The main focus of the educational program is on training specialists capable of solving problems related to mathematical programming, modeling, development, software implementation and support of computer systems and technologies</p> <p><i>Keywords:</i> programming, numerical methods, algorithmization, modeling, computer data processing, computing systems and technologies, C++ programming, Python</p>
<p>Peculiarities of the educational program</p>	<p>Availability of a variable component of professionally oriented disciplines for computer sciences; practical training in state institutions, enterprises, firms and organizations.</p> <p>Meaningful filling of the EP with a logical sequence of educational components, which ensure the formation of competitive advantages in the graduates of the EP in the modern labor market in the field of IT</p>

	due to the introduction of a significant list of disciplines related to thorough mathematical preparation and the study of modern programming languages C++, Python, software algorithms , numerical programming methods, optimization methods and models, and applied programming/
4 – Suitability of graduates for employment and further education	
Suitability of graduates for employment	<p>According to the National Classifier of Types of Economic Activity DK 009:2010, as well as taking into account the requirements of the labor market, the types of professional activity of a graduate are:</p> <ul style="list-style-type: none"> - activities in the field of informatization - 72; – development of software and provision of relevant consultations – 72.2 <p>According to the National Classifier of Professions DK 003:2010, a specialist with an educational degree "Junior Bachelor" in the specialty "Computer Science" can be employed in positions with the following professional title:</p> <p style="padding-left: 40px;">3121.2 Information technology specialist;</p>
Further training	The possibility of studying at the first (bachelor's) level of higher education according to bachelor's educational programs
5 –Teaching and evaluation	
Teaching and evaluation	<p>Lectures, practical classes, laboratory work, seminars, independent study using textbooks, manuals and notes, consultations with teachers, preparation for the qualification exam.</p> <p>Student-centered approach to learning. Credit and transfer system of training organization. Individual learning trajectory. Problem-oriented learning, self-learning (using library and Internet resources), learning through practical training. Distance learning using e-resources.</p>
Evaluation	Current control, exams, qualification exam. The evaluation is carried out in accordance with the "Regulations on the evaluation of the results of students' and postgraduate studies at SUTE", "Regulations on the organization of the educational process of students"
6 – Program competencies	
Integral competence	A person's ability to solve typical specialized tasks in the field of computer science or in the learning process, which involves the application of provisions and methods of the relevant sciences and is characterized by a certain uncertainty of conditions; to be responsible for the results of their activities and the activities of others in certain situations.
General competences	<p>GC1. Ability to abstract thinking, analysis and synthesis.</p> <p>GC2. Ability to apply knowledge in practical situations.</p> <p>GC3. Knowledge and understanding of the subject area and understanding of professional activity.</p> <p>GC4. Ability to communicate in the national language both orally and in writing.</p> <p>GC5. Ability to communicate in a foreign language.</p> <p>GC6. Ability to learn and master modern knowledge.</p> <p>GC7. Ability to search, process and analyze information from various sources.</p> <p>GC8. Ability to generate new ideas (creativity).</p> <p>GC9. Ability to work in a team.</p> <p>GC10. The ability to be critical and self-critical.</p> <p>GC11. Ability to make informed decisions.</p>

	<p>GC12. The ability to act on the basis of ethical considerations.</p> <p>GC13. The ability to preserve and multiply moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, technology and technology,</p>
Special (professional, subject) competences	<p>SC1. Ability to mathematically formulate and investigate continuous and discrete mathematical models, justify the choice of methods and approaches for solving theoretical and applied problems in the field of computer science, analysis and interpretation</p> <p>SC2. Ability to identify statistical regularities of non-deterministic phenomena, application of statistical data processing methods.</p> <p>SC3. The ability to think logically, draw logical conclusions, use formal languages and models of algorithmic calculations, design, develop and analyze algorithms, evaluate their effectiveness and complexity, solvability and insolvability of algorithmic problems for adequate modeling of subject areas and creation of software and information systems.</p> <p>SC4. The ability to use modern methods of mathematical modeling of objects, processes and phenomena, to develop models and algorithms for the numerical solution of mathematical modeling problems, to take into account the errors of the approximate numerical solution of professional problems.</p> <p>SC5. The ability to carry out a formalized description of operations research tasks in organizational-technical and socio-economic systems of various purposes, to determine their optimal solutions, to build optimal management models taking into account changes in the economic situation, to optimize management processes in systems of various purposes and hierarchy levels.</p> <p>SC6. The ability to apply the theoretical and practical foundations of modeling methodology and technology to study the characteristics and behavior of complex objects and systems, conduct computational experiments with processing and analysis of results.</p> <p>SC7. Ability to design and develop software using various programming paradigms: generalized, object-oriented, functional, logical, with appropriate models, calculation methods and algorithms, data structures and control mechanisms.</p> <p>SC8. The ability to apply methodologies, technologies and programming tools for the development of information and software systems, products and services of information technologies.</p> <p>SC9. The ability to ensure the organization of computing processes in information systems of various purposes, taking into account the architecture, configuration, performance indicators of the software.</p>
7 –Program learning outcomes	
	<p>PLO1. Apply knowledge of the basic forms and laws of abstract and logical thinking, the basics of the methodology of scientific knowledge, the forms and methods of extracting, analyzing, processing and synthesizing information in the subject area of computer science.</p> <p>PLO2. To use the modern mathematical apparatus of continuous and discrete analysis, linear algebra, analytical geometry, in professional activities to solve problems of a theoretical and applied nature in the process of designing and implementing informatization objects.</p>

	<p>PLO3. To use knowledge of regularities of random phenomena, their properties and operations on them, models of random processes and modern software environments to solve problems of statistical data processing and build predictive models.</p> <p>PLO4 Use numerical methods for data processing and programming, etc.</p> <p>PLO5. Design, develop and analyze algorithms for solving computational and logical problems, evaluate the efficiency and complexity of algorithms based on the application of formal models of algorithms and calculated functions.</p> <p>PLO6. Use the methods of numerical differentiation and integration of functions, solving ordinary differential and integral equations, features of numerical methods and the possibilities of their adaptation to engineering problems, have skills in software implementation of numerical methods.</p> <p>PLO7. Understand the principles of modeling organizational and technical systems and operations; use operations research methods, solving single- and multi-criteria optimization problems of linear, integer, nonlinear, stochastic programming.</p> <p>PLO8. To develop software models of subject environments, to choose a programming paradigm from the standpoint of convenience and quality of application for the implementation of methods and algorithms for solving problems in the field of computer science.</p> <p>PLO9. Use tools for designing conceptual, logical and physical models of databases, create databases, develop and optimize queries to them, including using programming languages.</p> <p>PLO10. Apply knowledge of applied programming methodology, object-oriented design methodology in the study of organizational-economic and production-technical systems.</p> <p>PLO11. Understand the concept of information security, the principles of safe software design, ensure the security of computer networks.</p>
8 –Resource support for the implementation of the program	
Personnel support	<p>The implementation of the educational program is provided by teachers who have the scientific degrees of candidate and doctor of sciences.</p> <p>The participation of foreign specialists and practitioners in the teaching of the disciplines of the cycle of professional training is possible.</p>
Material and technical support	<p>The basis of material and technical support consists of specialized computer laboratories with modern hardware and software resources, which ensure high-quality training of bachelors in the educational program "Computer Sciences". Students are fully provided with material resources for study and research. At their service:</p> <ul style="list-style-type: none"> - more than 30 thousand m2 of educational buildings; - dormitories; - 470 seats in the DTEU reading rooms, including in the DTEU multimedia library, where access to SCOPUS, Web of Science scientometric databases is provided; - 2,000 PC workstations with access to the Internet + WiFi. All computer equipment is equipped with basic software, special software is installed on the computers in the laboratories of the departments,

	<p>necessary for conducting classes and completing tasks by students;</p> <ul style="list-style-type: none"> - distance learning laboratory, which hosts 966 educational courses; - an electronic platform for student communication based on Microsoft Office 365, etc.
Information and educational methodical support	<p>Complete provision of educational and methodological complexes of disciplines and other types of educational and methodological materials.</p> <p>Documents regulating admission and study procedures at DTEU are available on the official website. Open access of students of higher education to informational and educational-methodical resources through educational process management information systems and other web-services:</p> <ul style="list-style-type: none"> -MOODLE distance learning system (966 educational courses, provides independent and individual training, control), - availability of free access to the Internet and e-mail; - information systems "Dean's Office", "Loading-Schedule", management of WEB-resources of the SUTE; - library fund management system - almost 1.5 million titles of educational and scientific literature in the SUTE library; - electronic document management system "OPTiMA – WorkFlow"; - corporate information environment in the form of a "personal account" of the user of the SUTE web portal. <p>Ensuring the publicity of information about educational programs, degrees of higher education and qualifications: implementation of the information policy of the SUTE, publication on the official website of the SUTE of ECTS information packages, educational programs, the schedule of classes, as well as all components of the provision of the educational process, which are subject to publication in accordance with the Law of Ukraine "On Higher education";</p> <p>Ensuring an effective system of prevention and detection of academic plagiarism in the scientific works of the SUTE employees, students of higher education (checking for plagiarism all graduation qualification papers, publications, publishing the text of dissertation research on the official website of the SUTE), compliance with the Code of Ethics of a scientist of Ukraine.</p>
9 – Academic mobility	
National credit mobility	National credit mobility is carried out in accordance with the concluded agreements on academic mobility.
International credit mobility	International credit mobility is implemented within the framework of cooperation agreements between the SUTE and institutions of higher education in France, Great Britain, Poland, and Germany, within the framework of which partner exchange and training are carried out. Study in the direction of KA1 with obtaining credits at universities of member countries of the Erasmus+ Program.
Teaching foreign applicants for higher education	Foreign students of higher education are guaranteed all rights and freedoms, in accordance with the current legislation of Ukraine and the University Charter. Education of foreign students of higher education is conducted on general terms with additional language training.

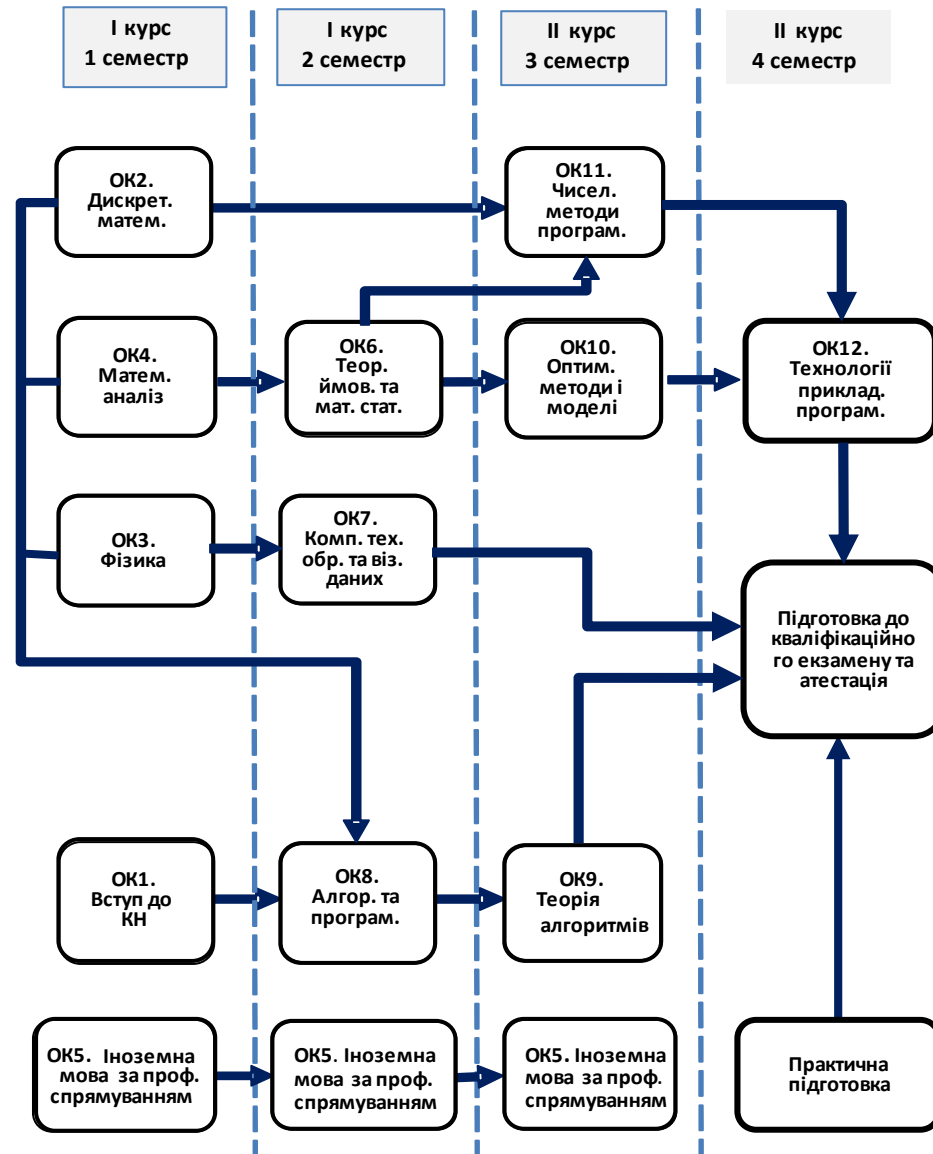
3.2. The list of components of the educational program and their logical consistency

3.2.1. List of EP components

Code N / A	Components of the educational program (academic disciplines, course projects (works), practice, qualification work)	Amount of credits
1	2	3
Compulsory components of the EP		
CC 1.	Introduction to computer science	6
CC 2.	Discrete Math	6
CC 3.	Physics	6
CC 4.	Mathematical analysis	6
CC 5.	Foreign language for professional purposes	21
CC 6.	Probability theory and mathematical statistics	6
CC 7.	Computer technologies of data processing and visualization	6
CC 8.	Algorithmization and programming	6
CC 9.	Theory of algorithms	6
CC 10.	Optimization methods and models	6
CC 11.	Numerical methods of programming	6
CC 12.	Applied programming technologies	5
Total volume of compulsory components:		86
Optional components of the EP		
OC 1.	Safety of life	6
OC 2.	Vector and tensor analysis	6
OC 3.	Differential equations	6
OC 4.	Electrical engineering and basics of electronics	6
OC 5.	Electronic trade	6
OC 6.	Economic theory	6
OC 7.	Engineering and computer graphics	6
OC 8.	Information wars	6
OC 9.	Information systems and technologies in the economy	6
OC 10.	Linear algebra and analytic geometry	6
OC 11.	Mathematical logic	6
OC 12.	Fundamentals of cyber security	6
OC 13.	Science of law	6
OC 14.	Automated design systems	6
OC 15.	Philosophy	6
The total amount of optional components:		30
Practical training		
Internship		3
Total		3
Attestation		
Preparation for the qualification exam and certification		1
Total		
TOTAL VOLUME OF EDUCATIONAL PROGRAM		120

For all components of the educational program, the form of final control is an exam.

3.2.2. Structural and logical scheme of the EP



1 year
1 semester
1 year
2 semester
2 year
3 semester
2 year
4 semester

CC 1. Introduction to computer science
CC 2. Discrete Math
CC 3. Physics
CC 4. Mathematical analysis
CC 5. Foreign language for professional purposes
CC 6. Probability theory and mathematical statistics
CC 7. Computer technologies of data processing and visualization
CC 8. Algorithmization and programming
CC 9. Theory of algorithms
CC 10. Optimization methods and models
CC 11. Numerical methods of programming
CC 12. Applied programming technologies
Preparation for the qualification exam and certification
Internship

3.3. Form of attestation of applicants for higher education

Attestation of graduates of the educational program of the specialty 122 "Computer Science" is carried out in the form of a qualifying exam and ends with the issuance of a document of the established model on awarding him with a junior bachelor's degree with the assignment of the qualification: degree of higher education, junior bachelor's specialty "Computer Science".

Attestation is carried out openly and publicly.

3.4. Matrix of compliance of program competencies to the compulsory components of the educational program

Component/ Competences	CC1	CC2	CC3	CC4	CC5	CC6	CC7	CC8	CC9	CC10	CC11	CC12
GC 1			•	•						•		
GC 2	•	•	•				•	•	•	•	•	•
GC 3	•						•	•				
GC 4	•			•								
GC 5					•							
GC 6			•	•		•	•			•		
GC 7						•	•					•
GC 8			•									
GC 9					•							
GC 10			•									
GC 11			•			•				•		
GC 12	•											
GC 13	•		•									
SC 1		•	•	•						•		
SC 2						•						
SC 3								•	•			
SC 4			•					•	•	•	•	
SC 5		•								•		
SC 6			•							•	•	
SC 7	•							•	•			•
SC 8												•
SC 9	•						•					•

**3.7. Matrix of provision of program learning outcomes
corresponding optional components of the educational program**

Components/ Program learning outcomes	OC 1	OC 2	OC 3	OC 4	OC 5	OC 6	OC 7	OC 8	OC 9	OC 10	OC 11	OC 12	OC 13	OC 14	OC 15
PLO 1					•						•				•
PLO 2		•	•							•					
PLO 3															
PLO 4		•	•							•					
PLO 5							•				•			•	
PLO 6			•												
PLO 7				•											
PLO 8							•							•	
PLO 9							•							•	
PLO 10							•		•					•	
PLO 11				•								•		•	