MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

KYIV NATIONAL UNIVERSITY
TECHNOLOGY AND DESIGN

APPROVED BY THE SCIENTIFIC COUNCIL
Chairman of the Academic Council of KNUTD

_____ Ivan Grishchenko

(Minutes from "___" _____ 20__ № ___)

EDUCATIONAL AND PROFESSIONAL PROGRAM

COMPUTER SCIENCE

Level of higher education first (bachelor)

Bachelor's degree

Field of knowledge 12 Information technologies

Specialty 122 Computer Science

Bachelor's degree in computer science

Kyiv 2021

LETTER OF APPROVAL

Educational and professional program

Computer Science

Level of higher education first (bachelor)

Bachelor's degree

Field of knowledge 12 Information technologies

Specialty 122 Computer Science

Vice-rector for scientific and pedagogical activity (educational activity)

_____ _____ Oksana MORGULETS
(date) (signature)

Approved by the Academic Council of the Faculty mechatronics and computer technology

Protocol from "____" _____ 20___ year № _____

Dean of the Faculty mechatronics and computer technology

_____ _____ Volodymyr PAVLENKO
(date) (signature)

Discussed and recommended at the meeting of the department computer science and technology

Protocol from "____" _____ 20___ year № ____

Head of Department computer science and technology

_____ _____ Volodymyr SHCHERBAN
(date) (signature)

Guarantor of the educational program

_____ _____ Borys SHRAMCHENKO
(date) (signature)

Entered into force by order of KNUTD from "_____" _____ 20___ year № ____

PREFACE

DEVELOPED: Kyiv National University of Technology and Design

DEVELOPERS:

Guarantor of the educational program Shramchenko Borys Lazarovych, Candidate of Technical Sciences, Senior Researcher, Associate Professor of Computer Science and Technology, Kyiv National University of Technology and Design

Members of the working group:

Kolysko Oksana Zenonivna, Candidate of Technical Sciences, Associate Professor, Associate ProfessorDepartment of Computer Science and Technology, Kyiv National University of Technology and Design;

Yakhno Volodymyr Mykhailovych, Candidate of Technical Sciences, Associate Professor, Associate ProfessorDepartment of Computer Science and Technology, Kyiv National University of Technology and Design;

Smorzhevsky Nazariy Valentinovych, student of the Faculty of Mechatronics and Computer Technologies Kyiv National University of Technology and Design.

REVIEWS OF EXTERNAL STAKEHOLDERS:

1) O.B. Palagin, Deputy Director of the Institute of Cybernetics. V.M. Glushkova of the National Academy of Sciences of Ukraine, Academician of the National Academy of Sciences of Ukraine;
2) V.M. Sorokin, Deputy Director of the Institute of Semiconductor Physics. V.Ye. Lashkareva NAS of Ukraine, Corresponding Member NAS of Ukraine, Professor;
3) V.D. Snitsar, Deputy Director of the Emergency Response Department of the State Emergency Service of Ukraine in the field of protection of the population and territories from emergencies;
4) G.V. Melnyk, director of Dunn Consulting Limited Liability Company, Candidate of Technical Sciences, Associate Professor;
5) OI Vakarchuk, General Director of DOKPROM Limited Liability Company.

Profile of the educational and professional program Computer Science

1 - General information	
Full name of the institution of higher education and structural unit	Kyiv National University of Technology and Design. Department of Computer Science and Technology.
Higher education degree and qualification in the original language	The level of higher education is the first (bachelor's). Degree of higher education - bachelor. Field of knowledge - 12 Information technologies. Specialty - 122 Computer Science.
Type of diploma and scope of educational program	Bachelor's degree, single, 240 ECTS credits / 180 ECTS credits for a reduced period of study.
Availability of accreditation	Certificate of accreditation of the educational and professional program Computer Science UD № 11010110 from 09.07. 2019
Cycle / level	The National Qualifications Framework of Ukraine is the sixth level.
Prerequisites	Complete general secondary education, professional higher education or a bachelor's degree (junior specialist). According toAccording to the standard of higher education in the specialty based on the degree of junior bachelor (OQR of the junior specialist), the University recognizes and recalculates ECTS credits received within the previous educational program of junior bachelor (junior specialist).
Language (s) of instruction	Ukrainian
Term of the educational program	Until July 1, 2024.
Internet address of the permanent placement of the description of the educational program	http://knutd.edu.ua/ekts/
2 - The purpose of the educational program	
Training of specialists with in-depth knowledge, as well as basic and professional competencies in the field of information technology, aimed at gaining students the ability to apply mathematical foundations, algorithmic principles in modeling, design, development and maintenance of information systems and technologies; who are able to develop, implement and maintain intelligent data analysis and processing systems in organizational, technical, natural and socio-economic systems. The main goals of the program are to achieve a bachelor's degree, which allows to perform engineering, innovation and design work in the field of application of information technology in light industry, and education of active members of civil society.	
3 - Characteristics of the educational program	
Subject area	The program is focused on the formation of applicants for competencies to acquire deep knowledge, skills and abilities in the specialty. Compulsory educational components - 75%, of which: disciplines of general training - 30%, vocational training - 44%, practical training - 13%, learning a foreign language - 13%. Disciplines of free choice of students - 25% are selected from the university catalog in accordance with the approved procedure at the University.
Orientation of the educational program	Educational and professional bachelor training program.
The main focus of the program	Emphasis is placed on the formation and development of professional competencies in the field of information technology; instudy of theoretical and methodological provisions, organizational and practical tools in modeling, design, development and maintenance of information systems

	and technologies, development, implementation and maintenance of intelligent systems of analysis and data processing in organizational, technical, natural and socio-economic systems.	
Features of the educational program	The program focuses on training specialists for light industry	
4 - Suitability of graduates for employment and further study		
Suitability for employment	The graduate is suitable for employment in enterprises, organizations and institutions operating in the field of light industry and is able to work in the following positions: database administrator; data administrator; access administrator; system administrator; computer software engineer; software engineer; programmer (database); application programmer; computer application engineer; information technology specialist; software development and testing specialist; specialist in computer program development.	
Further training	Opportunity to study according to the educational-scientific or educational-professional program of the second (master's) level of higher education.	
5 - Teaching and assessment		
Teaching and learning	Student-centered and problem-oriented learning, learning through industrial practice and self-study are used. The system of teaching methods is based on the principles of purposefulness, binary - active direct participation of research and teaching staff and applicants for higher education. The main approaches in teaching and learning are humanistic, student-centered, systematic, technological, discreet. Forms of organization of the educational process: lecture, seminar, practical, laboratory classes, practical training, independent work, consultations, development of professional projects (works). Multimedia means of presenting illustrative material are widely used in the teaching process.	
Evaluation	Oral and written exams, testing, essays, project work, presentations, reports, portfolios.	
6 - Program competencies		
Integral competence (IR)	Ability to solve complex specialized problems and practical problems in the field of computer science or in the learning process, which involves the application of theories and methods of information technology and is characterized by complexity and uncertainty of conditions.	
General competencies (ZK)	**ЗК 1**	Ability to abstract thinking, analysis and synthesis.
	ЗК 2	Ability to apply knowledge in practical situations.
	ЗК 3	Knowledge and understanding of the subject area and understanding of professional activity.
	ЗК 4	Ability to communicate in the state language both orally and in writing.
	ЗК 5	Ability to communicate in a foreign language.
	ЗК 6	Ability to learn and master modern knowledge.
	ЗК 7	Ability to search, process and analyze information from various sources.
	ЗК 8	Ability to generate new ideas (creativity).
	ЗК 9	Ability to work in a team.
	ЗК 10	The ability to be critical and self-critical.
	ЗК 11	Ability to make informed decisions.
	ЗК 12	Ability to evaluate and ensure the quality of work performed.
	ЗК 13	Ability to act on ethical considerations.
	ЗК 14	The ability to exercise their rights and responsibilities as a member of society, to realize the values of civil (free democratic) society

		and the need for its sustainable development, the rule of law, human and civil rights and freedoms in Ukraine.
	ЗК 15	Ability to preserve and increase 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, techniques and technologies. active recreation and a healthy lifestyle.
Professional competencies (FC)	**ФК 1**	Ability to mathematical formulation and research of continuous and discrete mathematical models, substantiation of the choice of methods and approaches for solving theoretical and applied problems in the field of computer science, analysis and interpretation.
	ФК 2	Ability to detect statistical patterns of non-deterministic phenomena, the use of methods of computational intelligence, including statistical, neural network and fuzzy data processing, methods of machine learning and genetic programming, etc.
	ФК 3	Ability to think logically, build logical conclusions, use formal languages and models of algorithmic calculations, design, development and analysis of algorithms, evaluate their efficiency and complexity, solvability and unsolvability of algorithmic problems for adequate modeling of subject areas and creation of software and information systems .
	ФК 4	Ability to use modern methods of mathematical modeling of objects, processes and phenomena, to develop models and algorithms for numerical solution of mathematical modeling problems, to take into account the errors of approximate numerical solution of professional problems.
	ФК 5	Ability to provide a formalized description of operations research tasks in organizational, technical and socio-economic systems for different purposes, to determine their optimal solutions, to build models of optimal management taking into account changes in the economic situation, to optimize management processes in systems for different purposes and hierarchy.
	ФК 6	Ability to systems thinking, application of systems analysis methodology to study complex problems of different nature, methods of formalization and solution of system problems with conflicting goals, uncertainties and risks.
	ФК 7	Ability to apply the theoretical and practical foundations of methodology and modeling technology to study the characteristics and behavior of complex objects and systems, to conduct computational experiments with processing and analysis of results.
	ФК 8	Ability to design and develop software using different programming paradigms: generalized, object-oriented, functional, logical, with appropriate models, methods and algorithms of calculations, data structures and control mechanisms.
	ФК 9	Ability to implement a multi-tier computing model based on client-server architecture, including databases, knowledge and data warehouses, perform distributed processing of large data sets on clusters of standard servers to meet the computing needs of users, including cloud services.
	ФК 10	Ability to apply methodologies, technologies and tools to manage the life cycle processes of information and software systems,

		information technology products and services in accordance with customer requirements.
	ФК 11	Ability to data mining based on methods of computational intelligence, including large and poorly structured data, their operational processing and visualization of analysis results in the process of solving applied problems.
	ФК 12	Ability to ensure the organization of computational processes in information systems for various purposes, taking into account the architecture, configuration, performance indicators of operating systems and system software.
	ФК 13	Ability to develop network software that operates on the basis of different topologies of structured cabling systems, uses computer systems and data networks and analyzes the quality of computer networks.
	ФК 14	Ability to apply methods and means of information security, to develop and operate special software for protection of information resources of critical information infrastructure.
	ФК 15	Ability to analyze and functional modeling of business processes, construction and practical application of functional models of organizational, economic and production-technical systems, methods of risk assessment of their design.
	ФК 16	Ability to implement high-performance computing based on cloud services and technologies, parallel and distributed computing in the development and operation of distributed parallel information processing systems.

7 - Program learning outcomes	
Knowledge and understanding:	
ПРН 1	Know the basic forms and laws of abstract-logical thinking, the basics of logic, the norms of the critical approach, the basics of the methodology of scientific knowledge, methods of analysis and synthesis.
ПРН 2	Know the methods of teaching, organization and implementation, stimulation and motivation of educational and cognitive activities, understanding the subject area of computer science.
ПРН 3	Understand the principles of modeling organizational and technical systems and operations.
ПРН 4	Understand the concept of information security, the principles of secure software design, ensure the security of computer networks in conditions of incomplete and uncertain source data.
ПРН 5	Understand responsibility for one's own decisions and results of professional activity.
Application of knowledge and understanding (skills):	
ПРН 6	Apply knowledge of the basic forms and laws of abstract-logical thinking, the basics of the methodology of scientific knowledge, forms and methods of extraction, analysis, processing and synthesis of information in the subject area of computer science.
ПРН 7	Use modern mathematical apparatus of continuous and discrete analysis, linear algebra, analytical geometry, in professional activities to solve problems of theoretical and applied nature in the design and implementation of informatization objects.
ПРН 8	Use knowledge of the laws 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 construction of predictive models.
ПРН 9	Use methods of computational intelligence, machine learning, neural network and fuzzy data processing, genetic and evolutionary programming to solve problems of recognition, prediction, classification, identification of control objects, etc.

ПРН 10	Design, develop and analyze algorithms for solving computational and logical problems, evaluate the efficiency and complexity of algorithms based on the use of formal models of algorithms and computational functions.
ПРН 11	To use methods of numerical differentiation and integration of functions, solution of usual differential and integral equations, features of numerical methods and possibilities of their adaptation to engineering problems, to have skills of program realization of numerical methods.
ПРН 12	Use methods of operations research, solving one - and multicriteria optimization problems of linear, integer, nonlinear, stochastic programming.
ПРН 13	Use the methodology of system analysis of objects, processes and systems for the tasks of analysis, forecasting, management and design of dynamic processes in macroeconomic, technical, technological and financial objects.
ПРН 14	Develop software models of subject environments, 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.
ПРН 15	Use tools for developing client-server applications, design conceptual, logical and physical models of databases, develop and optimize queries to them, create distributed databases, repositories and showcases, knowledge bases, including cloud services, using WEB languages -programming.
ПРН 16	Have the skills to manage the life cycle of software, products and services of information technology in accordance with the requirements and restrictions of the customer, be able to develop project documentation (feasibility study, terms of reference, business plan, agreement, contract, contract).
ПРН 17	Apply methods and algorithms of computational intelligence and data mining in the problems of classification, forecasting, cluster analysis, search for associative rules using software tools to support multidimensional data analysis based on technologies DataMining, TextMining, WebMining.
ПРН 18	To know the languages of system programming and methods of program development that interact with the components of computer systems, to know network technologies, computer network architectures, to have practical skills in computer network administration technology and their software.
ПРН 19	Apply knowledge of methodology and CASE-tools for designing complex systems, methods of structural analysis of systems, object-oriented design methodology in the development and study of functional models of organizational-economic and production-technical systems.
ПРН 20	Perform parallel and distributed calculations, apply numerical methods and algorithms for parallel structures, parallel programming languages in the development and operation of parallel and distributed software.
Formation of judgments:	
ПРН 21	Summarize information and be able to present it with accents of critical assessment.
ПРН 22	It is clear to convey complex ideas and argue them.
ПРН 23	Have typical lexical and syntactic models typical for professional communication, build communication in oral and written form in state and foreign languages, based on the goals and situation of communication.
8 - Resource support for program implementation	
Staffing	All scientific and pedagogical workers who provide educational and professional program by qualification, correspond to the profile and direction of the disciplines taught; have the necessary experience of pedagogical work and experience of practical work. In the process of organizing training, professionals with experience in research / management / innovation / creative work and / or work in the specialty are involved.
Logistics	Logistics allows to fully ensure the educational process throughout the training cycle of the educational program. The condition of the premises

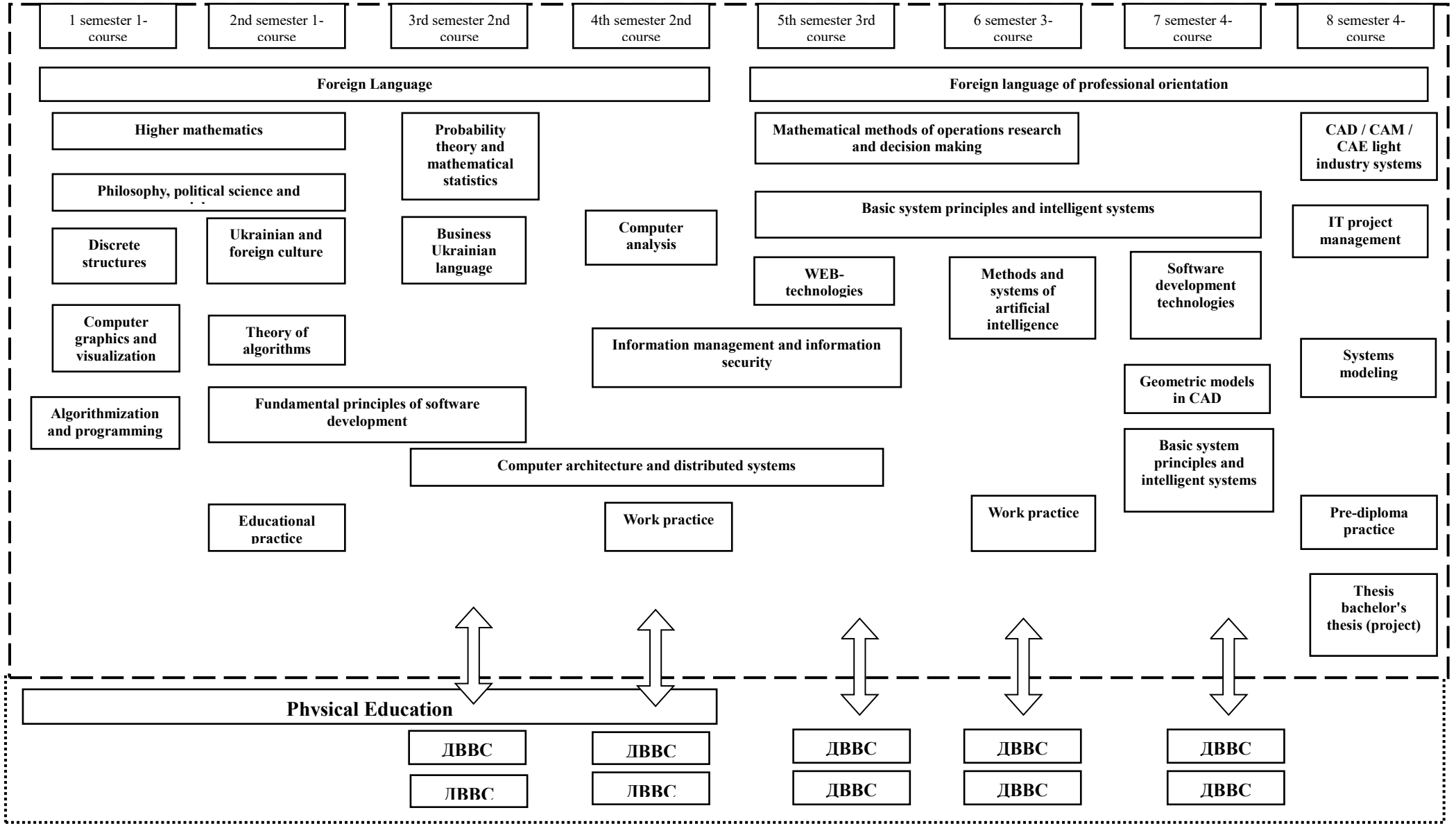
	is certified by sanitary and technical passports that comply with current regulations.
Information and educational and methodical support	The program is fully equipped with an educational and methodological complex of all components of the educational program, the availability of which is presented in the modular environment of the educational process of the University.
9 - Academic mobility	
National credit mobility	Provides for the possibility of academic mobility for some components of the educational program, ensuring the acquisition of general competencies.
International credit mobility	The program develops prospects for participation and internships in research projects and academic mobility programs. Performed in an active research environment, is mobile on the program "Double Diploma".
Training of foreign applicants for higher education	Training of foreign applicants for higher education is carried out according to accredited educational programs.

2. The list of components of the educational-professional program and their logical sequence

2.1 List of components of the educational-professional program of the first (bachelor's) level of higher education

Code n / a	Components of the educational program (academic disciplines, term papers (projects), practices, qualification work)	Number of credits	Form of final control
Mandatory components of the OP			
General training cycle			
OK 1	Ukrainian and foreign culture	3	Test
OK 2	Foreign Language(english, german, france	12	Examination
OK 3	Business Ukrainian language	3	Test
OK 4	Philosophy, political science and sociology	6	Examination
OK 5	Foreign language of professional orientation (english, german)	12	Examination
OK 6	Physical Education	3	Test
OK 7	Higher mathematics	12	Examination
OK 8	Discrete structures	3	Examination
OK 9	Computer graphics and visualization	3	Test
OK 10	Computer analysis	3	Examination
OK 11	Mathematical methods of operations research and decision making	6	Examination
OK 12	Probability theory and mathematical statistics	3	Examination
OK 13	Theory of algorithms	3	Examination
OK 14	Algorithmization and programming	6	Examination
	Total from the cycle	78	
Cycle of professional training			
OK 15	WEB technology	3	Examination
OK 16	CAD / CAM / CAE light industry systems	3	Examination
OK 17	Software development technologies	6	Examination
OK 18	Fundamental principles of software development	12	Examination
OK 19	Information management and information security	9	Examination
OK 20	IT project management	3	Examination
OK 21	Basic system principles and intelligent systems	12	Examination
OK 22	Methods and systems of artificial intelligence	3	Test
OK 23	Computer architecture and distributed systems	9	Examination
OK 24	Systems modeling	3	Examination
OK 25	Geometric models in CAD	3	Examination
OK 26	Educational practice	6	Test
OK 27	Work practice	12	Test
OK 28	Pre-diploma practice	6	Test
OK 29	Thesis bachelor's thesis (project)	12	Certification
	Total from the cycle	102	
	The total amount of mandatory components	**180**	
Selective components of the educational program			
ДВВС	Disciplines of free choice of the student	60	Test
TOTAL VOLUME OF THE EDUCATIONAL PROGRAM		**240**	

2.2. Structural and logical scheme of the educational and professional program Computer Science



3. Form of certification of applicants for higher education

Forms of certification of applicants for higher education	Certification of a graduate of an educational program is carried out in the form of public defense of a bachelor's thesis (project).
Document of higher education	Bachelor's degree with the educational qualification of Bachelor of Computer Science in the specialty 122 Computer Science (educational program Computer Science)

4. Matrix of correspondence of program competences to components of the educational-professional program

	ЗК 1	ЗК 2	ЗК 3	ЗК 4	ЗК 5	ЗК 6	ЗК 7	ЗК 8	ЗК 9	ЗК10	ЗК11	ЗК12	ЗК13	ЗК14	ЗК15	ФК1	ФК 2	ФК 3	ФК 4	ФК 5	ФК 6	ФК 7	ФК 8	ФК 9	ФК 10	ФК 11	ФК 12	ФК 13	ФК 14	ФК 15	ФК 16
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ОК28							*	*																				*	*		
ОК29		*		*		*		*								*			*	*		*	*	*	*		*		*		*

5. Matrix for providing program learning outcomes with relevant components of the educational-professional program

	PRN 1	PRN 2	PRN3	PRN4	PRN5	PRN6	PRN7	PRN 8	PRN 9	PRN10	PRN11	PRN12	PRN13	PRN14	PRN15	PRN16	PRN17	PRN18	PRN19	PRN20	PRN21	PRN22	PRN23
OK1																					*		*
OK2																						*	*
OK3																						*	*
OK4	*	*																				*	*
OK5																						*	*
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