

Profile of the educational program "Computer Science"
specialty 122 Computer Science

1 - General information	
Full name of higher education institution	O.M.Beketov National University of Urban Economy in Kharkiv
Higher education degree and qualification name in original language	Bachelor Bachelor of Computer Science
Official name of educational program	Computer Science
Diploma type and educational program amount	Bachelor's degree, single. 240 ECTS credits, training period 3 years 10 months
Presence of accreditation	The Ministry of Education and Science of Ukraine accreditation certificate № 21008297; valid until 1.07.2023
Cycle/Level	First (Bachelor's) Level Ukrainian NQF - Level 6 FQ-EHEA - first cycle EQF LLL - Level 6
Prerequisites	Presence of complete general secondary education General rules on admission prerequisites
Teaching language(s)	Ukrainian, English
The term of the educational program	5 years
URL for permanent placement of the educational program description	https://knit.kname.edu.ua/
2 - The purpose of the educational program	
Training of professionals capable of applying mathematical foundations, algorithmic principles in modelling, designing, developing and maintaining information systems and technologies;	
3 - Characteristics of the educational program	
Subject Area	<p><i>Object(s) of study and/or activity:</i></p> <ul style="list-style-type: none"> - mathematical, informational, simulation models of real phenomena, objects, systems and processes, subject areas, data and knowledge presentation - methods and technologies for obtaining, storing, processing, transmitting and using information, intelligent data analysis and decision-making - theory, analysis, development, efficiency assessment, implementation of algorithms, high-performance calculations, including parallel calculations and big data. <p><i>Theoretical content of the subject area:</i> modern models, methods, algorithms, technologies, processes and methods of obtaining, presenting, processing, analysis, transmission, storage of data in information systems.</p> <p><i>Methods, methodologies and technologies:</i> mathematical models,</p>

	<p>methods and algorithms for solving theoretical and applied problems arising in its 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; methods of computer graphics and data visualization technology; technologies of knowledge engineering, CASE-technology of modeling and design of IT;</p> <p><i>Tools and equipment:</i> distributed computing systems; computer networks; mobile and cloud technologies, database management systems, operating systems</p>
Orientation of the educational program	Educational and professional
The main focus of the educational program and specialization	<p>Special education in the field of information technology, specialty computer science</p> <p><i>Keywords:</i> mathematical, informational, simulation models, objects, systems and processes, methods and technologies for obtaining, storing, processing, transmitting and using information, intelligent data analysis and decision-making, theory, analysis, development, efficiency evaluation, implementation of algorithms, parallel calculations and big data</p>
Features of the program	Training of professionals in the field of computer science, having in-depth knowledge of the organization of design and implementation of information systems at urban facilities for the implementation of a strategy for building a "smart city", based on computing intelligence, machine learning, electronic management technologies.
4 – The suitability of graduates to employment and further education	
Employment suitability	<p>Professional activity as a specialist in the development of mathematical, information and software information systems, in the field of information technology, as well as administrator of databases and systems. Graduates can work in professions according to the current edition of the National Classifier of Ukraine:</p> <ul style="list-style-type: none"> Computational system developers Computer Systems Engineer Computer Software Engineer Computer software developers Technical specialists in the field of computer technology IT Specialist Infocommunication Specialist
Further education	The right to continue studying at the second (master's) level of higher education. Acquisition of additional qualifications in the postgraduate education system.
5 – Teaching and evaluation	
Teaching and learning	<p>Student-centred learning, self-study, (personal-oriented, humanistic, socially-practically-oriented, problematic-oriented).</p> <p>Teaching and learning include: lectures and practical classes, independent training, project work, individual consultations with teachers, practice and performance of master's qualification work.</p>

Evaluation	<p>Oral and written surveys, test tasks, graphic works, term works and projects, practice reports, oral and written examinations, differentiated tests, protection of qualification work (master's degree).</p> <p>The evaluation system is carried out on the ETS scale by conducting oral and written examinations, tests, practices, organization of presentations, project work, etc.</p>
6 – Program competencies	
Integral competence	<p>The ability to solve complex specialized problems and practical problems in the field of computer science or in the process of learning, which involves the use of theories and methods of information technologies and is characterized by complexity and uncertainty of conditions.</p>
<p>General competences (GC) defined by the standard of higher education for the specialty</p>	<p>GC1. Ability to abstract thinking, analysis and synthesis. GC2. Ability to apply knowledge in practical situations. GC3. Knowledge and understanding of the subject area and understanding of professional activity. GC4. Ability to communicate in the state language both orally and in writing. GC5. Ability to communicate in a foreign language. GC6. Ability to learn and master modern knowledge. GC7. Ability to search, process and analyse information from various sources. GC8. Ability to generate new ideas (creativity). GC9. Ability to work as a team. GC10. Ability to be critical and self-critical. GC11. Ability to make informed decisions. GC12. Ability to evaluate and ensure the quality of work performed. GC13. Ability to act on the basis of ethical considerations. GC14. The ability to exercise one's rights and responsibilities as a member of society, to be aware of the values of civil (free democratic) society and the need for its sustainable development, the rule of law, human and citizen rights and freedoms in Ukraine. GC15. The ability to preserve and increase the moral, cultural, scientific values and achievements of society on the basis of 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, to use different types and forms of motor activity for active recreation and healthy lifestyle.</p>
<p>Professional competencies of the specialty (PC), defined by the standard of higher education for the specialty</p>	<p>PC1. Ability to mathematical formulation and research of continuous and discrete mathematical models, substantiation of choice of methods and approaches for solving theoretical and applied problems in the field of computer science, analysis and interpreting. PC2. Ability to identify statistical patterns of non-deterministic phenomena through the use of computational intelligence methods, in particular statistical, neural network and fuzzy data processing, machine learning and genetic programming methods, etc. PC3. Ability to logical thinking, build logical conclusions, use formal languages and models of algorithmic calculations, design,</p>

develop and analyse algorithms, assess their effectiveness and complexity, solve and solve algorithmic problems for adequate modelling of subject areas and create software and information systems.

PC4. Ability to use methods of mathematical modelling of objects, processes and phenomena, to develop models and algorithms of numerical solution of mathematical modelling problems, to take into account errors of approximate numerical solution of professional problems.

PC5. Ability to carry out a formalized description of operations research tasks in organizational, technical and socio-economic systems for various 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 of different purposes and level of hierarchy.

PC6. Ability to system thinking, application of system analysis methodology for the study of complex problems of different nature, methods of formalization and solution of system problems with conflicting goals, uncertainties and risks.

PC7. Ability to apply theoretical and practical bases of methodology and modelling technology for the study of characteristics and behaviour of complex objects and systems, to conduct computational experiments with the processing and analysis of results.

PC8. 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 management mechanisms.

PC9. Ability to implement a multilevel computing model based on client-server architecture, including databases, knowledge and data storage, to perform distributed processing of large data sets on clusters of standard servers to meet the computational needs of users, including on cloud services.

PC10. Ability to apply methodologies, technologies and tools to manage the life cycle processes of information and software systems, products and services of information technologies in accordance with customer requirements.

PC11. Ability to intelligently analyse data based on computational intelligence methods, including large and poorly structured data, their operational processing and visualization of analysis results in the process of solving applied problems

PC12. Ability to ensure the organization of computational processes in information systems for various purposes, taking into account architecture, configuration, performance indicators of operating systems and system software.

PC13. The ability to develop network software that operates on the basis of various topology of structured cable systems, uses computer systems and data networks and analyses the quality of computer networks.

PC14. Ability to apply information security methods and means, to develop and operate special software for the protection of information resources of critical information infrastructure objects.

	<p>PC15. Ability to analyse and functional model business processes, build and practical application of functional models of organizational, economic and production-technical systems, methods of risk assessment of their design.</p> <p>PC16. Ability to implement high-performance computing based on cloud services and technologies, parallel and distributed computing in the development and operation of distributed systems of parallel information processing.</p>
7 – Program learning outcomes	
<p>Program learning outcomes defined by the standard of higher education for the specialty</p>	<p>LO1. To 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 field of computer science.</p> <p>LO2. Use a modern mathematical apparatus of continuous and discrete analysis, linear algebra, analytic geometry, in professional activities to solve problems of theoretical and applied nature in the process of design and implementation of informatization objects.</p> <p>LO3. Use knowledge of patterns 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.</p> <p>LO 4. Use methods of computational intelligence, machine learning, neural network and fuzzy data processing, genetic and evolutionary programming to solve problems of recognition, forecasting, classification, identification of control objects, etc.</p> <p>LO5. To design, develop and analyse algorithms for solving computational and logical problems, to evaluate the efficiency and complexity of algorithms based on the use of forward models of algorithms and calculated functions.</p> <p>LO6. To use methods of numerical differentiation and integration of functions, solution of ordinary differential and integral equations, features of numerical methods and possibilities of their adaptation to engineering problems, to have skills of software implementation of numerical methods.</p> <p>LO7. Understand the principles of modelling organizational and technical systems and operations; use methods of operations research, solving single- and multicritical optimization problems of linear, integer, nonlinear, stochastic programming.</p> <p>LO8. 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.</p> <p>LO9. To develop software models of subject environments, to choose the programming paradigm from the stand-in of convenience and quality of application for the implementation of methods and algorithms for solving problems in the field of computer science.</p> <p>LO10. Use client-server application development tools, design conceptual, logical and physical database models, develop and optimize queries to them, create distributed databases, storage and data cabinets, knowledge bases, including cloud services, using</p>

	<p>web programming languages.</p> <p>LO11. Have the skills to manage the life cycle of software, products and services of information technologies in accordance with the requirements and limitations of the customer, be able to develop project documentation (feasibility study, technical task, business plan, agreement, contract, contract).</p> <p>LO12. Apply methods and algorithms of computational intelligence and intelligent data analysis in problems of classification, forecasting, cluster analysis, search of associative rules using software tools to support multidimensional data analysis based on Datamining, Text Mining, Web Mining technologies.</p> <p>LO13. To speak system programming languages and methods of software development that interact with components of computer systems, to know network technologies, computer network architectures, to have practical skills in computer network administration technology and their software.</p> <p>LO14. Apply knowledge of methodology and CASE-means of designing complex systems, methods of structural analysis of systems, object-oriented design methodology in the development and research of functional models of organizational, economic and production-technical systems.</p> <p>LO15. Understand the concept of information security, principles of secure software design, ensure the security of computer networks in conditions of incompleteness and uncertainty of the source data.</p> <p>LO16. 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.</p>
8 - Resources for the program implementation	
Personnel	High quality level implementation of the program is provided by a qualified scientific and pedagogical staff, which includes PhDs and ScDs, professors, associate professors, including those with B-2 level English certificates. All the teachers of the graduating department have powerful practical experience in the field of information technology.
Material and Technical Ensure	The educational process is fully provided by the classroom fund, administrative and auxiliary premises. Specialized computer laboratories of the department have both modern equipment and software (Microsoft 365, Visual Studio Community 2019, SQL Server Management Studio 18, Google Chrome, Opera, Internet Explorer, GIMP Paint.NET, SketchUp, Linux OS, Geany, NetBeans, GIMP, Apache, PHP), and broadband Internet access. For lectures, auditoriums with multimedia equipment are used. Specialized laboratories are used for practical classes, including "Laboratory of information systems modelling", "Laboratory of Corporate Network Technologies", "Laboratory of Information Technologies", "Laboratory of Artificial Intelligence and Big Data Processing".
Information and educational, and	Computer Science educational program is provided with educational materials that are available for students in the reading

methodological Ensure	rooms of the http://library.kname.edu.ua/index.php/uk/ University Scientific Library, equipped with computers with Internet and local network of the University, in the digital repository http://eprints.kname.edu.ua , in MS Teams, on the portal of the Distance Learning Centre http://dl.kname.edu.ua in the relevant courses on the Moodle distance learning platform. Applicants have free access to modern professional literature and periodicals; Scopus and Web of Science databases; Springer resources; ScienceDirect databases from Elsevier Publishing; on the ScienceDirect platform – up to 39 thousand of e-books and to the collection of 2088 electronic monographs printed in 2019-2020.
9 – Academic mobility	
National credit mobility	In accordance with the Regulations on academic mobility of students, postgraduates, doctoral students, scientific-pedagogical and scientific workers of O.M. Beketov NUUE.
International Credit Mobility	O.M. Beketov NUUE has 5 existing agreements under Erasmus + International Credit Mobility with the following foreign universities: 1) Middle East Technical University, Ankara, Turkey. 2) Aristotle University of Thessaloniki, <u>Thessaloniki, Greece</u> 3) University of Nova Gorica, Nova Gorica, Slovenia 4) The Estonian University of Life Sciences, Tartu, Estonia 5) Lodz University of Technology, Lodz, Poland
Education of foreign applicants for higher education	In accordance with the Rules of admission to O.M. Beketov NUUE.