MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

KYIV NATIONAL UNIVERSITY
TECHNOLOGY AND DESIGN

EDUCATIONAL-SCIENTIFIC PROGRAM

COMPUTER SCIENCE

Level of higher education	third (educationally-scientific)
Degree of higher education	philosophy doctor
Field of knowledge	12 Information technologies
Specialty	122 Computer Science
Qualification	Philosophy Doctor of Computer Science

Kyiv 2021

PREFACE

DEVELOPED: Kyiv National University of Technology and Design

DEVELOPERS:

Guarantor of the educational program Minaev Yuriy Mykolayovych, Doctor of Technical Sciences, Professor, Professor of the Department of Computer Science and Technology, Kyiv National University of Technology and Design.

Working group members:

Shcherban Volodymyr Yuriiovych, laureate of the State Prize of Ukraine in the field of science and technology, Doctor of Technical Sciences, Professor, Head of the Department of Computer Science and Technology, Kyiv National University of Technology and Design;

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

Kolva Mykita Andriyovych, student of the Faculty of Mechatronics and Computer Technologies of Kyiv National University of Technology and Design.

REVIEWS OF EXTERNAL STAKEHOLDERS:

1) V.M. Opanasenko, a leading researcher at the Institute of Cybernetics. V.M. Glushkova NAS of Ukraine, laureate of the State Prize of Ukraine in the field of science and technology, doctor of technical sciences, professor;

2) V.M. Alekseenko, Chief Engineer of Glomstar Ukraine Limited Liability Company;

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) O.I. Vakarchuk, General Director of DOKPROM Limited Liability Company.

1. Profile of the educationally-scientific 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 third (educationally-scientific). Degree of higher education - Philosophy doctor . Field of knowledge - 12 Information technologies. Specialty - 122 Computer Science.
Type of diploma and scope of educational program	Doctor of Philosophy, single, 48 ECTS credits.
Availability of accreditation	-
Cycle / level	National Qualifications Framework of Ukraine - level 8.
Prerequisites	Master's degree or educational qualification level of a specialist.
Language (s) of instruction	Ukrainian
Term of the educational program	-
Internet address of the permanent placement of the description of the educational program	https://en.knutd.edu.ua/ects/
2 - The purpose of the educational program	
Training of specialists with deep knowledge, as well as basic and professional competencies in the field of information technology, aimed at developing philosophical and linguistic competencies, formation of universal skills of a researcher, which are sufficient for conducting and successfully completing research and further professional activities. The main goals of the program are to achieve the level of preparation for the degree of Doctor of Philosophy, which allows to develop and implement projects, conduct their own research, enabling the creation of new holistic knowledge and / or technology, the results of which have scientific novelty, theoretical and practical significance.	
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. The program is designed as an optimal combination of academic and professional requirements. It is focused on the formation of applicants' competencies for acquiring in-depth knowledge of the specialty, possession of general scientific (philosophical) competencies, acquisition of universal research skills and presentation of their own research results in oral and written form, in particular, in a foreign language. Compulsory subjects - 75%, of which: vocational training - 44%, general training - 34%, knowledge of a foreign language - 22%; disciplines of free choice of the applicant, providing professional training - 25% are selected from the university catalog in accordance with the approved procedure at the University.
Orientation of the educational program	Educational and scientific program for the preparation of a doctor of philosophy.
The main focus of the educational program	The emphasis of the educational and scientific program is on the formation and development of professional competencies in the field of information technology in the specialty of computer science; study of theoretical and methodological provisions, organizational and practical tools that will initiate and carry out research and innovation activities in the field of information technology based on the use of mathematical apparatus, programming and intelligent information processing tools; to form universal skills of the researcher, sufficient for carrying out and successful completion of scientific research and further professional-scientific activity.

Features of the educational program	The program focuses on conducting research in computer science, which includes multi-parameter optimization of technological processes and structures of light and textile industries based on the use of ant colony algorithms, neural algorithms, return algorithms using recursion.	
4 - Suitability of graduates for employment and further study		
Suitability for employment	The graduate is suitable for employment in institutions and establishments of the Ministry of Education and Science of Ukraine and the National Academy of Sciences of Ukraine, free economic zones of various forms of ownership, international and Ukrainian IT companies, banks, public administration and local government, analytical and information institutions. in the field of computer systems, researcher (computer systems), developer of computer systems, professional in the field of programming, researcher (programming), developer of computer programs.	
Further training	Lifelong learning to improve professional, scientific and other activities. Opportunity to continue studies at the scientific level higher education (doctor of sciences).	
5 - Teaching and assessment		
Teaching and learning	Student-centered and problem-oriented learning, learning through pedagogical 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 students of higher education. Forms of organization of the educational process: lecture, seminar, practical, laboratory classes, practical training, independent work, consultations.	
Evaluation	Exams, testing, essays, project work, presentations, reports, portfolio.	
6 - Program competencies		
Integral competence (ІК)	Ability to produce new ideas, solve complex problems in a particular field of professional and / or research and innovation, apply the methodology of scientific and pedagogical activities, as well as conduct their own research, the results of which have scientific novelty, theoretical and practical significance.	
General competencies (ЗК)	ЗК 1	Ability to abstract thinking, analysis and synthesis.
	ЗК 2	Ability to develop and manage projects.
	ЗК 3	Ability to generate new ideas (creativity).
	ЗК 4	Formation of a systemic scientific / artistic worldview, professional ethics and general cultural outlook.
	ЗК 5	Ability to communicate in a foreign language.
	ЗК 6	Ability to use information and communication technologies.
	ЗК	Ability to work in an international context.
Professional competencies (ФК)	ФК 1	Ability to carry out scientific and pedagogical activities.
	ФК 2	Ability to perform original research, to achieve scientific results that create new knowledge in computer science and related to it (them, them) interdisciplinary areas and can be published in leading scientific journals in computer science and related fields.
	ФК 3	Ability to orally and in writing present and discuss the results of research and / or innovative developments in the state and foreign (English or other) languages, a deep understanding of foreign scientific texts in the field of research.
	ФК 4	Ability to use modern information technologies, databases and other electronic resources, specialized software in scientific and educational activities.

	ФК 5	Ability to identify, set and solve research problems and / or problems in the field of computer science, evaluate and ensure the quality of research.
	ФК 6	Ability to initiate, develop and implement complex innovative projects in the field of computer science and related interdisciplinary projects, leadership in their implementation.
	ФК 7	Ability to adhere to research ethics, as well as the rules of academic integrity in research and scientific and pedagogical activities.
	ФК 8	Ability to the formation of the system scientific worldview and general cultural outlook.
	ФК 9	Ability to produce new ideas and solve complex problems in the field of professional and / or research and innovation, as well as to apply modern methodologies, methods and tools of pedagogical and scientific (creative) activities in the specialty.
	ФК 10	Ability to perform original research, achieve scientific results, which include multi-parameter optimization of technological processes and structures of light and textile industries based on the use of ant colony algorithms, neural algorithms, return algorithms using recursion.
7 - Program learning outcomes		
Knowledge and understanding:		
ПРН 1	Have advanced conceptual and methodological knowledge in computer science and at the frontiers of subject areas, as well as research skills sufficient to conduct scientific and applied research at the level of the latest world achievements in the relevant field, gain new knowledge and / or innovate.	
ПРН 2	Deeply understand the general principles and methods of computer science, as well as the methodology of scientific research, apply them in their own research in the field of computer science and in teaching practice.	
Application of knowledge and understanding (skills):		
ПРН 3	Formulate and test hypotheses; use appropriate evidence to substantiate the conclusions, in particular, the results of theoretical analysis, experimental research (surveys, observations,…) and mathematical and / or computer modeling, available literature data.	
ПРН 4	Develop and research conceptual, mathematical and computer models of processes and systems, use them effectively to gain new knowledge and / or create innovative products in computer science and related interdisciplinary areas.	
ПРН 5	Plan and perform experimental and / or theoretical research in computer science and related interdisciplinary areas using modern tools, critically analyze the results of their own research and the results of other researchers in the context of the whole set of modern knowledge about the research problem.	
ПРН 6	Apply modern tools and technologies for information retrieval, processing and analysis, in particular, statistical methods of analysis of large data and / or complex structure, specialized databases and information systems.	
ПРН 7	Develop and implement scientific and / or innovative engineering projects that provide an opportunity to rethink existing and create new holistic knowledge and / or professional practice and solve significant scientific and technological problems of computer science in compliance with academic ethics and taking into account social, economic, environmental and legal aspects.	
ПРН 8	Develop and implement scientific and / or innovative engineering projects, which include multi-parameter optimization of technological processes and structures of light and textile industry machines based on the use of ant colony algorithms, neural algorithms, return algorithms using recursion.	

Formation of judgments:	
ПРН 9	Freely present and discuss with specialists and non-specialists the results of research, scientific and applied problems of computer science in state and foreign languages, qualified to reflect the results of research in scientific publications in leading international scientific journals
ПРН 10	To study, generalize and implement innovations of computer sciences in the educational process.
ПРН 11	Carry out search and critical analysis of information, conceptualization and implementation of scientific projects in computer science.
8 - Resource support for program implementation	
Staffing	All scientific and pedagogical workers who provide the educational program on qualification, correspond to a profile and a direction of the educational components which are 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, providing the acquisition of general and / or professional competencies.
International credit mobility	The program develops prospects for participation and internships in research projects and academic mobility programs abroad. Performed in an active research environment.
Training of foreign applicants for higher education	Training of foreign applicants for higher education is carried out according to accredited educational programs.

2. List of components of educational and scientific program and their logical sequence

2.1.1 List of components educational component of the educational and scientific program of the third (educational and scientific) level of higher education

Code	Components of the educational program (academic disciplines, semester work, practice)	Number of credits	Form of final control
1	2	3	4
Mandatory components of the educational program			
General training cycle			
OK 1	Philosophy of science and research methodology	4	examination
OK 2	Foreign language for academic purposes	8	examination
OK 3	Information and communication technologies in scientific research	4	test
OK 4	Intellectual property and commercialization of scientific research	4	test
	Total from the cycle	**20**	
Cycle of professional training			
OK 5	Pedagogical skills in higher education institutions	4	test
OK 6	Mathematical modeling of complex processes and structural and structures	4	examination
OK 7	Multiparametric optimization of complex processes and structures	4	examination
OK 8	Pedagogical practice	4	test
	Total from the cycle	**16**	
	The total amount of mandatory components	**36**	
Selective components of the educational program			
TWO	Disciplines of free choice of student / graduate student	12	examination
	The total amount of sample components	**12**	
	TOTAL VOLUME OF THE EDUCATIONAL PROGRAM	**48**	

2.1.2 Content of the scientific component of the educational-scientific program of the third (educationally-scientific) level of higher education

Search for scientific sources and their processing. Defining the main tasks of the dissertation. Selection of optimal theoretical and / or experimental methods for their solution. Data mining, processing and analysis of the obtained results. Correction of initial hypotheses and problems in accordance with the results of the analysis. Preparation of scientific results for publication.Approbation of scientific results at scientific conferences of different levels. Generalization of research results. The final definition of the range of problems that will be considered in the dissertation, establishing the place of research in the context of the results of other authors. Formation of conclusions and recommendations. Registration of work and submission to the defense. Dissertation defense.

The main scientific results of the dissertation must be covered in at least three scientific publications that reveal the main content of the dissertation. Such scientific publications include:

– at least one article in periodical scientific publications of other states that are members of the Organization for Economic Cooperation and Development and / or the European Union, in the scientific field for which the applicant's dissertation was prepared. Such publication may be equated with publication in publications included in the list of scientific professional publications of Ukraine with the assignment of category "A", or in foreign publications indexed in the databases Web of Science Core Collection and / or Scopus;

– articles in scientific publications included in the list of scientific professional publications of Ukraine with the assignment of category "B" (instead of one article may be credited monograph or section of the monograph published in co-authorship);

- a scientific publication in the edition referred to in the first - third quartiles (Q 1 - Q 3) according to the classification SCImago Journal and Country Rank or Journal Citation Reports, is equated to two publications, which are credited in accordance with the first paragraph of this paragraph.

Scientific publications are credited on the topic of the dissertation subject to the following conditions:

– substantiation of the obtained scientific results in accordance with the purpose of the article (task) and conclusions;

– publication of articles in scientific professional publications, which on the date of their publication are included in the list of scientific professional publications of Ukraine, approved in the manner prescribed by law;

– publication of articles in scientific periodicals of other states in the scientific field for which the applicant's dissertation was prepared, provided that the dissertation materials, determined by the council, are complete;

– publication of not more than one article in one issue (issue) of a scientific publication.