MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
RIVNE STATE UNIVERSITY OF HUMANITIES

EDUCATIONAL AND PROFESSIONAL PROGRAM

«COMPUTER SCIENCES AND INFORMATION TECHNOLOGY»

Second (master's degree) **level of higher education**

in speciality 122 Computer sciences

branch of knowledge 12 Information technology

Qualifications: a master's degree of computer sciences, specialist in the field of computer sciences. Teacher of computer sciences

APPROVED BY ACADEMIC COUNCIL

Chairman of academic council

_____ **prof. Postolovskyi R.M.**

(protocol № 2 dated 27. 02. 2020)

Educational program is introduced with 01.09. 2020

Rektor RSHU

_____ **prof. Postolovskyi R.M.**

(order № 40-01-01 **dated 27.02.2020)**

Rivne, 2020

PREFACE

The educational-professional program is a normative document that regulates the normative, competence, qualification, organizational, educational and methodological requirements for the preparation of higher education masters in the branch of knowledge 12 Information Technology in the specialty 122 Computer Science.

The educational and professional program is based on the competence, student-centered and problem-oriented approaches to the training of applicants for higher education of a master's degree in the field of knowledge 12 Information Technologies in the specialty 122 Computer Science.

Educational and professional program was developed for the introduction as the Standard of higher education at the appropriate level of higher education by the project team of the Rivne State University of Humanities composed of:

Project team leader(educational program guarantor):

Siaskiy V. A., Ph.D. (Candidate of Technical Sciences), associate professor of the department of informatics and applied mathematics.

Члени робочої групи:

Petrivskiy Y. B., Ph.D. (Doctor of Technical Sciences), professor, head of educational work, Head of the department of higher mathematics;

Prisyazhnyuk I. M., Ph.D. (Candidate of Technical Sciences), associate professor of the department of higher mathematics.

Reviews of external stakeholders:

Semenyuk O.V., head of «HoneyComb Soft»;

Sushko D. V., chief executive officer „Soft Group.

1. Master's program profile in specialty 122 Computer Science

1.1. General information	
Full name of higher educational institution and structural unit	Rivne State University of Humanities Department of informatics and applied mathematics
The official name of the educational program	Computer Science and Information Technology
Type of diploma and the volume of the educational program	Master's degree. Unitary. 90 ECTS credits / 1 year 4 months
Accrediting organization	National Agency for Quality Assurance in Higher Education
Cycle / Level	NQS Ukraine - 8 level, FQ-EHEA - second cycle, EQF-LLL - 7 level
Prerequisites	Existence of a bachelor's degree, EQL "Specialist", a master's degree obtained in another specialty
Language (s) of teaching	Ukrainian
The duration of the educational program	Until 2023
Internet address of the permanent description of the educational program	http://www.rshu.edu.ua/navchannia/osvitni-prohramy/mahistr
1.2. The purpose of the educational program	
Training of highly skilled specialists on specialty 122 "Computer sciences", able to apply the modern methods of mathematical design in a technique with application of informative and Interne technologies, algorithmic principles in a design, planning, development and accompaniment of the informative systems and technologies; to carry out development, introduction and accompaniment of the intellectual systems of analysis and processing of data in the organizational, technical, natural and socio-economic systems; developments of technical decisions are on the basis of software products and vehicle platforms of leading firms; developments and exploitations of computer information technologies of treatment of information and management are in different industries of activity.	
1.3. Characteristics of the educational program	
Subject area (branch of	*Branch of knowledge* 12 Information technology *Specialty* 122 Computer Science

knowledge, specialty, specialization (if any))	*The object of study* are methods and technologies of analysis, design, development, implementation and maintenance of information software systems, which include: • analysis of requirements for software and information software systems; • construction and research of mathematical models of natural, technical, socio-economic systems and processes; • design, development and commissioning of information software systems; • definition of modification, optimization and development of information software systems • planning, management and coordination of various activities in the field of creation and operation of information software systems. *Learning objectives:* training of specialists capable to apply mathematical bases, algorithmic principles in modeling, designing, developing and maintaining information systems and technologies; to carry out development, implementation and support of intelligent systems of analysis and data processing in organizational, technical, natural and social and economic systems *Theoretical content of the subject area:* modern models, methods, algorithms, technologies, processes and methods for receiving, representing, processing, analyzing, transmitting, storing data in information systems in order to systematize them and identify the necessary facts of information nature.
Orientation of the educational program	Educational-professional.
The main focus of the educational program and specialization	Vocational-oriented education aimed at forming a specialist capable of innovative, research and creative activities in the field of information technology. *Keywords:* research methodology and methods, programming paradigms and technologies, problem-oriented systems, digital networks, process and system optimization, project management, intelligent systems, neural networks, knowledge dissemination models.
Features of the program	Multi-profile training of specialists in the field of knowledge 12 Information technologies. The educational program is developed taking into account the experience of training computer science specialists at leading domestic and foreign universities, as well as many years of experience in training specialists in specialties 7.04030201 and 8.04030201 Informatics. The structure of the program provides for

	separate training sessions in English, international mobility.
1.4. – Eligibility of graduates for employment and further training	
Eligibility for employment	Master of Science in Computer Science 122 may hold the following positions (according to the National Classifier "State Classification of Occupations DKP 003: 2010"): *2131. Professionals in the field of computer systems*: • 2131.1. Researchers (computer systems); • 2131.2. Developers of computer systems; *2132. Programming professionals:* • 2132.1. Researchers (programming); • 2132.2. Developers of computer programs; *1236. Heads of computer services;* *1238. Project and program managers;* *2139. Professionals in other fields of computing (computerization):* • 2139.1. Researchers (other areas of computing); • 2139.2. Professionals in other areas of computing; *2310. Teachers of universities and higher educational institutions*.
Continuing education	Possibility to continue studying according to the program of the third (educational-scientific) level of higher education.
1.5. Teaching and assessment	
Teaching and learning	*Основні підходи до навчання*: компетентнісний, студентоцентрований, діяльнісний та особистісно-орієнтований. *The main approaches to learning*: competence, student-centered, activity and personality-oriented. *Leading teaching methods:* problem-based, exploratory, research, verbal, practical, visual, interactive, group (collective) analysis, design and implementation. *Learning technologies:* interactive, project, communicative. *Teaching and learning* is carried out in the form of traditional, multimedia and interactive lectures, practical and laboratory work, independent learning, implementation of individual and group projects, internships, diploma projects.
Assessment	Current, modular and final control. Tests, oral and written semester exams, defense of internship reports. Certification in the form of defense of qualifying work.
1.6. Program competencies	
Integral competence	Ability to solve complex specialized tasks and practical problems in various subject areas of professional activity or in the learning process, which involves the application of mathematical theories and methods and characterized by complexity and uncertainty of the conditions.

General competences (CC)	1. Ability to think, analyze and synthesize abstract. Ability to identify, put and solve scientific problems. 2. The ability to realize their rights and responsibilities as a member of society, to realize the values of civil society 3. Ability to apply knowledge in practical situations. 4. Knowledge and understanding of the subject area and understanding of professional activity. 5. Ability to communicate in a foreign language. 6. Skills in the use of information and communication technologies. 7. The ability to conduct research at the appropriate level. 8. Ability to learn and master modern knowledge. 9. Ability to search, process and analyze information from various sources. 10. Ability to generate new ideas (creativity). 11. Ability to make informed decisions. 12. Ability to work in a team. 13. Skills of interpersonal interaction. 14. Ability to communicate with representatives of other professional groups of different levels (with experts from other branches of knowledge / types of economic activity). 15. Ability to design and manage projects. 16. Ability to find out initiative and enterprise. 17. Ability to assess and ensure the quality of work performed.
Special (professional) competencies (SC)	1. Ability to solve applied tasks in the field of protected information and telecommunication technologies and systems. Ability to design information systems, including a formal description of their structure and conduct business process simulation 2. Ability to design the architecture of the system, implementation, integration of information systems. 3. Ability to automate designing on the basis of modern CAD / CAM / CAE systems and modern IT technologies. 4. Ability to implement methods, algorithms, simulation technologies for studying the characteristics and behavior of complex objects in the process of designing information systems. 5. Ability to design and develop operational models and carry out operational studies in the process of analysis and synthesis of information systems of various purposes. 6. Ability to use modern computer technologies for system, functional, design and technological design of complex objects and systems. 7. Develop methodological and normative documents, proposals and implement measures on the implementation of developed projects and programs.

	8. Ability to solve problems of scalability, support remote components and interaction of different software platforms in distributed corporate information systems enterprise level. 9. The ability to detect previously unknown knowledge necessary for decision making in various areas of professional activity and store them in data warehouses. 10. Ability to develop plans and programs for organizing innovation in the enterprise, assess innovation and technological risks in the implementation of new technologies, organize training and training of employees of units in the field of innovation activities and coordinate the work of personnel in the integrated solution of innovation problems. 11. Ability to provide protection and assessment of the value of intellectual property objects. 12. Ability to organize work to improve the scientific and technical knowledge of workers; to organize the development of creative initiative, the implementation of the achievements of domestic and foreign science, technology, the use of best practices, ensuring the effective work of the unit, enterprises. 13. Ability to provide knowledge of standards, methods and tools for managing the processes of the life cycle of information systems, products and services of information technology. 14. Ability to publicly present their own and well-known scientific results of production and technological activities. 15. Ability to use methods of mathematical and algorithmic modeling in solving theoretical and applied problems. 16. Ability to pass the result of the conducted physical-mathematical and applied research in the form of concrete recommendations, formulated in terms of the subject area of the phenomenon studied. 17. Ability to apply and develop fundamental and interdisciplinary knowledge, including modern methods of discrete mathematics, probabilistic-statistical methods, mathematical methods of operations research, artificial intelligence, mathematical and algorithmic modeling, substantiation and acceptance of managerial and technical solutions for successful solving of professional tasks. 18. Ability to participate in the work of research seminars, conferences, symposiums, presentation of their own scientific achievements, preparation of scientific articles, scientific and technical reports. 19. Ability to process general scientific and technical information, bring it to the problem-task form, analysis and synthesis of information. 20. Ability to solve applied tasks in the field of protected information and telecommunication technologies and systems.

1.7. Program learning outcomes	
Program (learning) outcomes(PO)	1. Specialized conceptual knowledge gained in the process of learning and / or professional activity at the level of the latest achievements, which are the basis for original thinking and innovation, in particular in the context of research work, a critical understanding of problems in teaching and / or professional activities, and on the boundary between substantive industries. 2. Theoretical and practical bases of the methodology of system analysis, CASE-technology for the design of information and software systems, modern methods of mathematical and computer modeling, data visualization. 3. Methods and approaches for designing the architecture of information systems, programming languages and modern technologies for the development of information systems, CAD / CAM / CAE systems for automated design and modern IT technologies, methodologies for automated design of complex objects and systems, basic methods for analyzing requirements and software design. 4. Theoretical and practical bases of methodology and modeling technology in the process of research, design and operation of information systems, products, services of information technologies, other objects of professional activity. 5. General methodological principles of construction of operating models, main stages and essence of operational research and their ability to apply them in the analysis and synthesis of information systems of various purposes and in the tasks of organizational and economic management. 6. Types of reporting of the subject area of informatization and automation, requirements for scientific publications and rhetoric, tools for designing and demonstration of scientific results. 7. Knowledge of architecture and standards of component models, communication tools and distributed computing, concepts of data warehouses, methods for their prompt processing. 8. Legal aspects of intellectual property protection; criminal liability for violation of intellectual property rights; systems for preventing and detecting academic plagiarism, means of ensuring information security and data integrity in accordance with the solvable problem 9. Knowledge of new technologies, techniques and paradigms; achievements of domestic and foreign science; bases of production management and organization of innovative activity at the enterprise. 10. Ability to solve complex problems and problems requiring updating and integration of knowledge, often under conditions

	of incomplete / insufficient information and contradictory requirements, research and / or innovation activities. 11. Skills to apply the principles of system analysis of objects and automation processes, the use of state and international standards in the field of information technology in the design and development of information systems, their architecture, information and software, the use of CASE tools during design and modeling of business- processes and software development of information systems. 12. Ability to apply CAD / CAM / CAE systems of automated designing and modern IT technologies, to model systems and processes, conditions and behavior of complex informatization objects in the process of designing information systems and technologies. 13. Ability to develop operational models and carry out operational research in the process of analysis and synthesis of information systems of various purposes, possession of modern technologies for the automation of the design of complex objects and systems, products and services of information technology, modern paradigms and programming languages. 14. Skills to solve the problem of scalability, support of remote components and interaction of different software platforms in distributed corporate information systems at the enterprise level, application of technology of work with data warehouses, their analytical processing and intelligent analysis to ensure the reliable operation of information systems. 15. To develop plans and programs of organization of innovative activity at the enterprise; to evaluate innovative and technological risks when introducing new technologies; organize training and training of the employees of the units in the field of innovation activity and coordinate the work of the personnel in the complex decision of innovative problems. 16. To provide protection and assessment of the value of objects of intellectual activity; to be responsible for academic plagiarism. 17. To organize work on improving the scientific and technical knowledge of workers; to organize the development of a creative initiative, the implementation of the achievements of domestic and foreign science, technology, the use of excellence, which ensure the effective work of the unit, enterprise; select users to learn information systems. 18. Skills of presentation of own and well-known scientific results of production and technological activities, preparation of scientific articles, scientific and technical reports, their application in the development and integration of systems, products and services of information technology. 19. Ability to apply and develop fundamental and interdisciplinary

	knowledge to substantiate and make managerial and technical decisions for the successful resolution of professional tasks. 20. Ability to use hardware and software information security and integrity of data in information systems, mathematical methods of substantiation and adoption of managerial and technical solutions that are adequate to the conditions in which the objects of information processing function. 21. A clear and unambiguous statement of their own conclusions, as well as knowledge and explanations that justify them, to specialists and non-specialists, in particular to the persons who study. 22. Use of foreign languages in professional activities. 23. Decision-making in complex and unpredictable conditions requiring new approaches and forecasting. 24. Responsibility for the development of professional knowledge and practice, assessment of the strategic development of the team. 25. Ability to further education, which is largely autonomous and independent. 26.
1.8. Resource support for program implementation	
Specific characteristics of staffing	Scientific and pedagogical workers who carry out the educational process have experience of scientific and pedagogical activity over four years and the level of scientific and professional activity, which is evidenced by the performance of at least four types and results of professional activity (paragraph 30 of the License Terms of educational activities from 30.12. 2015 №1187 (as amended in accordance with the resolution of the Cabinet of Ministers of 10.05.2018 № 347))
Specific characteristics of material and technical support	Material and technical support meets the licensing requirements for providing educational services in the field of higher education and is sufficient to ensure the quality of the education. Modern computer equipment, licensed and freely distributable software are used to meet the needs of the educational process..
Specific characteristics of information and educational-methodical support	The use of modern application software and virtual learning environment of Rivne State University for the Humanities and the author's teaching and methodological developments of the teaching staff.
1.9. Academic mobility	
National credit mobility	On the basis of bilateral agreements between Rivne State University of Humanitaries and higher educational establishments and scientific institutions of Ukraine. (Regulations on the procedure for exercising the right to academic mobility of Rivne State University for the Humanities)

	http://www.rshu.edu.ua/images/navch/pol_akadem_mob_2017.pdf)
International Credit Mobility	On the basis of bilateral agreements between Rivne State Humanities University and foreign educational institutions.
Training of foreign applicants for higher education	Possible.