MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
THE NATIONAL UNIVERSITY OF OSTROH ACADEMY

EDUCATIONAL-PROFESSIONAL PROGRAMME ROBOTIC SYSTEMS PROGRAMMING

of the first (Bachelor's) level of higher education

Speciality: 'F3 Computer Science'
Field of study: 'F - Information Technology'

Ostroh 2025

Profile of the Educational and Professional Programme in the 'F3 Computer Science' Speciality

1 - General Information	
Full name of the higher education institution and structural unit	The National University of Ostroh Academy. Educational and Scientific Institute of Information Technology and Business. The Information Technology and Data Analytics Department.
Degree of higher education and title of qualification in the original language	**Бакалавр (Bachelor).** **Бакалавр** з комп'ютерних наук (Bachelor of Computer Science).
Official title of the educational programme	The Educational and Professional Programme "Robotic Systems Programming"
Type of the diploma and scope of the educational programme	Bachelor's Degree Diploma, single degree, 240 ECTS credits,
Forms of study under the educational programme and the standard duration of study for each form	Full-time form of study: - standard duration of study: 3 years 10 months.
Accreditation status	Accreditation certificate: not available.
Cycle/Level	NQF of Ukraine – Level 6, FQ-EHEA – First cycle, EQF-LLL – Level 6
Prerequisites	Complete General Secondary Education, in compliance with the Admission Regulations of the National University of Ostroh Academy for the current year.
Language(s) of Instruction	Ukrainian.
Validity Period of the Educational Programme	5 years
Permanent Internet Address of the Educational Programme Description	https://www.oa.edu.ua/ua/osvita/ects/info_prog/bachelor/ekonomichnij_fakultet/122_robototehnika_ta_mashynne_navchannia
2 – The EPP Purpose:	
The "Robotic Systems Programming" Educational Programme aims to develop advanced theoretical knowledge and practical skills in the field of robotics and machine learning, providing a comprehensive understanding of modern technologies and methods of robot programming.	
3 – The EEP Characteristics	
Subject Area (field of study, speciality, specialisation)	Field of study: F Information Technology Speciality: F3 Computer Science; according to the International Standard Classification of Education – 0613 Software and Applications Development and Analysis. *Object(s) of Study and/or Professional Activity:* Mathematical, informational, and simulation models of real phenomena, objects, systems, and processes; domain-specific models; data and knowledge representation; methods and technologies for obtaining, storing, processing, transmitting, and using information; methods of intelligent data analysis and decision-making; theory, analysis, development, performance evaluation, and implementation of algorithms; high-performance computing, including parallel computing and big data.

	Learning Objectives: training specialists capable of conducting theoretical and experimental research in the field of computer science; applying mathematical methods and algorithmic principles in modelling, designing, developing, and maintaining information technologies; developing, implementing, and maintaining intelligent systems for data analysis and processing within organisational, technical, natural, and socio-economic systems. *Theoretical Content of the Subject Area*: modern models, methods, algorithms, technologies, processes, and approaches to acquiring, representing, processing, analysing, transmitting, and storing data in information systems. *Methods, Techniques and Technologies:* mathematical models, methods, and algorithms for solving theoretical and applied problems arising in IT development; modern programming technologies and platforms; methods of collecting, analysing, and consolidating distributed information; technologies and methods for designing, developing, and ensuring the quality of IT components; methods of computer graphics and data visualisation technologies; knowledge engineering technologies, and CASE technologies for modeling and designing information technologies. *Tools and equipment:* distributed computing systems; computer networks; mobile and cloud technologies; database management systems; operating systems.
Type of the Educational Programme	The educational and professional programme is both academic and practice-oriented, based on achievements in the fields of robotics, electronics, programming, and machine learning. It aims to develop fundamental knowledge and advanced practical skills in programming and controlling robotic systems. The Scope of the Educational and Professional Programme (EPP) is **240 ECTS credits**, including: **- compulsory components of the EPP - 73.7%,** *including 10.8% of general training, 52.9% of professional training, and 10.0% of practical training.* **- elective components of the EPP - 26.3 %.**
The Primary Focus of the Educational Programme	Specialised education for information technology professionals, providing fundamental study and the acquisition of practical skills and abilities in applying machine learning during the development and practical use of software for robotic and electronic systems. *Keywords:* information technology, intelligent systems, computer software, machine learning, robotics, and electronics.
Distinctive Features of the Programme	Student-centred learning aimed at developing professional competencies necessary for understanding technological processes, as well as skills in critical analysis and creative problem-solving for complex and multifaceted tasks inherent in every robotic system, thereby enhancing students' professional adaptability and innovativeness. The programme aims to develop a high level of professional competencies required for practical work in a dynamically changing technological environment, providing alumni with a strong foundation for career growth in the fields of programming, robotics, and artificial intelligence, as well as the competencies necessary for continuous self-improvement and professional development. The formation of practical skills and competencies involves degree-seeking students' participation in practical training during each academic year, in particular: - In the first year of study, students undertake an educational internship in

	the *Fundamentals of Electronics.* - In the second year, they complete an educational internship in *the Fundamentals of Robotics.* - In the third year, they undertake a *work experience internship* . - In the fourth year, they complete a *professionally oriented work experience internship*. The educational and professional programme also includes project-based activities built on the principles of mentorship.
4 - Alumni Employability and Opportunities for Further Study	
Employability	Bachelor in Computer Science, according to the National Classifier of Occupations, DK 003:2010, may hold the following positions: 213. Professionals in the field of Computing. 312. Technical Specialists in Computer Engineering. 343. Technical Specialists in Management.
Further Study	Acquisition of education at the second (Master's) level of higher education (National Qualifications Framework of Ukraine – Level 7, FQ-EHEA – Second Cycle, EQF-LLL – Level 7). Acquisition of additional qualifications within the postgraduate education system.
5 - Teaching and Assessment	
Teaching and Learning	**Types of learning:** student-centred, problem-based, and self-directed. **Forms of teaching:** lectures, practical sessions, and laboratory work designed to study and discuss advanced issues, as well as to apply contemporary developments in the field
	Assessment The evaluation of a student's academic performance is conducted through the institution's 100-point grading system. This system involves accumulating points based on various academic activities that students participate in throughout their studies. Assessment results are recorded in academic transcripts according to the national and international (ECTS) grading scales: A – Excellent (91–100 points), B – Good (83–90.9 points), C – Good (76–82.9 points), D – Satisfactory (68–75.9 points), E – Satisfactory (61–67.9 points), FX – Fail, with the possibility of retaking (20–60.9 points), F – Fail, requiring mandatory repetition of the course (0–19.9 points). **Types of assessment:** ongoing, mid-term, final, and self-assessment. **Forms of assessment:** written and oral tests, exams, reports, and public defences of individual and group projects, oral presentations. **Final assessment:** exams, tests, and internship defences. **Final academic assessment:** defence of the qualification thesis/project.
6 – Programme Competencies	
Integral competence	The ability to solve complex, specialised, and practical problems in the field of computer science or in the process of learning that involves the application of theories and methods of information technology, and is characterised by the complexity and uncertainty of the conditions.
General Competencies (GC):	GC1. Ability for abstract thinking, analysis, and synthesis. GC2. Ability to apply knowledge in practical situations. GC3. Knowledge and understanding of the subject area, along with awareness of professional practices. GC4. Ability to communicate fluently 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 in a team. GC10. Ability to be critical and self-critical. GC11. Ability to make well-founded decisions. GC12. Ability to evaluate and ensure the quality of work performed. GC13. Ability to act based on ethical reasoning. GC14. Ability to exercise one's rights and responsibilities as a member of society, to recognise the values of a civil (free and democratic) society and the necessity of its sustainable development, as well as the rule of law and human and citizen rights and freedoms in Ukraine. GC15. Ability to preserve and enhance the moral, cultural, and scientific values and achievements of society based on an understanding of the history and patterns of development of the subject area, its place within the overall system of knowledge about nature and society, and its role in the development of society, technology, and engineering; ability to utilise various types and forms of physical activity for active recreation and maintaining a healthy lifestyle. GC16. Ability to make decisions and act in accordance with the principle of zero tolerance for corruption and any other forms of dishonesty.
Special (professional, subject-specific) competencies (SC)	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, and analyse and interpret results. SC2. Ability to identify statistical patterns in indeterminate phenomena, apply computational intelligence methods—including statistical, neural network, and fuzzy data processing techniques, as well as machine learning and genetic programming methods, among others. SC3. Ability for logical thinking, drawing logical conclusions, using formal languages and models of algorithmic computations, designing, developing, and analysing algorithms, evaluating their efficiency and complexity, as well as the solvability and insolvability of algorithmic problems, for adequate modelling of subject areas and creation of software and information systems. SC4. Ability to apply modern methods of mathematical modelling of objects, processes, and phenomena; develop models and algorithms for the numerical solution of mathematical modelling problems; and account for errors arising from approximate numerical solutions of professional tasks. SC5. Ability to perform a formalised description of operations research problems in organisational, technical, and socio-economic systems of various purposes; determine their optimal solutions; develop models of optimal management considering changes in the economic situation; and optimise management processes in systems of different purposes and hierarchical levels. SC6. Ability for systemic thinking, applying the methodology of systems analysis to investigate complex problems of various nature, and using methods for formalisation and solving systems problems that involve conflicting objectives, uncertainty, and risks. SC7. Ability to implement the theoretical and practical foundations of modelling methodology and technology to study the characteristics and

	behaviour of complex objects and systems, and to conduct computational experiments with processing and analysis of results. SC8. Ability to design and develop software using various programming paradigms—imperative, object-oriented, functional, and logic programming—with corresponding models, methods and algorithms of computation, data structures, and control mechanisms. SC9. Ability to implement a multi-tier computational model based on client-server architecture, including databases, knowledge bases, and data warehouses; perform distributed processing of large datasets on clusters of standard servers to meet users' computational needs, including using cloud services. SC10. Ability to implement methodologies, technologies, and tools for managing the lifecycle processes of information and software systems, products, and IT services in accordance with customer requirements. SC11. Ability to perform intelligent data analysis using computational intelligence methods, including large and unstructured datasets, carry out real-time data processing, and visualise analysis results in the course of solving applied problems. SC12. Ability to organise computational processes in information systems of various purposes, taking into account architecture, configuration, performance indicators of operating systems, and system software. SC13. Ability to develop network software operating on various structured cabling system topologies, utilising computer systems and data transmission networks, and analysing the performance of computer networks. SC14. Ability to implement methods and tools for information security, and to develop and operate specialised software for protecting the information resources of critical information infrastructure objects. SC15. Ability to analyse and functionally model business processes, develop and practically apply functional models of organisational-economic and production-technical systems, and use methods for assessing the risks of their design. SC16. Ability to implement high-performance computing using cloud services and technologies, as well as parallel and distributed computing, in the development and operation of distributed information processing systems. SC17. Ability to apply ESP32/Arduino microcontroller families for controlling robotic systems. SC18. Ability to configure the interaction between the hardware and software of robotic systems. SC19. Ability to design, model, and analyse robotic systems.
7 - Programme Learning Outcomes	
	PLO1. To apply the knowledge of primary forms and norms of abstract-logical thinking, the framework methodology of scientific cognition, and the forms and methods of extraction, analysis, processing, and synthesis of information in the topic field. PLO2. To utilise modern mathematical tools, including continuous and discrete analysis, linear algebra, and analytical geometry, in professional activities focused on solving theoretical and applied problems in the design and implementation of information technology facilities. PLO3 To use knowledge of random phenomena laws, their properties and operations with them, models of random processes and modern software environments to solve statistical data processing problems and build predictive models.

	PLO4. To utilise methods of computational intelligence, including machine learning, neural networks, fuzzy data processing, and genetic and evolutionary programming, to solve problems such as recognition, prediction, classification, and identification of control objects. PLO5. To design, develop, and analyse algorithms for solving computational and logical problems, and evaluate the efficiency and complexity of these algorithms based on formal models of algorithms and computational functions. PLO6. To use methods of numerical differentiation and integration of functions, solution of ordinary differential and integral equations, features of numerical methods and the possibility of their adaptation to engineering problems, to have skills in software implementation for numerical methods. PLO7. To understand the principles of modelling organisational and technical systems and operations, using operations research methods, and solving single- and multicriteria optimisation problems of linear, integer, nonlinear, and stochastic programming. PLO8. To apply the systems analysis methodology of objects, processes and systems for analysing, forecasting, managing and projecting dynamic processes in economic, technical, technological and financial entities. PLO9. To develop software models of subject environments, select a programming paradigm based on convenience and application quality to implement methods and algorithms for solving problems in computer science. PLO10. To use tools for developing client-server applications, designing conceptual, logical and physical models of databases, developing and optimising queries, creating distributed databases, repositories and storefronts of data knowledge bases, including cloud services, using web programming languages. PLO11. To possess skills in managing the life cycle of software, products, and services of information technology, following the requirements and restrictions of the customer, as well as to develop project documentation (feasibility study, terms of reference, business plan, agreement, contract). PLO12. To apply methods and algorithms of computational intelligence and data mining in the problems of classification, forecasting, cluster analysis, and search for associative rules using software tools to support multidimensional data analysis based on DataMining, TextMining, and WebMining technologies. PLO13. To know the languages of system programming and software development methods that interact with the components of computer systems, to understand network technologies and architectures, and to have practical skills in computer network administration technology and the relevant software. PLO14. To apply knowledge of methodology and CASE tools for designing complex systems, methods of structural analysis of systems, and object-oriented design methodology in developing and studying functional models of organisational-economic and production-technical systems. PLO15. To understand the concept of information security, the principles of safe software design, and ensure the security of computer networks in conditions of incomplete and uncertain source data. PLO16. To perform parallel and distributed calculations, apply numerical methods and algorithms for similar structures, and use parallel programming languages to develop and operate parallel and distributed software. PLO17. To use modern ESP32/Arduino microcontroller families.

	PLO18. To acquire skills in working with the Robot Operating System (ROS). PLO19. To use elements of digital electronics for designing robotic systems. PLO20. To implement computer modelling for the analysis and improvement of robotic systems. PLO21. To implement acquired knowledge to prevent corruption and any forms of dishonesty in the field of computer science.
8 – Resources for the Programme Implementation	
Human Resources	The department responsible for training within the Educational and Professional Programme "Robotic Systems Programming" is the Information Technology and Data Analytics Department. The qualifications of the academic and teaching staff fully comply with the licensing requirements for educational activities, as approved by Resolution No. 1187 of the Cabinet of Ministers of Ukraine dated December 30, 2015. The organisation of the educational process involves the engagement of professional practitioners. Special attention is given to the continuous professional development and internship training of the academic staff responsible for ensuring the educational process.
Material and Technical Support	The educational process is conducted in the institution's own teaching facilities, which have a total area of 9,170.7 m², including lecture and classroom facilities (8,324.4 m²) and computer laboratories (846.3 m²). All lecture halls are equipped with Acer P1525 multimedia projectors and Elite Screens Electric100V projection screens; three halls are equipped with Edifier X3 acoustic systems. Students have free access to the global Internet. Computer laboratories are equipped with operating systems, including application software packages and software development environments such as Visual Studio Community Edition, JetBrains Rider, MS SQL Server, SQL Server Management Studio, Visual Studio Code, Git, GitHub Desktop, PyCharm, and MySQL. C++, Arduino IDE, flux.ai, circuitmaker, ROS framework. Additionally, a laboratory is equipped with modern robotic arms, a 3D printer for robotics and prototyping projects, as well as measurement and research instruments, including multimeters, oscilloscopes, and laboratory power supplies, enabling comprehensive experiments and testing in various fields of electronics. The university's social infrastructure includes nine student dormitories (9,218.9 m²), four sports halls (503.8 m²), a stadium, sports grounds, and tennis courts with a total area of 9,430 m². The material and technical support for organising the educational process of the educational-professional programme complies with the Licensing Conditions for Educational Activities, approved by the Resolution of the Cabinet of Ministers of Ukraine No. 1187 dated December 30, 2015, and with the State Building Codes of Ukraine for "Buildings and Structures. Educational institutions. State Building Code of Ukraine DBN V.2.2-3:2018".
Information and Methodological Support	To train highly qualified specialists, the National University of Ostroh Academy has a computerised scientific library that is equipped with modern hardware and software, as well as a collection of textbooks, monographs, and journals. The library has an automated library system

	(ILS) Koha (https://koha.oa.edu.ua/), which contains resources of various types, purposes, and access levels. Full access to the digital resources of the Scientific Library is available to users with an account in the oa.edu.ua domain. The components of the electronic library are as follows: 1) The LitPro information system, which contains a complete list of recommended literature for all disciplines (http://litpro.oa.edu.ua/) (in-house development); 2) Digital archive/repository of the NaUOA (http://eprints.oa.edu.ua/, public access); 3) Electronic archive of theses and qualification works of the NaUOA (theses.oa.edu.ua/, combined access); 4) Electronic collections of classical music (http://lib.oa.edu.ua/funds/music/, combined access); 5) Electronic index of scientific works by the academic staff of the NaUOA, public access); 6) Other resources (CD/DVD collections, event management systems, combined access). The methodological support of the educational process is provided through educational and methodological complexes for each discipline, including methodological guidelines for completing coursework, qualifying (diploma) papers, and internships. Distance learning is facilitated through the Moodle information system (https://moodle.oa.edu.ua/). The information and methodological support for organising the educational process of the educational-professional programme complies with the Licensing Conditions for Educational Activities, approved by the Resolution of the Cabinet of Ministers of Ukraine No. 1187 dated December 30, 2015.
9 – Academic Mobility	
National Credit Mobility	Students have the opportunity to participate in national credit mobility based on agreements concluded by the National University of Ostroh Academy with other higher education institutions. Among the partner institutions are Vasyl' Stus Donetsk National University, West Ukrainian National University, and Zaporizhzhia National University.
International Credit Mobility	Students have the opportunity to participate in international academic mobility programmes based on cooperation agreements concluded by the NaUOA with over 90 universities worldwide, as well as within the Erasmus+ programme. Partner institutions include the University of St. Andrews (Scotland), Klaipedos valstybine kolegija / Higher Education Institution (Lithuania), the University of Beira Interior (Portugal), and Uniwersytet Pomorski w Słupsku (Poland).
Organisation of Education for International Students	Education of foreign citizens under accredited educational programmes at the National University of Ostroh Academy is carried out in accordance with the Regulations on the Education of Foreigners and Stateless Persons at the National University of Ostroh Academy and the Admission Rules of the National University of Ostroh Academy for the current year.

2. The components of the educational-professional programme 'Robotic Systems Programming'

in the 'F3 Computer Science' Speciality

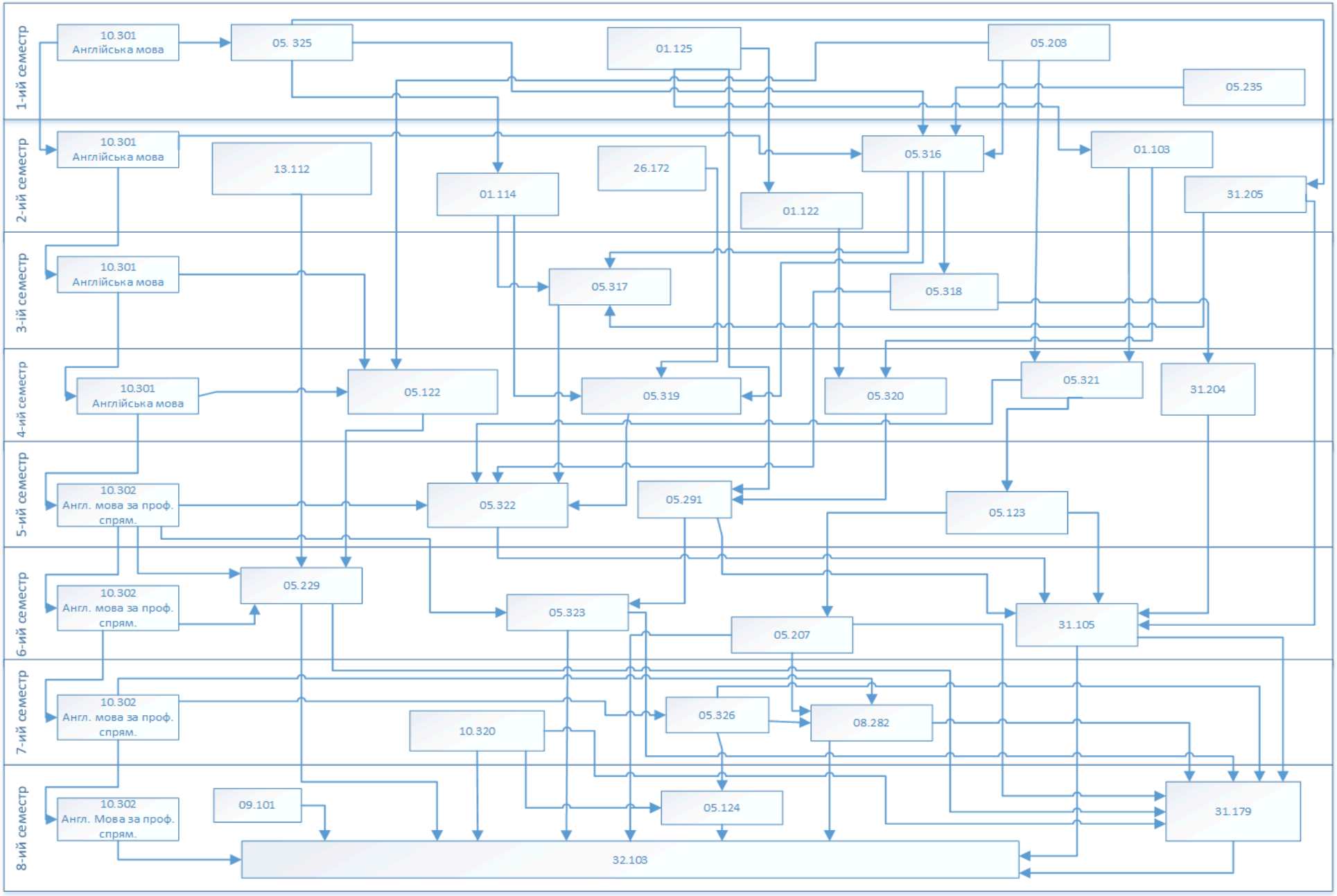
2.1. The components of the educational-professional programme

Component Code	Components of the educational-professional programme (academic disciplines, coursework/projects, internships, qualifying paper/project)	Number of credits	Form of final assessment
I. Compulsory components of the EPP			
1.1. General training cycle			
10.301	English Language	14	Exam
09.101	Philosophy	3	Exam
10.320	Ukrainian language (for professional purposes)	3	Exam
13.112	Fundamentals of Pedagogy and Psychology	3	Pass/Fail
26.172	History of Culture and of Ostroh Academy	3	Pass/Fail
	Total	26	
1.2. Professional Training Cycle			
10.302	English Language (in the professional sphere)	12	Exam
05.325	Fundamentals of Electronics	7	Exam
05.316	Fundamentals of Robotics and Modern Electronics	8	Exam
01.125	Fundamentals of Mathematics for Machine Learning	7	Exam
01.122	Theory of Probabilities and Mathematical Statistics	4	Exam
05.122	Python Web Development	4	Pass/Fail
05.203	Programming Basics	6	Exam
05.317	Digital Electronics and Robotics	7	Exam
05.318	Robotics Based on ESP32/Arduino	7	Exam
05.319	Modern Electronic Circuit Design and Development	3	Pass/Fail
05.235	Computer-Aided Circuit Engineering and Computer Architecture	4	Pass/Fail
01.103	Discrete Mathematics	4	Pass/Fail
01.114	Physics	3	Pass/Fail
05.320	Fundamentals of Algorithmisation	3	Exam
05.229	Front-End Web Development	3	Pass/Fail
05.321	Relational and Non-Relational Databases	4	Pass/Fail
05.322	Robot Operating System (ROS)	6	Exam
05.323	Machine Learning in Robotics	9	Exam
05.291	Fundamentals of Machine Learning	7	Exam
05.123	Developing Web Applications with REACT	3	Pass/Fail
05.326	Data Transmission Protocols	4	Exam
05.207	Object-Oriented Programming	5	Exam
08.282	IT Project Management	3	Exam
05.124	Developing and Publishing Web-Services and Web-Applications	4	Pass/Fail
	Total	127	
1.3. Practical training			
31.205	Educational internship in 'Fundamentals of Electronics'	3	Pass/Fail
31.204	Educational internship in 'Fundamentals of Robotics'	3	Pass/Fail
31.105	Work experience internship	6	Pass/Fail
31.179	Profession-Oriented Work Experience Practice	6	Pass/Fail
32.103	Qualifying paper/project	6	Thesis/Project defence
	Total	**24**	
The total amount of compulsory components 177			
II. Elective Components of the EPP			
2.1. General training cycle			
20.118	Basic Military Preparation (Theory)* / Academic Discipline 1	3	Pass/Fail
	Academic discipline 2	5	Pass/Fail
	Academic discipline 3	5	Pass/Fail
	Academic discipline 4	5	Pass/Fail
	Academic discipline 5	5	Pass/Fail
	Total	**23**	

2.2. Professional Training Cycle			
	Academic discipline 1	5	Pass/Fail
	Academic discipline 2	5	Pass/Fail
	Academic discipline 3	5	Pass/Fail
	Academic discipline 4	5	Pass/Fail
	Academic discipline 5	5	Pass/Fail
	Academic discipline 6	5	Pass/Fail
	Academic discipline 7	5	Pass/Fail
	Academic discipline 8	5	Pass/Fail
	Total	40	
The total amount of elective components:		63	
The total amount of EPP hours:		**240**	

* This academic discipline is mandatory for inclusion in the individual study plans of higher education students in accordance with Part Four of Article 10 of the Law of Ukraine 'On Military Duty and Military Service' and is elective for other students.

2.2. Programme Structure and Logic



3. Forms of Assessment of Higher Education Students

The qualifying assessment for the educational-professional programme 'Robotic Systems Programming' in the speciality of 'F3 Computer Science' is conducted by an examination committee. This assessment takes the form of a defence of a qualifying paper or project. Upon successful completion, graduates receive a state-recognised document awarding them a Bachelor's degree with the qualification of 'Bachelor of Computer Science.'

The qualifying paper/project should involve theoretical, systems-engineering, or experimental research on a complex, specialised task or practical problem in the field of computer science, characterised by the complexity and uncertainty of conditions, and requiring the application of information technology theories and methods. The qualifying work/project must not contain academic plagiarism, falsification, or fabrication. The qualifying paper/project must be published in the repository of the higher education institution in which it was submitted.

Qualifying assessment is conducted openly and publicly.

4. Matrix of Correspondence between Programme Competencies (General – GC, Special – SC) and the Educational Programme Components																																					
educational components	GC1	GC2	GC3	GC4	GC5	GC6	GC7	GC8	GC9	GC10	GC11	GC12	GC13	GC14	GC15	GC16	SC1	SC2	SC3	SC4	SC5	SC6	SC7	SC8	SC9	SC10	SC11	SC12	SC13	SC14	SC15	SC16	SC17	SC18	SC19
10.301		+			+	+	+		+				+		+																				
09.101	+	+				+		+			+		+	+	+	+																			
10.320	+			+		+	+							+	+																				
13.112	+	+				+								+	+																				
26.172	+												+	+	+																				
10.302		+	+		+	+	+																												
05.325			+			+	+					+			+			+	+		+	+						+						+	
05.316			+			+									+		+		+				+		+	+							+	+	
01.125	+	+															+	+	+	+															
01.122	+																+	+																	
05.122		+															+				+														
05.203		+				+													+		+														
05.317		+	+				+												+	+			+											+	
05.318		+	+				+			+												+				+							+		
05.319	+	+	+					+		+	+						+				+	+			+			+						+
05.235		+																	+									+							
01.103	+	+															+		+	+			+												
01.114			+																		+														
05.320	+	+															+				+							+							
05.229		+	+			+		+										+	+					+		+			+				+		
05.321		+	+														+										+								
05.322			+																+			+	+				+			+				+	

Table 4 (continued)

educational components	GC1	GC2	GC3	GC4	GC5	GC6	GC7	GC8	GC9	GC10	GC11	GC12	GC13	GC14	GC15	GC16	SC1	SC2	SC3	SC4	SC5	SC6	SC7	SC8	SC9	SC10	SC11	SC12	SC13	SC14	SC15	SC16	SC17	SC18	SC19
05.323		+	+			+		+				+					+	+	+	+													+	+
05.291	+	+																+									+						+	+	+
05.123		+																	+					+										+	
05.326		+	+				+											+	+			+			+		+			+			+		
05.207	+	+	+															+	+			+		+	+			+							
08.282		+		+				+		+	+	+														+					+		+		
05.124	+																								+				+			+			
31.205	+	+	+			+														+	+	+	+			+									
31.204	+	+	+			+	+													+	+	+	+			+		+	+				+	+	
31.105	+	+							+	+		+				+			+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+
31.179	+	+					+	+		+		+				+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
32.103	+	+	+	+		+	+	+	+	+		+				+			+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+

5. Matrix of Correspondence between Programme Learning Outcomes (PLOs) and the Educational Programme Components																					
EC	PLO 1	PLO 2	PLO 3	PLO 4	PL O5	PL O6	PLO 7	PLO 8	PL O9	PLO1 0	PLO 11	PLO1 2	PLO1 3	PLO1 4	PLO1 5	PLO1 6	PLO1 7	PLO 18	PLO1 9	PLO2 0	PLO2 1
10.301	+																				
09.101	+		+																		+
10.320	+																				
13.112	+																				
26.172	+																				
10.302		+		+					+		+								+	+	
05.325			+																+		
05.316	+							+											+		
01.125	+	+	+			+	+									+					
01.122		+	+				+									+					
05.122										+	+		+	+							
05.203	+									+			+								
05.317					+			+											+		
05.318					+			+	+	+			+				+				
05.319		+					+		+											+	
05.235							+						+								
01.103		+	+			+	+	+			+					+					
01.114	+						+														
05.320					+								+								
05.229									+	+	+		+								
05.321			+							+											
05.322				+					+	+					+			+			
05.323	+			+	+			+				+		+						+	
05.291	+		+	+								+		+							
05.123									+	+	+		+								

05.326					+		+		+				+		+					

Table 5 (continued)

EC	PLO 1	PLO 2	PLO 3	PLO 4	PL O5	PL O6	PLO 7	PLO 8	PL O9	PLO1 0	PLO 11	PLO1 2	PLO1 3	PLO1 4	PLO1 5	PLO1 6	PLO1 7	PLO 18	PLO1 9	PLO2 0	PLO2 1
05.207													+			+					
08.282											+			+							
05.124									+		+		+								
31.205	+																				
31.204			+																		
31.105				+		+	+		+	+	+						+				+
31.179				+	+	+	+	+	+	+	+	+	+				+	+	+	+	+
32.103					+				+		+	+	+		+		+	+	+	+	+