Approved by the decision of Academic Council
Minutes No. ____ of ____._____._____
Council Head _____A.V. Vasylyev
(signature)

EDUCATIONAL PROGRAM
SPECIALTY
122 "Computer Sciences and Information Technologies"
(name of educational program)

Degree	Bachelor
Branch of knowledge	12 "Information Technologies"
Specialty	122 "Computer Sciences and Information Technologies"
Specialization	122.1 "Information Technologies of Design" 122.2 "Information Sciences"
Qualification	Bachelor of Computer Sciences and Information Technologies
Diploma type	single
Program volume	240 ECTS credits / 4 years
Higher educational institution	Sumy State University
Accrediting organization	Ministry of Education and Science of Ukraine
Accreditation period	Certificate of Ministry of Education and Science of Ukraine НД-ІІ №1972144. Valid up to 01.07.2019 Certificate of Ministry of Education and Science of Ukraine НД-ІІ №1972139. Valid up to 01.07.2019
Program level	The first level of higher education (Law of Ukraine on Higher Education), National Qualifications Framework – the 6th level, QF-LLL – the 6th level, FQ-EHEA – the first cycle

1. PROGRAM PURPOSE

Purpose of Educational Program	The program is developed according to the university mission; it is aimed at formation of a professional's personality, able to apply mathematics basics, algorithm principles in modeling, designing, developing and supporting of information systems and technologies; to develop, implement and support intellectual analysis systems and data processing in organizational, technical, environmental, economic and social systems; to form the ability for further education and critical thinking.

2. PROGRAM DESCRIPTION

Subject Area	*Study and/or Activity Objects:* − mathematical, information and simulation models of real phenomena, objects, systems and processes; − presentation models of data and knowledge; − models, methods and technologies of obtaining, storing, processing, transferring and using of information; − theory, analysis, development, effectiveness evaluation and realization of algorithms; − methods and algorithms of operative ,multidimensional and intellectual analysis of data and decision making; − system analysis of objects and computerization processes; − models of subject areas and methods of intellectual system design based on the knowledge and technologies of decision making; − methods and algorithms of identification of sensor signals, sounds and images; − mathematical support of automated systems of information processing and control; information support of life cycle of industrial products, software systems and bundled software, decision making support system; − mathematical and software support of design automation, data visualization technologies. *Study aims:* training of professionals able to apply mathematics basics and algorithm principles in modeling, design, development and support of information systems and technologies; to develop, implement and support intellectual systems of analysis and data processing in organization, technic, environmental, economic and social systems.

	Theoretical content of subject area: advanced models, methods, algorithms, technologies, processes and means of obtaining, presentation, processing, analysis, transferring, data storing in information systems. *Methods, methodology and technologies:* mathematical models, methods and algorithms for solving theoretical and applied problems, which appear while developing IT and IS; modern design technologies and platforms; methods of gathering, analysis and consolidation of distributed information; design technologies and methods, development and quality support of IT and IS components; computer graphic methods and data visualization technologies. *Tools and equipment:* CASE-technologies of modeling and design of IT and IS; distributed computing systems; computer networks; cloud technologies, control systems of data bases, operating systems.
Main Focus of Program and Specialization	Computer sciences and information technologies, information systems design, software development, foreign language
Program Orientation	Educational and professional program
Peculiarities and Distinctions	The program is formed as an optimal combination of academic and professional requirements. It is aimed at forming student's competencies as to development, implementation and application of information processing systems using algorithmic methods with the help of computer equipment, mathematical methods and algorithms. Such software is widely used by leading enterprises, IT-companies, state establishments and organizations.

3. JOB PLACEMENT AND EDUCATION CONTINUATION

Professional Rights	Data base administrator, system administrator, software engineer, programming engineer, programmer (data base), application programmer, computer application engineer, information technologies specialist, software developing and testing engineer, computer programs development specialist.
Education Continuation (academic rights)	Opportunity to study according to the program of the second cycle FQ-EHEA, 7 level EQF-LLL and 7 level of NQF

4. TEACHING AND ASSESSMENT

Approaches to Teaching and Studying	The studying model supposes an active role of students in studying using computer and telecommunication means, which provide interaction between lecturers and students. Lectures, practical classes, project work in groups, individual work with the possibility of consulting with a lecturer using online education system, e-learning (for some educational components), qualifying paper (bachelor thesis).
Assessment Forms	Formative assessment – written comments and instructions of lecturers during studying, self-assessment skills forming and students' involvement in discussion, which provide joint (student and lecturer) solving of problematic situations and assignments for joint student's work. Summative assessment – current and term assessment (testing), assessment of current work during studying of separate educational components (checking of on-line assignments sent to a lecturer by e-mail, analysis of student's experiments and research using simulation programs (emulators) and virtual laboratories, individual computational-analytical tasks), public defense of qualifying paper (bachelor thesis).

5. EXPECTED PROGRAM COMPETENCIES

Integral Competency	Ability to solve complicated specialized tasks and practical problems in the sphere of computer sciences, during professional activity or studying, which are characterized by complexity and uncertain terms, with the help of theories and methods of information technologies.
General Competencies	– Ability to speak foreign languages. – Ability to act on the basis of ethical principles (motives).

	– Solving of social-economic and law problems taking into consideration universal values, behavior and moral norms in state, international, work, interpersonal and social relations
Professional Competencies	*122 "Computer Sciences and Information Technologies"*
	– Ability for abstract thinking and synthesis. – Ability to use languages while designing and programming of description languages of information resources, tools for design and creation of information systems, products and services of information technologies. – Ability to develop and administer relational and document data and knowledge bases; to apply technologies of data storage for providing safe operation of information systems. – Ability to create and research mathematical and software models of computation and information processes. – Ability to choose and apply the main methods and approaches to organization, planning, administration and control of design, development, support and operation of information systems, products, and services of information technologies. – Ability to use organizational, technical, algorithmic and other methods and means of computer information protection in professional activity.
	122.1 "Information Technologies of Design"
	– Ability to use methods of analysis, modeling, engineering and reengineering of business processes of information systems. – Ability to apply principles, methods and algorithms of computer graphics while developing graphic interfaces of human- computer interaction. – Ability to design and develop Web-applications and mobile applications. – Basic knowledge of distributed systems technology and parallel computing and ability to apply them.
	122.2 "Information Sciences"
	– Ability to use main approaches, methods, and technologies of intellectual analysis, to develop and apply knowledge representation models, inference method, technologies of knowledge engineering, tools of intellectual systems support. – Ability to organize computer networks in different subject areas and provide their effective functioning.

	– Ability to apply methods and means of intellectual information processing, computational intelligence, multiagent systems while software developing. – Ability for team work; basic knowledge of methods and means of team work support; planning and support of effective organization process of software development; control and testing methods of correct functioning of software.

6. PROGRAM RESULTS OF STUDYING

Program Results of Studying	*General:*
	• Ability to speak a foreign language, elaborate documents for systems, products and information technologies services; to read, understand and use technical documentation in a foreign language in professional activity: • Knowledge of the universal values system of behavior of a person and a group of people, ethical principles, understanding of professional moral code; • Act responsibly and have civic stand; evaluate and forecast legal, economic, social situations and phenomena; • Follow the basic principles of intellectual property, legal protection of objects in Ukraine and the world; • Ability to communicate with specialists and non-specialists of the branch and work in the international context.
	Professional:
	122 "Computer Sciences and Information Technologies"
	• Knowledge and understanding of mathematics and other fundamental sciences on the level necessary for obtaining of other results of the educational program; • Knowledge of data structures and fundamental algorithms, methodology and tools of object oriented analysis and design, peculiarities of different programming paradigms,principles, models, methods and design technologies and different software development; • Knowledge of principles, tools, programming languages, technologies of data bases, data storage, data marts and knowledge base of distributed application with integration of bases and storage data into client-server; • Skills to use modern mathematical apparatus for solving theoretical and practical tasks during analysis, synthesis and design of information systems according to branches; • Knowledge of standards, methods, technologies and means of life cycle control of information and software systems, products and services of information technologies; • Ability to preserve confidentiality, integrity and availability of information, to provide authenticity, to keep track of information, its reliability under conditions of incompleteness, ambiguity of initial data, multicriteriality of professional.

	122.1 "Information Technologies of Design"
	• Knowledge of methodology and technology of complex systems design, CASE-tools of systems design, methods of structural analysis of systems, object oriented design methodology,project documentation, evaluation methodology of labour input of complex systems; • Skills to apply methods, algorithms and computer graphic means while developing graphic applications; • Skills to design and apply systems of multimedia and graphic modeling; • Knowledge of organization and functioning principles of mobile operating systems; • Skills to apply methods and tools for design and development of Web-applications and mobile applications; • Skills to do parallel and distributed computations, apply numeric methods and algorithms for parallel structures while developing and operating of parallel and distributed software.
	122.2 "Information Sciences"
	• Knowledge of network technologies and their software for distributed computations; • Knowledge of methods and algorithms of operating analytical processing and intellectual analysis of data for classification, forecasting, cluster analysis, search of association rules using support software tools of multidimensional data analysis; • Knowledge of operating systems, system software, widespread application software packages, Internet information portals; • Skills to use OLAP, DataMining, TextMining, WebMining technologies for intellectual multidimensional data analysis: to solve professional tasks using methods of classification, forecasting, cluster analysis, search of association rules; • Ability to use modern organization strategies and technologies of collective software development including version control, processes of continuous integration, code standards and methods of code inspection.

7. PROGRAM ACCORDING TO TRAINING TYPES

No.	Type of Training	ECTS Credits	Hours
1	2	6	7
1. DISCIPLINES OF GENERAL TRANING			
1.1 Compulsory disciplines			
1.1.1	Ukrainian	25	750
1.1.2	Philosophy	5	150
	Total	**30**	**900**
1.2 Elective disciplines[9]			
1.2.1	Psychology	5	150
1.2.2	Political Science	5*	150*
1.2.3	Sociology	5*	150*
1.2.4	Management	5*	150*
1.2.5	Psychology of Management	5*	150*
1.2.6	Legal Regulation of International Economic Activity	5	150
	Total	10	300
	Total amount of general training disciplines	**40**	**1200**
2. DISCIPLINES OF PROFESSINAL TRANING			
2.1 Compulsory disciplines			
2.1.1 Speciality compulsory disciplines			
2.1.1.1	Higher mathematics	15	450
2.1.1.2	Discrete Mathematics	5	150
2.1.1.3	Introduction to Computers. Hardware and Software	5	150
2.1.1.4	Programming	10	300
2.1.1.5	Software Engineering Practices	5	150
2.1.1.6	Data Structure and Algorithms	5	150
2.1.1.7	IT Business Organization	5	150
2.1.1.8	Object Oriented Programming	5	150
2.1.1.9	Mathematical Methods of Operations Research and Numerical Optimization Methods	10	300
2.1.1.10	Data Bases Systems	5	150
2.1.1.11	Web-Technologies and Web-Design	5	150
2.1.1.12	Computer Graphics	5	150
2.1.1.13	Information Security Technologies	5	150
2.1.1.14	Artificial Intelligence	5	150
	Total	**90**	**2700**

2.1.2. Specialization (educational program) compulsory disciplines 122.1 "Information Technologies of Design"			
2.1.2.1	System Analysis, Design and Modelling of Information Systems	10	300
2.1.2.2	Computer Technologies of Design	10	300
2.1.2.3	Modern Technologies of Visualization	5	150
2.1.2.4	Interactive Multimedia Systems and Applications	5	150
	Total	**30**	**900**
2.1.3. Specialization (educational program) compulsory disciplines 122.2 "Information Science"			
2.1.3.1	Operating Systems	10	300
2.1.3.2	Front-end and Back-end Programming of Web Application	10	300
2.1.3.3	Design Patterns in Java	5	150
2.1.3.4	Technical Solution Support	5	150
	Total	**30**	**900**
2.2. Elective disciplines			
Elective unit No. 1. 122.1"Information Technologies of Design"			
2.2.1	Competition and Antitrust Law	5	150
2.2.2	Apostille and Legalization	5*	150*
2.2.3	Self-Management	5	150
2.2.4	Basics of International Economics and International Economic Relations	5*	150*
2.2.5	IT- Projects Management	10	300
2.2.6	Operating Systems	10*	300*
2.2.7	Human Resources Management	5	150
2.2.8	Intellectual Property Law	5*	150*
2.2.9	Design Patterns in Java	5	150
2.2.10	Contract Law	5*	150*
2.2.11	Investment Management	5	150
2.2.12	Mobile Application Development	10	300
2.2.13	Cloud Technologies	5*	150*
2.2.14	Business Security	5	150
2.2.15	Basics of Project-Oriented Organizations Management	5*	150*
	Total	**50**	**1500**
Elective unit No. 2. 122.2 "Information Science"			
2.2.1	Competition and Antitrust Law	5	150
2.2.2	Apostille and Legalization	5*	150*
2.2.3	Self-Management	5	150
2.2.4	Basics of International Economics and International Economic Relations	5*	150*
2.2.5	Data Analysis	10	300
2.2.6	IT- Projects Management	10*	300*
2.2.7	Human Resources Management	5	150

2.2.8	Intellectual Property Law	5*	150*
2.2.9	International Economic Law	5	150
2.2.10	Contract Law	5*	150*
2.2.11	Investment Management	5	150
2.2.12	Information and Telecommunication Technologies	10	300
2.2.13	Intellectual Information Systems	10*	300*
2.2.14	Business Security	5	150
2.2.15	Basics of Project-Oriented Organizations Management	5*	150*
	Total	**50**	**1500**
	Total amount of professional training disciplines	**170**	**5100**
3. PRACTICAL TRAINING			
3.1	Work Placement	10	300
3.2	Pre-graduation Internship	5	150
	Total amount of practical training	**15**	**450**
4. ASSESSMENT			
4.1	Qualifying Paper (Bachelor Thesis)	15	450
	Overall quantity	**240**	**7200**

8. ASSESSMENT OF DEGREE-SEEKING STUDENT

Assessment forms of degree-seeking students	Final assessment includes defense of qualifying paper (bachelor thesis).
Qualifying paper requirements (if available)	The qualifying paper supposes theoretical, system and technical or experimental research of one of the current tasks of the specialty "122 Computer Sciences and Information Technologies". It has to demonstrate the author's skills to apply acquired competences and studying results, to present logically the point of view according to the research topic on the basis of modern scientific methods; to ground the conclusions and formulate specific proposals and recommendations as to the solved task and also to identify the author's inclinations for scientific or practical activity. The research objects may be different phenomena, technological processes, technologies, different activity within the framework of the formulated problem. The qualifying paper should be checked for plagiarism The requirements as to content, volume and structure of qualifying paper (bachelor thesis) paper are defined by the higher educational institution. The topics and abstracts of qualifying papers must be published on the official site of higher educational institution or its subdivision (faculty, institute, department).

Director of Institute / Dean of Faculty /

Head of Centre

_____ _____ _____

(name) (signature) (surname and initials)

Head of the Department of Special (Professional) Training

_____ _____ _____

(name) (signature) (surname and initials)

Head of Working and Project Group

_____ _____

(signature) (surname and initials)

APPROVED:

Head of Organization and Methodological Department

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(signature) (surname and initials)