MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

SUMY STATE UNIVERSITY

EDUCATIONAL PROGRAM

"Information Technologies of Designing"

Higher education level	The Second Level
Degree	Master
Specialty	122 "Computer Sciences"
Branch of knowledge	12 "Information Technologies"
Qualification	Master of Computer Sciences

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

Sumy, 2020

1. Profile of the study programme

1.1 General information	
Full official name of a higher education institution	Sumy State University
Full name of a structural unit	Faculty of Electronics and Information Technology, Computer Science Department
Higher education degree and title of qualification	Master of Computer Sciences
Official title of the study programme	Information Technologies of Designing
Type of degree award and credit value	Master's Diploma, single, 90 ECTS credits, study term - 1 year 4 months
Availability of programme accreditation	Certificate of Ministry of Education and Science of Ukraine УД №19006987. Valid up to 01.07.2024
Cycle/level of higher education	The second higher education level, National Qualifications Framework – the 7th level, QF-LLL – the 7th level, FQ-EHEA – the second cycle
Preconditions	Bachelor Degree
Language(s) of instruction	Ukrainian, English
Time frames of the study programme	To 31.12.2022
Internet address with the permanent location of the study programme description	https://itp.elit.sumdu.edu.ua/educational-disciplines
1.2 Aims of the study programme	
The program is designed in accordance with the mission of the university and is aimed at forming the personality of a specialist, who is able to apply mathematical foundations and algorithmic principles in modeling, design, development and supporting of information technologies for complex systems; to develop, implement and maintain information systems of data analysis and processing in organizational, technical, natural and socio-economic systems to form the ability for further education and critical thinking.	
1.3 Description of the study programme	
Subject area of the study programme	Technical Science: Computer Sciences, Information Technologies of Designing
Orientation of the study programme	The educational program focuses on an integrated blend of research in the modeling, design, development and computer systems and information technology supporting in various subject areas. The program is aimed at training qualified professionals, who are able to apply modern approaches, methods, standards and principles in the development and implementation of new information technologies or the support of existing ones.
The main focus of the study programme and its majors	The program provides to form students with competence in modeling and designing information technology, as well as the development and maintenance of relevant information systems in various fields of human activity.
Peculiarities of the study programme	The training of specialists within the educational program is carried out in two educational directions "Information Technology and Systems" and "Computer Design and

	Multimedia". The formation of appropriate competences is ensured through the elective disciplines of the curriculum. The third semester's disciplines are coordinated with the educational program "The international Master's program in Web Science" of the University of Koblenz-Landau (Germany) within the frame of the cooperation agreement.
1.4 Graduate ability for employment and further education	
Employ ability	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.
Further education	Opportunity to study according to the program of the third higher education level (FQ-EHEA – the third cycle).
1.5 Teaching, learning and assessment	
Teaching and learning	Student-centered learning. Teaching is conducted in the form of lectures, practical and laboratory classes, independent work with consultation with the teacher, e-learning using the appropriate resources of SSU (OCW, MIX), the execution of course projects, research works, preparation of master's thesis. The program provides problem-oriented learning, self-study, e-learning, project teamwork, training.
Assessment	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).
1.6 Programme competencies	
Integral competence	The ability to solve complex tasks and problems in the sphere of professional activity in the field of information technology or in the training process, which involves conducting research and / or innovations and is characterized by uncertainty of conditions and requirements.
General competencies (GC)	**GC 1.** Ability to read and write scientific and technical texts in a foreign language. **GC 2.** Ability to scientifically communicating with professionals from different industries and work in an international context. **GC 3.** Ability to abstract thinking, to be able to identify the scientific nature of problems in the information technology field, to analyze the situation and to synthesize appropriate solutions. **GC 4.** Ability to search, process and analyze information from various sources.

	GC 5. Ability to apply knowledge in practical situations. **GC 6.** Ability to innovate.
Subject specific competences (SSC)	**SSC 1.** Ability to use national and international legislative and regulatory frameworks, provisions for standardization, certification and licensing of software in professional activity. **SSC 2.** Ability to use established scientific concepts and modern principles of artificial intelligence technologies creation and application. **SSC 3.** Ability to apply the latest approaches and tools for creating and using information technology in various fields of human activity effectively. **SSC 4.** Ability for strategic program-oriented project management at various scales, engagement and communication with stakeholders and clients. **SSC 5.** Knowledge and understanding of the project work execution concept at all stages of information technology and systems design. **SSC 6.** Ability to develop and use integrated and enterprise information systems. **SSC 7.** Ability to develop, research and use mathematical methods and algorithms for data processing, analysis and visualization. **SSC 8.** Knowledge of basic principles of business analysis of business processes development and maintenance , collection and coordination of requirements for the software new functionalities development; to cooperate with the management technical team to solve project problems. **SSC 9.** Knowledge of the latest tools, mathematical methods and technologies of heterogeneous data analysis with aim to identify previously unknown knowledge necessary for decision making in various professional activity fields. **SSC 10.** Knowledge of modern technologies and software for information visualization and analysis; methods and tools for modern multimedia systems building; theoretical aspects of multimedia data presentation; algorithmic and mathematical foundations for building a realistic scene. **SSC 11.** Knowledge of theoretical aspects of vector and bitmap graphics, mathematical and algorithmic foundations of computer graphics methods. **SSC 12.** Knowledge of principles and tools for preparation and processing of scattered and disordered data. Ability to develop multidimensional data models, organization concepts and techniques for data warehouses building.
1.7 Programme learning outcomes (LO)	
LO 1. To be able to communicate (oral and in writing) in Ukrainian and foreign languages on professional topics in a professional and non-professional environment. **LO 2.** To present the concept and results of the study in the form of a technical report and or oral presentation. **LO 3.** To organize and carry out practical activities according to the legal framework; to apply the knowledge of software standardization, certification and licensing according to national and international standards and practices. **LO 4.** To adhere to ethical principles and norms of academic integrity in teaching and	

conducting scientific and professional activities.
LO 5. To demonstrate and use knowledge of modern mathematical methods, data processing algorithms, optimization methods based on artificial intelligence technology.
LO 6. To formulate and solve a research problem, to collect, process and organize information and formulate conclusions in order to decide a research problem.
LO 7. To demonstrate decision-making skills, leadership skills and teamwork skills.
LO 8. To apply modern information technologies to solve professional tasks in the IT industry and the ability to make their reasonable choice, configuration and further operation.
LO 9. To research, generate new ideas, innovate.
LO 10. To demonstrate and use knowledge of designing integrated and corporate information systems in solving practical problems.
LO 11. To be able to use the basic principles of the software system architecture building, design templates, software interfaces, software design methods.
LO 12. To have skills to work with advanced tools to support IT products and solutions, organize communication to identify, analyze and solve problems in their development and operation throughout their lifecycle.
LO 13. To be able to implement algorithms for audio, video and hypertext information and animation processing programmatically; to carry out compositional analysis of complex graphic images and technical models; to select and to use appropriate technologies and software to create and edit hypertext, audio, video, and animation.
LO 14. To be able to select, apply and programmatically implement basic algorithms for raster and graphic images building and processing.
LO 15. To know and use the basic methods and tools of modern visual information analysis systems. To be able to realize spectral analysis, apply and adjust digital signal processing filters.
LO 16. To know the principles of creating and developing add-ons for solid-state modeling packages using the appropriate API interface. To be able to integrate your own solutions into existing solid state modeling packages as add-ons.
LO 17. To know the types of data, methods for collecting, cleaning, integrating and converting them. Be able to select algorithms, structures and data models, tools for their using and processing in order to search automation for regularities in a data group.
LO 18. To build multidimensional models of specific subject areas for business needs and organize data warehouses in accordance with generally accepted concepts considering the features of data warehouse architectures.

1.8 Resources available for the study programme implementation

Human resources	The main staff of the educational program consists of the teaching staff of the Computer Science Department , Faculty of Electronics and Information Technology. Also, the lecturers of other departments, including the Department of Foreign Languages of the Faculty of Foreign Philology and Social Communication, is involved in teaching some courses according to their competence and experience. Lecturers who teach within the program are active and recognized scientists. They publish works in national and foreign scientific publications, have relevant professional competence and experience in teaching, research and pedagogical activity. The head of working and project group and the teaching staff conforms to the requirements set out in the Licensing Terms of Educational Activities of Educational Institutions in Ukraines
Material and technical support	The educational process is carried out in classrooms and laboratories equipped with all nessesary audio-visual equipment and the technical facilities.. Classes are held in 9 computer classes. They are equipped with

	licensed operating systems from Microsoft and application software packages from Microsoft, Autodesk, Intel, Delcam, Siemens, etc. The material and technical base of IT companies "NETCRACKER" and "AMC BRIDGE" is usedIn the educational process. Thouse companies equipped with 2 teaching and training centers at the department.
Information, learning and methodic provisions	The university has a high-tech library and information base, containing more than 3.1 million copies of more than 300 thousand titles in 28 languages. The online library contains over 90,000 full-text materials. The total number of seats in the reading rooms is about 1350 seats, there are virtual electronic reading rooms. Sumy State University electronic repositories contain over 70 thousand documents. There are special platforms OCW and MIX, which was developed at Sumy State University. They are used to provide remote access to teaching materials. These resources allow you to combine course materials, a Lectur`ED designer with the ability to collaborate on e-learning resources, e-library materials, repositories, links to external learning resources, and organize teacher-student communication conveniently according to the blended teaching model).
1.9 Academic mobility	
Internal academic mobility	It is determined by Decision of the Cabinet of Ministers of Ukraine from August 12, 2015 № 646 “About procedure of implementation the right to academic mobility”
International academic mobility	It is determined individually by agreement between SSU and other universities (in particular the University of Koblenz-Landau (Germany).

2. The Educational Programme Components List and Their Logical Sequence

2.1. The educational programme components list

Component Code	Components of the educational program (study courses, course papers, practical trainings, qualification works)	ECTS Credits	Final Assessment Form
1	2	3	4
COMPULSORY COMPONENTS			
General training cycle			
CC 1.	Foreign language	5	Test
Professional training cycle			
CC 2.	Software certification and Licensing	5	Examination
CC 3.	Introduction to Data Science	5	Test
CC 4.	Scientific research work	5	Test
CC 5.	Web-based Systems Design	5	Examination and course project
CC 6.	Programming for Mobile Devices	5	Examination
CC 7.	Object-oriented analysis and design	5	Test
CC 8.	Academic writing and Scientific Achievements Publications	5	Test
CC 9.	Customer Support Analysis	5	Test
CC 10.	Corporative information systems	5	Test and course project
Practical trainings			
CC 11.	Scientific research practice	5	Test
Attestation			
CC 12.	Master's thesis	10	Test
The total amount of compulsory components		**65**	
ELECTIVE COMPONENTS			
EC 1.	Elective general disciplines	10	Test
EC 2.	Elective Speciality disciplines	15	Test
The total amount of elective components:		**25**	
The total amount of educational programme:		**90**	

2.2. The structural-logical scheme of educational programme

Semester, the volume of workload in credits	Sequence of components acquisition in the study program
Semester I, 30 credits	CC 1, CC 2, CC 5, CC6, CC7, CC 8
Semester II, 30 credits	CC 9, CC 10, EC 1, EC 2
Semester III, 30 credits	CC 3, CC 4, CC 11, CC 12, EC1

3. Higher Education Applicants Certification Form

Certification of graduates of the educational program "Information Technology Design" in the specialty "122 Computer Science" is carried out in the form of public defense of the master's thesis. In case of successful defense, the student receives a state-standard document awarding a master's degree with the qualification of "Master of Computer Science" with a specialization in "Information Technology Design".

4. Compliance of programme competences and training components

Codes of programme competences and training components	CC 1.	CC 2.	CC 3.	CC 4.	CC 5.	CC 6.	CC 7.	CC 8.	CC 9.	CC 10.	CC 11.	CC 12.	EC 1.	EC 2
GC 1.	●			●				●			●	●	●	
GC 2.	●			●				●			●	●	●	
GC 3.				●				●			●	●	●	
GC 4.	●			●	●			●			●	●	●	
GC 5.		●		●	●	●	●		●		●	●	●	
GC 6.				●	●			●			●	●	●	
SSC 1.		●							●		●	●		●
SSC 2.			●								●	●		●
SSC 3.					●	●	●			●	●	●		●
SSC 4.									●		●	●		●
SSC 5.					●		●			●	●	●		●
SSC 6.					●		●			●	●	●		●
SSC 7.											●	●		●
SSC 8.									●		●	●		●
SSC 9.											●	●		●
SSC 10.											●	●		●
SSC 11.											●	●		●
SSC 12.											●	●		●

Примітка:

● – позначка, яка означає, що певна програмна компетентність забезпечується певним освітнім компонентом поточного рядка.

5. Compliance of programme competences of learning outcomes and training components

Codes of learning outcomes and training components	CC 1.	CC 2.	CC 3.	CC 4.	CC 5.	CC 6.	CC 7.	CC 8.	CC 9.	CC 10.	CC 11.	CC 12.	EC 1.	EC 2
LO 1.	●							●	●		●	●		
LO 2.	●			●				●			●	●		
LO 3.		●			●						●	●		●
LO 4.		●		●	●	●		●			●	●		●
LO 5.			●	●							●	●		●
LO 6.	●			●	●		●				●	●		
LO 7.				●	●					●	●	●		●
LO 8.				●	●	●	●	●			●	●	●	●
LO 9.				●				●			●	●		
LO 10.					●						●	●		●
LO 11.					●	●	●				●	●		●
LO 12.		●							●	●	●	●		●
LO 13.											●	●		●
LO 14.											●	●		●
LO 15.											●	●		●
LO 16.											●	●		●
LO 17.											●	●		●
LO 18.											●	●		●

Примітка:
• – позначка, яка означає, що певний програмний результат забезпечується освітнім компонентом поточного рядка.

Department Head of Computer Science _____ A. S. Dovbysh

Coordinator of the Master's Degree Program in Information Technologies of Designing _____ A. V. Marchenko

APPROVED:
Head of Organization and Methodological Department _____ _____