

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

**TERNOPIL VOLODYMYR HNATIUK
NATIONAL PEDAGOGICAL UNIVERSITY**

EDUCATIONAL AND PROFESSIONAL PROGRAM

**THE FIRST (BACHELOR) LEVEL OF HIGHER EDUCATION
IN SPECIALTY 014 SECONDARY EDUCATION (INFORMATICS)**

**THE FIELD OF KNOWLEDGE 01 EDUCATION / PEDAGOGY
QUALIFICATION: BACHELOR OF EDUCATION. TEACHER OF
INFORMATICS**

**CERTIFIED BY ACADEMIC COUNCIL
THE CHAIR OF ACADEMIC COUNCIL
SIGNATURE V. P. KRAVETS
(protocol no. 13 on June, 27, 2017)**

**Education program is adopted on August, 01, 2017
Order no. 220 on August, 30, 2017**

Ternopil, 2017

1. Profile of the educational program
IN SPECIALTY 014 SECONDARY EDUCATION
IN SUBJECT SPECIALTY 014 (SPECIALISE IN)
014.09 SECONDARY EDUCATION (INFORMATICS)

1 – General information	
Full name of higher educational institution and structural unit	Ternopil Volodymyr Hnatiuk National Pedagogical University, Faculty of Physics and Mathematics, Department of Informatics and its teaching methods
The degree of higher education and the name of the qualification in the language of the original	Bachelor Bachelor of education. Teacher of informatics
The official name of the educational program	Educational and professional program of preparation of applicants for higher education of the first (Bachelor) level in the field of knowledge 01 Education / Pedagogy, specialty 014 Secondary education, subject specialization 014.09 Secondary education (Informatics)
Type of diploma and the volume of the educational program	Bachelor's degree, unitary, 90 ECTS credits, the term of study is 3 years 10 months, during which the students of higher education must learn the discipline, perform course work, undergo practical training and certification
Cycle/Level of the program	(NQF - national qualifications framework) of Ukraine - level 6, FQ-EHEA - first cycle, EQF-LLL - level 6
Prerequisites	A person has the right to obtain a bachelor's degree provided that they have complete comprehensive secondary education.
Teaching languages	Ukrainian
The duration of the educational program	Certificate of accreditation of specialty: Series: ND-II, number: 2078369, date: March 15, 2016, expiration date: July 1, 2026
Internet address of the permanent description of the educational program	http://tnpu.edu.ua/

2 – The purpose of the educational program	
Ensuring the fundamental theoretical and practical training of bachelors for acquiring the ability to perform professional tasks and duties of research and innovation in the field of modern informatics and information technologies, pedagogy and methodology of secondary school, the ability to independent professional and scientific and pedagogical activities. Provide full-time education in computer science and information technology with broad access to employment, prepare students with a special interest in certain areas of information technology, in particular, to pay attention to the peculiarities of information systems and technologies, methodology and practice of e-learning. Bachelors get the necessary knowledge, skills and abilities for the functions of the developer of computing systems and computer programs, information technology specialist, administrator of computer training systems, computer software analytics, software and multimedia analytics, database designer, specialist the development and testing of software sufficient to work in the IT services of enterprises and organizations of various industries and forms of ownership.	
3 – Characteristics of the educational program	
Subject area (branch of knowledge, specialty, specialization)	Secondary school pedagogy and methods of teaching in high school, e-learning technologies; computer science and information technologies: programming technologies, operating systems, software tools for software systems development, computer simulation, system analysis of information objects, organization of databases and knowledge, modern Web technologies, cloud technologies; etc. (55:35:10). Branch of Knowledge 01 Education / Pedagogy, Specialty 014 Secondary education, Specialization 014.09 Secondary education (Informatics)
Orientation of the educational program	Professional The program includes in-depth basic training in computer science, humanitarian, psychological and pedagogical, special and scientific-practical training taking into account the current state of computer science, focuses on the actual specialization, within which further professional and scientific careers are possible: informatics (theoretical and applied), information and communication technologies in education, theory and methods of computer science education. The program is based on the thorough knowledge of the peculiarities of the field of information technology taking into account its current state, focuses on topical specialization, within which further professional and scientific careers are possible.

The main focus of the educational program	Higher education in the field of informatics and methodology of teaching computer science in conjunction with specialization - computer science.
Peculiarities of the program	The program provides for additional specialization, relevant practices and final certification.
4 – Eligibility of graduates for employment and further training	
Eligibility for employment	Field of activity of graduates: educational establishments, research organizations, IT services of state and non-state institutions. Primary positions and professional titles: specialist teacher, computer science consultant, mathematician engineer, programmer engineer, system administrator, IT specialist, specialist in processing socio-economic and environmental information, mathematical and 3D modeling, specialist in designing and the introduction of modern network technologies and distributed database tools, the head (assistant manager) of the enterprise (institution, organization).
Further training	Bachelor in specialty 014 Secondary education (Informatics) can continue education at the next educational-professional and educational-scientific levels: the master's degree, programs and projects for raising the level of skills in computer science (theoretical and applied).
5 – Teaching and evaluation	
Teaching and studying	Approaches: student-centered learning, problem-oriented learning, e-learning in the Moodle system, self-learning, research-based learning. Teaching takes place in the form of: lectures (including multimedia and interactive lectures), seminars, practical classes with solving problem situations, laboratory research works of nature, individual research tasks, independent work on the basis of electronic educational complexes, consultations on teachers.
Assessment	Oral and written exams, examinations and tests in the form of tests, current (modular) test control, tests, essays, defense of practice reports, defense of coursework, state certification.
6 – Program competencies	
Integral competency	Ability to solve complex specialized tasks and practical problems in the field of education and computer sciences, which involves the application of certain theories and methods of pedagogical and computer sciences and is characterized by complexity and uncertainty of the conditions.

General competencies	GC1 Analysis and synthesis. Ability to analyze and synthesize based on logical arguments and verified facts. GC2 Flexibility of thinking. The acquisition of a flexible way of thinking that allows you to understand and solve problems and problems, while maintaining a critical attitude towards sustainable scientific concepts. Openness to the application of knowledge and competences in a wide range of possible workplaces and everyday life. GC3 Group work. Ability to work in a team. Ability to conduct laboratory research in a group under the leadership of a leader, skills that demonstrate the ability to take into account strict discipline requirements, planning and time management. GC4 Communication skills. Ability to communicate effectively and to present complex, complex information in a concise form, both verbally and in writing, using information and communication technologies and related technical terms. GC5 Popularization Skills. Ability to hold an oral presentation and write an understandable article based on the results of the research, as well as on modern concepts in informatics for the general public (not specialists). Ability to communicate with non-specialists, applying teaching skills. GC6 Ethical settings. Compliance with ethical principles from the point of view of professional honesty, and in terms of understanding the possible impact of advances in computer science and information technology on the social sphere.
Professional competencies of the specialty	PC1 Deep knowledge and understanding. Ability to use informational technologies and laws of computer science in conjunction with mathematical instruments for the description of natural phenomena. Ability to analyze the processes of design, development of software complexes, databases, web applications, hardware of computer-information systems, computer networks in terms of fundamental, professional knowledge, as well as on the basis of appropriate mathematical methods. Ability to analyze and synthesize scientific, technical, scientific and

	general information. PC2 Problem Solving. The ability to formulate, analyze, and synthesize scientific problems at an abstract level by decomposing them into components that can be explored separately in their more or less important aspects. PC3 Modeling skills. Ability to build appropriate models of information phenomena, explore them for new findings and deepening understanding of these phenomena. PC4 Mathematical Skills. Ability to understand and skillfully use mathematical and numerical methods that are often used in computer sciences and information technologies. Ability to use professionally-specialized knowledge in the field of mathematical modeling of probability theory and mathematical statistics for statistical processing of experimental data and obtained results in the field of computer science and information technologies. PC5 Computer skills. Professional computer skills and information technology. Ability to develop and implement computer programs (technologies) and use existing ones. Ability to design software complexes, databases, web applications with the help of appropriate software and computer hardware, to set up and administer computer networks, including computer training networks, to determine the methodology for finding an effective technical solution. PC6 Developed communication skills. Ability to communicate with colleagues in the field on scientific achievements at both the general level and at the level of specialists, the ability to make oral and written reports, discuss scientific topics in native and English languages. Ability to effectively use in practice the various theories in the field of communication. Ability to understand the ways of practical use of communication skills, effectively applying communication concepts. Understanding the factors that have a positive or negative impact on communication, and the ability to determine or take into account these factors in specific communication
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	situations. PC7 Research skills. Ability to conduct research in the field of theory and teaching methods, computer science and information technologies, to formulate (in the form of a presentation or a report) new hypotheses and scientific tasks in the field of informatics, choose the appropriate directions and appropriate methods for their solution, taking into account attention available resources. Ability to conduct experiments, as well as describe, analyze, process and critically evaluate experimental data. PC8 Ability to study. Ability to take on new knowledge in the field of informatics and integrate it with existing ones. Ability to orientate at the level of a specialist in a certain narrow area of computer science, which lies outside the chosen specialization. Ability to learn new areas in the field of computer sciences and information technologies by using independent learning, using the acquired mathematical, basic and professional knowledge. Ability to perform literary search of sources related to professional activity, ability to critically evaluate them, based on professional knowledge. Ability to engage in self-education. Erudition in Computer Science and Information PC9 Technology. Ability to describe a wide range of maintenance tasks and designing software complexes, databases, web applications, computer networks, based on the theory and knowledge of information technology; this ability is based on a deep knowledge and understanding of a wide range of theories and areas in the field of computer science and information technology. Ability to logical and algorithmic thinking in the process of developing mathematical and software information systems. Ability to use methods of observation, description, identification, classification of objects of informatization. PC10 Teaching skills. Ability to effectively apply the basic pedagogical concepts, to analyze the methods by which the teaching methods are used in practice. Ability to be the mentor of junior colleagues in
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	improving the teaching skills. Be able to effectively combine different technologies and learning tools (including e-learning, distance learning).
7 – Program outcomes of studying	
	Knowledge and skills from the domain: POS1 thorough knowledge of various pedagogical theories and technologies, which will allow graduates to successfully confer specialist disciplines in educational institutions and critically analyze literature in the field of teaching methods; POS2 ability to use existing ones and to design and implement new e-learning systems and approaches; be able to organize and manage the e-learning process; POS3 sufficient knowledge in the field of educational measurement in order to apply monitoring and statistical technologies, to successfully conduct scientific research under the supervision of a mentor in the interests of the customer; POS4 ability to understand and analyze scientific publications of the chosen specialization, to keep track of the latest achievements in specialization; POS5 be able to search scientific sources that belong to the sphere of professional activity; POS6 Awareness of different theories in the field of communications; POS7 thorough mathematical preparation in the field of discrete mathematics, computational mathematics, algorithms and complexity theory, probability theory; POS9 solid knowledge of languages and programming paradigms, programming technologies, operating systems; POS10 solid knowledge and ability to use software tools for development of software systems; POS11 profound knowledge in the field of system research, system modeling, system analysis of objects of information; POS12 knowledge of modern theories of organization of databases and knowledge, methods and technologies of development; POS13 knowledge of the fundamentals of the

	architecture of computers and computer networks, the ability to apply them in the process of substantiating the technical support of IP; POS14 knowledge of distributed systems technologies; POS15 profound knowledge of Web-technologies. Cognitive Skills and Objectives: POS16 thorough training on theoretical, methodological and algorithmic foundations of information technologies for the use of mathematical apparatus in solving applied and scientific problems in the field of information systems and technologies; POS17 thorough preparation in the field of programming, possession of algorithmic thinking, methods of software engineering for software implementation; POS18 ability to apply the principles of the organization and functioning of hardware of modern information processing systems for various purposes; POS19 ability to design activities in the professional sphere, the ability to build and use models for describing objects and processes, to carry out their qualitative analysis; POS20 modern understanding of the principles of structural and functional management of enterprise management, working in the field of computer science and information technologies; POS21 modern understanding of technological approaches for the adoption and implementation of innovative management solutions; POS22 ability to commercialize the results of intellectual development with the provision of owner rights; POS23 the ability to perform monitoring and comprehensive assessment of the effectiveness of the innovative activity of the enterprise working in the field of computer science and information technologies. Practical skills in the subject area (PRN3): POS24 ability to mathematical and logical thinking, knowledge of the basic concepts, ideas and methods of fundamental mathematics and their ability to use
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	them when solving specific problems; POS25 knowledge of discrete structures and the ability to apply modern methods of discrete mathematics during the analysis, synthesis and design of information systems of various nature; POS26 knowledge of the laws of random phenomena and the ability to apply probabilistic and statistical methods for solving professional problems; POS27 knowledge of modern methods of constructing and analyzing effective algorithms and their ability to implement them in specific applications; POS28 knowledge of theoretical peculiarities of numerical methods, possibilities of their adaptation to engineering tasks, ability to use numerical methods when solving various application problems; POS29 knowledge of the principles of structural programming, modern procedural-oriented languages, basic data structures and their ability to apply during program implementation of algorithms of professional tasks; POS30 ability to object-oriented thinking, knowledge of object-oriented programming languages and the ability to apply object-oriented approach when designing complex software systems; POS31 knowledge of modern technologies and tools for developing software systems, their ability to apply at all stages of the life cycle; POS32 knowledge of the general principles of the organization and operation of operating systems, the ability to develop elements of system software; POS33 knowledge of modern theories of organization of databases and knowledge, methods and technologies of their development, ability to design logical and physical models of databases and requests for them; POS34 knowledge and skills in distributed database development technologies, 3D modeling, modern information and communication technologies in order to successfully conduct scientific research under the supervision of a mentor; POS35 knowledge of server technologies for creating
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	Web applications, the ability to apply methods and tools for their design; POS36 knowledge of the principles, methods and algorithms of computer graphics, the ability to apply them during the development of graphical interfaces of human interaction with the computer; POS37 knowledge of the concepts of data warehouses, their operational analytical processing and intellectual analysis; POS38 knowledge of the principles of team work; Ability to work in a team and apply project management system software. General skills and abilities (PRN4): POS39 ability to create a stable outlook, pluralism, political consciousness and culture; correct perception of modern problems of development of society, human being, spiritual culture; POS40 ability to take an active life and civic stand, share social responsibility for the activity of the enterprise working in the field of computer sciences and information technologies; POS41 ability to communicate effectively, healthy lifestyle, learning new knowledge, self-improvement; POS42 ability to identify new possibilities for designing and maintaining software complexes, databases, web applications, equipment of computer systems and computer networks and new types of economic activity (business) and to ensure their implementation in conditions of high dynamism and uncertainty; POS43 to understand the natural and scientific basis of physical education, the basis of a healthy lifestyle; POS44 to understand the peculiarities of organization and management of educational activities in secondary school.
8 – Resource support	
Personnel support	95.3% of scientific and pedagogical workers involved in teaching subjects of discipline in the specialty 014 Secondary education in specialization 122 Computer sciences, have scientific degrees and academic titles.
Material and technical support	The educational and material base of the faculty consists of auditoriums, educational laboratories (equipped with

	modern computer facilities and software), methodical offices, which are located in buildings that meet the existing sanitary-technical and fire regulations.
Information and studying and methodological support	Using the electronic resources server based on LMS Moodle and resources of the library of Ternopil Volodymyr Hnatiuk National Pedagogical University, providing access to electronic resources of other libraries and scientific institutions on a contractual basis, use of author's development of scientific and pedagogical workers, namely textbooks and textbooks with stamp Ministry of Education of Ukraine; textbooks and manuals recommended by the university's academic council.
9 – Academic mobility	
National Credit Mobility	On the basis of bilateral agreements between Ternopil Volodymyr Hnatiuk National Pedagogical University and higher educational institutions of Ukraine
International Credit Mobility	On the basis of bilateral agreements between Ternopil Volodymyr Hnatiuk National Pedagogical University and higher educational institutions of foreign partner countries
Studying of foreign applicants for higher education	Probably after studying the course of the Ukrainian language

1. 2. List of components of the educational and professional program and their logical consistency

1.1. 2.1. List of components of educational and professional program

Code	Components of the educational program (educational disciplines, course projects (work), practice, qualification work)	The amount of credits	Assessment
OBJECTIVE COMPONENTS OF EDUCATIONAL PROGRAM			
Cycle of disciplines of general preparation			
OC1.01	History of Ukrainian statehood and national culture	5	Exam
OC1.02	Human and the environment	3	Credit
OC1.03	Foreign Language	7	Exam
OC1.04	Ukrainian language (in professional direction)	3	Exam
OC1.05	Philosophy	3	Exam
OC1.06	Life safety, civil protection and labor protection	4	Credit
OC1.07	Physical education (extracurricular discipline)	8	Credit
Discipline cycle of professional training			
OC1.01	Mathematical analysis	15	Exam
OC1.02	Algebra and geometry	8	Exam
OC1.03	Physics	5	Credit
OC1.04	Probability theory and mathematical statistics	3	Credit
OC1.05	Discrete Math	7	Exam
OC1.06	Databases and Information Systems	5	Credit
OC1.07	Mathematical logic	3	Credit
OC1.08	Methods of calculation	5	Exam
OC1.09	Psychology	6	Exam
OC1.10	Pedagogy	10	Exam
OC1.11	Methodology of teaching computer science	6	Exam
OC1.12	Computer networks and the Internet	6	Exam
OC1.13	Programming	16	Exam
OC1.14	Computer Architecture	4	Credit
SELECTIVE COMPONENTS OF EDUCATIONAL PROGRAM			
Discipline of an independent choice of an educational institution			
SC2.1.01	Economy	3	Credit
SC2.1.02	Politolology	3	Credit
SC2.1.01	Educational technologies	3	Credit
SC2.1.02	Methodology of educational work in summer health camps	1,5	Credit
SC2.1.03	Operating Systems	6	Exam
SC2.1.04	Administration of computer networks	6	Exam
SC2.1.05	Web programming	6	Exam

Code	Components of the educational program (educational disciplines, course projects (work), practice, qualification work)	The amount of credits	Assessment
SC2.1.06	Methodology of teaching mathematics	3	Exam
SC2.1.07	Elementary mathematics	4	Credit
SC2.1.08	Software COP	8	Credit
SC2.1.09	Fundamentals of the theory of graphs	3	Credit
SC2.1.10	Differential equations	3	Credit
SC2.1.11	Methods of optimization and operations research	6	Exam
SC2.1.12	Computer simulation	5	Credit
SC2.1.13	Basics of microelectronics	3	Credit
	Student's free choice discipline		
SC2.2.01	Analysis of algorithms	4	Credit
SC2.2.02	Multimedia technologies	3	Credit
SC2.2.03	Computer Graphics	3	Exam
SC2.2.04	Special Course "Scripting Programming Languages"	3	Credit
SC2.2.05	Special Course "Programming for Mobile Platforms"	3	Credit
SC2.2.06	Theory of information and coding	3	Credit
SC2.2.07	Workflow technology	3	Credit
SC2.2.08	Modern programming technologies	3	Exam
	Practical training		
OC2.3.01	Computer practice	4	Credit
OC2.3.02	Coursework	6	Credit
OC2.3.03	Production (pedagogical) practice in summer health facilities	4,5	Credit
OC2.3.04	Pedagogical practice	12	Credit
OC2.3.05	Design and technological practice	3	Credit
Total		88,5	
GENERAL		240	

3. Form of certification of higher education applicants

The certification of higher education graduates is to establish the level and extent of the knowledge, skills and competences of the higher education student who is studying for the educational program, the requirements of higher education standards.

Attestation of applicants for higher education specialty 014 Secondary education (by subject specialization 014.09 Secondary education (Informatics) is conducted in the form of a state examination and ends with the issuance of the prescribed standard certificate of awarding the master's degree with qualification: Bachelor of Education, Informatics teacher, teacher of mathematics. computer software specialist in information technology.