

**Profile of the educational program
in the specialty 152 "Metrology and information-measuring technology"
educational program "Mechatronics and intelligent information systems"**

1 - General information	
Full name of the higher educational institution and structural subdivision	Ternopil Ivan Puluj National University Department of Instruments and Control and Measuring Systems
Degree of higher education and title of qualification in the original language	Bachelor of Metrology and Information and Measurement Engineering
The official name of the educational program	Mechatronics and intelligent information systems
Type of diploma and scope of educational program	Bachelor's degree, single; 240 ECTS credits, term of study - 3 years 10 months, for bachelors with a standard term of study; 120 ECTS credits, term of study - 1 year 10 months, for bachelors with reduced term of study; At least 50% of the educational program is allocated to provide general and special (professional) competencies in this specialty. The internship must be at least 4 ECTS credits.
Availability of accreditation	Accreditation Commission of Ukraine, certificate of accreditation of ND № 2087404 (date of issue of the certificate 02.08.2017) Validity: Till 01.07 2024
Cycle / level	NRC of Ukraine - level 6, FQ-EHEA - first cycle, EQF-LLL - level 6
Prerequisites	Availability - complete general secondary education - for bachelors with a standard term of study, - degree of junior specialist (junior bachelor) - for bachelors with reduced term of study
Language (s) of instruction	Ukrainian
Term of the educational program	Introduced for the first time in 2021, may not exceed the accreditation period 01.07 2024.
Internet address of the permanent post of the description of the educational program	http://tntu.edu.ua/?p=uk/structure/faculties

2 - The purpose of the educational program

Formation of the personality of a specialist capable of solving complex specialized problems and practical problems of mechatronics and intelligent information systems, characterized by complexity and uncertainty of conditions.

3 - Characteristics of the educational program

Subject area	<p>Field of knowledge 15 "Automation and instrumentation" Specialty 152 "Metrology and information-measuring technology" Educational program "Mechatronics and intelligent information systems" <i>Object:</i> technical, software, mathematical, information support of mechatronic and intelligent information systems, principles of construction of mechatronic modules of motion, precision mechanics, electronics and informatics of measuring instruments and their use. Mechatronic modules of motion, precision mechanics, electronics and informatics of measuring instruments and their use. <i>Objectives of education:</i> training of specialists capable of complex solutions to the design of mechatronic devices, electronic sensors, built-in electronic control circuit, especially with the use of micro- and nanosystem technology (circuits in reconfigured crystals (FPGA, FPGA)), microcontrollers, SoC), MEMS (mechanical-electrical-measuring systems in the crystal), as well as the development of algorithms and software for data management and processing and construction of intelligent information systems. <i>Theoretical content of the subject area.</i> Concepts and principles of mechatronic modules and intelligent information systems. <i>Methods, techniques and technologies.</i> Methods of designing control systems using classical and modern methods, use modern software in solving problems of synthesis and analysis of control of mechatronic systems. <i>Instruments and equipment:</i> modern tools for mechatronic systems control, measuring equipment, tools and equipment for the manufacture and configuration of mechatronic modules using intelligent information systems.</p>
Orientation of the educational program	Educational and professional for bachelor's degree training
The main focus of the educational program and specialization	Emphasis is placed on the formation and development of professional competencies in the field of instrumentation, related to mechatronic and intelligent information systems; study of theoretical and methodological provisions, organizational and practical tools.

Features of the program	The program consists in deepening theoretical, special practical and research training, summarizing the results of research, design decisions and is performed in an active research environment aimed at the design, operation and maintenance of instrument systems, equipment equipped with mechatronic means and intelligent information systems. complexes used in light industry. Regular updating to take into account the trends of progressive development of mechatronic modules and intelligent information systems. Is mobile under the program of academic mobility "Double diploma"
4 - Suitability of graduates to employment and further training	
Suitability for employment	Main positions according to DK 003: 2010: 2144.2 – constructor engineer (electronics), 2145.2 – equipment complete engineer, 3115 – equipment maintenance and repair technicians 3119 – technical documentation technician, 3119 – debugging and testing technicians, 3121 – technician-programmer. Key positions by International Standard Classification of Occupations 2008 (ISCO-08): 2141 - Industrial and production engineers, 2144 - Mechanical engineers, 2152 - Electronics engineers, 2512 - Software developers, 3113 - Electrical engineering technicians.
Further training	Opportunity to study for programs: 7 levels of the NRC of Ukraine, the second cycle FQ-EHEA, level 7 EQF-LLL
5 - Teaching and assessment	
Teaching and learning	Student-centered learning, self-study, problem-oriented learning, interactive and distance learning, research-based learning, participation in specially designed individual choice courses, participation in specialized seminars, professional discussions, writing scientific texts and preparing publications ,Teaching is carried out in the form of: lectures, seminars and practical classes, individual calculation work, course work.
Evaluation	The educational process of the university uses preliminary (zero, incoming), current (operational, boundary), final (semester, certification) and deferred levels of control, the essence and form of which are regulated by the Regulations on the educational process at Ternopil National Technical University named after Ivan Pulyuy. approved by the decision of the Academic Council 25.09.2020
6 - Program competencies	
Integral competence	Ability to solve complex specialized problems and practical problems of mechatronics and intelligent information systems,

	<p>which are characterized by complex and uncertain conditions, which involves research and / or innovation in the development of mechatronic and intelligent systems.</p>
<p>General Competences (GQ)</p>	<p>GQ 01. Ability to apply professional knowledge and skills in practical situations.</p> <p>GQ 02. Ability to communicate in the state language both orally and in writing.</p> <p>GQ 03. Ability to communicate in a foreign language.</p> <p>GQ 04. Skills in the use of information and communication technologies.</p> <p>GQ 05. Ability to search, process and analyze information from various sources.</p> <p>GQ 06. Safe activities skills.</p> <p>GQ 07. The desire to preserve the environment.</p> <p>GQ 08. Ability to learn and master modern knowledge.</p> <p>GQ 09. Ability to be critical and self-critical.</p> <p>GQ 10. Ability to evaluate and ensure the quality of work performed.</p> <p>GQ 11. Ability to exercise one's rights and responsibilities as a member of society, to realize the values of civil (free democratic) society and the need for its sustainable development, the rule of law, human and civil rights and freedoms in Ukraine;</p> <p>GQ 12. Ability to preserve and increase moral, cultural, scientific values and achievements of society based on understanding the history and patterns of development of the subject area, its place in the general system of knowledge about nature and society and in the development of society, techniques and technologies. active recreation and healthy living.</p>
<p>Professional competencies of the specialty (FC)</p>	<p>FC1. Ability to analyze the constituent elements of mechatronic nodes, to operate on the components of error / uncertainty in accordance with measurement models.</p> <p>FC2. Ability to design mechatronic and intelligent information systems, information and measuring equipment and describe the principle of their operation.</p> <p>FC3. Ability, based on the measurement problem, to explain and describe the principles of construction of computing components of mechatronic technology.</p> <p>FC4. Ability to use modern engineering and mathematical packages to create models of mechatronic nodes.</p> <p>FC5. Ability to apply standard calculation methods in the design of mechatronic modules.</p> <p>FC6. Ability to perform technical operations in testing, verification, calibration and other operations of mechatronic systems.</p>

	<p>FC7. Ability to debug and test certain types of mechatronic units of devices in the laboratory and on site.</p> <p>FC8. Ability to develop regulatory and methodological framework for quality assurance and technical regulation and to develop scientific and technical principles of quality management systems and certification tests of mechatronic systems.</p>
7 - Program learning outcomes	
<p>Regulatory component Selective component</p>	<p>PPH1. Be able to find sound solutions when compiling structural, functional and schematic diagrams of mechatronics.</p> <p>PPH2. Know and understand the basic concepts of mechatronic system, theory of intelligent information systems, mathematical and computer modeling.</p> <p>PPH3. Understand the broad interdisciplinary context of the specialty, its place in the theory of knowledge and evaluation of objects and phenomena.</p> <p>PPH4. Be able to choose, based on the technical problem, a standardized method of evaluation and measurement control of the characteristic properties of products and parameters of technological processes.</p> <p>PPH5. Be able to use the principles and methods of reproduction of reference quantities in the construction of reference tools of mechatronics.</p> <p>PPH6. Be able to use information technology in the development of software for processing measurement information.</p> <p>PPH7. Be able to explain and describe the principles of construction of computing subsystems and modules used in solving measurement problems.</p> <p>PPH8. Understand the application of methods and techniques of analysis, design and research, as well as the limitations of their use.</p> <p>PPH9. Know the standards for the development of mechatronic modules, measuring equipment and metrological support.</p> <p>PPH10. Know and understand modern theoretical and experimental research methods to assess the accuracy of manufacturing mechatronic modules.</p> <p>PPH11. Know and be able to apply modern information technologies to solve problems in the field of mechatronics and intelligent information systems.</p> <p>PPH12. Know and understand the subject area, its history and place in the sustainable development of technology, in the general system of knowledge about nature and society.</p>

	<p>ПІРН13. Be able to take into account social, environmental, ethical, economic aspects, the requirements of labor protection, industrial sanitation and fire safety in the formation of technical solutions. Be able to use different types and forms of physical activity for active recreation and healthy living.</p> <p>ПІРН14. Be able to use in production and social activities the fundamental concepts and categories of state formation to substantiate their own worldviews and political beliefs, taking into account the socio-political history of Ukraine, legal principles and ethical norms.</p> <p>ПІРН15. Fluent in the terminological base of the specialty, understand the scientific and technical documentation of the state metrological system of Ukraine, international and interstate recommendations and guidelines for the specialty.</p>
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