

Programme specification (Master)
«SOFTWARE ENGINEERING»

1 – General information

Higher educational establishment	Ternopil I.Pulu'y national technical university
Full name of qualification	Master (Computer systems analyst)
Programme official name	Software Engineering
Тип диплому та обсяг освітньої програми	Master's Diploma, 90 credits ECTS, duration of study – 1-1,5 year(s)
Accreditation	Accreditation commission of Ukraine (National agency of higher education quality assurance)
Cycle/Level	
Requirements	Full general secondary education or professional training. Based on competition.
Language of study	Ukrainian
Basic concepts and their definitions	Basic concepts and their definitions are used in the programme according to the higher education standards on the specialism “Software engineering”

2 – Programme purpose

	Provide theoretical knowledge and practical skills necessary for successful performance of professional duties on specialism “Software engineering” and prepare students for further study on the chosen specialty
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3 – Programme characteristics

Subject-matter discipline	“Software engineering” - cycle of general training: cycle of professional training: cycle of practical training
Programme orientation	Educational-professional programme. It is based on generally accepted statements and results in software developments and testing; it is oriented on actual specializations for further possible professional and scientific carrier: software design, including requirements analysis, modelling, software design and architecture choice, perfect code writing, verification, testing, software evolution, software projects management and work in programmers teams
Programme focus and specialization. Peculiar and distinctive features.	It is focused on theoretical and practical skills of software design, including requirements analysis, simulation, architecture choice and software design, perfect code writing, verification, testing, software evolution, software projects management and work

	<p>teams of programmers.</p> <p>Key words: <i>Requirements Analysis, Verification, Validation, Requirement, User Requirements, Software Construction, needs, Software Engineering, Software, Software Requirements, Software Product, Software Design, Architectural Design, Top-Level Design, Software Detailed Design, System Requirements, Specification, System Requirements, Software Requirements Specification – SRS, Software Testing</i></p>
4 – Employment and further study	
Employment	Graduates may work at enterprises, production and scientific-production amalgamations, scientific-research and design organizations, in state and bank establishments, information centers as project manager of software development, software system architect, programmer, expert in software testing, researcher
Further study	Post-graduate courses are possible
5 – Teaching and rating	
Teaching and study	Educational process involves lectures, including those with multimedia and other technical facilities use; laboratory works; practical classes; individual classes; self-study using textbooks, manuals, lectures notes and Internet; tutorials, course papers and projects; Master’s diploma writing
Rating	Current tests and questionnaires, laboratory reports; oral presentations; final tests on each module; rector’s test; exams in the written or oral form; course papers and projects estimation; Master’s diploma project defence.
6 – Programme competence	
Integral competence	Possessing sound knowledge and practical skills in complex software systems design, mastering methods of software engineering and computing, object-oriented technologies of design and programming. Ability to solve complex specific tasks and practical problems in the professional activity in the field of software development and testing or in the studying process, involving modern methods and technologies use in top-level software products development, using: object-oriented principles of design and programming (<i>C/C++</i> , <i>Java/J2EE</i> , <i>C#/.Net</i>), hardware and development (<i>Visual Studio</i> , <i>Eclipse</i> , <i>NetBeans</i>), databases, interplatform use. The focus is made on software design theory and practical experience, including requirements analysis, modeling, software design and architecture choice,

	perfect code writing, verification, testing, software evolution, software projects management and work in teams of programmers
General competence	1) knowledge of main conceptions of philosophy, psychology, pedagogics assisting general culture development and personal socialization, inclination to ethic valuables, knowledge of national history, economy and law, comprehension of causal-consequential links of society development and a skill of their use in professional and social activity;
	2) modern notions of engineering requirements to software;
	3) modern notions of software structure and architecture, methods of software design;
	4)) modern notions of information models and systems, relational and distributed databases, query languages to databases;
	5) ability to speak and write mother tongue;
	6) speaking foreign language(s);
	7) a skill in scientific research;
	8 comprehension of necessary keeping to rules and requirements meeting of labor protection and production sanitary;
	9) ability to use professional knowledge in the field of general educational disciplines at professional tasks solving, mathematical models building;
	10) ability to convince his/her colleagues in the right decision he/she has made, a skill of his/her position substantiating.
Special (professional) competence	1) ability of modeling different aspects of the system, for which software is being developed;
	2) ability to design architecture components of software products;
	3) mastering the fundamentals of software design;
	4) mastering the fundamentals of object-oriented programming methods and technologies;
	5) ability to take part in database design and implementation;
	6) mastering the fundamentals of system analysis methods and technologies;
	7) typical processes of software engineering, ability to introduce and manage them;
	8) software verification and validation;
	9) ability to execute records (manuals) for software projects;;
	10) main knowledge of modern standards and processes of software quality management.
7 – Programme learning outcomes	
Knowledge	- sound training in the field of programming, possessing algorithmic thinking, mastering software engineering methods to introduce software taking into account the requirements on its

	<p>quality, reliability, production characteristics;</p> <ul style="list-style-type: none"> - knowledge of standards, methods and aids of life cycle management of information systems, IT products and services; mastering the software development technology according to customer requirements and restrictions; - ability to design in the professional activity, a skill to build and use models for describing objects and processes, to make their analysis.
Skills	<ul style="list-style-type: none"> -be well-trained to develop new mathematical models, effective algorithms and methods of information systems and technologies functions implementation in applied fields, including artificial intelligence methods and systems development; - knowledge of standards, methods and aids of life cycle management of information systems, IT products and services; - mastering the software development technology according to customer requirements and restrictions; - a skill in using IT standards and specifications which determine the capabilities, dynamics, protocols of interaction, and also other characteristics of IT systems, products and services.
Communication	<ul style="list-style-type: none"> - ability to communicate, including oral and written communication in Ukrainian and one of foreign languages (English, German, French); - ability to use various methods, namely IT, for effective communication at social and professional levels
Independence and responsibility	<ul style="list-style-type: none"> - be able to adopt to new situations and make decisions; - be able to realize the importance of study during all life and to advance the obtained professional knowledge and to gain new ones; - ability to be responsible in his/her work and achieve the aim keeping to professional ethics requirements.
8 – Resources supporting of the programme implementation	
Staffing features	More than 73% of teaching staff involved in profession-oriented courses are awarded with the Degree in specialty
Material and equipment features	<p>Educational processes is supported by all necessary equipment which meets modern requirements of information component rise in teaching and testing. All classrooms of the software engineering department are computerized that allows to increase the efficiency of training specialists and guarantee the early computer equipment mastering.</p> <p>Modern material and equipment use, specialized laboratories (laboratory of object-oriented programming and software engineering, software design, verification and testing laboratory, program management, embedded systems and</p>

	STMicroelectronics technologies laboratory, laboratory of software projects management (joined laboratory of TNTU and French software company Open Group), university classrooms.
Information and methodological support features	The essential component of educational process is e-learning (virtual education environment) carried out through the Centre of e-learning and Center of IT of TNTU, a number of IT-labs and programmes of leading world software companies (Academy CISCO, Microsoft IT Academy, SUN Microsystems IT Academy etc.) and author's developments of the staff
9 – Programme main components	
List of educational components (disciplines, internship programs, course and qualification papers)	Compliance matrices of the Programme competence with the courses and curricula are given in the Appendices.
10 – Academic mobility (is subject to the statement KMY № 579 „About approval of Statement concerning right for academic mobility enjoyment order” of August 12, 2015)	
National credit mobility	Based on mutual agreements between TNTU and technical universities of Ukraine
International credit mobility	As part of program EC Erasmus+ based on mutual agreements between TNTU and educational establishments of countries-partners.
Teaching foreigners	Possible after Ukrainian language course